



United States Environmental Protection Agency

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Region 10, Air & Radiation Division
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Seattle, Washington 98101

Technical Support Document

Tribal Minor New Source Review Permit

Permittee: Empire Lumber Company

Source: Empire Lumber Company dba Kamiah Mills

Location: Railroad Street and Highway 12 | Kamiah, Idaho 83536 | Nez Perce Reservation

Source Technical Contact: David Klau | (509) 534-0266 | Dak2@empirelumber.com

Source ID #: 16-061-00002

Permit #: R10TNSR03000

Pursuant to the provisions of Clean Air Act (CAA) sections 110(a) and 301(d) and the Code of Federal Regulations (CFR) title 40, section 49.158, the United States Environmental Protection Agency Region 10 (EPA) is issuing a synthetic minor permit in Indian Country to the Empire Lumber Company (“permittee” or “Empire”) for the Empire Lumber Company dba Kamiah Mills (“Source”), located in Kamiah, Idaho. This permit places enforceable restrictions on the potential to emit (PTE) of the source’s existing operations.

This Technical Support Document (TSD) provides the EPA’s analysis of the application and describes the equipment that is authorized to be operated, and the permit conditions that are included in the synthetic minor permit.

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Abbreviations, Acronyms and Symbols

@	at
°F	degrees Fahrenheit
#	number
%	percent
Δp	pressure drop
ASTM	American Society for Testing and Materials
CAA	Clean Air Act [42 U.S.C. § 7401, <i>et seq.</i>]
CFR	Code of Federal Regulations
CO	Carbon Monoxide
dba	doing business as
dscf	dry standard cubic foot
EAB	Environmental Appeals Board
EPA	U. S. Environmental Protection Agency, Region 10
EF	Emission Factor
EJ	Environmental Justice
ESA	Endangered Species Act
EU	Emission Unit
Facility	Empire Lumber Company dba Kamiah Mills located at Railroad Street and Highway 12 in Kamiah, Idaho
FARR	Federal Air Rules for Reservations
Fd	Dry F factor from EPA Reference Method 19
FD	Forced Draft
FIP	Federal Implementation Plan
FHISOR	Fuel Heat Input to Steam Output Ratio
FR	Federal Register
ft ³	cubic feet
gal	gallon
gr	grains
H ₂ O	Water
HAP	Hazardous Air Pollutant
hr	hour
ID	Identification Number
lb	pound
MACT	Maximum Achievable Control Technology
max	maximum
mbf	one thousand board feet
MFA	Miscellaneous Fugitive Activity
min	minimum
mmBtu	Million British Thermal Units
MACT	Maximum Achievable Control Technology
MNFA	Miscellaneous Non Fugitive Activity
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO _x	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
O ₂	oxygen

O&M	Operation and Maintenance
odt	oven-dried ton
Operator	Empire Lumber Company
Permittee	Empire Lumber Company
PM	Particulate Matter
PM2.5	Particulate Matter less than 2.5 microns in diameter
PM10	Particulate Matter less than 10 microns in diameter
ppmdv	parts per million by volume, dry basis
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
PTE	Potential to Emit
R2	Coefficient of Determination
RAP	Regulated Air Pollutant for NSR
Source	Empire Lumber Company dba Kamiah Mills
SO2	Sulfur Dioxide
tpy	Tons per year
VOC	Volatile Organic Compounds
WRC&PMCS	Wood Residue Capture and Pneumatic Material Conveyance Systems

1. Authority

The CAA provides the EPA with broad authority to protect air resources throughout the nation, including air resources in Indian country. Title 40 of the Code of Federal Regulations, 49.151-165, establish a federal new source review program in Indian Country that, among other things, establishes a mechanism for otherwise major sources (including major sources of hazardous air pollutants) to voluntarily accept restrictions on potential to emit to become synthetic minor sources pursuant to 40 CFR 49.158. In 2011, the EPA established the Tribal Minor New Source Review (NSR) Program as part of a FIP under the CAA for Indian country, through the Tribal NSR Rule.¹ The EPA is issuing this permit under the Tribal Minor NSR Program.

2. Tribal Minor NSR Program Requirements

The Tribal Minor NSR Program (40 CFR 49.151-165) is applicable to owners and operators of sources located, or planning to locate, in Indian reservations where no EPA-approved tribal air permit program is in place, and in other areas of Indian country where no EPA-approved tribal air permit program is in place and where an Indian tribe or the EPA has demonstrated that the tribe has jurisdiction.² The Source in this permitting action is located on the Nez Perce Reservation and there is no EPA-approved tribal CAA permitting program in place for this area. The Tribal Minor NSR Program allows existing major sources in Indian country to apply for a synthetic minor source permit to limit their PTE below title V and NSR major source permitting thresholds. *See* 40 CFR 49.158. Restrictions on the PTE of a synthetic minor source are required to be enforceable as a practicable matter, as defined in 40 CFR 49.152.

3. Source and Permit Information

3.1 Source and Area Description

Table 3-1: Source Contact Information

Company Name	Empire Lumber Company
Company Contact Name	David Klaue, President
Mailing Address	PO Box 11988, Spokane, WA 99211
Plant Name	Empire Lumber Company dba Kamiah Mills
Plant Address	Railroad Street and Highway 12, Kamiah, Idaho 83536
Plant Contact	Dan Musgrave, Maintenance Supervisor
Plant Telephone	(208) 935-2536 Ext. 31

The facility is located along Railroad Street near the intersection of State Highway No. 12 in Kamiah, Idaho in the southeast quadrant of the Nez Perce Reservation. The facility is located within the exterior boundaries of the 1863 Nez Perce Reservation and is in Indian Country.

Figure 3-1 shows the map location of the facility and its location in the town of Kamiah within Lewis County, Idaho. Figure 3-2 shows an aerial photograph of the facility.

¹ 76 FR 38748 (July 1, 2011) (codified at 40 CFR part 49).

² See 40 CFR 49.151(c)(1). "Indian country" is defined at 49.152(d).

Figure 3-1: Location Map

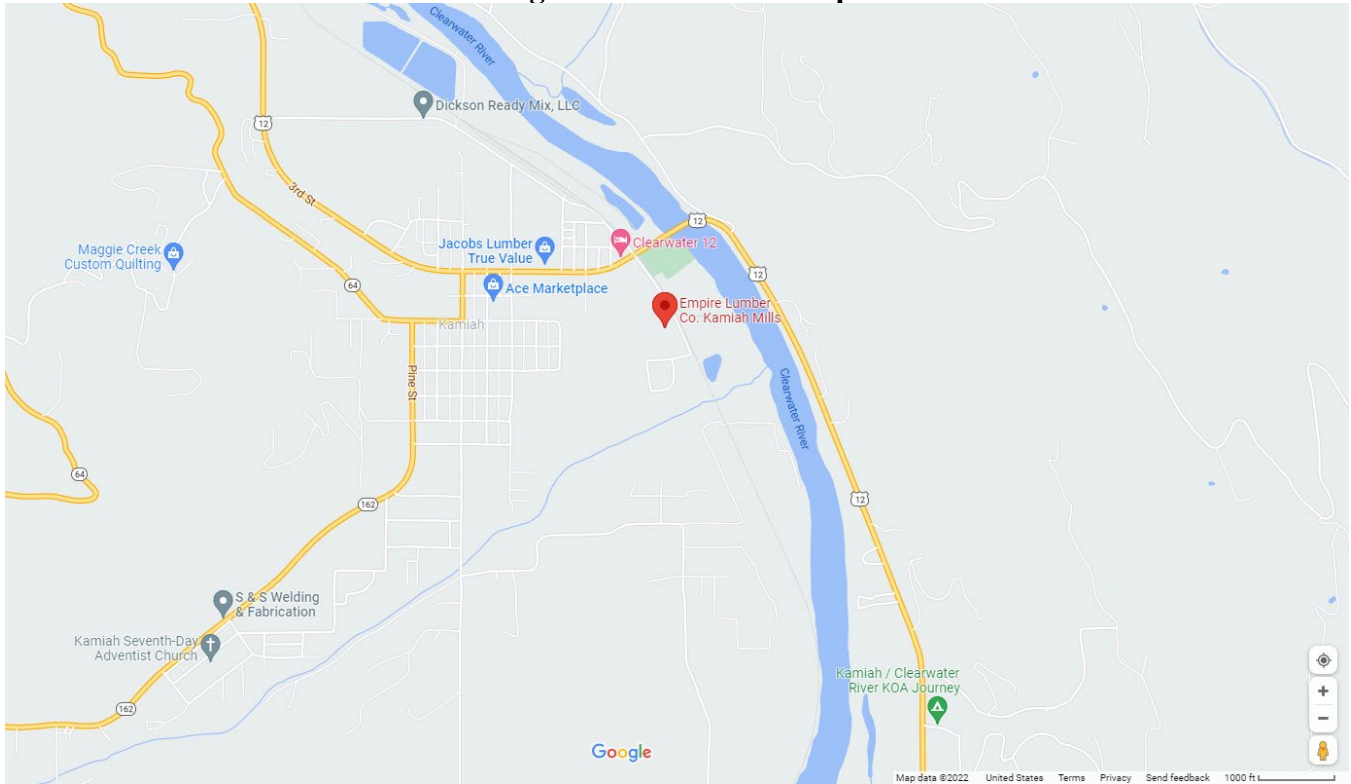


Figure 3-2: Aerial Photograph of Facility from Google Maps



3.2 Permit Action

The Tribal Minor NSR Rules at 40 CFR 49.158 provides a mechanism for new and existing sources to establish a synthetic minor limit on their PTE. Synthetic minor permit limits are voluntary, enforceable restrictions on a source’s operations that reduce the source’s PTE. Such limits can then be used to avoid being subject to other Clean Air Act requirements such as the major NSR program or the title V operating permit program.

The facility is currently operating under a Part 71 operating permit issued by the EPA under title V of the CAA (Permit # R10T5070101) because potential emissions of volatile organic compounds (VOC) exceed the title V major source threshold. The Part 71 permit includes the requirements of 40 CFR 63, Subpart JJJJJ – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources (NESHAP subpart JJJJJ) for Boiler EU-01. After consultation with the EPA, the permittee applied for a synthetic minor source permit to avoid the title V major source operating permit program requirements. To ensure the facility’s hazardous air pollutant (HAP) methanol potential emissions are below title V and NESHAP major source thresholds for HAP, the permit also includes synthetic minor limits for the HAP methanol.

This permit action establishes the existing equipment at the Empire Lumber Company dba Kamiah Mills facility as a synthetic minor source for title V and NESHAP programs. Upon issuance of this permit, the facility will no longer be subject to title V and its Part 71 permit will be rescinded. The facility will remain subject to NESHAP subpart JJJJJ.

The facility’s existing operations are described below in this section.

3.3 Permit History

The facility is currently operating under a Part 71 operating permit issued by EPA under title V of the CAA (Permit # R10T5070101) because emissions of volatile organic compounds (VOC) exceed Title V major source thresholds. Upon issuance of this permit, the Facility will no longer be subject to title V and its Part 71 permit will be rescinded.

Table 3-2 reflects that this an action for issuance of an initial synthetic minor permit for the Facility.

Table 3-2: Permit Revision History

Issue Date	Permit #	Action
07/01/2022	R10TNSR03000	Initial Synthetic Minor Permit

4. Public Participation

4.1 Public Comment Period

As required in 40 CFR 49.157, all draft synthetic minor source permits must be publicly noticed and made available for public comment for 30 days. For the draft permit, the public comment period began on April 29 and ended on May 31, 2022.

40 CFR 49.157(b)(1) requires the reviewing authority to provide adequate public notice to ensure that the affected community and the general public have reasonable access to the application and draft permit information, as set out in 40 CFR 49.157(b)(1)(i) and (ii). The public notice must provide an opportunity

for public comment and notice of a public hearing, if any, on the draft permit. 40 CFR 49.157(b)(2) lists the information that must be included in the public notice. 40 CFR 49.157(c) explains how to submit comments and what the requirements are for holding a public hearing. For the draft permit, the notice was posted on Region 10's website at <https://www.epa.gov/publicnotices/notices-search/location/Idaho> and e-mailed to required persons. Public notices were physically posted on notice boards throughout Kamiah in city libraries, post offices and tribal headquarters. Public notices were also published in both the Idaho County Free Press and Clearwater Progress newspapers on April 27 and April 28, 2022, respectively. Region 10 announced an opportunity for a public hearing on the draft permit contingent upon the public expressing interest. Because no requests were received for a public hearing, none was held.

40 CFR 49.157(a) requires reviewing authority to make the administrative record available for public inspection. For this draft permit, access to the record was available through the EPA's website at <https://www.epa.gov/publicnotices/notices-search/location/Idaho>. In the notice described above, Region 10 announced that the public could receive a copy of the administrative record or of individual documents in the record by contacting Region 10 via email or phone. Region 10 received no requests for documents.

4.2 Response to Public Comments and Permit Issuance

During the comment period, Region 10 received comments from Empire. Region 10 considered all comments received during the public comment period. See Region 10's separate Response to Comments document for a summary of the comments and our responses. As required in 40 CFR 49.159, Region 10 will notify (via email) the Permittee of the final permit decision and will provide adequate public notice of the final permit decision to ensure that the affected community, general public and any individuals who commented on the draft permit have reasonable access to the decision and supporting materials. Region 10 will provide public notice of the final permit decision and make the administrative record available online at <https://www.epa.gov/publicnotices/notices-search/location/Idaho> for a period of 30 days after service of notice of the final permit decision to the Permittee.

5. Facility Description

The facility produces dry dimensional lumber by first kiln-drying and then planing green lumber received from its Weippe, Idaho sawmill approximately 11 miles away (straight-line distance). Wood residue (primarily planer shavings, sawdust, hogged edgings and hogged trim ends) is either (a) combusted in the facility's biomass gasifier and boiler ("EU-01") to generate steam for use in the lumber drying kilns ("EU-02"), or (b) sold to outside companies. The facility can infrequently purchase biomass to combust in EU-01. The facility has the capability of drying approximately 120 million board feet of lumber annually, resulting in maximum annual production of approximately 100 million board feet of planed-dried lumber.

Rough green lumber is transported from an off-site sawmill to the facility on trucks in large bundles that are sometimes "stickered." Stickered consists of placing small pieces of wood between each piece of lumber to allow air flow by each side of each piece of lumber to provide for thorough and complete drying throughout the stack of lumber. If not stickered, the incoming green lumber is stickered in the onsite sticker building (P1). Stickered lumber is stored across the facility lumber yards (ST1). In warmer weather, stickered lumber is air dried to reduce the moisture content of the lumber. Until 2008, some lumber (primarily cedar) was dried to market moisture content without needing kiln drying. Market requirements now necessitate heat treatment of all lumber to prevent insect infestation. For example,

cedar is already air dried in warm months to market moisture content levels and is then entered into the facility's dry kilns at 160 degrees for only 2 to 8 hours to ensure sterilization.

The stickered lumber is loaded into one of the facility's lumber dry kilns (P14, P15, P16, P31 and P32) to remove moisture from the lumber. The heat source for the dry kilns is steam generated in the ConvertaKiln wood gasification boiler (EU-01), which is fueled by burning dry, clean lumber by-products generated onsite. Automated controls open or close the dry kiln vents to generate the scheduled drying temperature (never more than 190 degrees) and humidity and indicate to operators when the moisture content is estimated (by temperature drop across load) to reach the targeted moisture content. Moisture contents of lumber entering the kilns are lowered by air drying, with the lumber being stored in the air-dry yards on average for a month or more before entering the kilns. Maintaining the proper temperature and humidity in the dry kilns is necessary because excess moisture can stain the lumber being dried, lowering its grade and market value. Drying of lumber (that has not been air dried) is typically completed in 30 to 75 hours. Up to half of that time is spent getting the kiln up to temperature. After the kiln reaches and holds full schedule temperature, steam demanded from the boiler is reduced.

The facility operates for 52 weeks per year; however, boiler EU-01 is shut down for maintenance activities on average once per quarter for three to four days. Processes other than boiler EU-01 and kilns EU-02 would not be expected to be continuous year-round. The permittee indicates that it is not practical and may not even be possible to operate the planers and sources other than the boiler and kilns more than 5,500 hours per year. The permittee further indicates that increases in throughput, if any, would be expected to be gained from operational efficiencies or production of larger diameter product if the market supported it, rather than increased time of operations.

The air pollution emission units and control devices that exist at the facility are listed in Table 5-1 below by emission unit identification (EU ID). None of the emission units vent through a stack shared with another emission unit. Installation dates for each emission unit, to the extent known, are listed because they are important in determining applicability of federal standards and requirements. Capacities are listed for several emission units based on the best information available from the applicant.

Table 5-1 – Emission Units (EU) & Control Devices

EU ID	Emission Unit Description	Control Device
EU-01	<p><i>Biomass Gasifier and Boiler.</i> 25 MMBtu/hr heat input capacity steam generating unit consisting of a Converta Kiln, Inc. biomass gasifier and a Superior Boiler Works, Inc. Mohawk Scotch Marine fire-tube boiler. The gasifier produces gas from biomass, and the boiler combusts the produced gas. A pipe conveys the gas from the gasifier to the boiler where it is introduced through a burner. Maximum steam production of 18,061 lb/hr generating 100 psi, with fluctuations up to 110 psi, saturated steam. Installed November 1999. Boiler exhaust is routed to a multiclone and exhausted to the atmosphere via an induced draft fan. Under rare emergencies, the gas produced by the gasifier is diverted away from boiler (and multiclone) and released directly to atmosphere via a pressure relief stack as necessary to maintain safe operation.</p> <p>In the permit and this technical support document, use of the term “boiler” refers to the boiler section of this emission unit. Use of the term “gasifier” refers to the gasifier section of this emission unit. Use of the term “EU-01” refers to the single emission unit consisting of both the gasifier and boiler.</p>	<p>Multiclone manufactured by Boiler & Steam Systems, LLC. Model: MC-60-UP 46-7-7-4.0. Installed June 6, 2006.</p> <p>This multiclone replaced multiclone installed November 1999. Multiclone was upgraded from 15 to 46 cones in 2010. Multiclone internal serviced and replaced in September 2018.</p>
EU-02	<p><i>Lumber Drying Kilns.</i> Five 84-foot double-track indirectly heated Wellons lumber drying kilns. Kilns P14, P15 and P16 were installed circa Fall 2005 to Spring 2006, and each has 64 dry bulbs and 2 wet bulbs. Kilns P31 and P32 began operating April 23, 2012; and each has 48 dry bulbs and 2 wet bulbs. The facility’s annual lumber drying capacity is limited to around 120,000 mbf given the upstream steam generating capacity and plumbing. These two factors prevent the facility from drying lumber at temperatures exceeding 200°F.</p>	None
EU-03	<p><i>Wood Residue Capture and Pneumatic Material Conveyance Systems.</i> Consists of all the wood residue that is captured and pneumatically conveyed to storage structures.</p>	None
EU-04	<p><i>Tanks.</i> Gasoline (3,000 gallons), Diesel (2,500 gallons), and Propane (500 gallons)</p>	None
EU-05	<p><i>MNFA - Miscellaneous Non Fugitive Activity.</i> Includes sources of emissions that occur within a building.</p>	None
EU-06	<p><i>MFA - Miscellaneous Fugitive Activity.</i> Includes sources of emissions that occur outdoors.</p>	None

EU ID	Emission Unit Description	Control Device
EU-07	<i>Used Oil-Fired Heater: 500,000 Btu/hr.</i>	None

5.1 Emission Unit EU-01

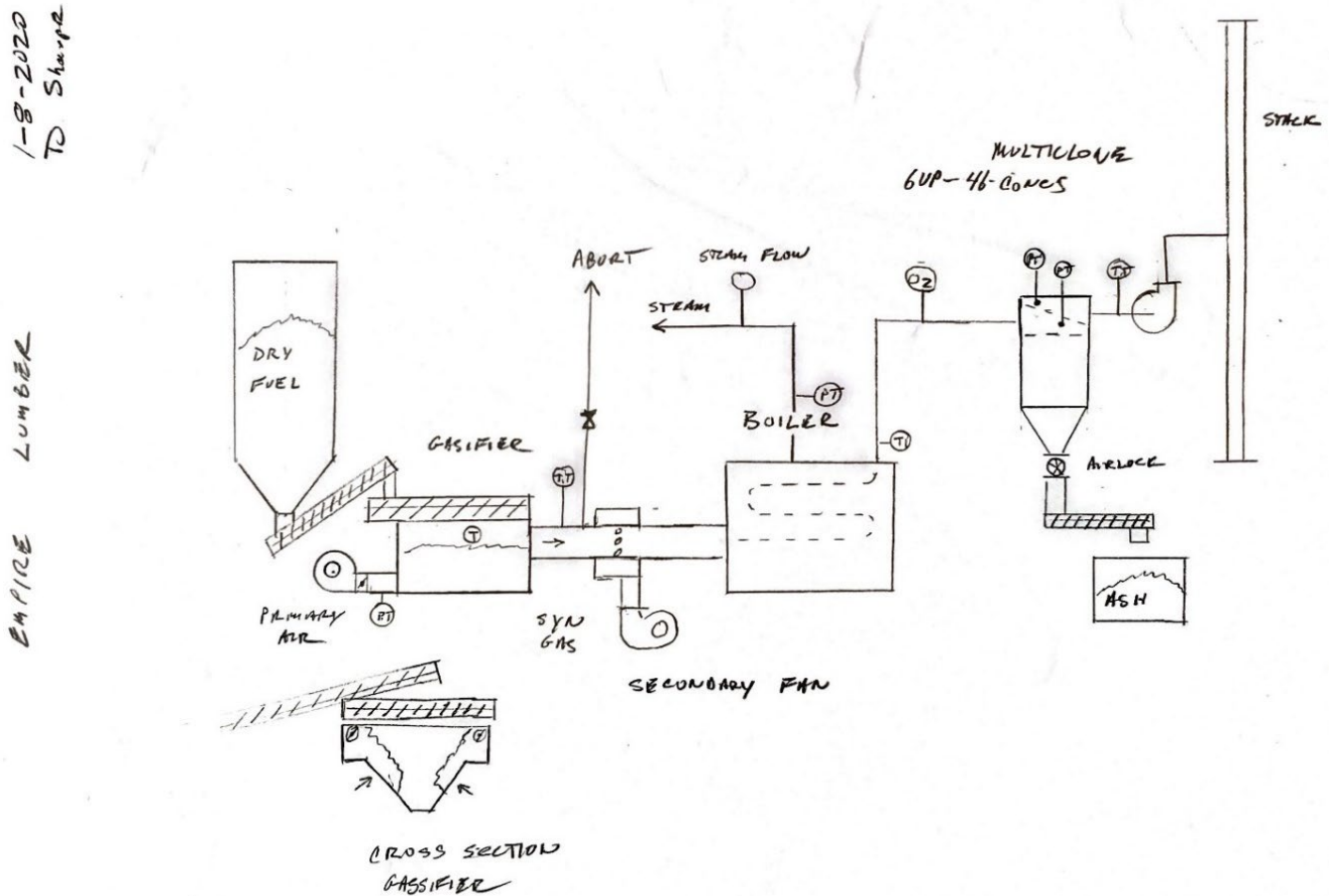
Boiler EU-01 is the combination of the gasifier and boiler into one emission unit. Historically, only on-site dry wood residue has been introduced to the V-hearth designed gasifier. However, this permit does not restrict Empire from feeding bark and wet wood residue to the gasifier. Information in the application suggests that Empire can operate boiler EU-01 in a manner that minimizes emissions while feeding bark and wet wood residue to the gasifier. The availability of fuel derived from manufacturing of lumber has not limited boiler operation. There is an abundant amount of on-site fuel available. The gasifier is a hybrid type gasifier not fully aligning with any of the four types listed in section 2.1 of the journal article entitled, “Influence of the biomass gasification processes on the final composition of syngas.” Energy Procedia 36 (2013) 596-606. Of the four types, Empire’s gasifier is most like the fixed bed-updraft type. According to the journal article:

The advantages of the updraft gasifier are:

- *simple and low-cost process;*
- *able to handle biomass with high moisture and high inorganic content (for example, municipal solid wastes);*
- *proven technology.*

The main disadvantage of the updraft gasifier is the tar content (10 to 20% of tar by weight), requiring intensive cleanup.

Figure 7-1: Illustration of Boiler EU-01³



Secondary air (FD fan) is trimmed by the automated computer controlled O₂ trim system to achieve ideal combustion. O₂ measured from within the exhaust gas controls whether more or less secondary air is required. Exhaust gas temperature is not measured and factored into the O₂ trim system. Prior to release to the atmosphere, exhaust gas exiting the boiler enters a multiclone where particulate (including trace metal HAP) is removed and deposited into a hopper.

Boiler EU-01 is subject to NESHAP Subpart JJJJJ. The NESHAP general duty to minimize emissions (40 CFR 63.11205(a)) applies to boiler EU-01 along with the NESHAP Subpart JJJJJ requirement to periodically conduct a performance tune-up (40 CFR 63.11223(a)). Boiler EU-01 is also subject to 40 CFR 60, Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. The New Source Performance Standards general duty to minimize emissions (40 CFR 60.11(d)) applies to boiler EU-01. The following Federal Air Rules for Reservations (FARR) limits apply to boiler EU-01 stack emissions: PM limit of 0.2 gr/dscf at 7% O₂ three-hour average (40 CFR 49.125(d)(2)), SO₂ limit of 500 ppm_v at 7% O₂ three-hour average (40 CFR 49.129(d)(1)), and visible emissions limit of 20% opacity six-minute average (40 CFR 49.124(d)(1)). The FARR limits the sulfur content of the bark/wood fuel fed to the gasifier to no greater than 2.0% by weight (40 CFR 49.130(d)(7)).

³ Sketch by Dave Sharpe, Boiler & Steam Systems LLC, on January 8, 2020.

5.2 Emission Unit EU-02

EU-02 consists of five lumber dry kilns (P14, P15, P16, P31 and P32) that are indirectly heated by steam generated by boiler EU-01. Automated controls open or close the dry kiln vents to generate the scheduled drying temperature and humidity. Drying lumber (that has not been air dried) is typically completed in 30 to 50 hours. The Wellons kiln management software will automatically shut the heating process off by discontinuing the flow of steam when the end of the drying schedule is reached. The end is reached when the estimated kiln-wide average moisture content of the charge equals (or is less than) the target value set before the run began. Target moisture contents for dried lumber are between 15 and 19%, dry basis. The kiln-wide average moisture content of the charge is estimated based upon measurements of the dry bulb temperature of the air entering and exiting each load of lumber. The facility does not employ an in-kiln capacitance-based lumber moisture content monitoring system. After steam flow to the kiln is discontinued, the doors to the kiln are opened and an employee with a hand-held Wagner moisture meter paddle samples lumber from multiple units throughout the load to confirm no further drying is necessary.

The following FARR limits apply to kilns EU-02 vent emissions: PM limit of 0.1 gr/dscf three-hour average (40 CFR 49.125(d)(3)), SO₂ limit of 500 ppm_{dv} three-hour average (40 CFR 49.129(d)(2)), and visible emissions limit of 20% opacity six-minute average (40 CFR 49.124(d)(1)).

5.3 Emission Units EU-03

The WRC&PMCS EU-03 consists of capturing wood residue and pneumatically conveying it to storage structures. Wood residue (planer shavings, sawdust, hogged wood) is generated when planing and sawing lumber and hogging the resultant trim ends. Emissions generated by this activity are exhausted to atmosphere through cyclone stacks and target box vents that receive the pneumatically conveyed wood residue.

The following FARR limits apply to WRC&PMCS EU-03 vent and stack emissions: PM limit of 0.1 gr/dscf three-hour average (40 CFR 49.125(d)(3)), SO₂ limit of 500 ppm_{dv} three-hour average (40 CFR 49.129(d)(2)), and visible emissions limit of 20% opacity six-minute average (40 CFR 49.124(d)(1)).

5.4 Other Emission Units

Miscellaneous fugitive and non-fugitive activities are subject to FARR requirements. Plant traffic and the mechanical transfer of bark and wood residue are two prominent activities that generate fugitive dust. Both activities are subject to the FARR 20% opacity six-minute average visible emissions limit (40 CFR 49.124(d)(1)). The FARR also requires the permittee to take all reasonable precautions to prevent fugitive PM emissions and to maintain and operate all pollutant-emitting activities to minimize fugitive PM emissions (40 CFR 49.126(d)(1)). Surveying the facility annually to determine the sources of fugitive PM emissions is part of the FARR requirement (40 CFR 49.126(e)(1)(i)).

6. Summary of Emissions

6.1 Emission Inventory Basics

An emission inventory generally reflects either the “actual” or “potential” emissions from a source. Actual emissions generally represent a specific period of time and are based on actual operation and controls. Potential emissions, referred to as PTE, generally represent the maximum capacity of a source to emit a pollutant under its physical and operational design, taking into consideration regulatory restrictions, including required control devices. PTE is often used to determine applicability for several EPA programs, including title V, PSD and Section 112 (NESHAP). Emissions can be broken into two categories: point and fugitive. Fugitive emissions are those which could not reasonably pass through a

stack, chimney, vent, or other functionally equivalent opening. Examples of fugitive emissions are roads, piles that are not normally enclosed, wind blown dust from open areas, and those activities that are normally performed outside buildings. Non-fugitive or point sources of emissions include any emissions that are not fugitive. The equation below represents the general technique for estimating emissions (in tpy) from each emission unit at the facility. Emissions are calculated by multiplying an EF by an operational parameter. To estimate actual emissions, the permittee will need to track the actual operational rates.

$$E = EF * OP * K$$

where:

- E = pollutant emissions in tpy;
- EF = emission factors (e.g., in units of lb/mmBtu, lb/mbf, lb/odt, lb/gal)
- OP = operational rate (or capacity for PTE);
- K = 1 ton/2000 lb for conversion from lb/yr to tpy

6.2 PTE Emissions Inventory

Without a permit limit on its PTE, the facility’s potential methanol emissions could exceed the 10 tpy major source threshold for HAP under the NESHAP and title V that includes both fugitive and non-fugitive emissions. Similarly, the facility’s VOC emissions exceed the 100 tpy major source threshold under title V for non-HAP pollutants that considers only non-fugitive emissions. Because boiler EU-01, kilns EU-02, and WRC&PMCS EU-03 emissions are non-fugitive, VOC emissions from these sources are counted in determining compliance with synthetic minor limits. HAP emissions count regardless of whether they can reasonably pass through a vent. PTE calculations for methanol, VOC and all other pollutants are detailed in Appendix A to this TSD. Tables 6-1 and 6-2 provide a summary of HAP and non-HAP emissions and illustrate that only unrestricted methanol and VOC emissions exceed their respective 10 and 100 tpy major source thresholds. Because total HAP PTE is less than 25 tpy, a limit on total HAP PTE is unnecessary for the source to be considered an area source of HAP.

Table 6-1: HAP Potential Emissions (not considering proposed limitations)

Rank	Hazardous Air Pollutant	EU-01 (Boiler)	EU-02 (Lumber Dry Kilns) ^a	EU-03 (WRC&PMCS)	Total (tpy)
1	Methanol	0.0802	11.78	0.0259	11.89
2	Acetaldehyde	0.1193	4.062	-	4.181
3	Hydrochloric acid	1.569	-	-	1.569
4	Formaldehyde	1.184	0.2616	-	1.445
5	Acrolein	0.8815	0.1560	-	1.038
6	Benzene	0.4692	0.1560	-	0.4692
7	Manganese	0.2657	-	-	0.2657
8	Styrene	0.2037	-	-	0.2037
9	Phosphorous	0.1804	-	-	0.1804
10	Toluene	0.1006	-	-	0.1006
	All other HAP	0.3211	N/A	-	0.3811
	Total	5.4	16.3	0.0	21.7

^a Lumber dry kilns EU-02 individual methanol, acetaldehyde, acrolein and formaldehyde potential emissions reflect highest-emitting wood species among several species the permittee is authorized to dry. Western true fir is the highest-emitting for methanol and formaldehyde while western hemlock is highest-emitting for acetaldehyde and acrolein. Overall, western true fir is highest-emitting for all HAP

combined. Because of the use of two different techniques to calculate kilns EU-02 potential emissions (individual versus total HAP), it is not possible to calculate a PTE value for “all other HAP” in Table 6-1. The acronym N/A has been placed in the appropriate fields.

Table 6-2: Non-HAP Potential Emissions (not considering proposed limitations)

Rank	Regulated Air Pollutant	EU-01 (Boiler)	EU-02 (Lumber Dry Kilns) ^a	EU-03 (WRC&PMCS)	Total (tpy)
1	VOC	4.0	171.9	9.1	185
2	PM10	47	3.6	9	60
3	PM2.5	47	3.6	0.001	56
4	NOx	13.1	-	-	13
5	CO	8.1	-	-	8
6	SO2	7.6	0	-	8
7	Lead	0.01	-	-	0

The PTE summary tables above generated by the EPA differ from the ones in the permittee’s synthetic minor permit application. Differences with respect to HAP and VOC include:

- The boiler EU-01 HAP EF relied on by the EPA generally reflects an average value that was calculated from test data in AP-42 and Boiler NESHAP rule development emissions databases considering combustion of wet wood and bark and multiclone control. Emissions data reflecting combustion of dry wood was not considered because the facility is not restricted from feeding the gasifier exclusively with wet wood and combustion of wet wood is thought to generate higher organic HAP emissions due to incomplete combustion. Trace metal HAP EF are derived from test data reflecting multiclone control only because the permit requires boiler EU-01 exhaust be controlled by a multiclone. The VOC EF generally reflects a summation of calculated organic HAP EF. In contrast, the facility’s boiler EU-01 HAP and VOC EF generally reflect values in AP-42 Section 1.6 summary tables that do not distinguish between wet versus dry wood fuel or PM control technology.
- The kilns EU-02 methanol, formaldehyde and VOC EF relied on by the EPA are calculated using small scale kiln test-derived best-fit curve equations with maximum “entering air” temperature equal to 200°F. The January 2021 lumber drying EF equations relied on by the EPA are available online along with supporting derivation.⁴ The emission factors used by the facility in it’s application for kilns EU-02 for methanol, formaldehyde and VOC are based upon small scale kiln test-derived EF derived by Region 10 in December 2012 assuming maximum “entering air” temperature less than or equal to 200°F. The December 2012 EF are presented in two categories and reflect worst-case or 90th percentile values. One set assumes “entering air” temperatures less than or equal to 200°F and another set assumes “entering air” temperatures greater than 200°F. The updated 2021 EF incorporate new source test data, estimate HAP EF when no test data exists for that wood species, generate temperature-dependent EF equations when correlation between drying temperature and emissions is sufficient, calculate EF without a conservative adjustment to address lack of source-specific verification testing, and calculate EF with an adjustment to address high bias of source test data generated by Oregon State University. In general, the 2021 EF are lower than the 2012 EF.

⁴ <https://www.epa.gov/system/files/documents/2021-07/epa-region-10-lumber-drying-ef-january-2021.pdf>

- The EPA’s addition of pneumatic conveyance of green (not kiln dried) wood residue as a methanol emitting activity within WRC&PMCS (EU-03) is based on EF documented in a January 1999 NCASI technical bulletin No. 773 entitled, "Volatile Organic Compound Emissions from Wood Products Manufacturing Facilities, Part VI - Hardboard and Fiberboard." Facility & Activity ID: 072-1LC1. The facility does not identify EU-03 as a methanol-emitting activity.

6.3 Actual Emissions Inventory

Table 6-3 reflects the EPA’s calculation of the facility’s actual methanol and VOC emissions based on data provided by the facility and presented in Appendix B to this TSD. The emissions are generated by EU-01 and EU-02.

Table 6-3: Actual Methanol and VOC Emissions

Year	Methanol			Total HAP			VOC		
	EU-01 (tpy)	EU-02 (tpy)	Total (tpy)	EU-01 (tpy)	EU-02 (tpy)	Total (tpy)	EU-01 (tpy)	EU-02 (tpy)	Total (tpy)
2007	0.03	2.17	2.20	2.18	4.13	6.31	1.64	13.98	15.63
2008	0.03	1.87	1.91	2.27	4.03	6.30	1.71	15.37	17.08
2009	0.02	1.71	1.74	1.58	3.35	4.94	1.19	11.41	12.61
2010	0.03	2.58	2.61	1.91	4.99	6.90	1.44	16.19	17.63
2011	0.03	2.50	2.53	1.91	4.70	6.61	1.44	15.17	16.61
2012	0.03	3.40	3.43	2.21	6.62	8.83	1.66	22.48	24.14
2013	0.04	4.45	4.49	2.93	8.44	11.37	2.21	28.14	30.35
2014	0.04	4.18	4.22	2.79	7.84	10.64	2.10	26.42	28.52
2015	0.04	3.22	3.26	2.42	5.97	8.39	1.82	20.46	22.29
2016	0.03	3.81	3.85	2.21	6.99	9.21	1.67	22.42	24.09
2017	0.04	3.91	3.95	2.65	6.91	9.57	2.00	21.53	23.52
2018	0.04	3.78	3.82	2.83	6.89	9.71	2.13	22.84	24.96
2019	0.04	3.67	3.71	2.73	6.46	9.19	2.06	20.77	22.83
2020	0.04	3.69	3.73	2.68	6.77	9.44	2.01	22.36	24.38
2021	0.04	3.46	3.50	2.59	6.12	8.71	1.95	19.42	21.38

The EPA’s calculations use boiler EU-01 steam generating rates and kilns EU-02 lumber production rates used by Empire in its calculation of emissions submitted in response to an EPA information request in support of permit development. Table 7-2 does not reflect emissions generated by EU-03 because the facility processed no green lumber between 2007 and 2021. Table 7-2 also does not reflect boiler EU-01

emissions generated during startup and shutdown (fuel combustion with no steam generation) because Empire’s emissions report did not include emissions estimates for this activity.⁵

The primary difference between the actual emission inventories developed by Empire and the EPA is attributable to the selection of EF explained in Section 6.2 of this TSD. In addition to using different EF in the calculation of boiler EU-01 emissions, Empire and the EPA used slightly different FHSOR. Empire used a FHSOR of 1.38 MMBtu/mlb steam based upon May 2018 testing. The EPA used a FHSOR of 1.36 mmBtu/mlb steam reflecting the average of September 2014, March 2018 and May 2018 test results.

7. Emission Limits, Testing, Monitoring and Recordkeeping Decision-making

Pursuant to 40 CFR 49.158, the permittee has proposed to take enforceable operating and emission limitations that will limit the source’s methanol and VOC PTE to below the major source thresholds. In Section 2 of the permit, 12-month rolling methanol and VOC emissions are limited to 9 and 99 tons, respectively. To ensure these limits are enforceable as a practical matter and effectively limit PTE, the ”limits must be accompanied by methods for calculating emissions to demonstrate compliance with the emission limits and the permit must require monitoring and recordkeeping to (1) collect emission unit operating rates and (2) assure the representativeness of EF.

Table 7-1 summarizes the permit’s monitoring and recordkeeping requirements that generate information necessary to calculate the facility’s emissions for comparison to the 12-month rolling methanol and VOC tpy emission limits.

Table 7-1: Summary of Monitoring and Recordkeeping Requirements

Emission Unit	Emission Calculation	EU Operating Rate Parameter (units of measure)	Parameters Needed to Determine Whether Corrective Action Required to Maintain Representativeness of EF (units of measure)
Boiler EU-01 (when generating steam)	EU operating rate * FHSOR * EF [lb pollutant/EU operating rate]	Mass steam generated (mlb/month)	<p><u>Trace metals; range specified in the boiler EU-01 O&M plan:</u></p> <ul style="list-style-type: none"> • multiclone Δp (inches H2O) <p><u>Organic HAP & VOC; range specified in the boiler EU-01 O&M plan:</u></p> <ul style="list-style-type: none"> • exhaust gas O2 concentration (% by volume, wet basis)
Kilns EU-02	EU operating rate * EF [lb pollutant/EU operating rate]	<p>Lumber volume dried, by product (mbf/month)</p> <ul style="list-style-type: none"> • product volume (mbf) • identity of species included in product (unitless) 	<p><u>Parameter for each charge needed to calculate monthly product-specific EF:</u></p> <ul style="list-style-type: none"> • product • species included in product • maximum kiln-wide average instantaneous temperature for air entering load of lumber (°F) (“entering air”) <p><u>No range specified for parameter to reflect EF representativeness:</u></p> <ul style="list-style-type: none"> • moisture content of lumber (% , dry basis)

⁵ The synthetic minor permit requires the calculation and reporting of methanol and VOC emissions generated during boiler EU-01 startup and shutdown when no steam is being generated.

Emission Unit	Emission Calculation	EU Operating Rate Parameter (units of measure)	Parameters Needed Determine Whether Corrective Action Required to Maintain Representativeness of EF (units of measure)
WRC&PMCS EU-03		Mass green wood residue conveyed (odt/month)	None

In addition, Empire is required to develop and implement a monitoring plan demonstrating that each monitoring system collects information at all times the EU is operating and generates representative and valid data. Empire is required to revise this plan at any time if the EPA determines the plan does not achieve its intended goal and specifies the deficiencies.

As explained below, the permit requires no testing to replace default EF or boiler EU-01 FHSOR.

The following sections of the TSD explain the basis for the monitoring and recordkeeping requirements included in the permit and summarized in Table 7-1 to ensure the 9 and 99 tpy methanol and VOC limits, respectively, are enforceable as a practical matter. The sections also explain the basis for requiring no testing to update or replace EU-01, EU-02 and EU-03 EF and EU-01 FHSOR.

7.1 Boiler EU-01

The facility-wide limits are set below the major source threshold (effectively 9.5 tpy methanol and 99.5 tpy VOCs). Approximately 3.82 tons of methanol and 24.96 tons of VOC were emitted from the facility in 2018. Of that amount, boiler EU-01 emitted 0.04 tons methanol and 3.78 tons VOC. Incomplete combustion generates unburned hydrocarbon emissions, including methanol and VOC. Poor maintenance of the multiclone and associated airlock reduces capture of PM and thus increases PM emissions. PM includes trace metal HAP. The permit does not explicitly limit trace metal HAP emissions because the EPA calculated potential emissions to be less than 10 tons per year. That PTE calculation, however, used EF assuming emission reductions achieved through use of a multiclone.

The EF the EPA used to calculate boiler EU-01 methanol and VOC actual and potential emissions were derived by gathering source test data for a pool of somewhat similar boilers and averaging the test results. Uncertain as to which of the pool's many firing configurations is most similar to Empire's, the EPA accepted test data for boilers using all types of firing configurations. The EPA rejected test data reflecting combustion of dry wood because combustion of such wood is thought to generate less unburned hydrocarbons (e.g., methanol and VOC), and the permit does not restrict Empire to firing only dry wood. The EPA assumes that the test data from which the EF were derived reflects boilers operating in a way that minimizes emissions. To assure the representativeness of the EF required in the permit to calculate methanol and VOC emissions, the permit requires monitoring of exhaust gas O₂. Corrective action is required if O₂ is not maintained above a threshold level specified in Empire's boiler EU-02 O&M plan. For estimating trace metal HAP emissions, the EPA relied on test data reflecting use of the multiclone. To assure the representativeness of the EF used to calculate potential trace metal HAP emissions, the permit requires monitoring of multiclone pressure drop and periodic inspection of the multiclone and multiclone airlock.

The permit does not require boiler EU-01 testing to derive source-specific methanol or VOC EF because the facility's actual emissions are only approximately 42% of the 9 tpy methanol limit and 25% of the 99 tpy VOC limit. Emissions were highest in 2013 when methanol and VOC were at these levels. If actual emissions increase to approximately 75% (or greater) of the limits, the EPA intends to revisit its decision here to not require boiler EU-01 methanol and VOC testing.

The permit requires Empire to continuously measure the mass of steam generated by boiler EU-01 to calculate emissions of methanol and VOC. Because EF are in units of “lb/mmBtu,” the facility uses Fuel Heat Input to Steam Output Ratio (FHISOR) in units of “mmBtu/mlb steam” to convert steam output to heat input. This enables calculation of boiler EU-01 emissions. The permit requires Empire to use a FHISOR of 1.360 mmBtu/mlb steam. The 1.360 mmBtu/mlb steam value is an average of three values derived from three tests conducted in September 2014 (3 runs with FHISOR of 1.294), March 2018 (3 runs with FHISOR of 1.403) and May 2018 (3 runs with FHISOR of 1.384). Fuel moisture content may influence FHISOR. During each of the three tests, Empire was feeding kiln-dried planer shavings to the gasifier. No further testing is required to update the default FHISOR given the close agreement in FHISOR values for the three rounds of testing performed and current understanding that Empire exclusively feeds kiln-dried wood residue to the gasifier.

Fuel moisture content may influence FHISOR. FHISOR may increase with increasing fuel moisture content as more energy in the fuel is spent boiling water in the fuel. The permit requires Empire to estimate monthly the mass of fuel fed to the gasifier for each of the following categories: wet non-resinated wood residue, bark and kiln-dried non-resinated wood residue. The permit also requires Empire to report annually the mass of each fuel fed to the gasifier. If annual reporting shows Empire is feeding wet non-resinated wood residue and bark to the gasifier, the EPA will evaluate whether to revise the permit to require boiler EU-01 testing to derive a FHISOR for those time periods when wet non-resinated wood residue and bark are fed to the gasifier.

7.2 Kilns EU-02

The EF for lumber drying are based upon a correlation between full-scale and small-scale lumber dry kiln emissions and subsequent small-scale kiln testing while employing drying schedules used to dry lumber in large-scale kilns. Table 7-2 summarizes information about the underlying testing supporting the EF for nine Pacific Northwest species of wood that could be dried in Empire’s lumber kilns.

Table 7-2: Information about Testing Data Supporting Lumber Dry Kiln EF (lb/mbf)

Species	% of Lumber Dried @ Empire 2012 – 2016 ¹	EF @ 200°F based on Best-Fit-Curve / # tests across all drying schedules ² / R2	
		Methanol	VOC
Western True Firs	32.2	0.1964 / 4 / 0.98	0.6127 / 10 / 0.75
Douglas Fir	24.9	0.0671 / 16 / 0.72	1.1487 / 21 / 0.63
Western Hemlock	0	0.1005 / 17 / 0.65	0.3460 / 23 / 0.50
Lodgepole Pine @ 237°F ³	0	0.0550 / 3 / $\frac{0.0510}{0.0570}$	1.1352 / 3 / NA
Engelmann Spruce (Sub White Spruce) ⁴	6.0	0.0407 / 2 / NA	0.1769 / 1 / NA
Ponderosa Pine	0.7	0.0842 / 5 / 0.89	2.8657 / 10 / 0.50
Western Larch	0	No test data for species. Data for Douglas Fir to be used.	
Western Red Cedar	34.0	No test data for species. Data for Western True Firs to be used.	
Western White Pine	2.1	No test data for species. Data for Ponderosa Pine to be used.	

¹ See Empire title V fee calculation worksheet reporting 2016 air pollutant emissions.

² For VOC, “# tests across all drying schedules” refers to number of RM25A tests performed and does not include number of tests performed to determine individual VOC contributions.

³ Lodgepole Pine methanol values reflect “average EF / # tests / $\frac{\max EF}{\min EF}$,” and VOC values reflect “average EF / # tests.” Best-fit-curve could not be generated given similar (nearly identical) drying temperatures experienced during the three runs.

⁴ Engelmann Spruce VOC value reflects EF based upon one test while drying White Spruce at 235°F.

The schedules that Empire employs to dry its lumber, however, are similar to the ones employed during small-scale kiln testing. References to the emission studies/reports illustrating the schedules are located in the EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, January 2021 beginning on page 52.

As discussed above, the facility-wide limits are set below the major source threshold (effectively 9.5 tpy methanol and 99.5 tpy VOCs). Methanol is the HAP emitted in greatest amount from lumber drying and across the facility combined. Approximately 4.92 tons of methanol and 26.59 tons of VOC were emitted from the facility in 2018. Of that amount, kilns EU-02 emitted 4.88 tons methanol and 24.46 tons VOC. Many factors influence the extent to which lumber generates methanol and VOC emissions while undergoing drying in a kiln. For both methanol and VOC, a batch will generate more emissions if dried at a higher temperature.

The EPA is not requiring Empire to perform testing to verify EF for the kilns, however, due to uncertainty surrounding the availability of small-scale kilns and the cost of conducting full-scale kiln testing. NCASI demonstrated that full-scale kiln testing could be performed and produce valid results most recently in 2016 at a cost of around \$100,000 for PM2.5, HAP (six total) and RM25A VOC for just one batch of lumber. EPA Region 10 decision-making on this issue may shift if relevant facts change over time. Such facts include, but are not limited to, the proximity of the facility’s emissions to the 9 tpy methanol and 99 tpy VOC limits, improved availability of small-scale kiln testing and improved affordability of full-scale kiln testing.

The permit requires Empire to track and record the following about each charge (initiated during the month) in order to calculate the total monthly emissions generated: product(s) and species of wood present, lumber volume by product, and record of all instantaneous kiln-wide average measured “entering air” temperatures. The permit also requires Empire to track lumber moisture content and report to the EPA if the kiln-wide average is less than 13% (dry basis). Most, if not all, small-scale kiln emissions data supporting the EF relied on in this permit reflects drying lumber to approximately 15% (dry basis). Additional emissions (beyond levels predicted by EF) are generated as moisture content is driven below the level observed during testing.

7.3 WRC&PMCS EU-03

The pneumatic conveyance of green wood residue generates methanol and VOC emissions. The permit specifies 0.00122 and 0.4283 lb/odt methanol and VOC EF, respectively, to calculate emissions resulting from conveyance of green wood residue, if any such conveyance occurs. The facility’s methanol and VOC PTE resulting from this activity is 0.026 and 9.1 tpy, respectively, based upon the specified EF above and the planer mill capacity noted in Empire’s application. The pneumatic conveyance of kiln-dried wood residue may likely generate some methanol and VOC emissions, but EPA is not aware of an EF for this emission generating activity. According to Empire, the facility typically only planes kiln-dried lumber and thus only generates and pneumatically conveys kiln-dried planer shavings. (According to Empire, the facility’s title V fee payment worksheet emission calculations erroneously reflect exclusive conveyance of green wood residue.) The EPA estimates that

the facility generates no methanol or VOC emissions as a result of pneumatic conveyance of wood residue. The permit does not require testing to develop a source-specific EF for this activity given its small contribution to the mill's overall emissions. As provided in Condition 34, however, the permit requires Empire to submit to the EPA for approval a plan for determining the volume of green wood residue conveyed from point of generation (or receipt from off-site) to pieces of equipment that either exhaust or vent to atmosphere.

7.4 Other Emission Units

In addition to EU-01 through EU-03, Table 5-1 lists activities at Empire that may generate a relatively small amount of non-fugitive VOC emissions and fugitive/non-fugitive HAP emissions. For instance, EU-07 may emit up to 0.02 tpy non-fugitive VOC and similarly small amounts of non-fugitive HAP (no methanol) based upon AP-42 EF and the unit's rated heat input capacity. The evaporation of organic HAP and VOC from bark and wood residue (fuel for boiler EU-01) stored in a partially enclosed building may generate organic HAP and VOC emissions. Loading wood residue into trucks and railcars may also generate organic HAP and VOC emissions. EF have not been developed for these activities. Filling, dispensing and breathing losses from fossil fuel tanks generates a relatively small amount of organic HAP and VOC emissions. Rather than requiring the permittee to track these emissions by (a) conducting source testing of piles and wood residue loading to develop EF, and (b) monitoring throughput, the EPA is requiring the permittee to limit emissions from Table 5-1 activities with EF assigned in the permit (EU-01 through EU-03) to levels slightly less than the individual HAP and VOC major source thresholds. The EPA estimates that activities at the facility listed in Table 5-1 with no assigned HAP or VOC EF in the permit (EU-04 through EU-07) do not have the potential to emit more than 0.5 tons (1,000 lb) of HAP or VOC annually. Thus, the EPA is limiting 12-month rolling methanol and VOC emissions generated by EU-01 through EU-03 to no more than 9 and 99 tons, respectively. These are effectively 9.5 and 99.5 tpy limits due to rounding conventions.

8. Listed Species-Related Requirements

Pursuant to section 7 of the Endangered Species Act (ESA), 16 U.S.C. 1536, and its implementing regulations at 50 CFR part 402, the EPA is required to ensure that any action authorized, funded, or carried out by the EPA is not likely to jeopardize the continued existence of any federally endangered (FE) or federally threatened (FT) species listed under the ESA, or result in the destruction or adverse modification of such species' designated critical habitat. The EPA has determined that this synthetic minor permitting action for the facility is subject to ESA section 7 requirements. In complying with its duty under the ESA, the EPA, as the action agency, examined the potential effects on listed species and critical habitat. This permit limits emissions generated by existing emission units. It does not authorize the construction of any new emission unit or the modification or increased utilization of any existing emission units. The EPA concludes that the issuance of this permit will not affect a listed species or critical habitat.

EPA's no effect determination concludes EPA's obligations under Section 7 of the ESA.

9. Historic Properties-Related Requirements

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies, including the EPA, to take into account the effects of an undertaking on historic properties. The implementing regulations of the NHPA can be found at 36 CFR part 800. An "undertaking," as defined at 36 CFR 800.16(y), includes projects requiring a federal permit. Therefore, the issuance of this permit constitutes an undertaking.

This is an existing facility that is taking emission limits of 99 tpy of VOC and 9 tpy of the individual HAP methanol. The facility will not be physically altered as a result of this permit. Therefore, the EPA concludes that the issuance of this permit will not affect nearby historic properties.

10. Environmental Justice Analysis

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” calls on each federal agency to make environmental justice a part of its mission by “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations.”

The EPA defines “Environmental Justice” (EJ) to include the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The EPA’s goal is to provide an opportunity for overburdened populations or communities to participate in the permitting process. “Overburdened” is used to describe the minority, low-income, tribal and indigenous populations or communities in the United States that potentially experience disproportionate environmental harms and risks due to exposures or cumulative impacts or greater vulnerability to environmental hazards.

The EPA has developed an EJ mapping and screening tool called EJSCREEN. It is based on nationally consistent data and an approach that combines environmental and demographic indicators in maps and reports. According to EPA’s EJSCREEN Version 2020 environmental justice screening and mapping tool, minorities comprise 21% of the community within a one-mile radius of the facility, and 52% of the 1,488-resident population within that area is characterized as low income. While the percentage of minorities in the community is lower than the national average (39%), the percentage of low-income residents is higher than the national average (33%).

This synthetic minor permit will not result in an increase in emissions but instead establish an emission limit at 99 tpy of VOC and 9 tpy of the individual HAP methanol. Therefore, EPA concludes that the issuance of this permit will not have disproportionately high and adverse impacts on minority or low-income populations.

11. Permit Content and Revisions

11.1 Permit Content

The terms and conditions of the permit are based on the required permit content and analysis for synthetic minor permits listed in the Tribal Minor NSR Rule. *See, e.g., 40 CFR 49.155(a)(What information must my permit include?)*. Because this permit does not authorize the permittee to construct or modify the synthetic minor source, permit content prescribed by regulation related to construction or modification is not included in the permit. Described below is the basis for the permit conditions.

Part 49 Permit Issuance History

This permitting action is for the initial issuance of a synthetic minor permit.

Source/Project Description

Empire is requesting issuance of a synthetic minor permit to avoid title V and major source NESHAP requirements.

Table 1: Source Information and Emission Units

Table 1 lists the emission units subject to the emission limits on PTE for methanol and VOC .

Section 1 – General Provisions Requirements

General requirements are laid out in this section and defined within the permit conditions themselves. 40 CFR 49.155(a)(1) requires that each minor NSR permit authorizing construction or modification of a source contain the following permit content including: the effective date of the permit; the emissions units subject to the permit and their associated emission limitations; and monitoring, recordkeeping, and reporting requirements to assure compliance with the emission limitations. The permit includes these requirements.

Severability Clause

40 CFR 49.155(a)(6) requires that each minor NSR permit authorizing construction or modification of a source contain a severability clause to ensure the continued validity of the other portions of the permit in the event of a challenge to a portion of the permit. The permit includes a severability clause based on 40 CFR 49.155(a)(6).

Additional Provisions

40 CFR 49.155(a)(7)(i) requires that each minor NSR permit authorizing construction or modification of a source contain provisions stating the requirements in paragraphs (a)(7)(i) through (vii) of that section. Although this permit does not authorize construction or modification, the permit does contain provisions from 49.155(a)(7) listed below that are appropriate for a synthetic minor permit. Also listed below is an explanation for those provisions of 49.155(a)(7) not included in the permit.

- 49.155(a)(7)(i) – Condition 5 of permit.
- 49.155(a)(7)(ii) – requirement for Source to not cause or contribute to NAAQS or PSD increment violations is not in the permit. Requirement is only appropriate for minor NSR permits authorizing an emission increase, and this permit does not do that.
- 49.155(a)(7)(iii) – Condition 6 of permit.
- 49.155(a)(7)(iv) – Condition 11 of permit.
- 49.155(a)(7)(v) – Condition 7 of permit.
- 49.155(a)(7)(vi) – Condition 10 of permit.
- 49.155(a)(7)(vii) – Condition 3 of permit.

Section 2 – Source Wide Emission Limitations and Standards

To be enforceable as a practical matter, emission limits must specify:

- A technically accurate limitation that identifies the portions of the source subject to the limitation;
- The time period for the limitation (hourly, daily, monthly, and annual limits such as 12-month rolling limits); and
- The method to determine compliance, including appropriate monitoring, recordkeeping and reporting.

See “Reclassification of Major Sources as Area Sources Under Section 112 of the Clean Air Act,” 84 FR 36304 (July 26, 2019).

The two emission limits in this section of the permit satisfy this criteria. The 12-month rolling limits apply to boiler EU-01, kilns EU-02 and WRC&PMCS EU-03. Permit conditions prescribing the method for determining compliance with the emission limits are referenced by the emission limits and included in the emission-unit specific sections of the permit.

Condition 13 helps assure that default EF do not underreport emissions. Default emission factors are based upon emissions testing of similar sources, and it is assumed that the units tested were being operated in a manner that minimizes emissions while undergoing testing.

Conditions 14-15 are the facility-wide 9 tpy methanol and 99 tpy VOC emissions limits. Using rounding conventions, the permit therefore allows for emissions of up to 9.5/99.5 tpy, respectively. Because the emission limits are based on a 12-month rolling average, emissions during the 12-month period prior to the effective date of the permit are considered in determining compliance with the emission limit. For emissions generated in the month the permit becomes effective and prior, the calculations shall be consistent with those performed to comply with part 71 emission and fee reporting requirements in Permit No. R10T5070101. For emissions generated beginning the month after the month in which the permit becomes effective, the calculations shall be consistent with methodology prescribed in this synthetic minor permit.

Section 2.1 – Source Wide Monitoring and Testing Requirements

40 CFR 49.155(a)(3) requires that the permit include monitoring sufficient to assure compliance with the emissions limitations found in Conditions 14 and 15.

Conditions 16-17 requires the permittee to submit a test protocol in advance of testing and that the testing be carried out consistent with protocol.

Condition 18 requires monitoring equipment required by this permit to meet certain performance, operational and maintenance criteria to assure the generated data is valid and representative.

Condition 19 requires the permittee to develop a monitoring plan that demonstrates that monitoring carried out by permittee satisfies Condition 18. For guidance in developing the plan, see Chapter 4 of EPA’s August 1998 “Technical Guidance Document: Compliance Assurance Monitoring, Revised Draft.”⁶ The guidance provides reference materials for various types of sensors commonly used to measure process and/or air pollution control equipment operating parameters.

Section 2.2 – Source Wide Recordkeeping Requirements

40 CFR 49.155(a)(4) requires that the permit include recordkeeping sufficient to assure compliance with the emission limitations and monitoring requirements, including the requirements of 40 CFR 49.155(a)(4)(i) and (ii).

Conditions 20-23 requires records be retained for a period of no less than 5 years and that they be readily accessible onsite.

Condition 24 requires the permittee by the final day of the month (beginning the month after the month the permit becomes effective) to calculate and record facility-wide 12-month rolling methanol and VOC emissions. For the month in which the permit becomes effective and the eleven preceding months, calculations shall be consistent with those performed to comply with part 71 emission and fee reporting

⁶ <https://www.epa.gov/sites/production/files/2016-05/documents/cam-tgd.pdf>

requirements in Permit No. R10T5070101. Beginning the month after the month the permit becomes effective, boiler EU-01 and kilns EU-02 emissions must be quantified using the methodology prescribed in the synthetic minor permit. WRC&PMCS EU-03 emissions must be quantified beginning the month in which the permittee submits the plan required in Condition 53, but no later than the third calendar month after the month in which the permit becomes effective.

Section 2.3 – Source Wide Notification and Reporting Requirements

40 CFR 49.155(a)(5) requires that the permit include the reporting requirements listed in 40 CFR 49.155(a)(5)(i) and (ii) related to annual reports and reporting of deviations.

Conditions 25-26 requires notification to the EPA of change in ownership/operator or if the facility is planning to close.

Conditions 27 requires submittal of an annual report documenting compliance status and summarizing monitoring performed and deviations reported. The report must document twelve monthly 12-month rolling facility-wide methanol and VOC emissions calculations. The report must also document kiln charges in which the average moisture content of lumber was dried to less than 13%, dry basis.

Conditions 28-29 requires prompt reporting of deviations to the EPA and explains what a deviation is.

Condition 30 requires that O&M plans for boiler EU-01 and kilns EU-02 and a monitoring plan be submitted, reviewed annually and updated as needed or required by the EPA.

Condition 31 requires that a plan to determine the planer mill's GWR_{EQP} be submitted to the EPA for approval before the activity occurs.

Condition 32 requires submittal of test reports if any testing is required.

Condition 33 requires electronic submittal of reports to the EPA and that a hardcopy be sent to the Tribal environmental office.

Conditions 34 and 35 requires all reports be certified by a responsible official and explains who qualifies to be a responsible official.

Section 3 – Boiler EU-01 Emission Limitations

Condition 36 restricts Empire to feeding only non-resinated wood residue and bark to the gasifier to assure representativeness of EF. This fuel restriction alone, however, does not assure the representativeness of FHISOR (developed from test data generated while feeding kiln-dried wood residue to the gasifier) because the permittee is not prohibited from feeding wet wood or bark to the gasifier. The representativeness of FHISOR is assured through monitoring in Condition 41.

Condition 37 requires boiler EU-1 exhaust be routed to the multiclone. Required use of the multiclone assures representativeness of the EF used to calculate trace metal HAP potential emissions. Because potential emissions (reflecting use of required multiclone) are less than 10 tpy, however, the permit does not include a 10 tpy emission limit for trace metal HAP.

Condition 38 requires Empire to develop and implement an O&M plan for boiler EU-01 and its air pollution control equipment to minimize emissions. The permittee is required to use EF derived from testing of similar sources and source-specific test-derived FHISOR to determine boiler EU-01 emissions. The EPA assumes Empire and these similar sources were operating in a manner to minimize

emissions while undergoing testing. For the test-derived values to remain representative, it is important that boiler EU-01 and its air pollution control equipment be operated in the manner in which they were operated during three rounds of testing to determine FHISOR. The EPA expects the recommended parameter ranges specified in the O&M plan to reflect operations during FHISOR testing. If the EPA determines that the plan does not achieve the goal of good air pollution control and efficient operation, then the EPA will notify the permittee of the specified deficiencies, and the permittee shall submit a revised plan to the EPA within 30 days.

It is important that the inspections required by the O&M plan identify and remedy any issues with the multiclone and airlock⁷. This is to ensure the multiclone and airlock are working as intended and to ensure that emissions are minimized. Periodic inspection of the following equipment to identify multiclone disruptions is required: cones, cylinders, inlet duct, vortex finder, axial vanes, ash hopper, ash hopper discharge, and all connecting hardware and welds. Disruptions consist of dents, holes, broken seals, worn seals, or any other type of deterioration that could result in decreased collection efficiency due to flow disruption. Developing and implementing the plan to repair and restore the multiclone and associated equipment ensures the representativeness of the trace metal HAP EF used to calculate emissions.

Section 3.1 – Boiler EU-01 Emission Calculations

Conditions 39 specifies the calculation used to determine boiler EU-01 monthly emissions for methanol and VOC based upon the mass of steam generated (mlb), the boiler's FHISOR (mmBtu/mlb steam) and an EF (lb/mmBtu).

Condition 40 requires the permittee to calculate boiler EU-01 emissions while not generating steam by tracking the volume of fuel fired (wet) and converting that volume to heat input, which is then used with the specified EF to calculate emissions. The 0.357 mmBtu/ft³ fuel factor was derived assuming a fuel density representative of wet wood and a heating value reflective of kiln-dried wood. The value is conservatively high when kiln-dried wood residue is fed to the gasifier because the calculation to derive it overestimates the density of the wood. The value is conservatively high when green wood residue is fed to the gasifier because the calculation to derive it overestimates the heating value of the wood as fired. The conversion factor in its entirety is calculated as follows:

⁷ Unidentified technical guidance made available by Ohio EPA at <https://epa.ohio.gov/static/Portals/27/engineer/eguides/mechanic.pdf>

mmBtu/ft3 fuel = fuel density [lb/ft3] * higher heating value [Btu/lb] * (mmBtu/1,000,000 Btu)		
mmBtu/ft3 fuel = (48.7 lb/ft3) * (7328 Btu/lb) * (mmBtu/1,000,000 Btu)		
mmBtu/ft3 fuel =		0.357
Fuel Density		
Species	Idaho 2015 Timber Harvest of Saw and Veneer Logs ¹ , (mbf)	Average Green Weight of Wood & Bark ² , (lb/ft3)
True Fir (Grand Fir)	376811	52
Douglas Fir	300871	47
Western Red Cedar	59110	31
Ponderosa Pine	89307	52
Western Larch	70197	53
Western Hemlock	53638	51
Lodgepole Pine	37942	42
Engelmann Spruce	18689	45
Western White Pine	8386	42
Weighted Average:		48.7
¹ University of Montana Bureau of Business and Economic Research document entitled, "Idaho's Forest Products Industry and Timber Harvest, 2015." August 2, 2017. Table 5.		
² USDA Forest Service, Northern Research Station, Research Note NRS-38 entitled, "Specific Gravity and Other Properties of Wood and Bark for 156 Tree Species Found in North America." October 2009. Table 1B https://www.nrs.fs.fed.us/pubs/rn/rn_nrs38.pdf		
Fuel Higher Heating Value		
Year of Fuel Sampling & Analysis at Empire	Higher Heating Value Average (as fired, ie. Wet basis), (Btu/lb)	3 Test Average ³
September 2014	7534	
March 2018	7445	
May 2018	7005	
		7328
³ March 2018 Source test page 9: Fuel samples were taken during each test run; a single composite of the three samples (#1, #2, #3) were taken and analyzed for EPA Method 19 FD.		

Section 3.1 – Boiler EU-01 Monitoring and Testing Requirements

Conditions 41 requires the permittee to determine monthly the mass of each type of fuel fed to the gasifier. The types of fuel are as follows: wet non-resinated wood residue, bark, and kiln-dried non-resinated wood residue. This information provides a check on whether test-derived FHISOR continues to be representative. If Empire begins feeding wet wood residue or bark to the gasifier, FHISOR may no longer be representative. See section 7.1 of this TSD for basis to require further testing if necessary. Condition 41 also requires the permittee to collect information needed calculate emissions when no steam is being generated.

Conditions 42 contains the monitoring for boiler EU-01 and the multiclone. A 90% minimum monthly data capture (recording) requirement applies to two parameters (steam & O2) needed to calculate emissions (tracking steam) or assure representativeness of the EF (tracking O2). The 90% minimum monthly data capture (recording) requirement means that the number of “absent” recordings (excused or not) cannot exceed 10% of the total recordings required of the monitor for the month.

Conditions 42.1 requires Empire to use a totalizer to track steam production. The facility operates a steam totalizer and will be required to record once an hour the instantaneous steam production rate

(lb/hr) appearing on the totalizer's display positioned in the boiler control room. Condition 42.1 requires Empire to direct a totalizer (the one currently in use or another) to consider all of the mass flow measurements performed over an hour in calculating the amount of steam produced during that hour. Empire must begin determining hourly steam production in this manner the day the permit becomes effective.

Conditions 42.1.1 requires the use of a missing data procedure to generate an artificial steam production rate for those periods when the totalizer fails to record a steam production rate for a one-hour period (or longer). Measuring or substituting for steam production is necessary to calculate the emissions generated during an hour.

Conditions 42.2 requires an hourly average exhaust gas %O₂ wet be calculated and recorded based on measurements performed at least every 15 minutes. Exhaust gas O₂ provides an indication of boiler performance because much lower oxygen levels may lead to incomplete combustion and much higher oxygen levels could cause the combustion chamber to be too cool. A description for the location of the monitoring equipment is provided for clarity.

Conditions 42.3 requires recording of multiclone Δp once per day. Pressure drop across the multiclone is generally related to control device performance (plugging or corrosion).

Conditions 43 requires Empire, upon discovery of an indicator out of range, to expeditiously restore operation of boiler EU-01 and multiclone such that the indicator is no longer outside the range established in the plan required in Condition 38. Although failing to expeditiously restore boiler EU-01 or multiclone operations to normal or usual manner of operation (characterized by indicators operating within the recommended range) is a permit deviation, an indicator out-of-range is not a permit deviation. Empire is required to report each indicator out-of-range occurrence in the annual report required pursuant to Condition 27.7. Operating out of range indicates that EF (used to calculate emissions) may not have been representative of emissions generated for the period.

Condition 44 requires inspection of multiclone and multiclone air lock at least twice annually.

Condition 45 requires the permittee to install equipment to track and record those occasions when the produced gas generated by the gasifier is diverted to atmosphere via the pressure relief stack. Under normal operating conditions, the gas produced by the gasifier is combusted in the boiler and sent downstream to the multiclone. This does not occur when the gas produced by the gasifier is diverted to atmosphere. The permittee needs to know and record information about these diversion episodes because the resultant emissions are not required to be counted in demonstrating compliance with the 9 and 99 tpy methanol and VOC emission limits, respectively. This permit condition also requires the facility to explain why the episode happened and what steps were taken to resolve it. Condition 27.8 requires Empire to annually report a summary of produced gas diversion events. Currently, the frequency and duration of these events do not warrant tracking their emissions. The EPA will review the annual reports to determine whether emissions tracking is needed.

Section 3.2 – Boiler EU-01 Recordkeeping Requirements

Condition 46 requires Empire to keep records showing that only non-resinated wood residue and bark are fed to the gasifier.

Section 4 – Kilns EU-02 Emission Limitations

Conditions 47 prohibits permittee from drying lumber for a species of wood if the species is not a Pacific Northwest softwood. The Pacific Northwest refers to the states and territories of Washington, Oregon, Northern California, Idaho, Montana, Wyoming and British Columbia.

Conditions 48 requires Empire to develop and implement an O&M plan for the kilns to minimize emissions. The permit allows Empire to employ best-fit-curve EF based upon small-scale kiln testing to determine the kilns EU-02 emissions without follow-up source testing for the reasons explained in Section 7.2 of the TSD. Compliance with this condition assures that drying will be carried out uniformly across the kiln to discourage the creation of “hot spots” that unnecessarily generate greater emissions. Compliance with this condition helps assure that use of the prescribed EF does not underreport the kilns EU-02 emissions. As stated in Condition 30.2, if the EPA determines that the plan does not achieve the goal of good air pollution control and efficient operation, then the EPA will notify the permittee of the specified deficiencies, and the permittee shall submit a revised plan to the EPA within 30 days.

Section 4.1 – Kilns EU-02 Emission Calculations

Conditions 49 requires that kilns EU-02 emissions be determined monthly by calculating emissions attributable to drying lumber of each product and then calculating the sum across all products. Product-specific emissions are calculated by multiplying lumber throughput (mbf/month) by EF (lb/mbf). The methodology for calculating monthly product-specific EF is specified in Appendix A of the permit. The highest EF from among all species for a given product must be used as the product-specific EF. Methanol and VOC EF are temperature-dependent, and the temperature used to calculate the EF shall be the greater of 190°F or the month’s highest kiln-wide average instantaneous dry bulb temperature (°F) of air entering a load of lumber for that product.

Section 4.2 – Kilns EU-02 Monitoring and Testing Requirements

Condition 50 requires the permittee to track various parameters for each batch of lumber dried in kilns EU-02. Table 10-1 summarizes the information to be recorded and what the information is used for:

Table 10-1: Kilns EU-02 Purpose of Recordkeeping Requirements

Permit Condition...	Summary of Information Recorded about a Batch	Purpose
50.1	Identity of products and associated wood species present	<ul style="list-style-type: none"> • Identity of species present in a product is needed to select the applicable equations to apply in Table A-1 of the permit to calculate the product-specific EF. • Identity of product is needed to identify batches from which temperature monitoring records will be used to calculate monthly product-specific EF.
50.2	Volume of lumber by product	Monthly volume of product dried is needed to determine monthly emissions resulting from drying that product. Multiply volume by EF to calculate emissions pursuant to Condition 49.
50.3	At least every 15 minutes, the instantaneous kiln-wide average dry bulb temperature of heated air that enters a load of lumber	Highest monthly instantaneous temperature measured of any batch containing that product (or 190°F) is used to calculate EF using applicable equations in Table A-1 of the permit.
50.4	Kiln moisture content of lumber measured with computerized Wellons system	Assists in efficiently drying lumber without over-drying it.
50.5	Moisture content of lumber determined based on O&M plan	Confirms EF are representative of lumber drying if lumber moisture content did not fall below 13%, dry basis

Each of the five kilns houses two side-by-side track systems. The track system is used for moving carts carrying stacks of lumber into and out of the kiln between batch drying cycles. The lumber carried by the carts on a single track inside the kiln is considered one load, so there are two loads (one on each track system) in each batch (i.e., charge) of lumber dried. A batch drying cycle duration can range from about one day to several days depending upon several factors.

Conditions 51 requires Empire to review monthly the information required to be monitored in Condition 50 and (1) calculate and record the product-specific volume of lumber dried and (2) record the product-specific maximum instantaneous kiln-wide average “entering air” temperatures.

Section 5 – WRC&PMCS EU-03 Emission Calculations

Condition 52 specifies the methodology for calculating WRC&PMCS EU-03 emissions resulting from the pneumatic conveyance of green wood residue. Green wood residue includes chips, shavings, hogged trim ends, sawdust, planer shavings, but not hogged bark. Pneumatic conveyance of kiln-dried wood residue likely generates some amount of VOC and methanol, but the EPA is not aware of an EF for this emission generating activity. The EPA is not requiring Empire to conduct source testing to determine an EF for pneumatic conveyance for kiln-dried wood residue because this activity’s emissions are expected to be relatively small. Its EF is likely a small fraction of the EF for green wood residue.

Section 5.1 – WRC&PMCS EU-03 Monitoring and Testing Requirements

Conditions 53 requires the permittee to develop a plan to determine monthly the mass of green wood residue pneumatically conveyed on an equipment-specific basis.

Appendix A – Calculation of Kilns EU-02 Monthly Methanol & VOC EF

Appendix A specifies calculation to determine monthly kilns EU-02 product-specific methanol and VOC EF.

Appendix A: PTE Emissions Inventory

Save file “tsd-app-a.xlsx” attached to adobe acrobat document. Open using Microsoft Excel.

Appendix B: Actual Emissions Inventory for Years 2007 through 2021

Save file “tsd-app-b.xlsx” attached to adobe acrobat document. Open using Microsoft Excel