United States Environmental Protection Agency
Region 10, Office of Air, Waste and Toxics
AWT-107
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

Permit Number: R10T5100100
Issued: September 30, 2013
Effective: September 30, 2013
Expiration: September 30, 2018
Replaces: R10T5ID0003
AFS Plant I.D. Number: 16-061-00001

Title V Air Quality Operating Permit

Permit Renewal No. 1

In accordance with the provisions of Title V of the Clean Air Act (42 U.S.C. 7401 *et seq.*), 40 CFR Part 71 and other applicable rules and regulations,

Blue North Forest Products, LLC

is authorized to operate air emission units and to conduct other air pollutant emitting activities in accordance with the conditions listed in this permit. This source is authorized to operate in the following location:

Location: Nez Perce Reservation
Woodland Road
Kamiah, Idaho
Latitude: 46.246 N, Longitude: 116.035 W

Responsible Official: Herb Hazen
Vice President, Manufacturing and Sales
Blue North Forest Products, LLC
P.O. Box 757
Kamiah, Idaho 83536-0757
Phone: 208.935.2547, Fax: 208.935.2540
Email: hjhazen22@hotmail.com

Owner: Michael F. Burns
2930 Westlake Avenue North, Suite 300
Seattle, Washington 98109-1968
Phone: 206.352.9324

The United States Environmental Protection Agency (EPA) has also developed a statement of basis that describes the bases for conditions contained in this permit.

Donald A. Dossett

Donald A. Dossett, P.E., Manager
Air Permits and Diesel Unit
Office of Air, Waste and Toxics
U.S. EPA, Region 10

9/30/13

Date

Table of Contents

1. Source Information and Emission Units 4
2. Standard Terms and Conditions 5
Compliance with the Permit 5
Permit Shield 5
Other Credible Evidence 5
Emergency Provisions 5
Permit Actions 6
Permit Expiration and Renewal 6
Off-Permit Changes 7
Emissions Trading and Operational Flexibility 7
Severability 7
Property Rights 8
3. General Requirements 8
General Compliance Schedule 8
Inspection and Entry 8
Open Burning Restrictions 8
Visible Emissions Limits 9
Fugitive Particulate Matter Requirements and Recordkeeping 10
Other Work Practice Requirements and Recordkeeping 11
General Testing and Associated Recordkeeping and Reporting 12
General Recordkeeping 13
General Reporting 14
Part 71 Emission and Fee Reporting 15
Annual Registration 16
Periodic and Deviation Reporting 17
Annual Compliance Certification 18
Document Certification 19
Permit Renewal 19
4. Facility-Specific Requirements 19
Fees and Emission Reports Due Date 19
Fuel Sulfur Limits 19
Fuel Sulfur Monitoring and Recordkeeping 20
Visible and Fugitive Emission Monitoring and Recordkeeping 20
Facility-Wide HAP Emission Limits and Work Practice Requirements 21

Table of Contents

Facility-Wide HAP Monitoring and Recordkeeping Requirements 21
Facility-Wide HAP Reporting Requirements 22
NESHAP Subpart JJJJJJ Work Practice and Emission Reduction Measures 22
NESHAP Subpart JJJJJJ Monitoring and Recordkeeping Requirements 23
NESHAP Subpart JJJJJJ Reporting Requirements 24
Monitoring for Modifications to the Facility – Employing PSD's Actual to Projected Actual Test 26
Reporting for Modifications to the Facility – Employing PSD's Actual to Projected Actual Test 27
5. Unit-Specific Requirements – BLR–1 (Hog Fuel-Fired Boiler No. 1) 27
BLR-1 Emission Limits and Work Practice Requirements 27
BLR-1 Testing Requirements 28
BLR-1 Monitoring and Recordkeeping Requirements 28
BLR-1 Reporting Requirements 31
6. Unit-Specific Requirements – BLR–2 (Hog Fuel-Fired Boiler No. 2) 32
BLR-2 Emission Limits and Work Practice Requirements 32
BLR-2 Testing Requirements 32
BLR-2 Monitoring and Recordkeeping Requirements 33
BLR-2 Reporting Requirements 36
7. Unit Specific Requirements – ENG-1 (Emergency Backup Engine No. 1) 37
ENG-1 Emission Limits and Work Practice Requirements 37
ENG-1 Monitoring and Recordkeeping Requirements 39
ENG-1 Reporting Requirements 39
8. Unit Specific Requirements – ENG-2 (Emergency Backup Engine No. 2) 40
ENG-2 Emission Limits and Work Practice Requirements 40
ENG-2 Monitoring and Recordkeeping Requirements 41
ENG-2 Reporting Requirements 42
9. Unit-Specific Requirements – KLN (Lumber Drying Kilns) 42
10. Unit-Specific Requirements – CYC (Wood Residual Cyclones) 43
11. Unit-Specific Requirements – SMI (Sawmill Activities Inside a Building) 43
Appendix A: Boiler Fuel-Heat-Input-To-Steam-Output Ratio 44
Appendix B: HCl Emission Factor Procedure for Hogged Fuel 45

1. Source Information and Emission Units

The Blue North Forest Products, LLC (BNFP or permittee) facility is a sawmill that produces dry dimensional lumber from logs. The emission units are listed in Table 1.

Table 1: Emission Units (EU) & Control Devices

EU ID	Emission Unit Description	Control Device[1]
BLR-1	31.7 MMBtu/hr capacity hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace. Induced draft. Water-cooled fixed grate. Actual steam production around 10,000 lb/hr of 110 psi steam in June 2013. Installed circa 1948.	Multiclone
BLR-2	31.7 MMBtu/hr capacity hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace. Induced draft. Water-cooled fixed grate. Actual steam production around 10,000 lb/hr of 110 psi steam in June 2013. Installed circa 1948.	Multiclone
ENG-1	Cummins NT-280-IF 255 horsepower compression-ignition diesel-fired engine to supply mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency. Manufactured 1971. Installed circa 1995. Rebuilt circa 2011.	None
ENG-2	Cummins NT-280-IF 255 horsepower compression-ignition diesel-fired engine to supply mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency. Manufactured 1971. Installed circa 1995.	None
KLN	Seven 64-foot double-track lumber drying kilns. Indirectly heated. Kilns No. 2 through 6 automated. Kilns No. 1 and 7 not automated. 16 dry bulbs and 2 wet bulbs per kiln.	None
CYC	Five wood residual cyclones. W4 – planer mill shavings cyclone. H1 – planer mill chipped trim ends hog cyclone. W3 – Atlas fuel bin cyclone. W5 – shavings cyclone on top of shavings/sawdust bin. T1 – saw mill trimmer sawdust cyclone on top of shavings/sawdust bin.	None.
BIN	Five wood residual bins. GS – green sawdust bin. GC – green chip bin. AF – Atlas fuel bin. SS – shavings and green trimmer sawdust bin. HF – hog fuel bin.	None.
SMI	Sawmill operations inside a building. This activity includes, but is not limited to, hogging, sawing, chipping, shaving and mechanical transfer of wood residuals.	Inside building
SMO	Sawmill operations outside a building. This activity includes, but is not limited to, debarking, hogging, sawing, chipping, mechanical transfer of wood residuals and hog fuel storage pile.	None.
PT	Plant traffic generating fugitive emissions along paved and unpaved roads.	Watering

[1] The multiclone is required to be used by this permit.

2. Standard Terms and Conditions

2.1. Terms not otherwise defined in this permit have the meaning assigned to them in the referenced regulations. The language of the cited regulation takes precedence over paraphrasing except the text of terms specified pursuant to any of the following sections is directly enforceable: section 304(f)(4) of the Federal Clean Air Act (CAA), 40 CFR §§ 71.6(a)(3)(i)(B and C), 71.6(a)(3)(ii), and 71.6(b), or any other term specifically identified as directly enforceable.

Compliance with the Permit

2.2. The permittee must comply with all conditions of this Part 71 permit. All terms and conditions of this permit are enforceable by EPA and citizens under the Clean Air Act. Any permit noncompliance constitutes a violation of the Clean Air Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. [40 CFR § 71.6(a)(6)(i)]

2.3. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. [40 CFR § 71.6(a)(6)(ii)]

Permit Shield

2.4. Compliance with the terms and conditions of this permit shall be deemed compliance with the applicable requirements specifically listed in this permit as of the date of permit issuance. [40 CFR § 71.6(f)(1)]

2.5. Nothing in this permit shall alter or affect the following:

2.5.1. The provisions of section 303 of the Clean Air Act (emergency orders), including the authority of EPA under that section;

2.5.2. The liability of a permittee for any violation of applicable requirements prior to or at the time of permit issuance;

2.5.3. The applicable requirements of the acid rain program, consistent with section 408(a) of the Clean Air Act; or

2.5.4. The ability of EPA to obtain information under section 114 of the Clean Air Act. [40 CFR § 71.6(f)(3)]

Other Credible Evidence

2.6. For the purpose of submitting compliance certifications in accordance with Condition 3.49 of this permit, or establishing whether or not a person has violated or is in violation of any requirement of this permit, nothing shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.
[Section 113(a) and 113(e)(1) of the CAA, 40 CFR §§ 51.212, 52.12, 52.33, 60.11(g) and 61.12]

Emergency Provisions

2.7. In addition to any emergency or upset provision contained in any applicable requirement, the permittee may seek to establish that noncompliance with a technology-based emission limitation under this permit was due to an emergency. To do so, the permittee shall demonstrate the

affirmative defense of emergency through properly signed, contemporaneous operating logs, or other relevant evidence that:

2.7.1. An emergency occurred and that the permittee can identify the cause(s) of the emergency;

2.7.2. The permitted facility was at the time being properly operated;

2.7.3. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards, or other requirements in this permit; and

2.7.4. The permittee submitted notice of the emergency to EPA within 2 working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken. This notice fulfills the requirements of Condition 3.48 of this permit, concerning prompt notification of deviations.

[40 CFR §§ 71.6(g)(2), (3) and (5)]

2.8. In any enforcement proceeding, the permittee attempting to establish the occurrence of an emergency has the burden of proof. [40 CFR § 71.6(g)(4)]

2.9. An "emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventive maintenance, careless or improper operation, or operator error. [40 CFR § 71.6(g)(1)]

Permit Actions

2.10. This permit may be modified, revoked, reopened, and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR § 71.6(a)(6)(iii)]

2.11. The permit may be reopened by EPA and the permit revised prior to expiration under any of the circumstances described in 40 CFR § 71.7(f). [40 CFR § 71.7(f)]

Permit Expiration and Renewal

2.12. Nothing in this permit shall alter or affect the following: This permit shall expire on the expiration date on page one of this permit or on an earlier date if the source is issued a Part 70 or Part 71 permit by a permitting authority under an EPA approved or delegated permit program. [40 CFR § 71.6(a)(11)]

2.13. Expiration of this permit terminates the permittee's right to operate unless a timely and complete permit renewal application has been submitted at least six months, but not more than 18 months, prior to the date of expiration of this permit. [40 CFR §§ 71.5(a)(1)(iii), 71.7(b) and 71.7(c)(1)(ii)]

2.14. If the permittee submits a timely and complete permit application for renewal, consistent with 40 CFR § 71.5(a)(2), but EPA has failed to issue or deny the renewal permit, then all the terms and conditions of the permit, including any permit shield granted pursuant to 40 CFR § 71.6(f) shall remain in effect until the renewal permit has been issued or denied. This permit shield shall cease to apply if, subsequent to the completeness determination, the permittee fails to submit by the deadline specified in writing by EPA any additional information identified as being needed to process the application. [40 CFR §§ 71.7(c)(3) and 71.7(b)]

Off-Permit Changes

2.15. The permittee is allowed to make certain changes without a permit revision, provided that the following requirements are met:

2.15.1. Each change is not addressed or prohibited by this permit;

2.15.2. Each change meets all applicable requirements and does not violate any existing permit term or condition;

2.15.3. The changes are not changes subject to any requirement of 40 CFR Parts 72 through 78 or modifications under any provision of Title I of the Clean Air Act;

2.15.4. The permittee provides contemporaneous written notice to EPA of each change, except for changes that qualify as insignificant activities under 40 CFR § 71.5(c)(11), that describes each change, the date of the change, any change in emissions, pollutants emitted, and any applicable requirements that would apply as a result of the change;

2.15.5. The changes are not covered by a permit shield provided under 40 CFR § 71.6(f) and Conditions 2.4 and 2.5 of this permit; and

2.15.6. The permittee keeps a record describing all changes that result in emissions of any regulated air pollutant subject to any applicable requirement not otherwise regulated under this permit, and the emissions resulting from those changes.

[40 CFR §71.6(a)(12)]

Emissions Trading and Operational Flexibility

2.16. The permittee is allowed to make a limited class of changes under section 502(b)(10) of the Clean Air Act within this permitted facility that contravene the specific terms of this permit without applying for a permit revision, provided:

2.16.1. The changes do not exceed the emissions allowable under this permit (whether expressed therein as a rate of emissions or in terms of total emissions);

2.16.2. The changes are not modifications under any provision of Title I of the Clean Air Act;

2.16.3. The changes do not violate applicable requirements;

2.16.4. The changes do not contravene federally enforceable permit terms and conditions that are monitoring (including test methods), recordkeeping, reporting, or compliance certification requirements;

2.16.5. The permittee sends a notice to EPA, at least 7 days in advance of any change made under this provision, that describes the change, when it will occur and any change in emissions and identifies any permit terms or conditions made inapplicable as a result of the change and the permittee attaches each notice to its copy this permit; and

2.16.6. The changes are not covered by a permit shield provided under 40 CFR § 71.6(f) and Conditions 2.4 and 2.5 of this permit. [40 CFR § 71.6(a)(13)(i)]

2.17. No permit revision shall be required, under any approved economic incentives, marketable permits, emissions trading and other similar programs or processes for changes that are provided for in this permit. [40 CFR § 71.6(a)(8)]

Severability

2.18. The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force. [40 CFR §71.6(a)(5)]

Property Rights

2.19. This permit does not convey any property rights of any sort, or any exclusive privilege. [40 CFR §71.6(a)(6)(iv)]

3. General Requirements

General Compliance Schedule

3.1. For applicable requirements with which the source is in compliance, the permittee will continue to comply with such requirements. [40 CFR §§ 71.6(c)(3) and 71.5(c)(8)(iii)(A)]

3.2. For applicable requirements that will become effective during the permit term, the permittee shall meet such requirements on a timely basis. [40 CFR §§ 71.6(c)(3) and 71.5(c)(8)(iii)(B)]

Inspection and Entry

3.3. Upon presentation of credentials and other documents as may be required by law, the permittee shall allow EPA or an authorized representative to perform the following:

3.3.1. Enter upon the permittee's premises where a Part 71 source is located or emissions-related activity is conducted, or where records must be kept under the conditions of the permit;

3.3.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;

3.3.3. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and

3.3.4. As authorized by the Clean Air Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements. [40 CFR § 71.6(c)(2)]

Open Burning Restrictions

3.4. Except as exempted in 40 CFR § 49.131(c), the permittee shall not openly burn, or allow the open burning of, the following materials:

3.4.1. Garbage;

3.4.2. Dead animals or parts of dead animals;

3.4.3. Junked motor vehicles or any materials resulting from a salvage operation;

3.4.4. Tires or rubber materials or products;

3.4.5. Plastics, plastic products, or styrofoam;

3.4.6. Asphalt or composition roofing, or any other asphaltic material or product;

3.4.7. Tar, tarpaper, petroleum products, or paints;

3.4.8. Paper, paper products, or cardboard other than what is necessary to start a fire or that is generated at single-family residences or residential buildings with four or fewer dwelling units and is burned at the residential site;

3.4.9. Lumber or timbers treated with preservatives;

3.4.10. Construction debris or demolition waste;

3.4.11. Pesticides, herbicides, fertilizers, or other chemicals;

3.4.12. Insulated wire;

3.4.13. Batteries;

3.4.14. Light bulbs;

3.4.15. Materials containing mercury (e.g., thermometers);

3.4.16. Asbestos or asbestos-containing materials;

3.4.17. Pathogenic wastes;

3.4.18. Hazardous wastes; or

3.4.19. Any material other than natural vegetation that normally emits dense smoke or noxious fumes when burned. [40 CFR §§ 49.131(c) and (d)(1)]

3.5. Open burning shall be conducted as follows:

3.5.1. All materials to be openly burned shall be kept as dry as possible through the use of a cover or dry storage;

3.5.2. Before igniting a burn, noncombustibles shall be separated from the materials to be openly burned to the greatest extent practicable;

3.5.3. Natural or artificially induced draft shall be present, including the use of blowers or air curtain incinerators where practicable;

3.5.4. To the greatest extent practicable, materials to be openly burned shall be separated from the grass or peat layer; and

3.5.5. A fire shall not be allowed to smolder. [40 CFR § 49.131(e)(1)]

3.6. Except for exempted fires set for cultural or traditional purposes, a person shall not initiate any open burning when:

3.6.1. The Regional Administrator has declared a burn ban; or

3.6.2. An air stagnation advisory has been issued or an air pollution alert, warning or emergency has been declared by the Regional Administrator.
[40 CFR §§ 49.131(d)(2), (d)(3) and (e)(2), and 49.137(c)(4)(i)]

3.7. Except for exempted fires set for cultural or traditional purposes, any person conducting open burning when such an advisory is issued or declaration is made shall either immediately extinguish the fire, or immediately withhold additional material such that the fire burns down.
[40 CFR §§ 49.131(e)(3) and 49.137(c)(4)(ii)]

3.8. Nothing in this section exempts or excuses any person from complying with applicable laws and ordinances of local fire departments and other governmental jurisdictions.
[40 CFR § 49.131(d)(4)]

Visible Emissions Limits

3.9. Except as provided for in Conditions 3.10 and 3.11, the visible emissions from any air pollution source that emits, or could emit, particulate matter or other visible air pollutants shall not exceed 20% opacity, averaged over any consecutive six-minute period. Compliance with this emission limit is determined as follows:

3.9.1. Using EPA Reference Method 9 found in Appendix A of 40 CFR part 60; or

3.9.2. Alternatively, using a continuous opacity monitoring system that complies with Performance Specification 1 found in Appendix B of 40 CFR part 60. [40 CFR §§ 49.124(d)(1) and (e)]

3.10. The requirements of Condition 3.9 do not apply to open burning, agricultural activities, forestry and silvicultural activities, non-commercial smoke houses, sweat houses or lodges, smudge pots, furnaces and boilers used exclusively to heat residential buildings with four or fewer dwelling units, or emissions from fuel combustion in mobile sources. [40 CFR § 49.124(c)]

3.11. Exceptions to the visible emission limit in Condition 3.9 include:

3.11.1. The visible emissions from an air pollution source may exceed the 20% opacity limit if the owner or operator of the air pollution source demonstrates to the Regional Administrator's satisfaction that the presence of uncombined water, such as steam, is the only reason for the failure of an air pollution source to meet the 20% opacity limit.

3.11.2. The visible emissions from an oil-fired boiler or solid fuel-fired boiler that continuously measures opacity with a continuous opacity monitoring system (COMS) may exceed the 20% opacity limit during start-up, soot blowing, and grate cleaning for a single period of up to 15 consecutive minutes in any eight consecutive hours, but must not exceed 60% opacity at any time. [40 CFR §§ 49.124(d)(2) and (3)]

Fugitive Particulate Matter Requirements and Recordkeeping

3.12. Except as provided for in Condition 3.17, the permittee shall take all reasonable precautions to prevent fugitive particulate matter emissions and shall maintain and operate all pollutant-emitting activities to minimize fugitive particulate matter emissions. Reasonable precautions include, but are not limited to the following:

3.12.1. Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, grading of roads, or clearing of land;

3.12.2. Application of asphalt, oil (but not used oil), water, or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces that can create airborne dust;

3.12.3. Full or partial enclosure of materials stockpiles in cases where application of oil, water, or chemicals is not sufficient or appropriate to prevent particulate matter from becoming airborne;

3.12.4. Implementation of good housekeeping practices to avoid or minimize the accumulation of dusty materials that have the potential to become airborne, and the prompt cleanup of spilled or accumulated materials;

3.12.5. Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;

3.12.6. Adequate containment during sandblasting or other similar operations;

3.12.7. Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne; and

3.12.8. The prompt removal from paved streets of earth or other material that does or may become airborne. [40 CFR §§ 49.126(d)(1) and (2)]

3.13. Once each calendar year, during typical operating conditions and meteorological conditions conducive to producing fugitive dust, the permittee shall survey the facility to determine the sources of fugitive particulate matter emissions. For new sources or new operations, a survey shall be conducted within 30 days after commencing operation.

3.13.1. The permittee shall record the results of the survey, including the date and time of the survey and identification of any sources of fugitive particulate matter emissions found; and

3.13.2. If sources of fugitive particulate matter emissions are present, the permittee shall determine the reasonable precautions that will be taken to prevent fugitive particulate matter emissions. [40 CFR §§ 49.126(e)(1)(i) and (ii)]

3.14. The permittee shall prepare, and update as necessary following each survey, a written plan that specifies the reasonable precautions that will be taken and the procedures to be followed to prevent fugitive particulate matter emissions, including appropriate monitoring and recordkeeping.

3.14.1. For construction or demolition activities, a written plan shall be prepared prior to commencing construction or demolition. [40 CFR §§ 49.126(e)(1)(iii) and (iv)]

3.15. The permittee shall implement the written plan, and maintain and operate all sources to minimize fugitive particulate matter emissions. [40 CFR §§ 49.126(e)(1)(iii) and (iv)]

3.16. Efforts to comply with this section cannot be used as a reason for not complying with other applicable laws and ordinances. [40 CFR § 49.126(e)(3)]

3.17. The requirements of Conditions 3.12 through 3.16 do not apply to open burning, agricultural activities, forestry and silvicultural activities, sweat houses or lodges, non-commercial smoke houses, or activities associated with single-family residences or residential buildings with four or fewer dwelling units. [40 CFR § 49.126(c)]

Other Work Practice Requirements and Recordkeeping

3.18. The permittee shall comply with the requirements of the Chemical Accident Prevention Provisions at 40 CFR Part 68 no later than the latest of the following dates:

3.18.1. Three years after the date on which a regulated substance, present above the threshold quantity in a process, is first listed under 40 CFR § 68.130; or

3.18.2. The date on which a regulated substance is first present above a threshold quantity in a process. [40 CFR § 68.10]

3.19. Except as provided for motor vehicle air conditioners (MVACs) in 40 CFR Part 82, Subpart B, the permittee shall comply with the stratospheric ozone and climate protection standards for recycling and emissions reduction pursuant to 40 CFR Part 82, Subpart F.

3.19.1. Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to 40 CFR § 82.156.

3.19.2. Equipment used during the maintenance, service, repair, or disposal of appliances must comply with the standards for recycling and recovery equipment pursuant to 40 CFR § 82.158.

3.19.3. Persons performing maintenance, service, repair, or disposal of appliances must be certified by an approved technician certification program pursuant to 40 CFR § 82.161.

3.19.4. Persons disposing of small appliances, MVACs, and MVAC-like appliances must comply with recordkeeping requirements pursuant to 40 CFR § 82.166. ("MVAC-like appliance" is defined at 40 CFR § 82.152.)

3.19.5. Persons owning commercial or industrial process refrigeration equipment must comply with the leak repair requirements pursuant to 40 CFR § 82.156.

3.19.6. Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to 40 CFR § 82.166. [40 CFR Part 82, Subpart F]

3.20. If the permittee performs a service on motor (fleet) vehicles when this service involves ozone-depleting substance refrigerant (or regulated substitute substance) in the MVAC, the permittee must comply with all the applicable requirements for stratospheric ozone and climate protection as specified in 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. [40 CFR Part 82, Subpart B]

3.21. The permittee shall comply with 40 CFR Part 61, Subpart M for asbestos removal and disposal when conducting any renovation or demolition at the facility. [40 CFR Part 61, Subpart M]

General Testing and Associated Recordkeeping and Reporting

3.22. In addition to the specific testing requirements contained in the emission unit sections of this permit, the permittee shall comply with the generally applicable testing requirements in Conditions 3.23 through 3.30 whenever conducting a performance test or emission factor derivation test required by this permit unless specifically stated otherwise in this permit. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.23. Test Notification. The permittee shall provide EPA at least 30 days prior notice of any performance test, except as otherwise specified in this permit, to afford EPA the opportunity to have an observer present. If after 30 days notice for an initially scheduled performance test, there is a delay in conducting the scheduled performance test, the permittee shall notify EPA as soon as possible of any delay in the original test date, either by providing at least 7 days prior notice of the rescheduled date of the performance test, or by arranging a rescheduled date with EPA by mutual agreement. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.24. Test Plan. The permittee shall submit to EPA a source test plan 30 days prior to any required testing. The source test plan shall include and address the following elements:

3.24.1. Purpose and scope of testing;

3.24.2. Source description, including a description of the operating scenarios and mode of operation during testing and including fuel sampling and analysis procedures;

3.24.3. Schedule/dates of testing;

3.24.4. Process data to be collected during the test and reported with the results, including source-specific data identified in the emission unit sections of this permit;

3.24.5. Sampling and analysis procedures, specifically requesting approval for any proposed alternatives to the reference test methods, and addressing minimum test length (e.g., one hour, 8 hours, 24 hours, etc.) and minimum sample volume;

3.24.6. Sampling location description and compliance with the reference test methods;

3.24.7. Analysis procedures and laboratory identification;

3.24.8. Quality assurance plan;

3.24.9. Calibration procedures and frequency;

3.24.10. Sample recovery and field documentation;

3.24.11. Chain of custody procedures;

3.24.12. Quality assurance/quality control project flow chart;

3.24.13. Data processing and reporting;

3.24.14. Description of data handling and quality control procedures; and

3.24.15. Report content and timing. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.25. Facilities for performing and observing the emission testing shall be provided that meet the requirements of 40 CFR 60.8(e) and Reference Method 1 (40 CFR Part 60, Appendix A). [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.26. Unless EPA determines in writing that other operating conditions are representative of normal operations or unless specified in the emission unit sections of this permit, the source shall be operated at a capacity of at least 90% but no more than 100% of maximum during all tests. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.27. Only regular operating staff may adjust the processes or emission control devices during or within 2 hours prior to the start of a source test. Any operating adjustments made during a source test, that are a result of consultation during the tests with source testing personnel, equipment vendors, or consultants, may render the source test invalid. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.28. Each source test shall follow the reference test methods specified by this permit and consist of at least three (3) valid test runs.

3.28.1. If the reference test method yields measured pollutant concentration values at an oxygen concentration other than specified in the emission standard, the permittee shall correct the measured pollutant concentration to the oxygen concentration specified in the emission standard by using the following equation:

$$PC_X = PC_M \times \frac{(20.9 - X)}{(20.9 - Y)}$$

Where: PC_X = Pollutant concentration at X percent;
PC_M = Pollutant concentration as measured;
X = The oxygen concentration specified in the standard; and
Y = The measured average volumetric oxygen concentration.
[40 CFR § 71.6(a)(3)(i)(B)]

3.28.2. Source test emission data shall be reported as the arithmetic average of all valid test runs and in the terms of any applicable emission limit, unless otherwise specified in the emission unit sections of this permit. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.29. Test Records. For the duration of each test run (unless otherwise specified), the permittee shall record the following information:

3.29.1. All data which is required to be monitored during the test in the emission unit sections of this permit; and

3.29.2. All continuous monitoring system data which is required to be routinely monitored in the emission unit sections of this permit for the emission unit being tested. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

3.30. Test Reports. Emission test reports shall be submitted to EPA within 45 days of completing any emission test required by this permit along with items required to be recorded in Condition 3.29 above. [40 CFR §§ 71.6(a)(3) and 71.6(c)(1)]

General Recordkeeping

3.31. Monitoring Records. The permittee shall keep records of required monitoring information that include the following:

3.31.1. The date, place, and time of sampling or measurements;

3.31.2. The date(s) analyses were performed;

3.31.3. The company or entity that performed the analyses;

3.31.4. The analytical techniques or methods used;

3.31.5. The results of such analyses; and,

3.31.6. The operating conditions as existing at the time of sampling or measurement.

[40 CFR § 71.6(a)(3)(ii)(A)]

3.32. Off-Permit Change Records. The permittee shall keep a record describing all off-permit changes allowed to be made under Condition 2.15 that result in emissions of any regulated air pollutant subject to any applicable requirement not otherwise regulated under this permit, and the emissions resulting from those changes. [40 CFR §71.6(a)(12)]

3.33. Open Burning Records. For any open burning allowed under Conditions 3.4 through 3.8, the permittee shall document the following:

3.33.1. The date that burning was initiated;

3.33.2. The duration of the burn;

3.33.3. The measures taken to comply with each provision of Condition 3.5; and

3.33.4. The measures taken to ensure that materials prohibited in Condition 3.4 were not burned. [40 CFR § 71.6(a)(3)(i)(B)]

3.34. Fee Records. The permittee shall retain in accordance with the provisions of Condition 3.35 of this permit, all work sheets and other materials used to determine fee payments. Records shall be retained for five years following the year in which the emissions data is submitted.

[40 CFR § 71.9(i)]

3.35. Records Retention. The permittee shall retain records of all required monitoring data and support information for a period of at least 5 years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records, all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. [40 CFR §§ 71.6(a)(3)(ii)(B), 49.126(e)(1)(v) and 49.130(f)(2)]

General Reporting

3.36. Additional Information. The permittee shall furnish to EPA, within a reasonable time, any information that EPA may request in writing to determine whether cause exists for modifying, revoking, and reissuing, or terminating the permit, or to determine compliance with the permit. Upon request, the permittee shall also furnish to EPA copies of records that are required to be kept pursuant to the terms of the permit, including information claimed to be confidential. Information claimed to be confidential must be accompanied by a claim of confidentiality according to the provisions of 40 CFR Part 2, Subpart B.

[40 CFR §§ 71.6(a)(6)(v) and 71.5(a)(3)]

3.37. Corrections. The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information. [40 CFR § 71.5(b)]

3.38. Off-Permit Change Report. The permittee shall provide contemporaneous written notice to EPA of each off-permit change allowed to be made under Condition 2.15, except for changes that qualify as insignificant activities under 40 CFR § 71.5(c)(11). The written notice shall describe

each change, the date of the change, any change in emissions, pollutants emitted, and any applicable requirements that would apply as a result of the change; [40 CFR §71.6(a)(12)]

3.39. Section 502(b)(10) Change Report. The permittee is required to send a notice to EPA at least 7 days in advance of any section 502(b)(10) change allowed to be made under Condition 2.16. The notice must describe the change, when it will occur and any change in emissions, and identify any permit terms or conditions made inapplicable as a result of the change. The permittee shall attach each notice to its copy of this permit. [40 CFR § 71.6(a)(13)(i)(A)]

3.40. Address. Unless otherwise specified in this permit, any documents required to be submitted under this permit, including reports, test data, monitoring data, notifications, compliance certifications, fee calculation worksheets, and applications for renewals and permit modifications shall be submitted to the EPA address below. A copy of each document submitted to EPA that does not contain confidential business information shall be sent to the Tribal address below:

Original documents go to EPA at:	Copies go to Tribe at:
Part 71 Air Quality Permits U.S. EPA - Region 10, AWT-107 1200 Sixth Avenue, Suite 900 Seattle, WA 98101-3140	Air Quality Coordinator Nez Perce Tribe P.O. Box 365 Lapwai, ID 83540-0365

[40 CFR §§ 71.5(d), 71.6(c)(1) and 71.9(h)(2)]

Part 71 Emission and Fee Reporting

3.41. Part 71 Annual Emission Report. No later than the date specified in Condition 4.1 of each year, the permittee shall submit to EPA an annual report of actual emissions for the preceding calendar year. [40 CFR § 71.9(h)(1)]

3.41.1. "Actual emissions" means the actual rate of emissions in tons per year of any "regulated pollutant (for fee calculation)," as defined in 40 CFR § 71.2, emitted from a Part 71 source over the preceding calendar year. Actual emissions shall be calculated using each emissions unit's actual operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted during the preceding calendar year. [40 CFR § 71.9(c)(6)]

3.41.2. Actual emissions shall be computed using methods required by the permit for determining compliance, such as monitoring or source testing data. [40 CFR § 71.9(h)(3)]

3.41.3. Actual emissions shall include fugitive emissions. [40 CFR § 71.9(c)(1)]

3.42. Part 71 Fee Calculation Worksheet. Based on the annual emission report required in Condition 3.41 and no later than the date specified in Condition 4.1 of each year, the permittee shall submit to EPA a fee calculation worksheet (blank forms provided by EPA) and a photocopy of each fee payment check (or other confirmation of actual fee paid). [40 CFR §§ 71.9(c)(1), 71.9(e)(1) and 71.9(h)(1)]

3.42.1. The annual emissions fee shall be calculated by multiplying the total tons of actual emissions of each "regulated pollutant (for fee calculation)," emitted from the source by the presumptive emission fee (in dollars/ton) in effect at the time of calculation. The presumptive emission fee is revised each calendar year and is available from EPA prior to the start of each calendar year. [40 CFR § 71.9(c)(1)]

3.42.2. The permittee shall exclude the following emissions from the calculation of fees:

3.42.2.1 The amount of actual emissions of each regulated pollutant (for fee calculation) that the source emits in excess of 4,000 tons per year;

3.42.2.2 Actual emissions of any regulated pollutant (for fee calculation) already included in the fee calculation; and

3.42.2.3 The insignificant quantities of actual emissions not required to be listed or calculated in a permit application pursuant to 40 CFR § 71.5(c)(11). [40 CFR § 71.9(c)(5)]

3.43. Part 71 Annual Fee Payment. No later than the date specified in Condition 4.1 of each year, the permittee shall submit to EPA full payment of the annual permit fee based on the fee calculation worksheet required in Condition 3.42. [40 CFR §§ 71.9(a), 71.9(c)(1) and 71.9(h)(1)]

3.43.1. The fee payment and a completed fee filing form shall be sent to:

U.S.EPA
FOIA and Miscellaneous Payments
Cincinnati Finance Center
P. O. Box 979078
St Louis, MO 63197-9000

[40 CFR § 71.9(k)(2)]

3.43.2. The fee payment shall be in United States currency and shall be paid by money order, bank draft, certified check, corporate check, or electronic funds transfer payable to the order of the U.S. Environmental Protection Agency. [40 CFR § 71.9(k)(1)]

3.43.3. The permittee, when notified by EPA of additional amounts due, shall remit full payment within 30 days of receipt of an invoice from EPA. [40 CFR § 71.9(j)(2)]

3.43.4. If the permittee thinks an EPA assessed fee is in error and wishes to challenge such fee, the permittee shall provide a written explanation of the alleged error to EPA along with full payment of the EPA assessed fee. [40 CFR § 71.9(j)(3)]

3.43.5. Failure of the permittee to pay fees in a timely manner shall subject the permittee to assessment of penalties and interest in accordance with 40 CFR § 71.9(l). [40 CFR § 71.9(l)]

3.44. The annual emission report and fee calculation worksheet (and photocopy of each fee payment check), required in Conditions 3.41 and 3.42, shall be submitted to EPA at the address listed in Condition 3.40 of this permit.[1] [40 CFR § 71.9(k)(1)]

3.45. The annual emission report and fee calculation worksheet (and photocopy of each fee payment check), required in Conditions 3.41 and 3.42, shall be certified by a responsible official in accordance with Condition 3.50 of this permit. [40 CFR § 71.9(h)(2)]

Annual Registration

3.46. The permittee shall submit an annual registration report that consists of estimates of the total actual emissions from the air pollution source for the following air pollutants: PM, PM_{10}, $PM_{2.5}$, SO_X, NO_X, CO, VOC, lead and lead compounds, ammonia, fluorides (gaseous and particulate), sulfuric acid mist, hydrogen sulfide, total reduced sulfur (TRS), and reduced sulfur compounds, including all calculations for the estimates. Emissions shall be calculated using the actual

[1] The permittee should note that an annual emissions report, required at the same time as the fee calculation worksheet by 40 CFR § 71.9(h), has been incorporated into the fee calculation worksheet.

operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted during the preceding calendar year.

[40 CFR §§ 49.138(e)(3)(xii), (e)(4) and (f)]

3.46.1. The emission estimates required by Condition 3.46 shall be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Regional Administrator. Any emission estimates submitted to the Regional Administrator shall be verifiable using currently accepted engineering criteria. The following procedures are generally acceptable for estimating emissions from air pollution sources:

3.46.1.1 Source-specific emission tests;

3.46.1.2 Mass balance calculations;

3.46.1.3 Published, verifiable emission factors that are applicable to the source;

3.46.1.4 Other engineering calculations; or

3.46.1.5 Other procedures to estimate emissions specifically approved by the Regional Administrator. [40 CFR §§ 49.138(e)(4) and (f)]

3.46.2. The annual registration report shall be submitted with the annual emission report and fee calculation worksheet required by Conditions 3.41 and 3.42 of this permit. The permittee may submit a single combined report provided that the combined report clearly identifies which emissions are the basis for the annual registration report, the part 71 annual emission report, and the part 71 fee calculation worksheet. All registration information and reports shall be submitted on forms provided by the Regional Administrator. [40 CFR §§ 49.138(d) and (f)]

Periodic and Deviation Reporting

3.47. Semi-Annual Monitoring Report. The permittee shall submit to EPA reports of any required monitoring for each six month reporting period from July 1 to December 31 and from January 1 to June 30. All reports shall be submitted to EPA and shall be postmarked by the 45th day following the end of the reporting period. All instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by a responsible official consistent with Condition 3.50. [40 CFR § 71.6(a)(3)(iii)(A)]

3.48. Deviation Report. The permittee shall promptly report to EPA, by telephone or facsimile, deviations from permit conditions, including those attributable to upset conditions as defined in this permit, the probable cause of such deviations, and any corrective actions or preventive measures taken. The report shall be made using the following numbers:

Telephone: (206) 553-1331
Facsimile: (206) 553-0110
Attn: Part 71 Deviation Report

[40 CFR § 71.6(a)(3)(iii)(B)]

3.48.1. For the purposes of Conditions 3.47 and 3.48, deviation means any situation in which an emissions unit fails to meet a permit term or condition. A deviation is not always a violation. A deviation can be determined by observation or through review of data obtained from any testing, monitoring, or record keeping required by this permit. For a situation lasting more than 24 hours, each 24-hour period is considered a separate deviation. Included in the meaning of deviation are any of the following:

3.48.1.1 A situation where emissions exceed an emission limitation or standard;

3.48.1.2 A situation where process or emissions control device parameter values indicate that an emission limitation or standard has not been met;

3.48.1.3 A situation in which observations or data collected demonstrate noncompliance with an emission limitation or standard or any work practice or operating condition required by the permit (including indicators of compliance revealed through parameter monitoring);

3.48.1.4 A situation in which any testing, monitoring, recordkeeping or reporting required by this permit is not performed or not performed as required;

3.48.1.5 A situation in which an exceedance or an excursion, as defined in 40 CFR Part 64, occurs; and

3.48.1.6 Failure to comply with a permit term that requires submittal of a report. [40 CFR § 71.6(a)(3)(iii)(C)]

3.48.2. For the purpose of Condition 3.48 of the permit, prompt is defined as any definition of prompt or a specific time frame for reporting deviations provided in an underlying applicable requirement as identified in this permit. Where the underlying applicable requirement fails to address the time frame for reporting deviations, reports of deviations will be submitted based on the following schedule:

3.48.2.1 For emissions of a hazardous air pollutant or a toxic air pollutant (as identified in the applicable regulation) that continue for more than an hour in excess of permit requirements, the report must be made within 24 hours of the occurrence;

3.48.2.2 For emissions of any regulated pollutant excluding those listed in Condition 3.48.2.1 above, that continue for more than two hours in excess of permit requirements, the report must be made within 48 hours of the occurrence; or

3.48.2.3 For all other deviations from permit requirements, the report shall be submitted with the semi-annual monitoring report required in Condition 3.47. [40 CFR § 71.6(a)(3)(iii)(B)]

3.48.3. Within 10 working days of the occurrence of a deviation as provided in Condition 3.48.2.1 or 3.48.2.2 above, the permittee shall also submit a written notice, which shall include a narrative description of the deviation and updated information as listed in Condition 3.48, to EPA, certified consistent with Condition 3.50 of this permit. [40 CFR §§ 71.6(a)(3)(i)(B) and (iii)(B)]

Annual Compliance Certification

3.49. The permittee shall submit to EPA a certification of compliance with permit terms and conditions, including emission limitations, standards, or work practices, postmarked by February 28 of each year and covering the permit or permits in effect during the previous calendar year. The compliance certification shall be certified as to truth, accuracy, and completeness by a responsible official consistent with Condition 3.50 of this permit. [40 CFR § 71.6(c)(5)]

3.49.1. The annual compliance certification shall include the following:

3.49.1.1 The identification of each permit term or condition that is the basis of the certification;

3.49.1.2 The identification of the method(s) or other means used by the permittee for determining the compliance status with each term and condition during

the certification period. Such methods and other means shall include, at a minimum, the methods and means required in this permit. If necessary, the permittee also shall identify any other material information that must be included in the certification to comply with section 113(c)(2) of the Clean Air Act, which prohibits knowingly making a false certification or omitting material information; and

3.49.1.3 The status of compliance with each term and condition of the permit for the period covered by the certification, including whether compliance during the period was continuous or intermittent. The certification shall be based on the method or means designated above. The certification shall identify each deviation and take it into account in the compliance certification. The certification shall also identify as possible exceptions to compliance any periods during which compliance is required and in which an excursion or exceedance as defined under 40 CFR Part 64 occurred.

[40 CFR § 71.6(c)(5)(iii)]

Document Certification

3.50. Any document required to be submitted under this permit shall be certified by a responsible official as to truth, accuracy, and completeness. Such certifications shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. [40 CFR §§ 71.5(d), 71.6(c)(1) and 71.9(h)(2)]

Permit Renewal

3.51. The permittee shall submit a timely and complete application for permit renewal at least six months, but not more than 18 months, prior to the date of expiration of this permit.

[40 CFR §§ 71.5(a)(1)(iii), 71.7(b) and 71.7(c)(1)(ii)]

3.52. The application for renewal shall include the current permit number, a description of permit revisions and off-permit changes that occurred during the permit term and were not incorporated into the permit during the permit term, any applicable requirements that were promulgated and not incorporated into the permit during the permit term, and other information required by the application form. [40 CFR §§ 71.5(a)(2) and 71.5(c)(5)]

4. Facility-Specific Requirements

Fees and Emission Reports Due Date

4.1. Unless otherwise specified, fees and emission reports required by this permit are due annually on November 15. [40 CFR §§ 71.9(a) and 71.9(h)]

Fuel Sulfur Limits

4.2. The permittee shall not sell, distribute, use, or make available for use any solid fuel that contains more than 2.0 percent sulfur by weight. [40 CFR § 49.130(d)(7)]

4.2.1. Compliance with the sulfur limit is determined using ASTM method E775-87(2004). [40 CFR § 49.130(e)(3)]

4.3. The permittee shall not sell, distribute, use, or make available for use any ASTM Grade 2 distillate fuel oil that contains more than 0.5 percent sulfur by weight. [40 CFR § 49.130(d)(4)]

4.3.1. Compliance with the sulfur limit is determined using ASTM methods D2880-03, D4294-03, D6021-96(2001). [40 CFR § 49.130(e)(1)]

Fuel Sulfur Monitoring and Recordkeeping

4.4. The permittee shall keep records showing that only wood is combusted in the boilers. [40 CFR § 49.130(f)(1)(iii)]

4.5. The permittee shall obtain, record, and keep records of the percent sulfur by weight from the vendor for each purchase of fuel oil. If the vendor is unable to provide this information, then obtain a representative grab sample for each purchase and test the sample using the reference method. [40 CFR § 49.130(f)(1)(i)]

Visible and Fugitive Emission Monitoring and Recordkeeping

4.6. Except as provided for in Condition 4.13, once each calendar quarter, the permittee shall visually survey each emission unit and any other pollutant emitting activity for the presence of visible emissions or fugitive emissions of particulate matter.

4.6.1. The observer conducting the visual survey must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting and wind, and the presence of uncombined water on the visibility of emissions (see 40 CFR part 60, Appendix A, Method 22).

4.6.2. For the surveys, the observer shall select a position that enables a clear view of the emission point to be surveyed, that is at least 15 feet, but not more than 0.25 miles, from the emission point, and where the sunlight is not shining directly in the observer's eyes.

4.6.3. The observer shall observe emissions from each potential emission point for at least 15 seconds.

4.6.4. Any visible emissions or fugitive emissions of particulate matter other than uncombined water shall be recorded as a positive reading associated with the emission unit or pollutant emitting activity.

4.6.5. Surveys shall be conducted while the facility is operating, and during daylight hours. [40 CFR § 71.6(a)(3)(i)(B)]

4.7. If the observation conducted under Condition 4.6 identifies any visible emissions or fugitive emissions of particulate matter, the permittee shall:

4.7.1. Immediately upon conclusion of the visual observation in Condition 4.6, investigate the source and reason for the presence of visible emissions or fugitive emissions; and

4.7.2. As soon as practicable, take appropriate corrective action. [40 CFR § 71.6(a)(3)(i)(B)]

4.8. If the corrective actions undertaken pursuant to Condition 4.7.2 do not eliminate the visible or fugitive emissions, the permittee shall within 24 hours of the initial survey conduct a visible emissions observation of the emission point in question, for thirty minutes, using the procedures specified in Condition 3.9.1. [40 CFR § 71.6(a)(3)(i)(B)]

4.9. If any of the visible emissions observations required in Condition 4.8 or 4.10 indicate visible emissions greater than 20% opacity, the permittee shall conduct daily visible emissions observations, for thirty minutes, of the emission point in question until two consecutive daily observations indicate visible emissions of 20% opacity or less. [40 CFR § 71.6(a)(3)(i)(B)]

4.10. If the Method 9 visible emissions observation required in Condition 4.8, or if two consecutive daily observations required by Condition 4.9 indicate visible emissions of 20% opacity or less, the permittee shall conduct weekly visible emissions observations of the emission point for three additional weeks. [40 CFR § 71.6(a)(3)(i)(B)]

4.11. The permittee shall maintain records of the following:

4.11.1. Details of each visual survey or visible emissions observation, including date, time, observer and results for each emission unit and any other pollutant emitting activity;

4.11.2. Date, time and type of any investigation conducted pursuant to Condition 4.7.1;

4.11.3. Findings of the investigation, including the reasons for the presence of visible emissions or fugitive emissions of particulate matter;

4.11.4. Date, time and type of corrective actions taken pursuant to Condition 4.7.2;

4.11.5. Results of any Method 9 visible emissions observations conducted on the source of visible or fugitive emissions, and pursuant to Conditions 4.8 through 4.10.

[40 CFR § 71.6(a)(3)(i)(B)]

4.12. Any observation of visible emissions in excess of 20% opacity is a deviation and subject to the provisions of Conditions 3.47 and 3.48. [40 CFR § 71.6(a)(3)(i)(B)]

4.13. The requirements of Conditions 4.6 through 4.12 shall not apply to emissions from boilers BLR-1 and BLR-2. [40 CFR § 71.6(a)(3)(i)(B)]

Open Burning, Agricultural Burning, Forestry and Silvicultural Burning Permits

4.14. The permittee shall apply for and obtain a permit for any open burning, agricultural burning, or forestry and silvicultural burning. The permittee shall submit an application to the Nez Perce Tribe for each proposed burn, and shall comply with the provisions of 40 CFR 49.132, 40 CFR 49.133 and/or 40 CFR 49.134, as applicable. [40 CFR 49.132, 40 CFR 49.133, 40 CFR 49.134]

Facility-Wide HAP Emission Limits and Work Practice Requirements

4.15. HAP emissions from this facility shall not exceed 24 tons per year as determined on a rolling 12-month basis by calculating the emissions (tons) for each month and adding the emissions (tons) for the previous eleven months. Monthly HAP emissions (tons) shall be determined by multiplying appropriate emission factors (lb/unit) by the recorded monthly operation/production rates (units/month) and dividing by 2000 lb/ton.

4.15.1. Hydrogen chloride emission factors shall be based on the most recent fuel sampling results. [Permit No. R10NT500901]

4.16. Emissions of any single HAP from this facility shall not exceed 9 tons per year as determined on a rolling 12-month basis by calculating the emissions (tons) for each month and adding the emissions (tons) for the previous eleven months. Monthly emissions of any single HAP (tons) shall be determined by multiplying appropriate emission factors (lb/unit) by the recorded monthly operation/production rates (units/month) and dividing by 2000 lb/ton.

4.16.1. Hydrogen chloride emission factors shall be based on the most recent fuel sampling results. [Permit No. R10NT500901]

Facility-Wide HAP Monitoring and Recordkeeping Requirements

4.17. Each month, the permittee shall calculate and record facility-wide monthly and rolling 12-month total emissions (tons) for all HAP-emitting activities at the facility. [Permit No. R10NT500901]

4.18. Prior to the first fuel analysis being conducted as required in Condition 5.5.4 and 6.5.4, the permittee shall use 1.7 MMBtu/M lb steam to calculate the monthly heat input to boilers BLR-1 and BLR-2 for use in emission calculations. [40 CFR § 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii) and 71.6(c)(1)]

4.19. The permittee shall track and record the operations and production for each HAP-emitting activity at the facility, such that facility-wide HAP emissions can be calculated on a monthly and 12-month basis. [Permit No. R10NT500901]

4.20. The permittee shall maintain records of emission calculations and parameters used to calculate emissions for at least five years. [Permit No. R10NT500901]

Facility-Wide HAP Reporting Requirements

4.21. Once each year, on or before November 15, the permittee shall, along with the annual registration required in Condition 3.46, submit to EPA a report containing the twelve monthly rolling 12-month emissions calculations for the previous calendar year. [R10NT500901]

4.21.1. The report shall contain a description of all emissions estimating methods used, including emission factors and their sources, assumptions made and production data. [R10NT500901]

NESHAP Subpart JJJJJJ Work Practice and Emission Reduction Measures

4.22. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Performance Tune-up. The permittee shall conduct a performance tune-up of boilers BLR-1 and BLR-2 no later than March 21, 2014, and biennially or every 5 years thereafter depending upon whether the boiler has an oxygen trim system that maintains an optimum air-to-fuel ratio subject to the following:
[40 CFR §§ 63.11196(a)(1), 63.11201(b), 63.11210(c), 63.11223(a) through (c) and Table 2 to Subpart JJJJJJ of Part 63]

4.22.1. If the boiler does not have an oxygen trim system that maintains an optimum air-to-fuel ratio, each performance tune-up shall be conducted no more than 25 months after the previous tune-up. [40 CFR § 63.11223(b)]

4.22.2. If the boiler has an oxygen trim system that maintains an optimum air-to-fuel ratio, each performance tune-up shall be conducted no more than 61 months after the previous tune-up. [40 CFR § 63.11223(c)]

4.22.3. If the boiler is not operating on the required date for a tune-up, the tune-up shall be conducted within 30 days of startup. [40 CFR § 63.11223(b)(7)]

4.22.4. Conduct the tune-up while combusting biomass. [40 CFR § 63.11223(a)]

4.22.5. Inspect the system controlling the air-to-fuel ratio and ensure that it is correctly calibrated and functioning properly. The inspection may be delayed until the next scheduled boiler shutdown, not to exceed 36 months from the previous inspection. [40 CFR § 63.11223(b)(3)]

4.22.6. Optimize total emissions of CO. This optimization shall be consistent with the manufacturer's specifications, if available, and with any NO_X requirement to which the boiler is subject. [40 CFR §§ 63.11223(b)(4)]

4.23. NESHAP Subpart JJJJJJ Energy Assessment for Boilers BLR-1 and BLR-2 and Their Energy Use Systems. The permittee shall satisfy Condition 4.23.1 or 4.23.2 no later than March 21, 2014:
[40 CFR § 63.11196(a)(3), 63.11201(b), 63.11210(c) and Table 2 to Subpart JJJJJJ of Part 63]

4.23.1. Have a one-time energy assessment performed or amended in accordance with Condition 4.24 and as follows:
[40 CFR § 63.11201(b) and Table 2 to Subpart JJJJJJ of Part 63]

4.23.1.1 The energy assessment (and in the case of an amendment; the underlying assessment) shall be completed on or after January 1, 2008.
[40 CFR § 63.11201(b) and Table 2 to Subpart JJJJJJ of Part 63]

4.23.1.2 An energy assessment performed after February 1, 2013 shall be conducted by a qualified energy assessor. [Table 2 to Subpart JJJJJJ of Part 63]

4.23.2. Operate under an energy management program compatible with ISO 50001 that includes boilers BLR-1 and BLR-2.
[40 CFR § 63.11201(b) and Table 2 to Subpart JJJJJJ of Part 63]

4.24. NESHAP Subpart JJJJJJ One-Time Energy Assessment Requirements for Boilers BLR-1 and BLR-2 and Their Energy Use Systems. If the permittee elects to have a one-time energy assessment performed or amended to comply with Condition 4.23, the assessment (or amended assessment) shall include the following:
[40 CFR § 63.11201(b), 40 CFR § 63.11237 and Table 2 to Subpart JJJJJJ of Part 63]

4.24.1. An on-site evaluation up to 8 technical labor hours in duration (but may be longer at the discretion of the permittee) that includes the following: [40 CFR § 63.11237]

4.24.1.1 A visual inspection of the boiler system;
[Table 2 to Subpart JJJJJJ of Part 63]

4.24.1.2 An evaluation of operating characteristics of the boiler system, specifications of energy use systems, operating and maintenance procedures, and unusual operating constraints;
[Table 2 to Subpart JJJJJJ of Part 63]

4.24.1.3 An inventory of major energy use systems consuming energy from the boiler and which are under control of the permittee;
[Table 2 to Subpart JJJJJJ of Part 63]

4.24.1.4 A review of available architectural and engineering plans, facility operating and maintenance procedures and logs, and fuel usage;
[Table 2 to Subpart JJJJJJ of Part 63]

4.24.2. A list of major energy conservation measures that are within the permittee's control;
[Table 2 to Subpart JJJJJJ of Part 63]

4.24.3. A list of the energy savings potential of the energy conservation measures identified, and [Table 2 to Subpart JJJJJJ of Part 63]

4.24.4. A comprehensive report detailing the ways to improve efficiency, the cost of specific improvements, benefits, and the time frame for recouping those investments.
[Table 2 to Subpart JJJJJJ of Part 63]

4.25. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 General Duty Requirement. At all times, the permittee must operate and maintain the boiler , including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require the permittee to make any further efforts to reduce emissions if levels required by this standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to EPA that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. [40 CFR § 63.11205(a)]

NESHAP Subpart JJJJJJ Monitoring and Recordkeeping Requirements

4.26. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Performance Tune-up Monitoring. The permittee shall measure and record the concentration of CO in parts per million, by volume, and O_2 in volume percent, in the boiler's effluent stream before and after the performance tune-up conducted to satisfy Condition 4.22. Measurements may be either on a dry or wet basis, as long as

it is the same basis before and after the performance tune-up is performed. Measurements may be taken using a portable CO analyzer. [40 CFR § 63.11223(b)(5)]

4.27. NESHAP Subpart JJJJJJ Recordkeeping for Compliance – Boilers BLR-1 and BLR-2 and Their Energy Use Systems. The permittee shall maintain the following records: [40 CFR § 63.11225(c)]

4.27.1. A copy of each notification and report submitted to comply with NESHAP Subpart JJJJJJ and all documentation supporting any Initial Notification or Notification of Compliance Status submitted to EPA. [40 CFR §§ 63.10(b)(2)(xiv) and 63.11225(c)(1)]

4.27.2. Records identifying the boiler, the date of tune-up, the procedures followed for tune-up, and the manufacturer's specifications to which the boiler was tuned. [40 CFR § 63.11225(c)(2)(i)]

4.27.3. A copy of the energy assessment report for the boiler and its energy use systems. [40 CFR § 63.11225(c)(2)(iii)]

4.28. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Recordkeeping for General Duty Requirement. The permittee shall maintain the following records: [40 CFR § 63.11225(c)]

4.28.1. Records of the occurrence and duration of each malfunction of the boiler, or of the associated air pollution control and monitoring equipment. [40 CFR § 63.11225(c)(4)]

4.28.2. Records of actions taken during periods of malfunction to minimize emissions in accordance with Condition 4.25, including corrective actions to restore the malfunctioning boiler, air pollution control, or monitoring equipment to its normal or usual manner of operation. [40 CFR § 63.11225(c)(5)]

4.29. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Recordkeeping for Use of Non-Hazardous Secondary Materials as Fuels. The permittee shall maintain the following records:

4.29.1. If the boiler combusts non-hazardous secondary materials that have been determined not to be a solid waste pursuant to 40 CFR § 241.3(b)(1), the permittee shall keep a record which documents how the secondary material meets each of the legitimacy criteria under 40 CFR § 241.3(d)(1).

4.29.2. If the boiler combusts a fuel that has been processed from a discarded non-hazardous secondary material pursuant to 40 CFR § 241.3(b)(4), the permittee shall keep records as to how the operations that produced the fuel satisfies the definition of processing in 40 CFR § 241.2 and each of the legitimacy criteria in 40 CFR § 241.3(d)(1).

4.29.3. If the boiler combusts a fuel that received a non-waste determination pursuant to the petition process submitted under 40 CFR § 241.3(c), the permittee shall keep a record that documents how the fuel satisfies the requirements of the petition process.

4.29.4. If the boiler combusts non-hazardous secondary materials as fuel per 40 CFR §241.4, the permittee shall keep records documenting that the material is a listed non-waste under 40 CFR § 241.4(a). [40 CFR § 63.11225(c)(2)(ii)]

NESHAP Subpart JJJJJJ Reporting Requirements

4.30. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Performance Tune-up Reporting. Maintain on-site and submit to EPA as part of the reporting satisfying Conditions 4.32 and 4.33, as applicable, the following information for each performance tune-up conducted to satisfy Condition 4.22: [40 CFR § 63.11223(b)(6)]

4.30.1. The concentration of CO in the boiler's effluent stream in parts per million, by volume, and O_2 in volume percent, measured at high fire or typical operating load, before and after the tune-up of the boiler. [40 CFR § 63.11223(b)(6)(i)]

4.30.2. A description of any corrective action taken as a part of the tune-up of the boiler. [40 CFR § 63.11223(b)(6)(ii)]

4.31. NESHAP Subpart JJJJJJ Initial Notification Requirement. The permittee shall submit an Initial Notification to EPA no later than January 20, 2014, and the notification shall provide the following information:
[40 CFR §§ 63.9(b), 63.11225(a)(2), 63.11235 and Table 8 to NESHAP JJJJJJ of Part 63]

4.31.1. The name and address of the owner or operator; [40 CFR § 63.9(b)(2)(i)]

4.31.2. The address (i.e., physical location) of the affected source; [40 CFR § 63.9(b)(2)(ii)]

4.31.3. An identification of the relevant standard, or other requirement, that is the basis of the notification and the source's compliance date; [40 CFR § 63.9(b)(2)(iii)]

4.31.4. A brief description of the nature, size, design, and method of operation of the source and an identification of the types of emission points within the affected source subject to the relevant standard and types of hazardous air pollutants emitted; and [40 CFR § 63.9(b)(2)(iv)]

4.31.5. A statement of whether the affected source is a major source or an area source. [40 CFR § 63.9(b)(2)(v)]

4.32. NESHAP Subpart JJJJJJ Notification of Compliance Status. The permittee shall submit a Notification of Compliance Status to EPA no later than July 19, 2014, and the notification shall be signed by the permittee's responsible official certifying its accuracy and attesting to whether the source has complied with NESHAP JJJJJJ. The notification shall provide the following information: [40 CFR §§ 63.9(h)(1), 63.11214(b) and (c), and 63.11225(a)(4)]

4.32.1. The methods that were used to determine compliance; [40 CFR § 63.9(h)(2)(i)(A)]

4.32.2. The methods that will be used for determining continuing compliance, including a description of monitoring and reporting requirements and test methods; [40 CFR § 63.9(h)(2)(i)(C)]

4.32.3. A statement by the permittee as to whether the boiler has complied with NESHAP Subpart JJJJJJ or other requirements. [40 CFR § 63.9(h)(2)(i)(G)]

4.32.4. The statement, "This facility complies with the requirements in 40 CFR § 63.11214 to conduct an initial tune-up of the boiler." [40 CFR § 63.11225(a)(4)(ii)]

4.32.5. The statement, "This facility has had an energy assessment performed according to § 63.11214(c)." [40 CFR § 63.11225(a)(4)(iii)]

4.32.6. The statement, "No secondary materials that are solid waste were combusted in any affected unit." [40 CFR § 63.11225(a)(4)(v)]

4.33. NESHAP Subpart JJJJJJ Annual Compliance Certification Report. Each year, the permittee shall prepare by March 1 and submit to EPA by March 15 an Annual Compliance Certification Report for the previous calendar year. The report shall be signed by the permittee's responsible official and provide the following information: [40 CFR § 63.11225(b)]

4.33.1. Company name and address. [40 CFR §63.11225(b)(1)]

4.33.2. Statement by a responsible official, with the official's name, title, phone number, email address and signature, certifying the truth, accuracy and completeness of the notification and a statement of whether the source has complied with all the relevant standards and other requirements of NESHAP Subpart JJJJJJ. [40 CFR §63.11225(b)(2)]

4.33.3. The statement, "This facility complies with the requirements in 40 CFR § 63.11223 to conduct a biennial or 5-year tune-up, as applicable, of each boiler." [40 CFR §63.11225(b)(2)(i)]

4.33.4. The statement, "No secondary materials that are solid waste were combusted in any affected unit." [40 CFR §63.11225(b)(2)(i)(ii)]

4.33.5. A description of any deviations from the applicable requirements during the previous calendar year, the time periods during which the deviations occurred, and the corrective actions taken. [40 CFR § 63.11225(b)(3)]

4.34. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Notification of Combustion of Solid Waste. The permittee shall provide 30 days prior notice to EPA of the date upon which combusting of solid waste will commence or recommence in the boiler. The notification shall identify the following: [40 CFR § 63.11225(f)]

4.34.1. The name of the owner or operator of the boiler, the location of the boiler, identification of the boiler as a boiler that will commence combusting solid waste, and the date of the notice. [40 CFR § 63.11225(f)(1)]

4.34.2. The currently applicable subcategory listed at 40 CFR § 63.11200. [40 CFR § 63.11225(f)(2)]

4.34.3. The date on which the permittee became subject to the currently applicable emission limits. [40 CFR § 63.11225(f)(3)]

4.34.4. The date upon which the permittee will commence combusting solid waste**.** [40 CFR § 63.11225(f)(4)]

4.35. NESHAP Subpart JJJJJJ Boilers BLR-1 and BLR-2 Notification of Fuel Switch, Physical Change or Permit Limit. The permittee shall provide notice to EPA if the permittee switched fuels or made a physical change to the boiler and the fuel switch or change resulted in (a) the applicability of a different subcategory of NESHAP JJJJJJ listed at 40 CFR § 63.11200, (b) the boiler becoming subject to NESHAP Subpart JJJJJJ, or (c) the boiler switching out of NESHAP Subpart JJJJJJ due to a change to 100 percent natural gas. Notice shall also be provided if EPA issues a permit limit to the permittee that results in the permittee being subject to NESHAP Subpart JJJJJJ. Notice shall be provided within 30 days of the change, and the notification shall identify the following: [40 CFR § 63.11225(g)]

4.35.1. The name of the owner or operator of the boiler, the location of the boiler, identification of the boiler as a boiler that has switched fuels, was physically changed, or took a permit limit, and the date of the notice. [40 CFR § 63.11225(g)(1)]

4.35.2. The date upon which the fuel switch, physical change, or permit limit occurred. [40 CFR § 63.11225(g)(2)]

Monitoring for Modifications to the Facility – Employing PSD's Actual to Projected Actual Test

4.36. Where there is a reasonable possibility (as defined in 40 CFR § 52.21(r)(6)(vi)) that a project (other than projects at a source with a PAL) that is not a part of a major modification may result in a significant emissions increase of any regulated NSR pollutant and the permittee elects to use the method specified in 40 CFR § 52.21(b)(41)(ii)(a) through (c) for calculating projected actual emissions, the permittee shall perform the following:

4.36.1. Before beginning actual construction of the project, document and maintain a record of the following information.

4.36.1.1 A description of the project.

4.36.1.2 Identification of the emissions unit(s) whose emissions of a regulated NSR pollutant could be affected by the project.

4.36.1.3 A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded under 40 CFR § 52.21(b)(41)(ii)(c) and an explanation for why such amount was excluded, and any netting calculations, if applicable.

4.36.2. Monitor the emission of any regulated NSR pollutant that could increase as a result of the project and that is emitted by any emissions unit identified in Condition 4.36.1.2; and calculate and maintain a record of the annual emissions, in tons per year on a calendar year basis, for a period of 5 years following resumption of regular operations after the change, or for a period of 10 years following resumption of regular operations after the change if the project increases the design capacity or potential to emit of that regulated NSR pollutant at such emissions unit. [40 CFR § 52.21(r)(6)]

Reporting for Modifications to the Facility – Employing PSD's Actual to Projected Actual Test

4.37. If monitoring and recordkeeping is required in Condition 4.36, the permittee shall report to EPA when the annual emissions, in tons per year, from the project identified in Condition 4.36.1.1 exceed the baseline actual emissions as documented and maintained pursuant to Condition 4.36.1.3 by a significant amount (as defined in 40 CFR § 52.21(b)(23)) for that regulated NSR pollutant , and when such emissions differ from the preconstruction projection as documented and maintained pursuant to Condition 4.36.1.3. Such report shall be submitted to EPA within 60 days after the end of such year. The report shall contain the following.

4.37.1. The name, address and telephone number of the major stationary source.

4.37.2. The annual emissions as calculated pursuant to Condition 4.36.2.

4.37.3. Any other information that the owner or operator wishes to include in the report (e.g., an explanation as to why the emissions differ from the preconstruction projection). [40 CFR § 52.21(r)(6)]

5. Unit-Specific Requirements – BLR–1 (Hog Fuel-Fired Boiler No. 1)

BLR-1 Emission Limits and Work Practice Requirements

5.1. FARR Particulate Matter Limit. Particulate matter emissions from the boiler stack shall not exceed an average of 0.46 grams per dry standard cubic meter (0.2 grains per dry standard cubic foot), corrected to seven percent oxygen, during any three-hour period.

5.1.1. Compliance with the particulate matter limit is determined using EPA Reference Method 5 (see 40 CFR part 60, Appendix A). [40 CFR §§ 49.125(d)(2) and (e)]

5.2. FARR Sulfur Dioxide Emission Limit. Sulfur dioxide emissions from the boiler stack shall not exceed an average of 500 parts per million by volume, on a dry basis and corrected to seven percent oxygen, during any three-hour period.

5.2.1. Compliance with the SO_2 limit is determined using EPA Reference Methods 6, 6A, 6B, and 6C as specified in the applicability section of each method (see 40 CFR part 60,

appendix A) or, alternatively, a continuous emission monitoring system that complies with Performance Specification 2 found in Appendix B of 40 CFR Part 60.
[40 CFR §§ 49.129(d)(1) and (e)]

5.3. At all times that the boiler operates, the boiler exhaust shall be directed to the multiclone.
[40 CFR §§ 49.124(d)(1), 49.125(d)(2) and 71.6(a)(1)]

5.4. The multiclone shall be maintained in good operating condition and shall be operated at all times that the boiler is operational. [40 CFR §§ 49.124(d)(1), 49.125(d)(2) and 71.6(a)(1)]

BLR-1 Testing Requirements

5.5. Initial Particulate Matter Test. No later than 120 days after issuance of this permit, the permittee shall measure particulate matter emissions from the boiler stack using the test method specified in Condition 5.1.1.

5.5.1. Testing shall be conducted at a minimum of one load condition; that load condition being one in which the boiler is generating steam at a load reflecting the highest sustained load (M lb steam/hr) generally observed since the facility was re-started in August 2010.

5.5.2. During each source test run, the permittee shall measure the visible emissions from the boiler stack for the duration of each particulate matter test run using the procedures specified in Condition 3.9.1.

5.5.3. During each source test run, the permittee shall record the values (and time recorded) of the parameters specified in Condition 5.8. For monitoring devices that do not have continuous recording devices, the recorded values must consist of no fewer than 3 values recorded per test run.

5.5.4. During each source test run, the permittee shall collect composite fuel samples. The permittee shall estimate and record the percentages of bark, species of wood and material less than 1/8 inch in each composite fuel sample. The permittee shall determine and record the boiler fuel-heat-input-to-steam-output ratio (MMBtu/M lb steam) using the procedures specified in Appendix A to this permit (below). Prior to the first fuel analysis being conducted, the permittee shall use 1.7 MMBtu/M lb steam to calculate the monthly heat input to the boiler for emission calculations.
[40 CFR § 71.6(a)(3)(i)(B)]

5.6. Periodic Particulate Matter Test. The permittee shall measure particulate matter emissions from the boiler stack using the procedures specified in Condition 5.5 as follows:

If testing required in Condition 5.5 results in measured particulate matter emissions …	**Additional particulate matter testing shall be conducted …**
≥ 90% of the emission limit in Condition 5.1 for any load condition	Once per calendar year, between December 1 and March 31
≥ 75% but < 90% of the emission limit in Condition 5.1 for any load condition	Once per two calendar years, between December 1 and March 31
< 75% of the emission limit in Condition 5.1 for any load condition	Once per four calendar years, between December 1 and March 31

[40 CFR § 71.6(a)(3)(i)(B)]

BLR-1 Monitoring and Recordkeeping Requirements

5.7. Periodic Visible Emission Monitoring. The permittee shall measure visible emissions from the boiler stack within one month after this permit is issued for one hour using the procedures specified in Condition 3.9.1 and subsequently as specified in the following table.

If the most recent visible emission measurement results in measured opacity of …	**Additional visible emissions measurements shall be conducted …**
One or more 6-minute average > 20% opacity	Once per day, until two consecutive daily measurements are ≤ 20%
One or more 6-minute average ≥ 10% opacity	Once per month, with consecutive tests at least 10 days apart, until three consecutive monthly measurements are < 10%
All 6-minute averages < 10% opacity	Once per calendar quarter, with consecutive tests at least 30 days apart

[40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii), 71.6(c)(1), 64.6(c), 64.3(b)(4)]

5.8. Within 60 days of issuance of this permit, the permittee shall install, calibrate, operate and maintain equipment necessary to measure and record:

5.8.1. Steam production (lb/hr) - continuous measurement/display, recorded at least once per hour with at least 90% monthly data capture;

5.8.2. Steam pressure (psig) - continuous measurement/display, recorded at least once per month;

5.8.3. Boiler excess oxygen downstream of the combustion chamber (%) - continuous measurement/display, recorded at least once per day with at least 90% monthly data capture;

5.8.4. Pressure drop across the multiclone (inches of water) - continuous measurement/display, recorded at least once per day with at least 90% data capture.

[40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii), 71.6(c)(1), 64.6(c), 64.3(b)(4)]

5.9. Procedure to Define Multiclone Pressure Drop and Visible Emissions Excursions. No later than 45 days after conducting testing pursuant to Condition 5.5, the permittee shall define excursions for multiclone pressure drop and visible emissions. The level at which an excursion will be deemed to occur shall be based upon testing conducted pursuant to Condition 5.5 and the following criteria:

5.9.1. If the permittee conducts testing at one load condition (M lb steam/hr), the excursion levels for all operating loads shall be determined as follows:

If particulate matter testing required in Condition 5.5 results in measured emissions (gr/dscf @ 7% O_2)…	**A multiclone pressure drop excursion shall be defined as an instantaneous measurement (inches of water) less than…**	**A visible emissions excursion is defined as a one-hour average greater than…**
≥ 90% of the emission limit in Condition 5.1	Average pressure drop observed over three test runs	Average opacity observed over 3 test runs
≥ 75% but < 90% of the emission limit in Condition 5.1	95 percent of the average pressure drop observed over	110 percent of the average opacity observed

If particulate matter testing required in Condition 5.5 results in measured emissions (gr/dscf @ 7% O_2)…	A multiclone pressure drop excursion shall be defined as an instantaneous measurement (inches of water) less than…	A visible emissions excursion is defined as a one-hour average greater than…
	three test runs	over 3 test runs
≥ 50% < 75% of the emission limit in Condition 5.1	90 percent of the average pressure drop observed over three test runs	125 percent of the average opacity observed over 3 test runs
< 50% of the emission limit in Condition 5.1	80 percent of the average pressure drop observed over three test runs	150 percent of the average opacity observed over 3 test runs

5.9.2. If the permittee conducts testing at more than one load condition (M lb steam/hr), excursion levels shall be determined as follows:

5.9.2.1 Apply the criteria in Condition 5.9.1 separately to test results for each load condition;

5.9.2.2 Excursion levels for a particular load condition shall apply to operating loads that are equal to or less than the particular one tested, but only to the extent that the operating load is greater than all other load conditions undergoing testing (if any) between 0 lb steam/hr and the particular load condition. [40 CFR § 64.6(c)]

5.10. The permittee shall ensure that the monitoring equipment required by Condition 5.8 meets the following performance, operational and maintenance criteria:

5.10.1. Measurement locations that provide for obtaining data that are representative of the emissions or parameters being monitored. [40 CFR § 64.3(b)(1)]

5.10.2. Quality assurance and control practices, considering manufacturer recommendations, that are adequate to ensure the continuing validity of the data. [40 CFR § 64.3(b)(3)]

5.10.3. Maintaining necessary parts for routine repairs of the monitoring equipment. [40 CFR § 64.7(b)]

5.10.4. Except for, as applicable, monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), continuous operation of the monitoring equipment (or collecting data at all required intervals) at all times that the pollutant-specific emissions unit is operating. Data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities shall not be used for purposes of this part, including data averages and calculations, or fulfilling a minimum data availability requirement, if applicable. The owner or operator shall use all the data collected during all other periods in assessing the operation of the control device and associated control system. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. [40 CFR § 64.7(c)]

5.10.5. Until the permittee provides notice of the establishment of excursion levels pursuant to Condition 5.18, an excursion is defined as a one-hour average exhaust stack opacity

greater than 5%. Thereafter, an excursion is any multiclone pressure drop or exhaust stack opacity value beyond the levels established pursuant to Condition 5.9.
[40 CFR §§ 64.1 and 64.6(c)(2)]

5.10.6. An exceedance is defined as any measured emission of PM which exceeds an emission limit specified in Condition 3.9 or 5.1. [40 CFR §§ 64.1 and 64.6(c)(2)]

5.11. Upon detecting an excursion or exceedance, the permittee shall restore operation of the pollutant-specific emissions unit (including the control device and associated capture system) to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to restore normal operation and prevent the likely recurrence of the cause of an excursion or exceedance (other than those caused by excused startup or shutdown conditions). Such actions may include initial inspection and evaluation, recording that operations returned to normal without operator action (such as through response by a computerized distribution control system), or any necessary follow-up actions to return operation to within the indicator range, designated condition, or below the applicable emission limitation or standard, as applicable. [40 CFR § 64.7(d)(1)]

5.12. The permittee shall develop and implement a quality improvement plan (QIP) in accordance with 40 CFR § 64.8 if EPA Region 10 determines, pursuant to 40 CFR § 64.7(d)(2), that the permittee has not used acceptable procedures in response to an excursion or exceedance.
[40 CFR §§ 64.7(d)(2) and 64.8(a)]

5.13. If the permittee identifies a failure to achieve compliance with an emission limitation or standard for which the approved monitoring did not provide an indication of an excursion or exceedance while providing valid data, or the results of compliance or performance testing document a need to modify the existing indicator ranges or designated conditions, the permittee shall promptly notify the permitting authority and, if necessary, submit a proposed modification to the permit to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters. [40 CFR § 64.7(e)]

5.14. The recordkeeping requirements of Condition 3.35 shall apply to monitoring conducted to satisfy Conditions 5.8 through 5.13. The permittee shall maintain records of monitoring data, monitor performance data, corrective actions taken, any written quality improvement plan required pursuant to 40 CFR § 64.8 and any activities undertaken to implement a quality improvement plan, and other supporting information required to be maintained under this part (such as data used to document the adequacy of monitoring, or records of monitoring maintenance or corrective actions). Instead of paper records, the permittee may maintain records on alternative media, such as microfilm, computer files, magnetic tape disks, or microfiche, provided that the use of such alternative media allows for expeditious inspection and review, and does not conflict with other applicable recordkeeping requirements. [40 CFR § 64.9(b)]

5.15. The permittee shall sample and analyze the wood fuel for chloride content no less frequently than quarterly to determine a hydrogen chloride emission factor (lb/MMBtu).

5.15.1. Sampling and analysis procedures to determine chloride content in the wood fuel shall follow the procedures specified in 40 CFR § 63.7521 as described in Appendix B to this permit (below). The results of the analyses shall be used to determine a hydrogen chloride emission factor (lb/MMBtu) for the boiler as specified in 40 CFR § 63.7521 as described in Appendix B to this permit (below).
[Permit No. R10NT500901 and 40 CFR § 71.6(c)(1)]

BLR-1 Reporting Requirements

5.16. The reports required by Condition 3.47 and 3.48 shall include the following:

5.16.1. Summary information on the number, duration and cause (including unknown cause, if applicable) of excursions and exceedances, as applicable, and the corrective actions taken;

5.16.2. Summary information on the number, duration and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other daily calibration checks, if applicable); and

5.16.3. A description of the actions taken to implement a QIP during the reporting period as specified in § 64.8. Upon completion of a QIP, the owner or operator shall include in the next summary report documentation that the implementation of the plan has been completed and reduced the likelihood of similar levels of excursions or exceedances occurring.[40 CFR § 64.9(a)(2)]

5.17. The report required by Condition 3.46 shall include copies of all laboratory results relied upon to calculate HCl emission factors and shall list the sampling and analytical methods employed. [40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii) and 71.6(c)(1)]

5.18. At the time the permittee submits a report for the testing conducted pursuant to Condition 5.5 but no later than 45 days after having completed the testing, the permittee shall notify EPA of the establishment of excursion levels for multiclone pressure drop and visible emissions. The notice shall present the excursion levels and an explanation of how the values were derived. [40 CFR § 64.6(c)(2)]

6. Unit-Specific Requirements – BLR–2 (Hog Fuel-Fired Boiler No. 2)

BLR-2 Emission Limits and Work Practice Requirements

6.1. FARR Particulate Matter Limit. Particulate matter emissions from the boiler stack shall not exceed an average of 0.46 grams per dry standard cubic meter (0.2 grains per dry standard cubic foot), corrected to seven percent oxygen, during any three-hour period.

6.1.1. Compliance with the particulate matter limit is determined using EPA Reference Method 5 (see 40 CFR part 60, Appendix A). [40 CFR §§ 49.125(d)(2) and (e)]

6.2. FARR Sulfur Dioxide Emission Limit. Sulfur dioxide emissions from the boiler stack shall not exceed an average of 500 parts per million by volume, on a dry basis and corrected to seven percent oxygen, during any three-hour period.

6.2.1. Compliance with the SO_2 limit is determined using EPA Reference Methods 6, 6A, 6B, and 6C as specified in the applicability section of each method (see 40 CFR part 60, appendix A) or, alternatively, a continuous emission monitoring system that complies with Performance Specification 2 found in Appendix B of 40 CFR Part 60. [40 CFR §§ 49.129(d)(1) and (e)]

6.3. At all times that the boiler operates, the boiler exhaust shall be directed to the multiclone. [40 CFR §§ 49.124(d)(1), 49.125(d)(2) and 71.6(a)(1)]

6.4. The multiclone shall be maintained in good operating condition and shall be operated at all times that the boiler is operational. [40 CFR §§ 49.124(d)(1), 49.125(d)(2) and 71.6(a)(1)]

BLR-2 Testing Requirements

6.5. Initial Particulate Matter Test. No later than 120 days after issuance of this permit, the permittee shall measure particulate matter emissions from the boiler stack using the test method specified in Condition 6.1.1.

6.5.1. Testing shall be conducted at a minimum of one load condition; that load condition being one in which the boiler is generating steam at a load reflecting the highest sustained load (M lb steam/hr) generally observed since the facility was re-started in August 2010.

6.5.2. During each source test run, the permittee shall measure the visible emissions from the boiler stack for the duration of each particulate matter test run using the procedures specified in Condition 3.9.1.

6.5.3. During each source test run, the permittee shall record the values (and time recorded) of the parameters specified in Condition 6.8. For monitoring devices that do not have continuous recording devices, the recorded values must consist of no fewer than 3 values recorded per test run.

6.5.4. During each source test run, the permittee shall collect composite fuel samples. The permittee shall estimate and record the percentages of bark, species of wood and material less than 1/8 inch in each composite fuel sample. The permittee shall determine and record the boiler fuel-heat-input-to-steam-output ratio (MMBtu/M lb steam) using the procedures specified in Appendix A to this permit (below). Prior to the first fuel analysis being conducted, the permittee shall use 1.7 MMBtu/M lb steam to calculate the monthly heat input to the boiler for emission calculations.

[40 CFR § 71.6(a)(3)(i)(B)]

6.6. Periodic Particulate Matter Test. The permittee shall measure particulate matter emissions from the boiler stack using the procedures specified in Condition 6.5 as follows:

If testing required in Condition 6.5 results in measured particulate matter emissions …	**Additional particulate matter testing shall be conducted …**
≥ 90% of the emission limit in Condition 6.1 for any load condition	Once per calendar year, between December 1 and March 31
≥ 75% but < 90% of the emission limit in Condition 6.1 for any load condition	Once per two calendar years, between December 1 and March 31
< 75% of the emission limit in Condition 6.1 for any load condition	Once per four calendar years, between December 1 and March 31

[40 CFR § 71.6(a)(3)(i)(B)]

BLR-2 Monitoring and Recordkeeping Requirements

6.7. Periodic Visible Emission Monitoring. The permittee shall measure visible emissions from the boiler stack within one month after this permit is issued for one hour using the procedures specified in Condition 3.9.1 and subsequently as specified in the following table.

If the most recent visible emission measurement results in measured opacity of …	**Additional visible emissions measurements shall be conducted …**
One or more 6-minute average > 20% opacity	Once per day
One or more 6-minute average ≥ 10% opacity	Once per month, with consecutive tests at

	least 10 days apart
All 6-minute averages < 10% opacity	Once per calendar quarter, with consecutive tests at least 30 days apart

[40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii), 71.6(c)(1), 64.6(c), 64.3(b)(4)]

6.8. Within 60 days of issuance of this permit, the permittee shall install, calibrate, operate and maintain equipment necessary to measure and record:

6.8.1. Steam production (lb/hr) - continuous measurement/display, recorded at least once per hour with at least 90% monthly data capture;

6.8.2. Steam pressure (psig) - continuous measurement/display, recorded at least once per month;

6.8.3. Boiler excess oxygen downstream of the combustion chamber (%) - continuous measurement/display, recorded at least once per day with at least 90% monthly data capture;

6.8.4. Pressure drop across the multiclone (inches of water) - continuous measurement/display, recorded at least once per day with at least 90% data capture.

[40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii), 71.6(c)(1), 64.6(c), 64.3(b)(4)]

6.9. Procedure to Define Multiclone Pressure Drop and Visible Emissions Excursions. No later than 45 days after conducting testing pursuant to Condition 6.5, the permittee shall define excursions for multiclone pressure drop and visible emissions. The level at which an excursion will be deemed to occur shall be based upon testing conducted pursuant to Condition 6.5 and the following criteria:

6.9.1. If the permittee conducts testing at one load condition (M lb steam/hr), the excursion levels for all operating loads shall be determined as follows:

If particulate matter testing required in Condition 6.5 results in measured emissions (gr/dscf @ 7% O_2)…	**A multiclone pressure drop excursion shall be defined as an instantaneous measurement (inches of water) less than…**	**A visible emissions excursion is defined as a one-hour average greater than…**
≥ 90% of the emission limit in Condition 6.1	Average pressure drop observed over three test runs	Average opacity observed over 3 test runs
≥ 75% but < 90% of the emission limit in Condition 6.1	95 percent of the average pressure drop observed over three test runs	110 percent of the average opacity observed over 3 test runs
≥ 50% < 75% of the emission limit in Condition 6.1	90 percent of the average pressure drop observed over three test runs	125 percent of the average opacity observed over 3 test runs
< 50% of the emission limit in Condition 6.1	80 percent of the average pressure drop observed over three test runs	150 percent of the average opacity observed over 3 test runs

6.9.2. If the permittee conducts testing at more than one load condition (M lb steam/hr), excursion levels shall be determined as follows:

6.9.2.1 Apply the criteria in Condition 6.9.1 separately to test results for each load condition;

6.9.2.2 Excursion levels for a particular load condition shall apply to operating loads that are equal to or less than the particular one tested, but only to the extent that the operating load is greater than all other load conditions undergoing testing (if any) between 0 lb steam/hr and the particular load condition. [40 CFR § 64.6(c)]

6.10. The permittee shall ensure that the monitoring equipment required by Condition 6.8 meets the following performance, operational and maintenance criteria:

6.10.1. Measurement locations that provide for obtaining data that are representative of the emissions or parameters being monitored. [40 CFR 64.3(b)(1)]

6.10.2. Quality assurance and control practices, considering manufacturer recommendations, that are adequate to ensure the continuing validity of the data. [40 CFR 64.3(b)(3)]

6.10.3. Maintaining necessary parts for routine repairs of the monitoring equipment. [40 CFR § 64.7(b)]

6.10.4. Except for, as applicable, monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), continuous operation of the monitoring equipment (or collecting data at all required intervals) at all times that the pollutant-specific emissions unit is operating. Data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities shall not be used for purposes of this part, including data averages and calculations, or fulfilling a minimum data availability requirement, if applicable. The owner or operator shall use all the data collected during all other periods in assessing the operation of the control device and associated control system. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. [40 CFR § 64.7(c)]

6.10.5. Until the permittee provides notice of the establishment of excursion levels pursuant to Condition 6.18, an excursion is defined as a one-hour average exhaust stack opacity greater than 5%. Thereafter, an excursion is any multiclone pressure drop or exhaust stack opacity value beyond the levels established pursuant to Condition 6.9. [40 CFR § 64.1 and 64.6(c)(2)]

6.10.6. An exceedance is defined as any measured emission of PM which exceeds an emission limit specified in Condition 3.9 or 6.1. [40 CFR § 64.1 and 64.6(c)(2)]

6.11. Upon detecting an excursion or exceedance, the permittee shall restore operation of the pollutant-specific emissions unit (including the control device and associated capture system) to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to restore normal operation and prevent the likely recurrence of the cause of an excursion or exceedance (other than those caused by excused startup or shutdown conditions). Such actions may include initial inspection and evaluation, recording that operations returned to normal without operator action (such as through response by a computerized distribution control system), or any necessary follow-up actions to return operation to within the indicator range, designated condition, or below the applicable emission limitation or standard, as applicable. [40 CFR § 64.7(d)(1)]

6.12. The permittee shall develop and implement a quality improvement plan (QIP) in accordance with 40 CFR § 64.8 if EPA Region 10 determines, pursuant to 40 CFR § 64.7(d)(2), that the permittee has not used acceptable procedures in response to an excursion or exceedance.

[40 CFR §§ 64.7(d)(2) and 64.8(a)]

6.13. If the permittee identifies a failure to achieve compliance with an emission limitation or standard for which the approved monitoring did not provide an indication of an excursion or exceedance while providing valid data, or the results of compliance or performance testing document a need to modify the existing indicator ranges or designated conditions, the permittee shall promptly notify the permitting authority and, if necessary, submit a proposed modification to the permit to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters. [40 CFR § 64.7(e)]

6.14. The recordkeeping requirements of Condition 3.35 shall apply to monitoring conducted to satisfy Conditions 6.8 through 6.13. The permittee shall maintain records of monitoring data, monitor performance data, corrective actions taken, any written quality improvement plan required pursuant to 40 CFR § 64.8 and any activities undertaken to implement a quality improvement plan, and other supporting information required to be maintained under this part (such as data used to document the adequacy of monitoring, or records of monitoring maintenance or corrective actions). Instead of paper records, the permittee may maintain records on alternative media, such as microfilm, computer files, magnetic tape disks, or microfiche, provided that the use of such alternative media allows for expeditious inspection and review, and does not conflict with other applicable recordkeeping requirements. [40 CFR § 64.9(b)]

6.15. The permittee shall sample and analyze the wood fuel for chloride content no less frequently than quarterly to determine a hydrogen chloride emission factor (lb/MMBtu).

6.15.1. Sampling and analysis procedures to determine chloride content in the wood fuel shall follow the procedures specified in 40 CFR § 63.7521 as described in Appendix B to this permit (below). The results of the analyses shall be used to determine a hydrogen chloride emission factor (lb/MMBtu) for the boiler as specified in 40 CFR § 63.7521 as described in Appendix B to this permit (below).

[Permit No. R10NT500901 and 40 CFR § 71.6(c)(1)]

BLR-2 Reporting Requirements

6.16. The reports required by Condition 3.47 and 3.48 shall include the following:

6.16.1. Summary information on the number, duration and cause (including unknown cause, if applicable) of excursions and exceedances, as applicable, and the corrective actions taken;

6.16.2. Summary information on the number, duration and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other daily calibration checks, if applicable); and

6.16.3. A description of the actions taken to implement a QIP during the reporting period as specified in § 64.8. Upon completion of a QIP, the owner or operator shall include in the next summary report documentation that the implementation of the plan has been completed and reduced the likelihood of similar levels of excursions or exceedances occurring.[40 CFR § 64.9(a)(2)]

6.17. The report required by Condition 3.46 shall include copies of all laboratory results relied upon to calculate HCl emission factors and shall list the sampling and analytical methods employed.

[40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii) and 71.6(c)(1)]

6.18. At the time the permittee submits a report for the testing conducted pursuant to Condition 6.5 but no later than 45 days after having completed the testing, the permittee shall notify EPA of the establishment of excursion levels for multiclone pressure drop and visible emissions. The notice shall present the excursion levels and an explanation of how the values were derived.
[40 CFR § 64.6(c)(2)]

7. Unit Specific Requirements – ENG-1 (Emergency Backup Engine No. 1)

ENG-1 Emission Limits and Work Practice Requirements

7.1. Particulate matter emissions from the stack of this emission unit shall not exceed an average of 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot), corrected to seven percent oxygen, during any three-hour period.

7.1.1. Compliance with the particulate matter limit in Condition 7.1 is determined using EPA Reference Method 5 (see 40 CFR part 60, appendix A).
[40 CFR §§ 49.125(d)(1) and (e)]

7.2. Sulfur dioxide emissions from the stack of this emission unit shall not exceed an average of 500 parts per million by volume, on a dry basis and corrected to seven percent oxygen, during any three-hour period.

7.2.1. Compliance with the SO_2 limit in Condition 7.2 is determined using EPA Reference Methods 6, 6A, 6B, and 6C as specified in the applicability section of each method (see 40 CFR part 60, appendix A) or, alternatively, a continuous emission monitoring system that complies with Performance Specification 2 found in Appendix B of 40 CFR Part 60. [40 CFR §§ 49.129(d)(1) and (e)]

7.3. At all times the permittee shall be in compliance with NESHAP Subpart ZZZZ requirements that apply to the permittee. [40 CFR § 63.6605(a)]

7.4. The permittee shall change the oil and filter every 500 hours of operation or annually, whichever comes first. [40 CFR § 63.6603(a) and Row 4.a. of Table 2d to Subpart ZZZZ of Part 63]

7.4.1. The permittee has the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Condition 7.4 as follows:

7.4.1.1 The analysis program must at a minimum analyze the following three parameters: Total Base Number, viscosity, and percent water content.

7.4.1.2 The condemning limits for these parameters are as follows: Total Base Number is less than 30 percent of the Total Base Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5.

7.4.1.3 If all these condemning limits are not exceeded, the engine owner or operator is not required to change the oil.

7.4.1.4 If any of the limits are exceeded, the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the

engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.
[40 CFR § 63.6625(i) and footnote 1 of Table 2d to Subpart ZZZZ of Part 63]

7.5. The permittee shall inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary.
[40 CFR § 63.6603(a) and Row 4.b. of Table 2d to Subpart ZZZZ of Part 63]

7.6. The permitee shall inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.
[40 CFR § 63.6603(a) and Row 4.c. of Table 2d to Subpart ZZZZ of Part 63]

7.7. If an emergency engine is operating during an emergency and it is not possible to shut down the engine in order to perform the management practice requirements pursuant to Conditions 7.4, 7.5 and 7.6, or if performing the management practice would otherwise pose an unacceptable risk under federal, state, or local law, the management practice shall be performed as soon as practicable after the emergency has ended or the unacceptable risk under federal, state, or local law has abated. [Footnote 2 of Table 2d to Subpart ZZZZ of Part 63]

7.8. Except as provided for in Condition 7.10, the permittee shall not operate the engine for more than 100 hours per calendar year for the following purposes: [40 CFR § 63.6640(f)(2)]

7.8.1. Maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor or the insurance company associated with the engine; and [40 CFR § 63.6640(f)(2)(i)]

7.8.2. Other non-emergency situations. [40 CFR § 63.6640(f)(4)]

7.9. The permittee may operate the engine for up to 50 hours per calendar year in non-emergency situations other than the activities listed in Condition 7.8.1, but only to the extent allowed by Condition 7.8. [40 CFR §§ 63.6640(f)(2) and (4)]

7.10. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency engines beyond 100 hours per calendar year. [40 CFR § 63.6640(f)(2)(i)]

7.11. During periods of startup, the permittee shall minimize the engine's time spent at idle and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.
[40 CFR § 63.6625(h) and Table 2d to Subpart ZZZZ of Part 63]

7.12. At all times the permittee shall operate and maintain the engine, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emission does not require the permittee to make any further efforts to reduce emissions if levels required by this standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source.
[40 CFR § 63.6605(b)]

7.13. The permittee shall operate and maintain the engine and after-treatment control device (if any) according to the manufacturer's emission-related written operation and maintenance instruction, or alternatively, the permittee shall develop and follow its own maintenance plan which shall provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions

[40 CFR §§ 63.6625(e), 40 CFR § 63.6640(a) and Row 9 of Table 6 to Subpart ZZZZ of Part 63]

ENG-1 Monitoring and Recordkeeping Requirements

7.14. The first time each calendar year that the engine is operated during daylight hours in a non-emergency situation, the permittee shall conduct at least one 6-minute visible emissions observation of the engine stack using the procedures specified in Condition 3.9.1. [40 CFR § 71.6(a)(3)(i)(B)]

7.15. If the permittee utilizes an oil analysis program pursuant to Condition 7.4.1, the owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.
[40 CFR § 63.6625(i) and footnote 1 of Table 2d to Subpart ZZZZ of Part 63]

7.16. The permittee shall install a non-resettable hour meter if one is not already installed.
[40 CFR § 63.6625(f)]

7.16.1. The permittee shall keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter.

7.16.2. The permittee shall document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. [40 CFR § 63.6655(f)]

7.17. The permittee shall keep records to show continuous compliance with Condition 7.13.
[40 CFR § 63.6655(d)]

7.18. The permittee shall keep records of the maintenance conducted on the engine in order to demonstrate that the permittee operated and maintained the engine and after-treatment control device (if any) according to the permittee's own maintenance plan. [40 CFR § 63.6655(e)]

ENG-1 Reporting Requirements

7.19. The permittee shall comply with the applicable NESHAP Subpart A general provisions listed in Table 8 to Subpart ZZZZ of Part 63.
[40 CFR §§ 63.6665 and Table 8 to Subpart ZZZZ of Part 63]

7.19.1. The requirement to submit all of the notifications in §§ 63.7(b) and (c), 63.8(e), (f)(4) and (f)(6), 63.9(b) through (e), and (g) and (h) does not apply.
[40 CFR § 63.6645(a)(5)]

7.20. The permittee shall report in the semi-annual monitoring report required by Condition 3.47 any failure to perform timely management practices as required by Conditions 7.4, 7.5 and 7.6 for reasons afforded by Condition 7.7. Report also the federal, state or local law under which the risk was deemed unacceptable.
[40 CFR §§ 71.6(a)(3)(iii)(A) and footnote 2 of Table 2d to Subpart ZZZZ of Part 63)]

7.21. The permittee shall report in the semi-annual monitoring report required by Condition 3.47 each instance in which the permittee did not meet the requirements in Table 8 to 40 CFR 63, Subpart ZZZZ. [40 CFR §§ 63.6640(e) and 71.6(a)(3)(iii)(A)]

7.22. The permittee shall report all deviations as defined in 40 CFR Part 63, Subpart ZZZZ in the semi-annual monitoring report required by Condition 3.47. [40 CFR § 63.6650(f)]

8. Unit Specific Requirements – ENG-2 (Emergency Backup Engine No. 2)

ENG-2 Emission Limits and Work Practice Requirements

8.1. Particulate matter emissions from the stack of this emission unit shall not exceed an average of 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot), corrected to seven percent oxygen, during any three-hour period.

8.1.1. Compliance with the particulate matter limit in Condition 8.1 is determined using EPA Reference Method 5 (see 40 CFR part 60, appendix A).
[40 CFR §§ 49.125(d)(1) and (e)]

8.2. Sulfur dioxide emissions from the stack of this emission unit shall not exceed an average of 500 parts per million by volume, on a dry basis and corrected to seven percent oxygen, during any three-hour period.

8.2.1. Compliance with the SO_2 limit in Condition 8.2 is determined using EPA Reference Methods 6, 6A, 6B, and 6C as specified in the applicability section of each method (see 40 CFR part 60, appendix A) or, alternatively, a continuous emission monitoring system that complies with Performance Specification 2 found in Appendix B of 40 CFR Part 60. [40 CFR §§ 49.129(d)(1) and (e)]

8.3. At all times the permittee shall be in compliance with NESHAP Subpart ZZZZ requirements that apply to the permittee. [40 CFR § 63.6605(a)]

8.4. The permittee shall change the oil and filter every 500 hours of operation or annually, whichever comes first. [40 CFR § 63.6603(a) and Row 4.a. of Table 2d to Subpart ZZZZ of Part 63]

8.4.1. The permittee has the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Condition 8.4 as follows:

8.4.1.1 The analysis program must at a minimum analyze the following three parameters: Total Base Number, viscosity, and percent water content.

8.4.1.2 The condemning limits for these parameters are as follows: Total Base Number is less than 30 percent of the Total Base Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5.

8.4.1.3 If all these condemning limits are not exceeded, the engine owner or operator is not required to change the oil.

8.4.1.4 If any of the limits are exceeded, the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.
[40 CFR § 63.6625(i) and footnote 1 of Table 2d to Subpart ZZZZ of Part 63]

8.5. The permittee shall inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary.
[40 CFR § 63.6603(a) and Row 4.b. of Table 2d to Subpart ZZZZ of Part 63]

8.6. The permitee shall inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

[40 CFR § 63.6603(a) and Row 4.c. of Table 2d to Subpart ZZZZ of Part 63]

8.7. If an emergency engine is operating during an emergency and it is not possible to shut down the engine in order to perform the management practice requirements pursuant to Conditions 8.4, 8.5 and 8.6, or if performing the management practice would otherwise pose an unacceptable risk under federal, state, or local law, the management practice shall be performed as soon as practicable after the emergency has ended or the unacceptable risk under federal, state, or local law has abated. [Footnote 2 of Table 2d to Subpart ZZZZ of Part 63]

8.8. Except as provided for in Condition 8.10, the permittee shall not operate the engine for more than 100 hours per calendar year for the following purposes: [40 CFR § 63.6640(f)(2)]

8.8.1. Maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor or the insurance company associated with the engine; and [40 CFR § 63.6640(f)(2)(i)]

8.8.2. Other non-emergency situations. [40 CFR § 63.6640(f)(4)]

8.9. The permittee may operate the engine for up to 50 hours per calendar year in non-emergency situations other than the activities listed in Condition 8.8.1 but only to the extent allowed by Condition 8.8. [40 CFR §§ 63.6640(f)(2) and (4)]

8.10. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency engines beyond 100 hours per calendar year. [40 CFR § 63.6640(f)(2)(i)]

8.11. During periods of startup, the permittee shall minimize the engine's time spent at idle and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.
[40 CFR § 63.6625(h) and Table 2d to Subpart ZZZZ of Part 63]

8.12. At all times the permittee shall operate and maintain the engine, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emission does not require the permittee to make any further efforts to reduce emissions if levels required by this standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source.
[40 CFR § 63.6605(b)]

8.13. The permittee shall operate and maintain the engine and after-treatment control device (if any) according to the manufacturer's emission-related written operation and maintenance instruction, or alternatively, the permittee shall develop and follow its own maintenance plan which shall provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions
[40 CFR §§ 63.6625(e), 40 CFR § 63.6640(a) and Row 9 of Table 6 to Subpart ZZZZ of Part 63]

ENG-2 Monitoring and Recordkeeping Requirements

8.14. The first time each calendar year that the engine is operated during daylight hours, the permittee shall conduct at least one 6-minute visible emissions observation of the engine stack using the procedures specified in Condition 3.9.1. [40 CFR § 71.6(a)(3)(i)(B)]

8.15. If the permittee utilizes an oil analysis program pursuant to Condition 8.4.1, the owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the

analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.
[40 CFR § 63.6625(i) and footnote 1 of Table 2d to Subpart ZZZZ of Part 63]

8.16. The permittee shall install a non-resettable hour meter if one is not already installed.
[40 CFR § 63.6625(f)]

8.16.1. The permittee shall keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter.

8.16.2. The permittee shall document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. [40 CFR § 63.6655(f)]

8.17. The permittee shall keep records to show continuous compliance with Condition 8.13.
[40 CFR § 63.6655(d)]

8.18. The permittee shall keep records of the maintenance conducted on the engine in order to demonstrate that the permittee operated and maintained the engine and after-treatment control device (if any) according to the permittee's own maintenance plan. [40 CFR § 63.6655(e)]

ENG-2 Reporting Requirements

8.19. The permittee shall comply with the applicable NESHAP Subpart A general provisions listed in Table 8 to Subpart ZZZZ of Part 63.
[40 CFR §§ 63.6665 and Table 8 to Subpart ZZZZ of Part 63]

8.19.1. The requirement to submit all of the notifications in §§ 63.7(b) and (c), 63.8(e), (f)(4) and (f)(6), 63.9(b) through (e), and (g) and (h) does not apply.
[40 CFR § 63.6645(a)(5)]

8.20. The permittee shall report in the semi-annual monitoring report required by Condition 3.47 any failure to perform timely management practices as required by Conditions 8.4, 8.5 and 8.6 for reasons afforded by Condition 8.7. Report also the federal, state or local law under which the risk was deemed unacceptable.
[40 CFR §§ 71.6(a)(3)(iii)(A) and footnote 2 of Table 2d to Subpart ZZZZ of Part 63)]

8.21. The permittee shall report in the semi-annual monitoring report required by Condition 3.47 each instance in which the permittee did not meet the requirements in Table 8 to 40 CFR 63, Subpart ZZZZ. [40 CFR §§ 63.6640(e) and 71.6(a)(3)(iii)(A)]

8.22. The permittee shall report all deviations as defined in 40 CFR Part 63, Subpart ZZZZ in the semi-annual monitoring report required by Condition 3.47. [40 CFR § 63.6650(f)]

9. Unit-Specific Requirements – KLN (Lumber Drying Kilns)

KLN Emission Limits and Work Practice Requirements

9.1. Particulate matter emissions from the stack(s) of this emission unit shall not exceed an average of 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot) during any three-hour period.

9.1.1. Compliance with the particulate matter limit is determined using EPA Reference Method 5 (see 40 CFR part 60, Appendix A). [40 CFR §§ 49.125(d)(3) and (e)]

KLN Monitoring and Recordkeeping Requirements

9.2. The permittee shall determine the monthly volume of lumber dried (bf/month) in the lumber kilns according to species of lumber and maximum drying temperature of each batch.

9.2.1. For each kiln charge, track the species and volume of lumber dried (bf) and the maximum dry bulb temperature (ºF) of heated air entering the lumber stack. [40 CFR §§ 71.6(a)(3)(i)(B) and (C), 71.6(a)(3)(ii) and 71.6(c)(1)]

10. Unit-Specific Requirements – CYC (Wood Residual Cyclones)

CYC Emission Limits and Work Practice Requirements

10.1. Particulate matter emissions from the stack(s) of this emission unit shall not exceed an average of 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot) during any three-hour period.

10.1.1. Compliance with the particulate matter limit is determined using EPA Reference Method 5 (see 40 CFR part 60, Appendix A). [40 CFR §§ 49.125(d)(3) and (e)]

11. Unit-Specific Requirements – SMI (Sawmill Activities Inside a Building)

SMI Emission Limits and Work Practice Requirements

11.1. Particulate matter emissions from the stack(s) of this emission unit shall not exceed an average of 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot) during any three-hour period.

11.1.1. Compliance with the particulate matter limit is determined using EPA Reference Method 5 (see 40 CFR part 60, Appendix A). [40 CFR §§ 49.125(d)(3) and (e)]

Appendix A: Boiler Fuel-Heat-Input-To-Steam-Output Ratio

Last Revised September 2013

1. During each emission test run:
   - Measure average stack gas flow (dscfm) using Reference Method 2
   - Measure average steam flow rate (mlbsteam/hr) using boiler monitoring equipment

2. Sample Fuel
   - Take 3 composite samples (composed of three approximately 2-pound individual samples) using 63.7521(c); all samples shall be collected at a location that most accurately represents the fuel being burned; if not sampling during a stack test, individual belt or screw feeder samples, described in 63.7521(c)(1)(ii), shall be separated by a 30 minute period

3. Homogenize Fuel Sample
   - Subdivide and homogenize each composite sample using 63.7521(d) until sample passes 0.5 mm screen

4. Determine Fuel Moisture
   - Determine moisture content (%, wet basis) of three composite samples using ASTM E871-82R06; time analysis such that samples used for moisture analysis represents moisture content of samples introduced to oxygen bomb; do not average the three sample results
   - For converting heat content or ultimate analysis % to dry basis, use the following:
     - (value, wet basis) / (1 - %moisture) = (value, dry basis)

5. Determine Fuel Heat Content (aka Gross Calorific Value or High Heat Value)
   - Determine gross calorific value (Btu/lb, wet basis) for each composite sample using ASTM E711-87R04; do not average the three sample results; convert GCV results to be on dry basis

6. Perform Ultimate Analysis (for each composite sample)
   - Determine ash content (%, dry basis) using ASTM D1102-84R07
   - Determine C (%, wet basis) using ASTM E777-87R04; convert to dry basis
   - Determine H (%, wet basis) using ASTME777-87R04; convert to dry basis
   - Determine N (%, wet basis) using ASTM E778-87R04; convert to dry basis
   - Determine S (%, wet basis) using ASTM E775-87R04; convert to dry basis
   - Calculate O (%, dry basis) using ash, C, H, N and S results (%, dry basis) and ASTM E870-82R06

7. Calculate Hogged Fuel F-Factor (for each composite sample)
   - Calculate F-factor (dscf/mmBtu) using results from ultimate analysis (dry basis) and GCV (dry basis) using equation 19-13 in 40 CFR 60 App A, RM19

8. Calculate Conversion Factor
   - Determine fuel heat input rate (mmBtu/hr) using average stack flow rate and percent oxygen (dry) for each run and F-factor for each composite sample:
     (dscf/min) ((20.9 - $\%O_2$)/20.9) x (60 min/hr) / (dscf/mmBtu) = (mmBtu/hr)
   - Determine input/output ratios (mmBtu/mlbsteam) by dividing the fuel heat input rate (mmBtu/hr) for each composite by the steam flow rate (mlbsteam/hr) for each run
   - Average the input/output ratio (mmBtu/mlbsteam) for the three samples/runs

Appendix B: HCl Emission Factor Procedure for Hogged Fuel

Last Revised December 2008

1. Sample Fuel
   - Take 3 composite samples (composed of three approximately 2-pound individual samples) using 40 CFR 63.7521(c); all samples shall be collected at a location that most accurately represents the fuel being burned; if not sampling during a stack test, individual belt or screw feeder samples, described in 40 CFR 63.7521(c)(1)(ii), shall be separated by a 30 minute period

2. Homogenize Sample
   - Subdivide and homogenize each composite sample using 40 CFR 63.7521(d) until sample passes 0.5 mm screen; approximately 50 grams of sample are needed for each moisture analysis, 1 gram of sample is needed for each oxygen bomb, and 2 grams of sample are needed for ash analysis

3. Determine Moisture Content
   - Determine moisture content (%, wet basis) of three composite samples using ASTM E871-82R06; time analysis such that samples used for moisture analysis represents moisture content of samples introduced to oxygen bomb; do not average the three sample results

4. Prepare Sample for Heat Content and Chlorine Content Analysis
   - Prepare three composite samples using SW-846-5050; this sample preparation can be performed simultaneously with heat content analysis (ASTM E711); alternatively, ASTM E776-87R04 can be used in place of both SW-846-5050 and SW-846-9056/9056A; do not combine composite samples before or after sample preparation

5. Determine Heat Content (aka Gross Calorific Value or High Heat Value)
   - Determine gross calorific value (Btu/lb, wet basis) of three composite samples using ASTM E711-87R04; do not average the three sample results
   - Convert GCV results to be on a dry basis:
     (GCV, wet basis) / (1 - %moisture) = (GCV, dry basis)

6. Determine Chlorine Content
   - Analyze bomb combustate for each composite sample for Cl (mg/L, wet basis) using SW-846-9056 or SW-846-9056A (alternatively, use ASTM E776-87R04 in place of SW-846-5050 and SW-846-9056/9056A)
   - Convert Cl mg/L (wet basis) to Cl ug/g (wet basis) using SW-846-5050 (eq. 1)

7. Determine Average HCl Emission Factor
   - Convert Cl (ug/g, wet basis) to HCl (lb/mmBtu, dry basis) for each composite sample:
     (Cl ug/g, wet basis) / (1 -%moisture) x (36.5 g HCl / 35.5 g Cl) / ($1x10^6$ ug/g) / (GCV Btu/lb, dry basis) x ($1x10^6$ Btu/mmBtu) = (HCl lb/mmBtu)
   - Determine HCl emission factor (HCl lb/mmBtu) by averaging the HCl results from the three composite samples.

United States Environmental Protection Agency
Region 10, Office of Air, Waste and Toxics
AWT-107
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

Permit Number: R10T5100100
Issued: September 30, 2013
Effective: September 30, 2013
Expiration: September 30, 2018
Replaces: R10T5-ID-00-03
AFS Plant I.D. Number: 16-061-00001

Statement of Basis

Title V Air Quality Operating Permit
Permit Renewal No. 1

Permit Writer: Dan Meyer

Blue North Forest Products, LLC

Nez Perce Reservation
Kamiah, Idaho

Purpose of Permit and Statement of Basis

Title 40 Code of Federal Regulations Part 71 establishes a comprehensive air quality operating permit program under the authority of Title V of the 1990 amendments to the federal Clean Air Act. The air quality operating permit is an enforceable compilation of all of the applicable air pollution requirements that apply to an existing affected air emissions source. The permit is developed via a public process, may contain additional new requirements to improve monitoring of existing requirements, and contains procedural and prohibitory requirements related to the permit program itself. The permit is valid for 5 years and may be renewed.

This document, the statement of basis, summarizes the legal and factual basis for the permit conditions in the air quality operating permit to be issued to Blue North Forest Products, LLC (referred to herein as BNFP, facility, source, or permittee). Unlike the air quality operating permit, this document is not legally enforceable. This statement of basis summarizes the emitting processes at the facility, air emissions, permitting and compliance history, the statutory or regulatory provisions that relate to the subject facility, and the steps taken to provide opportunities for public review of the permit. The permittee is obligated to follow the terms of the permit. Any errors or omissions in the summaries provided here do not excuse the permittee from the requirements of the permit.

Table of Contents

1. EPA Authority to Issue Title V Permits 3
2. Facility Information 3
2.1 Location 3
2.2 Nez Perce Reservation 3
2.3 Facility Description 3
2.4 Local Air Quality and Attainment Status 6
2.5 Permitting, Construction and Compliance History 6
3. Emission Inventory 7
3.1 Emission Inventory Basics 7
3.2 Potential to Emit (PTE) 8
4. Regulatory Analysis and Permit Content 9
4.1 Federal Air Quality Requirements 10
4.2 Other Federal Requirements 13
4.3 Permit Conditions 13
5. Public Participation 27
5.1 Public Notice and Comment 27
5.2 Response to Public Comments and Permit Issuance 27
6. Abbreviations and Acronyms 27

Appendix A

1. EPA Authority to Issue Title V Permits

On July 1, 1996, EPA adopted regulations (see 61 Federal Register (FR) 34202) codified at 40 Code of Federal Regulations (CFR) Part 71 setting forth the procedures and terms under which the Agency would administer a federal operating permit program. These regulations were updated on February 19, 1999 (64 FR 8247) to incorporate EPA's approach for issuing federal operating permits to affected stationary sources in Indian Country.

As described in 40 CFR 71.4(a), EPA will implement a Part 71 program in areas where a state, local, or Tribal agency has not developed an approved Part 70 program. Unlike states, Indian Tribes are not required to develop operating permit programs, though EPA encourages Tribes to do so. See, for example, Indian Tribes: Air Quality Planning and Management (63 FR 7253, February 12, 1998) (also known as the "Tribal Authority Rule"). Therefore, within Indian Country, EPA will administer and enforce a Part 71 federal operating permit program for stationary sources until the governing Indian Tribe receives EPA's approval to administer its own operating permit program.

2. Facility Information

2.1 Location

The BNFP facility is located along the east side of the Clearwater River directly north of 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 as defined in 40 CFR Part 71.

2.2 Nez Perce Reservation

The Nez Perce Reservation is in northern Idaho. In 1855, Governor Stevens concluded a treaty with the Nez Perce Tribe recognizing tribal rights to an immense tract of country consisting of some 7.5 million acres. A new treaty in 1863 reduced the reservation to its current size of approximately 760,000 acres located in northern Idaho. Today there are 15 communities located within the boundaries of the reservation. Based on 1986 data, the population is estimated at about 11,400 within the incorporated communities. Another 5,000 to 6,000 people live in the rural areas. Tribal enrollment is approximately 3,300 members with 1,000 members living off the reservation.

The Nez Perce Tribe operates under a constitution that was approved in 1958. The Tribe's constitution provides that a nine member Nez Perce Tribal Executive Committee is the governing body.

Tribal Contact: Julie Simpson
Air Quality Coordinator
Nez Perce Tribe
P.O. Box 365
Lapwai, Idaho 83540-0365
Phone: 208.843.7375
Email: julies@nezperce.org

2.3 Facility Description

The primary operation at the privately-owned 34-acre facility is the production of dimensional lumber from raw logs. The BNFP facility has debarkers and saws, kilns for drying lumber, a planer, wood chippers, a bark hog, various storage bins and two hog fuel-fired boilers (to supply steam to the kilns). The site includes a log yard, shops, offices, and open and covered storage areas. There are no chemical

wood preservative or gluing operations. Logs are received and stored in the log yard. The process of cutting the logs into lumber includes debarking, sawing, chipping, kiln drying, planing, and packaging for shipping.

The manufacturing process is comprised of the following steps. The raw logs are delivered to the site, stockpiled, debarked, cut to length, and then rough sawn into lumber. The lumber is stickered, kiln dried, planed, graded, bundled, sold and shipped out. There are two debarking lines based on the diameter of the logs. Currently only the small log line is operational. The bark or hog is ground into a manageable size, approximately 1.5 inches, and conveyed to the boiler house. Extra hog fuel is sold to Clearwater Paper in Lewiston (formerly Potlatch Corporation). Some bark is sold for 'beauty bark'. Douglas fir and white fir are the primary species processed at the mill. They usually run less than 10% ponderosa pine and they do not process cedar. The Douglas fir has higher BTU than the white fir; therefore, they prefer to sell the white fir fuel and utilize the Douglas fir bark and shavings on-site. The bark is stored under a roof for approximately two weeks before being mixed with dry shavings and fed into the boiler. When stockpiled, the bark starts to heat, drying the fuel out, resulting in a more consistent fuel. Planner shavings and chips are also used as fuel for the boiler or sold to Clearwater Paper or to a pellet plant for horse bedding. The shavings are stored in a bin. Rough lumber is sorted by moisture (weight) to load the kilns efficiently for energy conservation. One species of lumber is loaded in the kiln at a time. The drying time is 24-120 hours depending on the species and time of year.

The facility runs a shift per day with 58 total employees, 40 working in the yard. Everyone works a 40 hour week. Logs are supplied from US Forest Service sales, State of Idaho lands, industrial landowners like Potlatch, and private foresters. About 90% of their product is 2 by stock lumber and of that 60% is white fir and 40% is Douglas fir. The other 10% of their product is ponderosa pine, 1 by stock. They do not process cedar. Annually they process approximately 60 million board feet. All the green chips and sawdust generated are sold. They use bark and shavings as fuel for their boiler. The mill has two debarking and planer lines, one for large diameter logs and the other for small diameter logs. They are only using the small diameter side and that the average log diameter being processed is 7.5 inches in diameter. They take logs down to 4.5 inches in diameter.

The air pollution emission units and control devices that exist at the facility are listed in Table 2-1 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 PSD, NSPS and MACT standards (see further discussion in Section 4). Capacities are listed for several emission units based on the best information available from the applicant. Those control devices that are required by rule or this permit are so noted.

Table 2-1 – Emission Units (EU) & Control Devices

EU ID	Emission Unit Description	Control Device[1]
BLR-1	31.7 MMBtu/hr capacity hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace. Induced draft. Water-cooled fixed grate. Actual steam production around 10,000 lb/hr of 110 psi steam in June 2013. Installed circa 1948.	Multiclone
BLR-2	31.7 MMBtu/hr capacity hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace. Induced draft. Water-cooled fixed grate. Actual steam production around 10,000 lb/hr of 110 psi steam in June 2013. Installed circa 1948.	Multiclone

EU ID	Emission Unit Description	Control Device[1]
ENG-1	Cummins NT-280-IF 255 horsepower compression-ignition diesel-fired engine to supply mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency. Manufactured 1971. Installed circa 1995. Rebuilt circa 2011.	None
ENG-2	Cummins NT-280-IF 255 horsepower compression-ignition diesel-fired engine to supply mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency. Manufactured 1971. Installed circa 1995.	None
KLN	Seven 64-foot double-track lumber drying kilns. Indirectly heated. Kilns No. 2 through 6 automated. Kilns No. 1 and 7 not automated. 16 dry bulbs and 2 wet bulbs per kiln. Annual capacity equals 174,000 mbf lumber. Installed?	None
CYC	Five wood residual cyclones. W4 – planer mill shavings cyclone. H1 – planer mill chipped trim ends hog cyclone. W3 – Atlas fuel bin cyclone. W5 – shavings cyclone on top of shavings/sawdust bin. T1 – saw mill trimmer sawdust cyclone on top of shavings/sawdust bin.	None.
BIN	Five wood residual bins. GS – green sawdust bin. GC – green wood chip bin. AF – Atlas fuel bin. SS – shavings and green trimmer sawdust bin. HF – hog fuel bin.	None.
SMI	Sawmill operations inside a building. This activity includes, but is not limited to, hogging, sawing, chipping, shaving and mechanical transfer of wood residuals.	Inside building
SMO	Sawmill operations outside a building. This activity includes, but is not limited to, debarking, hogging, sawing, chipping, mechanical transfer of wood residuals and hog fuel storage pile.	None.
PT	Plant traffic generating fugitive emissions along paved and unpaved roads.	Watering

[1] The multiclone is required to be used by this permit.

An emission unit or activity qualifies as an insignificant emission unit (IEU) if it is an activity type listed in 40 CFR 71.5(c)(11)(i) or emits less than 2 tons per year of any regulated air pollutant excluding HAPs [40 CFR 71.5(c)(11)(ii)(A)] and less than 1000 pounds per year of any HAP or the de minimis HAP level established under Section 112(g), whichever is lower [40 CFR 71.5(c)(11)(ii)(B)]. BNFP has noted in its renewal application a list of IEUs similar to the one from its previous Title V permit. The updated list of IEUs are shown in Table 2-2 below.

Table 2-2 – Insignificant Emission Units (IEU)

EU ID	Emission Unit Description
IEU-1	500 gallon gasoline tank and fueling
IEU-2	12,000 gallon diesel tank and fueling
IEU-3	Wood residue pile
IEU-4	Log feed decks
IEU-5	Sawmill building vents
IEU-6	Sorter building vents
IEU-7	Powerhouse vents

EU ID	Emission Unit Description
IEU-8	Planner building vents
IEU-9	Lumber storage shed vents
IEU-10	Fire station roof vents
IEU-11	Lumber shipping
IEU-12	Log storage

2.4 Local Air Quality and Attainment Status

Local Air Quality and Attainment Status: Northern Idaho, including the Nez Perce Reservation, attains the national ambient air quality standard (NAAQS) for $PM_{2.5}$, and is "unclassified" for all other criteria pollutants. An area is unclassifiable when there is insufficient monitoring data to determine compliance with the NAAQS. The State of Idaho operates continuous $PM_{2.5}$ monitors at three locations near the Nez Perce Reservation, in the towns of Lewiston, Moscow, and Grangeville. The 2010-2012 24-hour $PM_{2.5}$ design values for these monitors are, respectively, 18 micrograms per cubic meter ($\mu g/m^3$), 16 $\mu g/m^3$, and 14 $\mu g/m^3$. These values are substantially below the 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$, and demonstrate that the surrounding area is in compliance with the $PM_{2.5}$ NAAQS. Monitoring for $PM_{2.5}$ is also being conducted by the Nez Perce Tribe at three locations on the Nez Perce Reservation in Kamiah, Lapwai and Reubens. Data from these monitors indicate that both the 24-hour and annual $PM_{2.5}$ design values on the reservation are well below the $PM_{2.5}$ NAAQS.

2.5 Permitting, Construction and Compliance History

The facility currently owned by Blue North Forest Products, LLC was previously owned by Three Rivers Timber (TRT). Previous to that, the mill was owned by Weyerhaeuser, by Rawlins Construction/Triple R Forest Products Limited Partnership, and by Potlatch Corporation. The mill was reportedly built in the late 1950s and owned by the Potlatch Corporation until it was shut down in March 1984. Potlatch subsequently sold the mill to Rawlins Construction Company in January 1986. Rawlins transferred the mill to Triple R Forest Products, a Montana limited partnership, with Rawlins as general partner, and Weyerhaeuser Company as the limited partner. Operation of the mill resumed in November/December 1986 with normal production beginning in January 1987. In March 1988, Weyerhaeuser Company purchased Rawlins' general partnership. The limited partnership structure was formally dissolved in February 1993 leaving Weyerhaeuser in full ownership. Three Rivers Timber purchased the mill from Weyerhaeuser in 1994. TRT operated the facility until it closed in November 2008. In April 2010 the mill was auctioned but did not sell. Mill equipment and other assets were to be sold piecemeal, prior to Michael Burns purchasing the mill on June 21, 2010. The BFNP mill started operations on August 30, 2010. Restart of the mill did not trigger PSD review based upon EPA review conducted May 2011.

A chronological summary of permit activities for BNFP is presented in Table 2-3 below.

Table 2-3 – Clean Air Act Permitting History

Date	Permit No.	Action
08/23/02	R10T5-ID-00-03	EPA issues initial Title V permit.
09/27/07	R10NT500900	EPA issues non-Title V permit to limit HAP emissions to less than major source threshold levels to avoid Plywood and Composite Wood Products MACT and any other major source MACT to come.
04/07/06 – 04/07/07	R10T5-ID-00-03	Title V permit renewal application due to EPA.
04/07/07	R10T5-ID-00-03	EPA receives TRT Title V permit renewal application.
010/07/07	R10T5-ID-00-03	Title V permit expires but is administratively extended because TRT submitted a timely permit renewal application.

Date	Permit No.	Action
12/08/10	R10T5-ID-00-03	BNFP submits Title V permit renewal application.
09/30/11	R10T5-ID-00-03	BNFP submits amendment to Title V permit renewal application.
07/26/13	R10T5010100	Pre-draft Title V permit renewal is sent to BNFP and Nez Perce Tribe for initial review.
08/21/13 – 09/20/13	R10T5100100	Public comment period for draft Title V permit renewal.

The Nez Perce Tribe Air Quality Program has inspected the facility each year for the past three years. There is no record of any notice of violation having been issued to BNFP for Clean Air Act violations stemming from those inspections. However, the inspection reports suggest that the facility is not complying with Condition 3.3 of its non-Title V permit, R10NT500900, as only two composite samples are being collected and analyzed quarterly. The permittee is required to sample and analyze three composite samples quarterly. Also, the inspection reports suggest that the facility is not complying with (a) 40 CFR § 49.126(e)(1)(i) requirement to, "Document the results of the (annual fugitive dust) survey, including the date and time of the survey and identification of any sources of fugitive particulate matter emissions found" and (b) 40 CFR § 49.126(e)(1)(iii) requirement to "prepare, and update as necessary following each (annual fugitive dust) survey, a written plan that specifies the reasonable precautions that will be taken and the procedures to be followed to prevent fugitive particulate matter emissions, including appropriate monitoring and recordkeeping."

3. Emission Inventory

3.1 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 potential to emit (PTE), generally represent the maximum capacity of a source to emit a pollutant under its physical and operational design, taking into consideration regulatory restrictions, but only required control devices. PTE is often used to determine applicability to several EPA programs, including Title V, PSD and Section 112 (MACT).

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. Point sources of emissions include any emissions that are not fugitive.

The equation below represents the general technique for estimating emissions (in tons per year) from each emission unit at the facility. Emissions are calculated by multiplying an emission factor by an operational parameter. To estimate actual emission, BNFP will need to track the actual operational rates. Note that emission factors may be improved over time. For those estimation techniques that require substantial site-specific parameter tracking, such as piles and roads, emissions associated with a defined operational rate can be estimated to establish a set ratio that can be used to multiply by the actual operational rate in future years, significantly simplifying the annual inventory effort. All of the techniques and site-specific parameters and assumptions should be reviewed each year before estimating emissions to be sure they remain appropriate.

$$E = EF \times OP \times K$$

Where:

E = pollutant emissions in tons/year

EF = emission factor (see Appendix A to this Statement of Basis)
OP = operational rate (or capacity for PTE)
K = 1 ton/2000 lbs for conversion from pounds per year to tons per year

3.2 Potential to Emit (PTE)

BNFP completed and submitted EPA Part 71 Operating Permit Form EMISS for all emission units as part of its Title V permit renewal application. Form EMISS lists actual and potential emissions. BNFP submitted calculations supporting Form EMISS. EPA has documented the facility PTE in Appendix A. In some instances, EPA revised the emission estimates provided by BNFP to more accurately reflect potential emissions from the facility. A summary of BNFP's PTE is presented in Table 3-1 below. Note that while fugitive emissions are included in Table 3-1, fugitive emissions are not always used to determine program applicability as explained in more detail in Section 4.1 of this Statement of Basis.

Table 3-1 – BNFP Potential to Emit[1]

	PTE in tons per year										
Pollutant[2]	**BLR-1**	**BLR-2**	**ENG-1**	**ENG-2**	**KLN**	**CYC**	**BIN**	**IMA**	**OMA**	**PT**	**Total**
CO	83.3	83.3	0.4	0.4	0						167.4
Pb	0	0	0	0	0						0
NO_X	68.0	68.0	2.0	2.0	0						140
PM	57.2	57.2	0.1	0.1	4.4	0	0	0	0	0	119
PM_{10}	59.6	59.6	0.1	0.1	4.4	0	0	0	0	106.9	230.7
$PM_{2.5}$	59.6	59.6	0.1	0.1	4.4	0	0	0	0	14.0	137.8
SO_2	166.3	166.3	0.2	0.2	0						333
VOC	3.2	3.2	0.2	0.2	331.4		0				338.2
GHG (CO_2e)[3]	29,324	29,324	73	73	0						58,794
Plant-wide Total HAP[4]											24
Plant-wide Single HAP[4]											9

[1] Fugitive emissions are included in this table but may not always be used in applicability determinations (see Section 4.1)

[2] CO = carbon monoxide; Pb = lead; NO_X = oxides of nitrogen; PM = particulate matter; PM_{10} = particulate matter with diameter 10 microns or less; $PM_{2.5}$ = particulate matter with diameter 2.5 microns or less; SO_2 = sulfur dioxide; VOC = volatile organic compounds; GHG = greenhouse gases; HAP = hazardous air pollutants [see Clean Air Act, Section 112(b)]; plant-wide total HAP = all HAPs totaled; plant-wide single HAP = highest individual HAP

[3] The DC Circuit Court of Appeals on July 12, 2013 vacated EPA regulations that delayed until July 21, 2014 consideration of CO_2 emissions resulting from biomass combustion in determining PSD and Title V applicability pursuant to 40 CFR 52.21(b)(49)(ii)(a) and 40 CFR 71.2 definition of "subject to regulation." See explanation for exemption provided by EPA at 76 FR 43490. See DC Circuit Court of Appeals July 12, 2013 ruling vacating the exemption at http://www.cadc.uscourts.gov/internet/opinions.nsf/F523FF1F29C06ECA85257BA6005397B5/$file/11-1101-1446222.pdf

[4] HAP PTE is capped by plant-wide emission limits created in a FARR Non-Title V permit

The PTE estimates for the facility generally assume all units operate 8760 hours per year, with the exception being the engines ENG-1 and ENG-2. Because these engines are intended only to operate in the event of an emergency to suppress a fire should electricity not be available, their potential emissions are calculated assuming 500 hours of annual operation. The boilers' (BLR-1 and BLR-2) potential PM emissions were calculated assuming emission rates equal to the applicable FARR PM emission limit for wood-fired boiler stacks of 0.2 gr/dscf at 7% O_2. This is equivalent to about 0.4 lb/MMBtu. The permit requires the facility to vent boilers' exhausts to their respective multiclones at all times to achieve compliance with the PM limit. The boilers' potential sulfur dioxide emissions are based on the applicable FARR combustion source stack SO_2 emission limit of 500 ppm. Although boilers' HAP PTE was estimated by employing AP-42 emission factors, individual and total HAP emissions have been limited facility-wide to less than major source threshold levels at the request of BNFP so as to avoid MACT standards that apply to major sources. The boilers' potential greenhouse gas emissions were estimated

employing emission factors appearing in the Mandatory Greenhouse Gas Reporting Rule (40 CFR 98) pursuant to March 2011 EPA guidance document entitled, "PSD and Title V Permitting Guidance for Greenhouse Gases." For a derivation of nearly all the emission factors employed to construct the boilers' PTE inventory, see sections of Appendix A entitled, "EPA Region 10 Regulated NSR Air Pollutant Potential to Emit Emission Factors for Wood Residue-Fired Boilers, July 2013" and "EPA Region 10 Hazardous Air Pollutant Potential to Emit Emission Factors for Wood Residue-Fired Boilers, July 2013."

Emission factors for the boilers are based on heat input (fuel) to the boilers. The permit requires BNFP to track steam production so as to calculate boiler heat input (firing rate) for the purpose of the emission inventory. The conversion factor applied to convert steam production to heat input must be based on the latest site specific boiler testing/sampling data. Appendix A to the permit explains the procedures for developing a boiler input-to-output ratio.

The kilns' VOC PTE was estimated by employing worst-case emission factors derived from lab-scale testing conducted largely by Professor Mike Milota at Oregon State University. Although the kilns are each subject to the applicable FARR process source stack PM emission limit of 0.1 gr/dscf, EPA did not consider the limit in determined the kilns' PM PTE because BNFP did not provide each kiln's physical capacity to vent to the atmosphere. Neither did EPA consider the applicable FARR visible emissions limit of 20% opacity because EPA could not quantify a correlation between opacity and PM emissions for the kiln exhaust vents. To estimate PM PTE, EPA employed an uncontrolled emission factor published by the Oregon Department of Environmental Quality. Although the kilns' HAP PTE was estimated by employing worst-case emission factors derived from lab-scale testing conducted largely by Professor Mike Milota at Oregon State University, individual and total HAP emissions have been limited facility-wide to less than major source threshold levels at the request of BNFP.

EPA relied largely upon AP-42, ODEQ guidance, an Oregon State University draft technical report, 1977 and 1978 EPA technical documents along with engineering judgment to estimate PM, PM_{10} and $PM_{2.5}$ potential emissions resulting from traditional sawmill activities like log debarking, sawing, chipping, hogging, mechanical and pneumatic conveyance of wood residuals and loading and unloading wood residuals. EPA did not consider the FARR visible emissions limit of 20% opacity that applies to all these activities because EPA could not quantify a correlation between opacity and PM emissions. Neither did EPA consider the FARR rule for limiting fugitive PM emissions largely because the permit we are issuing does not contain sufficient testing, monitoring, recordkeeping and reporting to support the use of controlled emission factors.

BNFP is expected to use the emission factors and calculation methods presented in Appendix A unless BNFP demonstrates that a more appropriate emission factor or calculation method should be used (e.g., results of more recent source testing or sampling, revised emission factors published in AP-42, etc.). It is important to emphasize that to the extent BNFP relies on any type of emission control technique to estimate emissions used to determine annual fees, or the applicability of a regulatory program, use of the technique must be fully documented and verifiable.

4. Regulatory Analysis and Permit Content

EPA is required by 40 CFR Part 71 to include in this Title V permit all emission limitations and standards that apply to the facility, including operational, monitoring, testing, recordkeeping and reporting requirements necessary to assure compliance. This section explains which air quality regulations apply to this facility and how those requirements are addressed in the permit.

Located within Indian Country, the BNFP sawmill is subject to federal air quality regulations, but is not subject to state air quality regulations. EPA does not consider any permits issued by Idaho to the BNFP facility to be applicable requirements. The facility could be subject to tribal air quality regulations;

however, the Tribe has not gone through the process of obtaining authorization to be treated in the same manner as states under 40 CFR §§ 49.6 and 49.7 (Tribal Authority Rule) and obtaining approval of air quality regulations as a "Tribal Implementation Plan." Therefore, Tribal air quality regulations, if any, are not federally enforceable and do not meet the definition of "applicable requirement" under 40 CFR Part 71. As such, there are no Tribal air quality regulations in the BNFP Title V permit.

EPA relied on information provided in BNFP's Title V permit application and on supplementary information provided by BNFP to determine the requirements that are applicable to the sawmill. Future modifications to the mill could result in additional requirements.

4.1 Federal Air Quality Requirements

Title V Operating Permit Program. Title V of the Clean Air Act and the implementing regulation found in 40 CFR part 71 require major sources (as well as a selection of non-major sources) of air pollution to obtain operating permits and form the legal bases for this permit. A source is major if it has the potential to emit 100 tons per year or more of any air pollutant subject to regulation, 25 tons per year or more of hazardous air pollutants (totaled) or 10 tons per year or more of any single hazardous air pollutant (see 40 CFR 71.2). BNFP's sawmill is a major source subject to Title V because it has the potential to emit more than 100 tons per year of CO, NO_X, PM_{10}, $PM_{2.5}$, SO_2 and VOC not counting fugitive emissions (see Table 1 and Appendix A). While PM emissions also exceed 100 tons per year, EPA does not consider PM a regulated pollutant for Title V applicability purposes. Greenhouse gas potential emissions do not exceed the 100,000 ton-per-year CO_2 equivalent threshold to qualify as a pollutant subject to regulation.

The Title V operating permit serves as a comprehensive compilation of the air quality requirements that are applicable to a source. The permit also must assure compliance, so source-specific testing, monitoring, recordkeeping and reporting have been added where EPA believes it is necessary, as explained in Section 4.3 (Permit Conditions) of this Statement of Basis below.

Compliance Assurance Monitoring (CAM). CAM applies at time of initial Title V permit issuance for emission units that (a) are subject to an emission limit, (b) employ a control device to comply with the limit, and (c) have post-control PTE equal to or greater than the major source threshold defined in Title V (generally, 100 tons per year). See 40 CFR Part 64. Each of the boilers at BNFP (a) is subject to a PM emission limit, (b) employs a multiclone to comply with the limit, but (c) does not have post-control PTE equal to or greater than 100 tpy.[1] Each boiler, however, does have pre-control PTE equal to or greater than 100 tpy.[2] CAM applies at the time of Title V permit renewal for emission units like the BNFP boilers that satisfy criteria (a) and (b) above and that have pre-control PTE equal to or greater than the major source threshold defined in Title V. The boilers must be in compliance with CAM at permit renewal and may also be required to submit a CAM plan if a significant change is made to the unit prior to renewal. The multiclones that control particulate matter emissions from the boilers are the only control devices at the sawmill.

Prevention of Significant Deterioration (PSD). Under the PSD pre-construction permitting program found in Part C of the Clean Air Act and 40 CFR 52.21, no "major stationary source" or "major modification" to a major stationary source can begin actual construction without first obtaining a PSD permit. The PSD

[1] Each Boiler's Post-Control PTE Calculations. 57.2 tpy PM = (31.7 MMBtu/hr) X (0.412 lb PM/MMBtu) X (8760 hr/yr) X (ton/2000 lb), where 31.7 MMBtu/hr equals heat input capacity of each boiler and 0.412 lb PM/MMBtu is approximately equal to applicable FARR PM emission limit.

[2] Each Boiler's Pre-Control PTE Calculations. The calculation to estimate each boiler's PM potential emission not considering multiclone is as follows: (56 tons per year) X [1 / (1 - 0.6)] = 140 tons. The value "56 tons per year" is extracted from BNFP Part 71 permit renewal application and is based upon stack test results reflecting post-control emissions. The value "0.6" reflects an estimated 60 percent PM control efficiency for a multiclone. EPA carried out this calculation back in 2002 to determine each boiler's potential to emit in the absence of the FARR PM limit in support of issuance of initial Part 71 permit to TRT.

program has been changed over the years, but in general, a major stationary source for purposes of the PSD program is a source with a PTE of more than 250 tons per year of any PSD pollutant. A modification is major if it results in emission increases greater than defined significance levels. Historical reviews of potential PSD projects are difficult due to the lack of specific details about the sources, their emissions and the various applicability requirements in previous PSD programs.

Based on the information available today, EPA is not aware of any modifications that would have been subject to PSD. EPA is not aware of any other modifications to the facility and does not draw any conclusions regarding compliance with past permitting requirements for this facility. Therefore, no permit shield is implied or explicit for past new source review or PSD requirements.

New Source Performance Standards (NSPS). Four NSPS subparts may apply to each boiler (a steam generating unit): 40 CFR 60, Subparts D (Fossil-Fuel-Fired Steam Generators), Da (Electric Utility Steam Generating Units), Db (Industrial-Commercial-Institutional Steam Generating Units) and Dc (Small Industrial-Commercial-Institutional Steam Generating Units). Subparts D, Da and Db do not apply because the heat capacity of each boiler is 31.7 MMBtu/hr, comfortably below the applicability thresholds of 100 (NSPS Db) and 250 MMBtu/hr (NSPS D and Da). Subpart Dc does not apply because each boiler was constructed well before the June 9, 1989 cutoff. EPA has no record of either boiler being reconstructed or undergoing a modification such that Subpart Dc is now applicable.

National Emission Standards for Hazardous Air Pollutants (NESHAP). With a few exceptions, MACT standards promulgated under 40 CFR Part 63 apply to "major sources" of HAP. Section 112(a)(1) and 40 CFR 63.2 define a "major source" as a stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls in the aggregate, 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAP. There are at least two MACT standards that might be applicable to BNFP operations if major for HAP: Subparts DDDDD (Industrial, Commercial and Institutional Boilers and Process Heaters at Major Sources) and DDDD (Plywood and Composite Wood Products Manufacture – includes lumber kilns). The compliance dates for the two MACT standards are January 31, 2016 and October 1, 2007, respectively.

Potential HAP emissions (in the absence of enforceable PTE limits) from BNFP operations are approximately 54 tons per year. See emissions inventory in Appendix A. On September 27, 2007, EPA issued a non-Title V permit limiting HAP emissions to less than major source thresholds to the former owner of the facility TRT. That permit has recently been administratively amended to reflect new ownership of the mill. Requirements from that non-Title V permit have been incorporated into this Title V permit renewal, and EPA is creating additional testing, monitoring, recordkeeping and reporting requirements at this time to assure compliance. With enforceable limits on HAP emissions from BNFP in place, the facility is considered a minor (aka area) HAP source, thereby avoiding major source MACT standards that might otherwise apply.

EPA has recently finalized a MACT standard that applies to boilers at area HAP sources. The regulation is codified at 40 CFR 63, Subpart JJJJJJ - Industrial, Commercial, and Institutional Boilers for Area Sources, and each boiler at BNFP is an affected source (biomass boiler). BNFP is required to conduct an energy assessment and tune the boiler before March 21, 2014. Thereafter, BNFP is required to tune the boiler either every two or five years depending upon whether an oxygen trim system is being employed to control combustion in the boiler. BNFP intends to install and begin employing an oxygen trim system in each boiler beginning around October 1, 2013. If BNFP's plans are successful, the next boiler tune-up beyond the first will not be required until five years later.

Another MACT standard that applies to area HAP sources (as well as major HAP sources) is MACT Subpart ZZZZ - National Emission Standards for Reciprocating Internal Combustion Engines. Each of

BNFP's emergency engines is an affected source. Among other requirements, BNFP is required to either (a) operate and maintain each engine according to the manufacturer's emission-related operation and maintenance instructions or (b) develop and follow its own maintenance plan. MACT Subpart ZZZZ also specifies a schedule for changing the engine oil and conducting inspections of certain engine components, and replacing as necessary. BNFP must limit the number of hours it operates the engines in order for certain other requirements to not apply. Compliance is required no later than May 3, 2013.

Section 111(d) and Section 129 Regulations. There are no CAA, Section 111(d) or 129 regulations that apply to the type of emission units at BNFP. Biomass combustion in the boilers is not considered solid waste or municipal waste combustion or incineration.

Federal Air Rules for Reservations (FARR). On April 8, 2005, EPA promulgated a Federal Implementation Plan (FIP) for Reservations in Idaho, Oregon and Washington. This FIP is commonly referred to as the Federal Air Rules for Reservations (FARR). EPA published the FARR rules that generally apply to Indian Reservations in EPA Region 10 in 40 CFR 49.121 to 49.139. The FARR rules that specifically apply on the 1863 Nez Perce Reservation are codified at 40 CFR 49.10401 to 49.10411. Those FARR requirements that apply to the permittee and have been included in the permit are discussed in Section 4.3 of this document. Several requirements of the FARR that are in effect on the Nez Perce Reservation do not apply to BNFP's mill. Table 4-2 below lists the FARR requirements that do not apply to the permittee and explains why.

Table 4-2 – Inapplicable FARR Requirements

Citation	Description	Reason Inapplicable
49.127	Rules that apply to wood waste burners (wigwam burners)	No wigwam burners exist at BNFP
49.128	Rules that apply to wood veneer, plywood, particleboard and hardboard manufacturing	BNFP does not produce any of the products listed
49.129(d)(2)	Limits SO_2 from process source stacks	None of BNFP's processes emit SO_2
49.130(d)(1), (3-6) and (8)	Limits amount of sulfur in coal and gaseous fuels	BNFP only combusts wood waste in its boilers and No. 2 distillate in its engines.
49.130(e)(2) and (4)	Specifies reference methods for determining sulfur content of coal and gaseous fuels	BNFP only combusts wood waste in its boilers and No. 2 distillate in its engines.
49.130(f)(1)(ii)	Additional requirements that apply to gaseous fuels	BNFP only combusts wood waste in its boilers and No. 2 distillate in its engines.
49.135	Restricts emissions determined to be detrimental to human health or welfare	Actual requirements will result from EPA's determination and subsequent permits or orders that address an issue

Acid Rain Program. Title IV of the CAA created a SO_2 and NO_X reduction program found in 40 CFR Part 72. The program applies to any facility that includes one or more "affected units" that produce power. Neither of BNFP's boilers are a "unit" as defined in 40 CFR 72.2 because neither combust fossil fuels.

Mandatory Greenhouse Gas Reporting Rule. This rule requires sources above certain emission thresholds to calculate, monitor, and report greenhouse gas emissions. According to the definition of "applicable requirement" in 40 CFR 71.2, neither 40 CFR part 98, nor CAA §307(d)(1)(V), the CAA authority under which 40 CFR part 98 was promulgated, are listed as applicable requirements for the purpose of Title V permitting. Although the rule is not an applicable requirement under 40 CFR part 71, the source is not relieved from the requirement to comply with the rule separately from compliance with their part 71

operating permit. It is the responsibility of each source to determine applicability to part 98 and to comply, if necessary.

4.2 Other Federal Requirements

EPA Trust Responsibility. As part of the EPA Region 10's direct federal implementation and oversight responsibilities, EPA Region 10 has a trust responsibility to each of the 271 federally recognized Indian tribes within the Pacific Northwest and Alaska. The trust responsibility stems from various legal authorities including the U.S. Constitution, Treaties, statutes, executive orders, historical relations with Indian tribes, and in this case the Nez Perce Treaty of 1863. In general terms, EPA is charged with considering the interest of tribes in planning and decision making processes. Each office within EPA is mandated to establish procedures for regular and meaningful consultation and collaboration with Indian tribal governments in the development of EPA decisions that have tribal implications. EPA Region 10's Office of Air, Waste and Toxics has contacted the Nez Perce Tribe to invite consultation on the BNFP Title V operating permit renewal application.

Endangered Species Act (ESA). Under this act, EPA is obligated to consider the impact that a federal project may have on listed species or critical habitats. It is EPA's conclusion that the issuance of this Title V permit will not affect a listed species or critical habitat because it does not authorize new emissions units, increase existing emission limits or impose any new work practice requirements. Therefore, no additional analysis and no additional requirements will be added to this permit for ESA reasons. EPA's no-effect determination concludes EPA's obligations under Section 7 of the ESA. For more information about EPA's obligations, see the Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act, published by the FWS and NMFS (March 1998, Figure 1).

National Environmental Policy Act (NEPA). Under Section 793(c) of the Energy Supply and Environmental Coordination Act of 1974, no action taken under the Clean Air Act shall be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969. This permit is an action taken under regulations implementing the Clean Air Act and is therefore exempt from NEPA.

National Historic Preservation Act (NHPA). As noted earlier, the issuance of this Title V permit does not authorize new emissions units, increase existing emission limits or impose any new work practice requirements. No changes to the facility are expected as a result of this permit action. Consequently, no adverse effects are expected, and further review under NHPA is not indicated.

Environmental Justice (EJ) Policy - Under Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* signed on February 11, 1994, EPA is directed, to the greatest extent practicable and permitted by law, to make achieving environmental justice 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 in the United States. This permit action does not allow new or additional emissions and therefore impacts. As a result, there is no information available that indicates that there are disproportionately high and adverse impacts to a minority or low-income population.

4.3 Permit Conditions

This Title V operating permit compiles all of the applicable requirements that apply to the permittee. Additional monitoring, recordkeeping and reporting requirements have been created where needed so the permit assures compliance with all of the applicable requirements. Each permit condition in the permit is explained below. The permit is organized into the following eleven sections:

Permit Section 1: Source Information and Emission Units
Permit Section 2: Standard Terms and Conditions
Permit Section 3: General Requirements
Permit Section 4: Facility-Specific Requirements
Permit Section 5: Unit-Specific Requirements – BLR-1 (Hog Fuel-Fired Boiler No. 1)
Permit Section 6: Unit-Specific Requirements – BLR-2 (Hog Fuel-Fired Boiler No. 2)
Permit Section 7: Unit-Specific Requirements – ENG-1 (Emergency Backup Engine No. 1)
Permit Section 8: Unit-Specific Requirements – ENG-1 (Emergency Backup Engine No. 2)
Permit Section 9: Unit-Specific Requirements – KLN (Lumber Drying Kilns)
Permit Section 10: Unit-Specific Requirements – CYC (Wood Residual Cyclones)
Permit Section 11: Unit-Specific Requirements – SMI (Sawmill Activities Inside a Building)

Permit Section 1 – Source Information and Emission Units

This permit section contains a brief description of the facility and a list of emission units. A more detailed description of the facility can be found in Section 2 of this Statement of Basis.

Permit Section 2 – Standard Terms and Conditions

This permit section includes generic compliance terms that are required in all Title V permits, but are not subject to the annual compliance certification requirements found in Permit Condition 3.49.

Permit Condition 2.1 explains that the language in the underlying regulations takes precedence over paraphrased language in the permit. Some applicable requirements are paraphrased in the permit with the intention of clarifying the requirement, but with no intention of changing the underlying meaning of the requirement. Where there is a difference between the language in a permit and an underlying regulation, the wording in the underlying regulation should be used to interpret and implement the requirement. This permit condition also notes some underlying authorities that may have been used to create additional requirements in this permit.

Permit Conditions 2.4 and 2.5 address a general permit shield which states that compliance with the permit is deemed compliance with the applicable requirements listed in the permit. The permittee is responsible for complying with any applicable requirements that exist but have not been included in the permit. The permittee did not request a specific permit shield for any specific requirement excluded from this permit and none is being granted.

Permit Conditions 2.12 through 2.14 address the expiration of the permit and the ramifications if the permittee does or does not renew their permit. It is important to note that, if the permittee does not submit a complete and timely renewal application, the permittee's right to operate is terminated. The expiration date of the permit is listed on the top right-hand corner of the front page of the permit. Specific requirements regarding permit renewal are in Permit Conditions 3.51 and 3.52.

Permit Conditions 2.15 through 2.17 address options for making certain physical and operational changes in the facility that do not require a permit modification. If the permittee uses any of these options, they must comply with the applicable recordkeeping requirement found in Permit Condition 3.32 and reporting requirements found in Permit Conditions 3.38 and 3.39.

Permit Section 3 – General Requirements

This permit section includes conditions that are required in all Title V permits. In some cases, facility-specific testing, monitoring, recordkeeping and reporting requirements for these permit conditions might be found in Section 4 of the permit because those requirements can vary from permit to permit. Unless otherwise specified, emission units are subject to the general requirements in Section 3 of the permit as

well as the facility-specific and unit-specific requirements in Sections 4 and 5.

Permit Conditions 3.1 and 3.2 are general compliance schedule requirements. Because EPA is not aware of any non-compliance at the time of permit issuance, there is no issue-specific compliance schedule in Section 4 of the permit. The area source boiler MACT (NESHAP Subpart JJJJJJ) is the only applicable regulation for which the initial compliance date has not yet passed. The initial notification must be submitted no later than January 20, 2014, and BNFP must comply with the applicable work practice and emission reduction measures no later than March 21, 2014. Section 4 of the permit contains all applicable NESHAP Subpart JJJJJJ requirements.

Permit Condition 3.3 requires the permittee to allow EPA-authorized representatives access to the facility and required records.

Permit Conditions 3.4 through 3.8 restrict open burning wherever the FARR applies including at industrial facilities. If the permittee performs any open burning, recordkeeping requirements specific to open burning found in Permit Condition 3.33 will apply.

Permit Condition 3.9 through 3.11 limit visible emissions, require the use of either Reference Method 9 or a continuous opacity monitoring system (COMS) for determining compliance with the limit, and provide exception to the rule. Reference Method 9 includes specific guidance for reading opacity when there is a wet plume (both attached and detached and directs the observer to take readings excluding the portion of the plume that includes uncombined water (droplets). In the vast majority of cases, the likelihood of exceeding the 20% opacity limit due to the presence of uncombined water is very low because an experienced observer would know that he/she should not read that portion of the plume. However, there are meteorological conditions that can prevent uncombined water (droplets) from completely evaporating in a plume (e.g., 100% relative humidity and a saturated plume). The provision in Permit Condition 3.11 addresses that situation. Currently, this facility does not use (and is not required to use) a COMS to monitor visible emissions.

Because testing, monitoring, recordkeeping and reporting for assuring compliance with the visible emission limit can change based on the emission unit in question, the testing, monitoring, recordkeeping and reporting requirements are contained in the facility-specific requirements in Section 4 of the permit, or in each emission unit-specific section, as appropriate. The general monitoring, recordkeeping and reporting for this requirement is the periodic visible emissions survey (plant walkthrough) specified in Permit Conditions 4.6 through 4.13.

Permit Conditions 3.12 through 3.17 restrict fugitive particulate matter emissions and require a plan be created to assure the use of reasonable precautions to prevent fugitive emissions. The plan is based on a survey of the facility and is updated annually. This annual survey can be accomplished simultaneously with the periodic visible emission survey requirement in Permit Conditions 4.6 through 4.13, as long as both requirements are fully complied with.

Permit Condition 3.18 addresses requirements in the Chemical Accident Prevention Program found in 40 CFR Part 68. This program requires sources that use or store regulated substances above a certain threshold to develop plans to prevent accidental releases. Based on information in their application, there are no regulated substances above the threshold quantities in this rule at BNFP; therefore, the facility is not currently subject to the requirement to develop and submit a risk management plan. However, this requirement is included in the permit as an applicable requirement because BNFP has an ongoing responsibility to submit a risk management plan if a substance is listed that BNFP has in quantities over the threshold amount, or if BNFP ever increases the amount of any regulated substance above the threshold quantity. Including this term in the permit minimizes the need to reopen the permit if BNFP becomes subject to the requirement to submit a risk management plan.

Permit Conditions 3.19 and 3.20 address the Stratospheric Ozone and Climate Protection Program found in 40 CFR Part 82. This program requires sources that handle regulated materials to meet certain procedural and certification requirements. There may be equipment at the facility that uses or contains chlorofluorocarbons (CFCs) or other materials regulated under this program. All air conditioning and refrigeration units must be maintained by certified individuals if they contain regulated materials.

Permit Condition 3.21 addresses asbestos demolition or renovation activity found in 40 CFR Part 61, Subpart M (NESHAP). This program requires sources that handle asbestos-containing materials to follow specific procedures. If BNFP conducts any demolition or renovation activity at their facility, they must assure that the project is in compliance with the federal rules governing asbestos, including the requirement to conduct an inspection for the presence of asbestos. This requirement is in the permit to address any demolition or renovation activity that may occur at the facility.

Permit Conditions 3.22 through 3.30 specify the procedures that must be followed whenever the permit requires emissions testing or sampling in an emission unit-specific section of the permit. If there is a conflict between these permit conditions and an emission unit-specific permit condition, the specific permit condition should be followed. Concentration-based emission limits required to be corrected to a specific oxygen concentration in the flue gas often do not contain a protocol to convert measured concentrations to specified oxygen levels. Permit Condition 3.28 provides a protocol for such a conversion.

Permit Condition 3.31 describes general recordkeeping that has been added to the permit using Part 71 authority to assure that there is good documentation for any monitoring that the permittee performs.

Permit Condition 3.32 describes recordkeeping requirements that apply only if the permittee makes off-permit changes. Certain off-permit changes are allowed in Permit Condition 2.15.

Permit Condition 3.33 describe recordkeeping requirements that apply if the permittee performs open burning. The open burning recordkeeping was added using Part 71 authority. Open burning is restricted in Permit Conditions 3.4 through 3.8.

Permit Condition 3.34 includes recordkeeping that applies to fee records including the duration that the records must be maintained. The duration is consistent with that required by Title V (see Permit Condition 3.35).

Permit Condition 3.35 sets the duration that records must be maintained. Both Title V and FARR records must be maintained for 5 years. These two requirements have been combined (streamlined) into one permit condition. If there is ever a conflict between these requirements and a more restrictive emission unit-specific permit condition, the specific permit condition should be followed.

Permit Conditions 3.36 and 3.37 require the permittee to submit or correct submitted information when requested by EPA and as needed. The permittee has an ongoing obligation to assure that all data in its Title V application is correct and to notify EPA of any errors or omissions.

Permit Condition 3.38 and 3.39 describe reporting requirements that apply only if the permittee makes off-permit changes (Permit Condition 3.38) or section 502(b)(10) changes (Permit Condition 3.39). Certain off-permit changes are allowed in Permit Condition 2.15. Section 502(b)(10) changes are allowed in Permit Conditions 2.16.

Permit Condition 3.40 includes the address for submittals to EPA Region 10. All reports and notices, except for fee payments (see Permit Condition 3.43), should be sent to this address. Copies of each document sent to EPA should be sent to the Tribal Air Quality Coordinator.

Permit Conditions 3.41 through 3.45 require submittal of an annual emission inventory (of actual emissions) and payment of fees for Part 71 purposes. These requirements refer to Permit Condition 4.1 for the actual due date by which fees and emissions must be submitted each year. The per-ton fee rate varies

each year; the permittee should contact EPA to obtain the current rate. The submittal of the emission inventory is timed to coincide with the payment of fees because annual Title V fees are based on actual emissions generated during the previous calendar year. Appendix A to this statement of basis documents the methods, techniques, and assumptions that EPA believes provide the most accurate basis for estimating actual emissions for this facility. As explained in Section 3.2 of this statement of basis, the emission estimation techniques listed in this statement of basis should be used to calculate the annual emissions inventory, unless the permittee has other information showing why another technique more accurately represents emissions. Also note that the actual emission estimates differ from the facility's PTE because actual emission are calculated based on actual operations, not maximum operational capacity.

Note that the FARR emission inventory required in Permit Condition 3.46 to be reported at the same time can be combined with the Part 71 emission inventory as long as it is clear which emissions inventory is for which purpose, because the pollutant lists for each emission inventory are slightly different.

At this time, greenhouse gases (GHG) are neither regulated air pollutants nor regulated air pollutant (for fee calculation) as those terms are defined at 40 CFR § 71.2. BNFP is not required to pay Title V fees on its GHG emissions. EPA, however, has formally proposed to regulate GHG emitted from electric utility generating units through an NSPS. In the event EPA promulgates an NSPS regulating GHG, GHG may become a regulated pollutant and regulated pollutant (for fee calculation). Right now, it is not.

Permit Condition 3.46 requires submittal of an annual emission inventory (of actual emissions) for FARR registration purposes. Appendix A to this statement of basis documents the methods, techniques, and assumptions that EPA believes provide the most accurate basis for estimating actual emissions for this facility. As explained in Section 3.2 of this statement of basis, the emission estimation techniques listed in this statement of basis should be used to calculate the annual emissions inventory, unless the permittee has other information showing why another technique more accurately represents emissions. Also note that the actual emission estimates differ from the facility's PTE because actual emission are calculated based on actual operations, not maximum operational capacity.

Note that the FARR emission inventory is required to be submitted at the same time as the Part 71 fees and emission inventory required in Permit Conditions 3.41 through 3.45. The Part 71 and FARR emission inventories can be combined as long as it is clear which emissions inventory is for which purpose, because the pollutant lists for each emission inventory are slightly different.

Permit Conditions 3.47 and 3.48 require semi-annual monitoring reports and prompt deviation reports. Determinations of deviations, continuous or intermittent compliance status, or violations of the permit are not limited to the testing or monitoring methods required by the underlying regulations or this permit. Failure to meet any permit term or permit condition, including emission standards, is considered a deviation. Other credible evidence (including any evidence admissible under the federal rules of evidence) must be considered by the source and EPA in such determinations. The timing for reporting deviations, as well as other data collected, depends on the circumstances, as explained in these permit conditions. The deadline for the semiannual monitoring report was changed from the 30th day to the 45th day following the end of the reporting period in the permit renewal in an effort by EPA to make all of the Title V permits consistent.

Permit Condition 3.49 requires an annual compliance certification. The permittee must certify compliance with the permit conditions in sections 3 through 9. The permittee does not need to annually certify compliance with the provisions in permit sections 1 or 2. Consistent with Permit Condition 2.6, however, if a permittee is aware of any information that indicates noncompliance, that information must be included in the annual compliance certification. In a year when the permit is renewed or revised, the permittee must address each permit for the time that permit was in effect. The deadline for the annual compliance certification has changed from January 30 to February 28 in the permit renewal in an effort by

EPA to make all of the Title V permits consistent. Forms for the annual compliance certifications may be obtained on the internet at:

http://www.epa.gov/air/oaqps/permits/p71forms.html.

Permit Condition 3.50 requires the permittee to certify the truth, accuracy and completeness of all documents (notices, reports, data, and etc) submitted to EPA. The certification must be signed by a responsible official as defined in 40 CFR 71.2. BNFP's responsible officials are listed on the first page of the permit. BNFP should request an administrative amendment of the permit if the responsible official for the facility changes.

Permit Conditions 3.51 through 3.52 require the permittee to submit an application for renewal and describe some of the information that must be included in the application. As explained in Permit Conditions 2.12 through 2.14, failure to submit a complete application on time terminates the permittee's right to operate. The expiration date of the permit is listed on the top right-hand corner of the front page of the permit.

Permit Section 4 – Facility-Specific Requirements

This permit section includes applicable requirements and related testing, monitoring, recordkeeping and reporting that apply either to multiple emission units or on a facility-specific basis. Unless otherwise specified, emission units are subject to the facility-specific requirements in Section 4 of the permit as well as the general and unit-specific requirements in Sections 3 and 5 of the permit.

Permit Conditions 4.1 lists the due date for the annual fees and emission reports required in Permit Conditions 3.41 through 3.46. Note that the due date continues to be November 15.

Permit Conditions 4.2 and 4.4 limit the sulfur content of the solid fuel burned in any combustion device and specifies the method for determining compliance. The facility burns only wood waste in the boilers. The underlying rule allows the permittee to simply keep records showing that only wood waste is burned because the naturally occurring sulfur content of wood waste is normally much less than the limit of 2% by weight.

Permit Conditions 4.3 and 4.5 limit the sulfur content of the No. 2 distillate fuel oil burned in any combustion device and require recordkeeping or sampling to document compliance.

Permit Conditions 4.6 through 4.13 require a quarterly survey (also called a plant walkthrough) for visible and fugitive emissions as well as specific follow-up steps (investigation, corrective action, RM9 observation and additional recordkeeping and reporting) if visible or fugitive emissions are observed. If observed visible or fugitive emissions can not be eliminated within 24 hours, a tiered sequence of RM9 opacity observations must be performed. Observations of visible or fugitive emissions during a survey are not considered deviations; however, any resulting RM9 readings above 20% opacity are considered permit deviations pursuant to Permit Conditions 3.47 and 3.48. The annual fugitive particulate matter survey required in Permit Condition 3.13 can be accomplished simultaneously with a quarterly survey required in this permit condition as long as both requirements are fully complied with. This permit condition serves as the periodic monitoring for several fugitive and particulate matter limits found in the permit.

Permit Condition 4.14 requires permits for open burning, agricultural burning and forestry/silvicultural burning. These requirements are in effect on the Nez Perce Reservation only.

Permit Conditions 4.15 and 4.16 limit HAP emissions to below the major source thresholds of 10 tpy for any individual HAP and 25 tpy for all HAP combined. These permit conditions originated in 2007 non-Title V permit No. R10NT500900 to TRT. The facility will be treated as a minor source for NESHAP/MACT reasons as long as it complies with the limits. Because the limits are facility-wide,

compliance with the limits will be determined based on actual emission estimates using actual production data and current emission factors. The lumber kiln emission factors currently recommended were developed primarily through testing performed in a laboratory because lumber kilns are very difficult and expensive to test in the field. If there ever is a question regarding the representativeness of the kiln emission factors, it may be possible to test lumber from this specific mill in a "lab scale" kiln. In Permit Conditions 4.15.1 and 4.16.1, the second sentence of the underlying non-Title V requirement was removed because chloride sampling now exists.

Permit Conditions 4.17 through 4.19 describe the recordkeeping and calculations required to confirm compliance with the HAP limits. Recommended emission factors for the boilers are presented in Appendix A as lb/MMBtu. BNFP plans to track steam production. BNFP will need to convert the steam output (lb/hr) to heat input (mmBtu/hr) using a factor of 1.7 MMBtu/M lb steam until actual values are measured (see the required sampling and analysis in Permit Condition 5.5.3) – Permit Condition 4.18 was added for that reason.

Permit Condition 4.20 requires chloride data to be kept for 5 years, consistent with the Non-Title V permit and the Part 71 data maintenance requirements.

Permit Condition 4.21 requires the permittee to report actual HAP emissions with their annual FARR emission report. This allows all of the emission reporting to be done simultaneously for the facility.

Permit Conditions 4.22 – 4.25. EPA has placed area source boiler MACT (NESHAP Subpart JJJJJJ) requirements in the section of the permit reserved for facility-specific requirements, and not emission unit-specific requirements. This is because the area source boiler MACT requirements extend beyond just the boilers. They extend, for instance, to energy use systems like the lumber drying kilns.

BNFP combusts in boilers only material satisfying the definition of biomass as that term is defined at 40 CFR § 63.11237. Biomass means any biomass-based solid fuel that is not a solid waste. This includes, but is not limited to, wood residue and wood products (e.g., trees, tree stumps, tree limbs, bark, lumber, sawdust, sander dust, chips, scraps, slabs, millings, and shavings); animal manure, including litter and other bedding materials; vegetative agricultural and silvicultural materials, such as logging residues (slash), nut and grain hulls and chaff (*e.g.,* almond, walnut, peanut, rice, and wheat), bagasse, orchard prunings, corn stalks, coffee bean hulls and grounds. This definition of biomass is not intended to suggest that these materials are or are not solid waste as that term is defined at 40 CFR § 241.2. Because the boilers combust only biomass, it is in the NESHAP Subpart JJJJJJ biomass subcategory of boilers pursuant to 40 CFR § 63.11200(b). It is with this in mind that EPA Region 10 created permit terms reflecting NESHAP Subpart JJJJJJ requirements.

Permit Condition 4.22. Existing biomass boilers are subject to periodic tune-up management practices for PM (surrogate for urban metal HAP) and CO (surrogate for urban organic HAP) based upon finding that periodic tune-ups represent generally available control technology (GACT), (78 FR 7489, February 1, 2013). BNFP plans to install and employ on each of its boilers an oxygen trim system that consists of a flue gas oxygen monitor that automatically provides a feedback signal to the combustion air controller. An oxygen trim system, according to 40 CFR §63.11237, means a system of monitors that is used to maintain excess air at the desired level in a combustion device. Whereas boilers not employing an oxygen trim system are required to undergo a tune-up once every 2 years, the tune-up frequency is relaxed to once every 5 years for boilers employing said system. The NESHAP Subpart JJJJJJ tune-up requirements at 40 CFR § 63.11223(b)(1) and (2) related to inspection of burner and flame pattern do not apply to the BNFP boilers because the boilers do not employ any burners. Burners are typically employed to combust gas and liquid fuels along with pulverized coal. In contrast, BNFP employs a fuel chute to introduce biomass into the boilers.

Permit Conditions 4.23 and 4.24. Existing biomass boilers are subject to a beyond-the-floor control technology or GACT requirement to conduct an energy assessment, (76 FR 15573, March 21, 2011). For boilers like the BNFP boilers with an annual heat input capacity less than 0.3 trillion Btu, the duration of the energy assessment will be up to 8 on-site technical labor hours pursuant to the definition of energy assessment at 40 CFR § 63.11237.[3] This length of time may be extended at the discretion of the source. EPA has not established a minimum value for the amount of time necessary to conduct on-site technical labor.

The requirement to evaluate systems to identify energy savings opportunities extends to the boiler system and any energy use system (under the control of the source) that accounts for at least 50 percent of the boiler's energy (e.g., steam, hot water, or electricity). See definition of energy assessment at 40 CFR § 63.11237. The energy use systems serving as the basis for the percent of affected boiler energy production may be segmented by production area or energy use area as most logical and applicable to the source. The term boiler system, as defined in 40 CFR § 63.11237 means the boiler and associated components, such as feedwater systems, combustion air systems, fuel systems, blowdown systems, combustion control systems, steam systems, and condensate return systems, directly connected to and serving the energy use systems. Similarly, the term energy use system includes any of the following systems located at the Clean Air Action (CAA) Section 112 stationary source that use energy provided by the boiler: (a) process heating; compressed air systems; machine drive (motor, pumps, fans); process cooling; facility heating, ventilation, and air conditioning systems; hot water systems; building envelop; and lighting; or (b) other systems that use steam, hot water, process heat, or electricity, provided by the boiler. Energy use systems are only those systems using energy clearly produced by the boiler either (a) directly as steam or process heat, or (b) through an associated steam turbine generator in the form of electricity. The steam produced by the BNFP boilers is delivered to its lumber drying kilns.

A source operating under an energy management program compatible with ISO 50001 is not required to conduct an energy assessment. An energy management program, as defined at 40 CFR § 63.11237, means a program that includes a set of practices and procedures designed to manage energy use that are demonstrated by the facility's energy policies, a facility energy manager and other staffing responsibilities, energy performance measurement and tracking methods, and energy saving goal, action plans, operating procedures, internal reporting requirements, and periodic review intervals used at the facility. Facilities may establish their program through energy management systems compatible with ISO 50001.

Permit Condition 4.25. The following sentence appears in Condition 4.25, "The general duty to minimize emissions does not require the permittee to make any further efforts to reduce emissions if levels required by this standard have been achieved." Because the BNFP boilers are not subject to an emission limitation, there is no "level" for emissions to be reduced by. Achieving compliance with general duty to minimize emissions goes beyond complying with tune-up and energy assessment requirements of Conditions 4.22 through 4.24. Compliance with this requirement will be determined, in part, based upon inspection of records created and maintained by the permittee to comply with 40 CFR §§ 63.10(b)(2)(iii), 63.11223(b)(6) and 63.11225(c)(4) and (5).

Permit Conditions 4.26 – 4.29. BNFP is required to conduct monitoring and maintain records to document compliance with GACT work practice standards and emission reduction measures. BNFP is also required to document that when it combusts biomass that is considered a non-hazardous secondary material as that term is defined at 40 CFR § 241.2, that it is combusting a fuel and not a solid waste.[4]

[3] Each boiler's annual heat input capacity of 0.28 TBtu = (31.7 MMBtu/hr) X (8,760 hr/yr) X (1 TBtu/1x10^6 MMBtu)

[4] When EPA refers to secondary materials in this context, EPA means any material that is not the primary product of a manufacturing or commercial process, and can include post-consumer material, off-specification commercial

Permit Condition 4.26. The requirement to measure and record boiler exhaust stack CO concentration is satisfied if measurements are taken before and after the performance tune-up. It is not necessary to take measurements between interim tasks in the tune-up process.

Permit Condition 4.27. Should BNFP choose to operate in accordance with an energy management program so as to comply with Condition 4.23.2, Condition 4.27 requires BNFP to, among other things; maintain records that document BNFP's energy management program and how it is compatible with ISO 50001.

Permit Condition 4.29. The following background about the different biomass streams that could potentially be combusted in the boilers provides some context for Condition 4.29. EPA understands that BNFP only combusts in its boilers biomass generated on-site. This clean cellulosic biomass is considered a traditional fuel as those terms are defined at 40 CFR § 241.2. EPA does not know to what extent, if at all, BNFP occasionally combusts in the boilers bark that has been recovered from any unpaved log yard floor and processed back into a fuel. This material is considered a non-hazardous secondary material. It is possible that BNFP may combust biomass that is generated off-site and received at the facility via truck delivery. Whether this off-site material is considered clean cellulosic material or non-hazardous secondary material would need to be determined on a load-by-load basis.

Permit Conditions 4.29.1 and 4.29.2. These permit conditions refer to legitimacy criteria that must be satisfied in order to consider non-hazardous secondary material to be a fuel. The criteria presented at 40 CFR § 241.3(d)(1) are as follows:

(d) Legitimacy criteria for non-hazardous secondary materials.

(1) Legitimacy criteria for non-hazardous secondary materials used as a fuel in combustion units include the following:

(i) The non-hazardous secondary material must be managed as a valuable commodity based on the following factors:

(A) The storage of the non-hazardous secondary material prior to use must not exceed reasonable time frames;

(B) Where there is an analogous fuel, the non-hazardous secondary material must be managed in a manner consistent with the analogous fuel or otherwise be adequately contained to prevent releases to the environment;

(C) If there is no analogous fuel, the non-hazardous secondary material must be adequately contained so as to prevent releases to the environment;

(ii) The non-hazardous secondary material must have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy.

(iii) The non-hazardous secondary material must contain contaminants at levels comparable in concentration to or lower than those in traditional fuels which the combustion unit is designed to burn. Such comparison is to be based on a direct comparison of the contaminant levels in the non-hazardous secondary material to the traditional fuel itself.

Permit Condition 4.29.2. This permit condition refers to the term processing, and that term has the meaning given to it by EPA at 40 CFR § 241.2. Processing means any operations that transform discarded non-hazardous secondary material into a non-waste fuel or non-waste ingredient product. Processing

---

chemical products or manufacturing chemical intermediates, post-industrial material, and scrap. A non-hazardous secondary material is a secondary material that, when discarded, would not be identified as a hazardous waste under 40 CFR § 261.

includes, but is not limited to, operations necessary to: Remove or destroy contaminants; significantly improve the fuel characteristics of the material, *e.g.,* sizing or drying the material in combination with other operations; chemically improve the as-fired energy content; or improve the ingredient characteristics. Minimal operations that result only in modifying the size of the material by shredding do not constitute processing for purposes of this definition.

Permit Condition 4.29.3. This permit condition refers to a petition process whereby the Regional Administrator may grant a non-waste determination that a non-hazardous secondary material that is used as a fuel, which is not managed within the control of the generator, is not discarded and is not a solid waste when combusted pursuant to 40 CFR § 241.3(c). The criteria and process for making such non-waste determinations includes the following:

(1) Submittal of an application to the Regional Administrator for the EPA Region where the facility combusting the non-hazardous secondary material is located for a determination that the non-hazardous secondary material, even though it has been transferred to a third party, has not been discarded and is indistinguishable in all relevant aspects from a product fuel. The determination will be based on whether the non-hazardous secondary material that has been discarded, is a legitimate fuel as specified in 40 CFR § 241.3(d)(1) and on the following criteria:

   (i) Whether market participants treat the non-hazardous secondary material as a product rather than as a solid waste;

   (ii) Whether the chemical and physical identity of the non-hazardous secondary material is comparable to commercial fuels;

   (iii) Whether the non-hazardous secondary material will be used in a reasonable time frame given the state of the market;

   (iv) Whether the constituents in the non-hazardous secondary material are released to the air, water or land from the point of generation to the point just prior to combustion of the secondary material at levels comparable to what would otherwise be released from traditional fuels; and

   (v) Other relevant factors.

(2) The Regional Administrator will evaluate the application pursuant to the following procedures:

   (i) The applicant must submit an application for the non-waste determination addressing the legitimacy criteria in 40 CFR § 241.3(d)(1) and the relevant criteria in 40 CFR § 241.3(c)(1)(i) through (v). In addition, the applicant must also show that the non-hazardous secondary material has not been discarded in the first instance.

   (ii) The Regional Administrator will evaluate the application and issue a draft notice tentatively granting or denying the application. Notification of this tentative decision will be published in a newspaper advertisement or radio broadcast in the locality where the facility combusting the non-hazardous secondary material is located, and be made available on EPA's Web site.

   (iii) The Regional Administrator will accept public comments on the tentative decision for at least 30 days, and may also hold a public hearing upon request or at his discretion. The Regional Administrator will issue a final decision after receipt of comments and after the hearing (if any).

   (iv) If a change occurs that affects how a non-hazardous secondary material meets the relevant criteria contained in this paragraph after a formal non-waste determination has been granted, the applicant must re-apply to the Regional Administrator for a formal determination that the

non-hazardous secondary material continues to meet the relevant criteria and, thus is not a solid waste.

Permit Condition 4.29.4. BNFP does not combust any of the materials that EPA has listed as non-waste under 40 CFR § 241.4(a). The current list of EPA-designated non-waste materials are as follows:

(1) Scrap tires that are not discarded and are managed under the oversight of established tire collection programs, including tires removed from vehicles and off-specification tires.

(2) Resinated wood.

(3) Coal refuse that has been recovered from legacy piles and processed in the same manner as currently-generated coal refuse.

(4) Dewatered pulp and paper sludges that are not discarded and are generated and burned on-site by pulp and paper mills that burn a significant portion of such materials where such dewatered residuals are managed in a manner that preserves the meaningful heating value of the materials.

Permit Condition 4.30. The underlying NESHAP Subpart JJJJJJ requirement at 40 CFR §63.11223(b)(6) quires the permittee to track certain tune-up related information and to submit it to the EPA if requested by the Administrator. EPA is taking this opportunity to require the permittee to submit certain tune-up related information as part of notification of compliance status and annual compliance certification.

The requirement in 40 CFR § 63.11223(b)(6)(iii) to track the type and amount of fuel used over the 12 months prior to the tune-up would have appeared as an element of Permit Condition 4.30, but the requirement does not apply to the boilers because they combust only biomass. It is not physically capable of using any other type of fuel listed at 40 CFR § 63.11200.

Permit Condition 4.33. EPA is utilizing its discretion, as granted through 40 CFR § 63.11225(b), to require BNFP to submit a NESHAP Subpart JJJJJJ compliance certification report to EPA each year by March 15 for the previous year's operations. EPA is unable to require this report be submitted by February 28 as part of the annual compliance certification report required by Condition 3.49 because the underlying NESHAP Subpart JJJJJJ reporting provision specifies a submittal date no sooner than March 15.

Permit Conditions 4.36 and 4.37. The PSD regulation applicability test for modifications was changed in December 2002. The rule change resulted in a new applicable requirement for PSD major sources. Since BNFP is a PSD major source, this term is included in the operating permit. In summary, when the permittee considers a plant modification project to be exempt from PSD via the method specified in 40 CFR § 52.21(b)(41)(ii)(a-c) and there is a reasonable possibility that there will be a significant emissions increase resulting from the project, then the permittee must fulfill specified requirements related to documentation, monitoring, and notification. This term will be relevant to BNFP only when the permittee is contemplating making physical or operational changes to the facility. In those instances it is strongly recommended that the permittee contact EPA to discuss their plans and verify their assumptions.

Permit Section 5 – Unit-Specific Requirements – BLR-1 (Hog Fuel-Fired Boiler No. 1)

Permit Condition 5.1 limits the particulate matter (PM) emissions from the boiler to 0.2 gr/dscf at 7% O_2 and describes the emission testing method for determining compliance.

Permit Condition 5.2 limits the sulfur dioxide (SO_2) emissions from the boiler and describes the emission testing methods for determining compliance. As the boiler only uses wood waste as fuel, SO_2 emissions are expected to be well below the emission limit.

Permit Condition 5.3 requires the boiler exhaust to be vented to the multiclone at all times. While there is no testing to confirm it, it can be assumed that the multiclone is needed for the boiler to comply with the

particulate matter and visible emission limits. This requirement ensures the emission control device is used and will be considered when estimating PTE for the boiler.

Permit Condition 5.4 requires the boiler control device to be maintained. Consistent with the requirement to ensure boiler emissions are controlled at all times, this requires ensures the control device is operating correctly and hopefully that the boiler stays in compliance with the particulate matter and visible emission limits.

Permit Conditions 5.5 and 5.6 require measurement of particulate matter emissions. The boiler was last tested to determine PM emissions in 1993 while Weyerhaeuser was running the mill. Emissions rates approaching or exceeding the FARR PM limit were measured. BNFP indicates that it believes its emissions are much less now given the improved quality of hog fuel being combusted. The permit requires the permittee to test the boiler to determine PM emissions within 120 days of permit issuance. The schedule for additional testing after that depends on the results of that next test. During each test, visible emissions must be measured and all required periodic and compliance assurance monitoring required by the permit must be recorded. A new heat-input-to-steam-output ratio must be developed during each particulate matter test. The ratio is used to convert tracked steam production into heat input for calculating boiler emissions. Testing is required to be performed during winter months to hopefully capture worst-case emissions due to wetter fuel and higher steam demand. Because the permittee prefers to measure and track steam output rather than fuel input, during each emission test a ratio of heat input to steam output must be determined using procedures found in Appendix A to the permit. The ratio is then used to convert measured steam flows (mlb/hr) to heat input (mmBtu/hr) which can be applied to emission factors that are normally in terms of heat input (lb/mmBtu). The general emission testing requirements in Permit Conditions 3.22 through 3.30 apply to all emissions testing; except, periodic visible emission testing is only required to meet 3.27 (emission unit operation), 3.29 (records during tests) and 3.30 (test reports) of the general requirements as well as the recordkeeping required in Condition 5.5.3 (note that all particulate matter testing must follow all of Condition 5.5).

Permit condition 5.7 requires routine visible emission monitoring to satisfy compliance assurance monitoring for the visible emission limit and provides additional indication of compliance with the particulate matter limit. The frequency for each observation depends on the results of the previous observation.

Permit Condition 5.8 requires ongoing monitoring of boiler operations and multiclone pressure drop. Each of the parameters are required to be monitored (measured with a gauge indicator) continuously; however, the frequency of data recording varies. Because the permittee will base actual emissions on steam production, the permit requires continuous recording of the pounds of steam produced. Steam pressure, required to be recorded once per month, provides an indication of potential changes in boiler duty and allows an estimation of steam heat content. Boiler excess oxygen, required to be recorded once per hour, provides an indication of boiler performance with the concern that much lower oxygen levels may lead to incomplete combustion and much higher oxygen levels could cause the combustion chamber to be too cool. Pressure drop across the multiclone is generally related to control device performance (plugging or corrosion); but, is often only adequate for indicating significant changes in performance. The boiler oxygen and multiclone pressure drop readings can be useful for trouble-shooting performance problems and for tracking equipment condition trends. The permit includes a 90% data capture requirement for recordkeeping on a hourly or daily schedule – that is at least 90% percent of the data required to be measured and recorded each hour or day must be measured and recorded to comply with the permit. Data capture of less than 90% for steam production, boiler excess oxygen and multiclone pressure drop is a permit deviation. This provides relief for the more stringent monitoring/recording schedules during a given month; whereas, steam pressure must be recorded at least once each month to comply with the data capture requirement.

While BNFP is already measuring steam production and pressure, it does not currently have equipment in place to continuously measure boiler excess oxygen and the pressure drop across the multiclone. BNFP has up to 60 days after permit issuance to begin measuring these additional parameters.

Permit Condition 5.9 provides the procedure the permittee is required to follow in order to define multiclone pressure drop and opacity excursions. Levels will be based upon values observed during PM emissions testing. The closer PM emissions are to the FARR limit, the less observed values will be adjusted to account for compliant operational variability. The permittee is being given the opportunity to test at more than one load condition so as derive load-specific threshold values.

Permit Condition 5.10 requires the performance, operational and maintenance criteria from Part 64 that applies to the monitoring equipment required in Permit Condition 5.8. Excursions thresholds for multiclone pressure drop and visible emissions, specifically defined for BNFP's boiler and control equipment, will be based upon testing required by this permit. If testing shows a good margin of compliance with the particulate matter limits, excursion thresholds will be relaxed from test observations. Excursion thresholds may not be established for up to six months after permit issuance. Until the excursion thresholds have been established, an interim CAM threshold of 5% opacity will apply. While visiting the facility in June 2013, EPA permit writer observed negligible opacity in boiler stack exhaust.

Permit Condition 5.11 specifies what Part 64 requires the permittee to do when an excursion occurs.

Permit Condition 5.12 simply states EPA's option to require a quality improvement plan (QIP); this condition becomes a requirement only in the event EPA informs the permittee that a QIP is required.

Permit Condition 5.13 serves as a safeguard against incorrectly set excursion/exceedance thresholds by requiring the redefinition of the thresholds as needed.

Permit Condition 5.14 requires, consistent with Permit Condition 3.35, the maintenance of all records and supporting information.

Permit Condition 5.15 requires quarterly wood waste fuel sampling to determine the chloride content of the wood so a hydrogen chloride emission factor can be developed and used for reporting emissions. The hogged fuel sampling and chloride analytical procedures are specified in Appendix B to the permit. While the Non-Title V permit in which the sampling/analytical procedure was first required allows the permittee to request an alternative, that option has not been transferred to the Title V permit because it is EPA's policy that the methods required be specified in the permit. The permit must be revised to incorporate any alternative that is approved.

Permit Condition 5.16 requires reporting from Part 64 to be combined with the Part 71 semi-annual deviation reports required in Permit Conditions 3.47 and 3.38.

Permit Condition 5.17 requires fuel chloride analytical data to be included in the Part 71 annual compliance report required in 3.46.

Permit Condition 5.18 requires notification be given for establishment of CAM indicator levels at the same time PM testing is submitted.

Permit Section 6 – Unit-Specific Requirements – BLR-2 (Hog Fuel-Fired Boiler No. 2)

The requirements for boiler BLR-2 exactly mimic the requirements for BLR-1 exactly. See explanation of BLR-1 requirements immediately above.

Permit Section 7 – Unit-Specific Requirements – ENG-1 (Emergency Backup Engine No. 1)

Permit Condition 7.1 limits the particulate matter (PM) emissions from the engine to 0.1 gr/dscf at 7% O_2 and describes the emission testing method for determining compliance. This is equivalent to

approximately 0.1974 lb/MMBtu. EPA's October 1996 AP-42 at Table 3.3-1 estimates an actual PM_{10} emission rate of 0.31 lb/MMBtu for diesel-fired industrial engines up to 600 hp. No unit-specific testing or monitoring is required given that BNFP only intends to operate the engine in an emergency and as needed to maintain readiness. If BNFP operates the engine for more than 100 hours per year in non-emergency situations, additional MACT ZZZZ requirements will apply. BNFP is required to track the engine's hours of operation.

Permit Condition 7.2 limits sulfur dioxide emissions and specifies the test method for determining compliance. The monitoring required in Permit Condition 4.5 to demonstrate compliance with the fuel sulfur content limit can also be used to indicate compliance with this stack concentration limit through calculations if needed, because the fuel sulfur content limit is more stringent than this limit as illustrated in SO_2 PTE calculation in Appendix A to this Statement of Basis.

Permit Conditions 7.3 through 7.13 are MACT ZZZZ requirements to properly operate and maintain an emergency engine. No fuel requirements apply. If BNFP operates the engine in non-emergency situations for more than 100 hours per year, additional requirements will apply. There is no time limit on the use of the engine in emergency situations. Compliance with MACT ZZZZ requirements must be achieved no later than May 3, 2013 pursuant to 40 CFR § 63.6595(a)(1).

Permit Condition 7.14 requires periodic visible emission monitoring to assure compliance with the facility-wide visible emission limit.

Permit Conditions 7.15 through 7.18 are MACT ZZZZ monitoring and recordkeeping requirements. BNFP is required to track hours of operation, and this provides BNFP with information useful to calculate its actual emissions.

Permit Conditions 7.19 through 7.22 are MACT ZZZZ reporting requirements. With issuance of this Title V permit, EPA is specifying when certain MACT ZZZZ reports must be submitted.

Permit Section 8 – Unit-Specific Requirements – ENG-2 (Emergency Backup Engine No. 2)

The requirements for engine ENG-2 mimic the requirements for ENG-1 exactly. See explanation of ENG-1 requirements immediately above.

Permit Section 9 – Unit-Specific Requirements – KLN (Lumber Drying Kilns)

Permit Conditions 9.1 limits particulate matter emissions and describes the test method for determining compliance. The visible and fugitive emission monitoring required in Permit Conditions 4.6 through 4.12 will serve as the periodic monitoring to assure compliance for this unit.

Permit Condition 9.2 requires periodic monitoring and recordkeeping that will assure compliance with the hazardous air pollutant emission limits.

Permit Section 10 – Unit-Specific Requirements – CYC (Wood Residual Cyclones)

Permit Condition 10.1 limits particulate matter emissions and describes the test method for determining compliance. No unit-specific testing or monitoring is required. The visible and fugitive emission monitoring required in Permit Conditions 4.6 through 4.12 will serve as the periodic monitoring to assure compliance for this unit.

Permit Section 11 – Unit-Specific Requirements – SMI (Sawmill Activities Inside a Building)

Permit Condition 11.1 limits particulate matter emissions and describes the test method for determining compliance. No unit-specific testing or monitoring is required. The visible and fugitive emission

monitoring required in Permit Conditions 4.6 through 4.12 will serve as the periodic monitoring to assure compliance for this unit.

5. Public Participation

5.1 Public Notice and Comment

As required in 40 CFR 71.11(a)(5) and 40 CFR 71.8, all draft operating permits must be publicly noticed and made available for public comment. The public notice of permit actions and public comment period is described in 40 CFR 71.11(d). There is a 30 day public comment period for actions pertaining to a draft permit. For this permit action, the requirements of 40 CFR 71.11(a)(5) and 40 CFR 71.8 have been satisfied as follows:

1. Publishing the public notice for this draft permit in a daily or weekly newspaper of general circulation in the area affected by this source. In this case, publication was provided in the daily Lewiston Tribune on August 21, 2013, and in the weekly Clearwater Progress on August 22, 2013;

2. Providing a copy of the public notice to: the permit applicant, the affected states, the air pollution control agencies of affected states, the Tribal, city and county executives, any comprehensive land use planning agency, any state or federal land manager whose lands may be affected by emissions from the source, the local emergency planning authorities which have jurisdiction over the area where the source is located and all persons who submitted a written request to be included on EPA Region 10's mailing list for Title V permitting actions;

4. Making available from August 21, 2013 through September 20, 2013, on the Region 10 public notice website [Link from http://yosemite.epa.gov/R10/homepage.nsf/Information/R10PN/], a copy of the public notice and the draft permit and statement of basis prepared by EPA;

5. Making available from August 21, 2013 through September 20, 2013, at the Region 10 office and at the locations listed below, a copy of the public notice, draft permit, the statement of basis, the application, and relevant supporting materials:

Lapwai Community Library	Kamiah Community Library
103 N. Main St.	505 S. Main Street
Lapwai, Idaho 83540	Kamiah, Idaho 83536

5.2 Response to Public Comments and Permit Issuance

The public comment period for this permit ran from August 21, 2013 to September 20, 2013. EPA received a letter from the Idaho County Board of Commissioners supporting issuance of the permit without substantive comment on the permit itself. EPA appreciates the Idaho County Board of Commissioners interest in this permitting action. No other comments were received. EPA received no request for public hearing, and therefore none was held. The Idaho County Board of Commissioners requested notice of the final permit decision. As required in 40 CFR 71.11(i), EPA will notify the applicant and the Idaho County Board of Commissioners of the final permit decision.

6. Abbreviations and Acronyms

Btu	British thermal units
CAA	Clean Air Act [42 U.S.C. section 7401 et seq.]
CAM	Compliance assurance monitoring

CFR	Code of Federal Regulations
CO	Carbon monoxide
COMS	Continuous opacity monitoring system
dscf	Dry standard cubic feet
EU	Emission Unit
EPA	United States Environmental Protection Agency (also U.S. EPA)
FARR	Federal Air Rules for Reservations
FR	Federal Register
gr/dscf	Grains per dry standard cubic foot (7,000 grains = 1 pound)
HAP	Hazardous air pollutant
hr	Hour
IEU	Insignificant emission unit
lb	Pound
1bm	Pound-mole
MACT	Maximum Achievable Control Technology
mm	One million
NESHAP	National Emission Standards for Hazardous Air Pollutants (40 CFR Parts 61 and 63)
NOx	Nitrogen oxides
PM	Particulate matter
PM10	Particulate matter less than or equal to 10 microns in aerodynamic diameter
ppmdv	Parts per million on a dry, volume basis
PSD	Prevention of significant deterioration
PTE	Potential to emit
S	Sulfur
SO_2	Sulfur dioxide
tpy	Tons per year
VOC	Volatile organic compound

Appendix A

EPA Estimation of BNFP Potential Air Pollutant Emissions

Statement of Basis

Title V Operating Permit

R10T5100100

Blue North Forest Products
Kamiah, Idaho

Appendix A: Potential Emissions Inventory

Summary of Facility Regulated NSR Air Pollutant Potential Emissions

Potential to Emit, (tons per year)

Non-Fugitive Emissions

	BLR-1	BLR-2	ENG-1	ENG-2	KLN	CYC	BIN	SMI	SMO	PT	
	Hog Fuel Boiler No. 1	Hog Fuel Boiler No. 2	Emergency Diesel Engine No. 1	Emergency Diesel Engine No. 2	Lumber Drying Kilns	Wood Residual Cyclones	Wood Residual Bins	Indoor Milling Activities	Outdoor Milling Activities	Plant Traffic	**Non-Fugitive Subtotal**
Carbon Monoxide (CO)	83.3	83.3	0.4	0.4	0						167
Lead (Pb)	0.01	0.01	0	0	0						0
Nitrogen Oxides (NO_X)	68.0	68.0	2.0	2.0	0						140
Particulates (PM)	57.2	57.2	0.1	0.1	4.4	0.0	0.0	0.0			119
Respirable Particulates (PM_{10})	59.6	59.6	0.1	0.1	4.4	0.0	0.0	0.0			124
Fine Particulates ($PM_{2.5}$)	59.6	59.6	0.1	0.1	4.4	0.0	0.0	0.0			124
Sulfur Dioxide (SO_2)	166.3	166.3	0.2	0.2	0						333
Volatile Organic Compounds (VOC)	3.2	3.2	0.2	0.2	331.4		0.0				338
Greenhouse Gas (CO_2e)	29,324	29,324	73	73	0						58,795

Fugitive Emissions

	BLR-1	BLR-2	ENG-1	ENG-2	KLN	CYC	BIN	SMI	SMO	PT	
	Hog Fuel Boiler No. 1	Hog Fuel Boiler No. 2	Emergency Diesel Engine No. 1	Emergency Diesel Engine No. 2	Lumber Drying Kilns	Wood Residual Cyclones	Wood Residual Bins	Indoor Milling Activities	Outdoor Milling Activities	Plant Traffic	**Fugitive Subtotal**
Carbon Monoxide (CO)											0
Lead (Pb)											0
Nitrogen Oxides (NO_X)											0
Particulates (PM)									0.0	0.0	0
Respirable Particulates (PM_{10})									0.0	106.9	107
Fine ($PM_{2.5}$)									0.0	14.0	14
Sulfur Dioxide (SO_2)											0
Volatile Organic Compounds (VOC)											0
Greenhouse Gas (CO_2e)											0

All Emissions

	BLR-1	BLR-2	ENG-1	ENG-2	KLN	CYC	BIN	SMI	SMO	PT	
	Hog Fuel Boiler No. 1	Hog Fuel Boiler No. 2	Emergency Diesel Engine No. 1	Emergency Diesel Engine No. 2	Lumber Drying Kilns	Wood Residual Cyclones	Wood Residual Bins	Indoor Milling Activities	Outdoor Milling Activities	Plant Traffic	**Plantwide PTE**
Carbon Monoxide (CO)	83.3	83.3	0.4	0.4	0	0	0	0	0	0	167
Lead (Pb)	0	0	0	0	0	0	0	0	0	0	0
Nitrogen Oxides (NO_X)	68.0	68.0	2.0	2.0	0	0	0	0	0	0	140
Particulates (PM)	57.2	57.2	0.1	0.1	4.4	0.0	0.0	0.0	0.0	0.0	119
Respirable Particulates (PM_{10})	59.6	59.6	0.1	0.1	4.4	0.0	0.0	0.0	0.0	106.9	231
Fine Particulates ($PM_{2.5}$)	59.6	59.6	0.1	0.1	4.4	0.0	0.0	0.0	0.0	14.0	138
Sulfur Dioxide (SO_2)	166.3	166.3	0.2	0.2	0	0	0	0	0	0	333
Volatile Organic Compounds (VOC)	3.2	3.2	0.2	0.2	331.4	0	0.0	0	0	0	338
Greenhouse Gas (CO_2e)	29,324	29,324	73	73	0	0	0	0	0	0	58,795

Notes:

1. For emission unit entitled, "PT - Plant Traffic," EPA is simply transmitting here the result of the calculations performed by BNFP. In the interest of time, EPA did not calculate PT potential emissions.

2. For PSD and Title V applicability considering NSR regulated pollutant emissions, only non-fugitive emissions are counted given the source category in which this facility (sawmill) is listed. For MACT and Title V applicability considering HAP emissions, all emissions are counted.

3. PM is not a pollutant considered in determining whether a source is subject to the requirement to obtain a Title V permit, however, PM emissions are considered in determining whether a facility/project is a major PSD source/modification and whether a source is subject to CAM.

4. The DC Circuit Court of Appeals on July 12, 2013 vacated EPA regulations that delayed until July 21, 2014 consideration of CO_2 emissions resulting from biomass combustion in determining PSD and Title V applicability pursuant to 40 CFR 52.21(b)(49)(ii)(a) and 40 CFR 71.2 definition of "subject to regulation." See explanation for exemption provided by EPA at 76 FR 43490. See DC Circuit Court of Appeals July 12, 2013 ruling vacating the exemption at http://www.cadc.uscourts.gov/internet/opinions.nsf/F523FF1F29C06ECA85257BA6005397B5/$file/11-1101-1446222.pdf

5. The "All Emissions" table sums the values in the "Non-Fugitive Emissions" and "Fugitive Emissions" tables.

Summary of Facility Hazardous Air Pollutant (HAP) Potential Emissions

Potential to Emit, (tons per year)

Hazardous Air Pollutants	BLR-1 Hog Fuel Boiler No. 1	BLR-2 Hog Fuel Boiler No. 2	ENG-1 Emergency Diesel Engine No. 1	ENG-2 Emergency Diesel Engine No. 2	KLN Lumber Drying Kilns	Single HAP Plantwide Totals (tons per year)
Trace Metal Compounds						
Antimony Compounds	1.10E-03	1.10E-03				2.2E-03
Arsenic Compounds (including arsine)	3.05E-03	3.05E-03				6.1E-03
Beryllium Compounds	1.53E-04	1.53E-04				3.1E-04
Cadmium Compounds	5.69E-04	5.69E-04				1.1E-03
Chromium Compounds (including hexavalent)	2.92E-03	2.92E-03				5.8E-03
Cobalt Compounds	9.02E-04	9.02E-04				1.8E-03
Lead Compounds (not elemental lead)	6.66E-03	6.66E-03				1.3E-02
Manganese Compounds	2.22E-01	2.22E-01				4.4E-01
Mercury Compounds[2]	4.86E-04	4.86E-04				
Nickel Compounds	4.58E-03	4.58E-03				9.2E-03
Phophorus	3.75E-03	3.75E-03				7.5E-03
Selenium Compounds	3.89E-04	3.89E-04				7.8E-04
Other Inorganic Compounds						
Chlorine	1.10E-01	1.10E-01				2.2E-01
Hydrochloric acid (hydrogen chloride)	2.64E+00	2.64E+00				5.3E+00
Organic Compounds						
Acetaldehyde	1.15E-01	1.15E-01	3.42E-04	3.42E-04	4.79E+00	5.0E+00
Acetophenone	4.44E-07	4.44E-07				8.9E-07
Acrolein	5.55E-01	5.55E-01	4.13E-05	4.13E-05	2.26E-01	1.3E+00
Benzene	5.83E-01	5.83E-01	4.16E-04	4.16E-04		1.2E+00
1,3-Butadiene			1.74E-05	1.74E-05		3.5E-05
Bis(2-ethylhexyl)phthalate (DEHP)	6.53E-06	6.53E-06				1.3E-05
Carbon tetrachloride	6.25E-03	6.25E-03				1.2E-02
Chlorobenzene	4.58E-03	4.58E-03				9.2E-03
Chloroform	3.89E-03	3.89E-03				7.8E-03
Dibenzofurans*	2.59E-07	2.59E-07				5.2E-07
2,4-Dinitrophenol	2.50E-05	2.50E-05				5.0E-05
Ethyl benzene	4.30E-03	4.30E-03				8.6E-03
Ethylene dichloride (1,2-Dichloroethane)	4.03E-03	4.03E-03				8.1E-03
Formaldehyde	6.11E-01	6.11E-01	5.27E-04	5.27E-04	1.42E+00	2.6E+00
Methanol					3.65E+01	3.7E+01
Methyl bromide (Bromomethane)	2.08E-03	2.08E-03				4.2E-03
Methyl chloride (Chloromethane)	3.19E-03	3.19E-03				6.4E-03
Methyl chloroform (1,1,1-trichloroethane)	4.30E-03	4.30E-03				8.6E-03
Methylene chloride (Dichloromethane)	4.03E-02	4.03E-02				8.1E-02
Naphthalene*	1.35E-02	1.35E-02	3.78E-05	3.78E-05		2.7E-02
4-Nitrophenol	1.53E-05	1.53E-05				3.1E-05
Pentachlorophenol	7.08E-06	7.08E-06				1.4E-05
Phenol	7.08E-03	7.08E-03				1.4E-02
Polychlorinated biphenyls (PCB)	1.10E-06	1.10E-06				2.2E-06
Polycyclic Organic Matter (POM)	1.76E-02	1.76E-02	7.29E-05	7.29E-05		3.5E-02
Propionaldehyde	8.47E-03	8.47E-03			1.57E-01	1.7E-01
Propylene dichloride (1,2-Dichloropropane)	4.58E-03	4.58E-03				9.2E-03
Styrene	2.64E-01	2.64E-01				5.3E-01
2,3,7,8-Tetrachlorodibenzo-p-dioxin*	1.19E-09	1.19E-09				2.4E-09
Tetrachloroethylene (tetrachloroethene)	5.28E-03	5.28E-03				1.1E-02
Toluene	1.28E-01	1.28E-01	1.83E-04	1.83E-04		2.6E-01
Trichloroethylene (Trichloroethene)	4.17E-03	4.17E-03				8.3E-03
2,4,6-Trichlorophenol	3.05E-06	3.05E-06				6.1E-06
Vinyl chloride	2.50E-03	2.50E-03				5.0E-03
Xylenes (inlc isomers and mixtures)	3.47E-03	3.47E-03	1.27E-04	1.27E-04		7.2E-03
TOTAL[1]	5.4	5.4	0.002	0.002	43.1	

Predicted Highest Plantwide Single HAP	~~36.5~~	tons per year, methanol
Predicted Plantwide HAP Total	~~53.9~~	tons per year, based on summing estimates
Highest Plantwide Single HAP PTE	9	tons per year, based on emission limit in FARR Non-Title V permit R10NT500901
Plantwide HAP PTE	24	tons per year, based on emission limit in FARR Non-Title V permit R10NT500901

* designates a HAP that is subject individually to the 10 tpy major source threshold, but that is also one of several polycyclic organic matter (POM) compounds that, in aggregate, are subject to the same 10 tpy major source threshold.

[1] Because dibenzofurans, naphthalene and 2,3,7,8-Tetrachlorodibenzo-p-dioxin (one of several dibenzodioxins) are accounted for individually and in the calculation of POM EF, their individual contribution here is discounted so as to avoid double-counting.

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **BLR-1**
Description: Hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace.
Induced draft. Water-cooled fixed grate.
Maximum Steam Production: 14,000 lb/hr at 110 psig
Particulate Matter Control Device: Multiclone (required by permit)
Fuel: Biomass (hog fuel, wood residue)
Commence Construction: Prior to NSPS Dc applicabity with no known NSPS reconstruction or modification.
Startup: 1948
Design Maximum Heat Input Capcity: 31.7 MMBtu/hr
Operation: 8760 hours per year

NON-FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Criteria Pollutant Emissions	EF (lb/MMBtu)	PTE (tons per year)	EF Reference
Carbon Monoxide (CO)	0.6	83.3	1
Lead (Pb)	4.80E-05	0.01	1
Nitrogen Oxides (NO_X)	0.49	68.0	1
Particulate Matter (PM)	0.412	57.2	1
Particulate Matter (PM_{10})	0.429	59.6	1,2
Particulate Matter ($PM_{2.5}$)	0.429	59.6	1,2
Sulfur Dioxide (SO_2)	1.198	166.3	1
Volatile Organic Compounds (VOC)	0.023	3.2	1

Greenhouse Gas Emissions (CO_2 Equivalent)	EF (lb/MMBtu)	PTE (tons per year)	EF Reference
Carbon Dioxide (CO_2)[1]	206.8	28,713	1
Methane (CH_4)	1.5	208	1
Nitrous Oxide (N_2O)	2.9	403	1
TOTAL		29,324	

[1] The DC Circuit Court of Appeals on July 12, 2013 vacated EPA regulations that delayed until July 21, 2014 consideration of CO_2 emissions resulting from biomass combustion in determining PSD and Title V applicability pursuant to 40 CFR 52.21(b)(49)(ii)(a) and 40 CFR 71.2 definition of "subject to regulation." See explanation for exemption provided by EPA at 76 FR 43490. See DC Circuit Court of Appeals July 12, 2013 ruling vacating the exemption at http://www.cadc.uscourts.gov/internet/opinions.nsf/F523FF1F29C06ECA85257BA6005397B5/$file/11-1101-1446222.pdf

EF Reference	Description
1	EPA Region 10 Regulated NSR Air Pollutant Potential to Emit Emission Factors for Wood Residue-fired Boilers, July 2013.
2	Conservatively assume that all "filterable" PM is also PM_{10} and $PM_{2.5}$. The "filterable" fraction equals 0.412 lb/MMBtu as noted in EF Reference No. 1. PM_{10} and $PM_{2.5}$ emissions do include the "condensible" fraction as noted in October 25, 2012 Federal Register notice, pages 65107-65119. The "condensible" fraction equals 0.017 lb/MMBtu as noted in Table 1.6-1 of AP-42 (09/03). The two fractions combined equal 0.117 lb/MMBtu.

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **BLR-2**
Description: Hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace.
Induced draft. Water-cooled fixed grate.
Maximum Steam Production: 14,000 lb/hr at 110 psig
Particulate Matter Control Device: Multiclone (required by permit)
Fuel: Biomass (hog fuel, wood residue)
Commence Construction: Prior to NSPS Dc applicabity with no known NSPS reconstruction or modification.
Startup: 1948
Design Maximum Heat Input Capcity: 31.7 MMBtu/hr
Operation: 8760 hours per year

NON-FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Criteria Pollutant Emissions	EF (lb/MMBtu)	PTE (tons per year)	EF Reference
Carbon Monoxide (CO)	0.6	83.3	1
Lead (Pb)	4.80E-05	0.01	1
Nitrogen Oxides (NO_X)	0.49	68.0	1
Particulate Matter (PM)	0.412	57.2	1
Particulate Matter (PM_{10})	0.429	59.6	1,2
Particulate Matter ($PM_{2.5}$)	0.429	59.6	1,2
Sulfur Dioxide (SO_2)	1.198	166.3	1
Volatile Organic Compounds (VOC)	0.023	3.2	1

Greenhouse Gas Emissions (CO_2 Equivalent)	EF (lb/MMBtu)	PTE (tons per year)	EF Reference
Carbon Dioxide (CO_2)[1]	206.8	28,713	1
Methane (CH_4)	1.5	208	1
Nitrous Oxide (N_2O)	2.9	403	1
TOTAL		29,324	

[1] The DC Circuit Court of Appeals on July 12, 2013 vacated EPA regulations that delayed until July 21, 2014 consideration of CO_2 emissions resulting from biomass combustion in determining PSD and Title V applicability pursuant to 40 CFR 52.21(b)(49)(ii)(a) and 40 CFR 71.2 definition of "subject to regulation." See explanation for exemption provided by EPA at 76 FR 43490. See DC Circuit Court of Appeals July 12, 2013 ruling vacating the exemption at http://www.cadc.uscourts.gov/internet/opinions.nsf/F523FF1F29C06ECA85257BA6005397B5/$file/11-1101-1446222.pdf

EF Reference	Description
1	EPA Region 10 Regulated NSR Air Pollutant Potential to Emit Emission Factors for Wood Residue-fired Boilers, July 2013.
2	Conservatively assume that all "filterable" PM is also PM_{10} and $PM_{2.5}$. The "filterable" fraction equals 0.412 lb/MMBtu as noted in EF Reference No. 1. PM_{10} and $PM_{2.5}$ emissions do include the "condensible" fraction as noted in October 25, 2012 Federal Register notice, pages 65107-65119. The "condensible" fraction equals 0.017 lb/MMBtu as noted in Table 1.6-1 of AP-42 (09/03). The two fractions combined equal 0.117 lb/MMBtu.

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **ENG-1**
Description: Cummins NT-280-IF compression-ignition diesel-fired engine. Manufactured 1971. Installed circa 1995. Rebuilt circa 2011.
Engine supplies mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency.
Control Device: none
Fuel: Distillate Fuel Oil No. 2
Design Maximum Power Output: 255.00 horsepower
Design Maximum Heat Input Capcity: 1.785 MMBtu/hr[1]
Operation: 500 hours per year[2]

NON-FUGITIVE EMISSIONS
Potential to Emit, (tons per year)

Criteria Pollutant Emissions	EF (lb/MMBtu)	PTE (tpy)	EF Reference
Carbon Monoxide (CO)	0.95	0.4	1
Lead (Pb)	-	0.0	1
Nitrogen Oxides (NO_x)	4.41	2.0	1
Particulate Matter (PM)	0.1974	0.1	2
Particulate Matter (PM_{10})	0.1974	0.1	2
Particulate Matter ($PM_{2.5}$)	0.1974	0.1	2
Sulfur Dioxide (SO_2)	0.50357	0.2	3
Volatile Organic Compounds (VOC)	0.36	0.2	1

Greenhouse Gas Emissions (CO_2 Equivalent)	EF (lb/MMBtu)	PTE (tpy)	EF Reference
Carbon Dioxide (CO_2)	163.054	72.8	4
Methane (CH_4)	0.139	0.1	4
Nitrous Oxide (N_2O)	0.410	0.2	4
TOTAL		73	

[1] Heat Input = Power Output (MMBtu/hr) X Average BSFC (Btu/hp-hr) X (MMBtu/1x10^6 Btu), where BSFC stands for brake-specific fuel consumption. See footnote A of Table 3.3-1 of AP-42, October 1996.
8.4483 MMBtu/hr = (1,206.9 hp-hr) X (7,000 Btu/hp-hr) X (MMBtu/1x10^6 Btu)
[2] September 6, 1995 EPA memorandum entitled, "Calculating Potential to Emit (PTE) for Emergency Generators"

EF Reference	Description
1	Table 3.3-1 of AP-42, October 1996.
2	Basis: FARR combustion source stack PM emission limit of 0.1 gr/dscf corrected to 7% O_2 at 40 CFR 49.125(d)(1) EF (lb/MMBtu) = FARR PM Limit (gr/dscf@7%O_2) X $CF_{7\rightarrow 0\%O2}$ X F_d (dscf/MMBtu) / $CF_{gr\rightarrow lb}$ (gr/lb) • $CF_{7\rightarrow 0\%O2}$ = (20.9 - X_{O2Fd}) / (20.9 - X_{O2FARR}). To create a correction factor that adjusts the basis of the FARR emission limit from 7% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and X_{O2FARR} = 7. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the FARR baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60. • F_d = 9,190 dscf/MMBtu for combustion of oil. See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.
	FARR PM Calculated EF (lb/MMBtu) | FARR PM Emission Limit (gr/dscf @7%O_2) | $CF_{7\rightarrow 0\%O2}$ (unitless) | F_d (dscf/MMBtu) | $CF_{gr\rightarrow lb}$ (gr/lb) 0.1974 | 0.1 | 1.504 | 9,190 | 7,000
	• Assume $PM_{2.5}$ = PM_{10} = PM
3	Option 1: 0.50357 lb/MMBtu. This emission factor is employed to determine PTE as it limits emissions to less than Option 2 below. Basis: FARR distillate fuel oil No. 2 sulfur limit of 0.5% by weight at 40 CFR 49.130(d)(2) EF (lb/MMBtu) = [FARR Fuel S Limit (%S) / 100] X $CF_{S\rightarrow SO2}$ X $CF_{lb\rightarrow gal}$ (lb/gal) X $CF_{Btu\rightarrow MMBtu}$ (Btu/MMBtu) / $CF_{gal\rightarrow Btu}$ (Btu/gal) • $CF_{S\rightarrow SO2}$ = 2 lb SO_2/lb S. S + O_2 → SO_2. For every 1 mol S (16 lb/lb-mol) reactant, there is 1 mol SO_2 (32 lb/lb-mol) product. 32 / 16 = 2. • $CF_{lb\rightarrow gal}$ = 7.05 lb/gal fuel. See weight of distillate oil on page A-6 of Appendix A to AP-42, September 1985. • $CF_{gal\rightarrow Btu}$ = 140,000 Btu/gal fuel. See heating value of distillate oil on page A-5 of Appendix A to AP-42, September 1985.
	FARR Fuel S Calculate SO_2 EF (lb/MMBtu) | FARR Fuel Sulfur Limit (% by weight) | $CF_{S\rightarrow SO2}$ (lb SO_2/lb S) | $CF_{lb\rightarrow gal}$ (lb/gal fuel) | $CF_{gal\rightarrow Btu}$ (Btu/gal fuel) | $CF_{Btu\rightarrow MMBtu}$ (Btu/MMBtu) 0.50357 | 0.5 | 2 | 7.05 | 140,000 | 1.E+06
	Option 2: 1.147 lb/MMBtu. Basis: FARR combustion source stack SO_2 emission limit of 500 parts per million by volume dry basis (ppmvd) corrected to 7% O_2 at 40 EF (lb/MMBtu) = FARR SO_2 Limit (ppmvd@7%O_2) X $CF_{7\rightarrow 0\%O2}$ X $CF_{ppm\rightarrow lb/dscfSO2}$ X F_d (dscf/MMBtu) • $CF_{7\rightarrow 0\%O2}$ = (20.9 - X_{O2Fd}) / (20.9 - X_{O2FARR}). To create a correction factor that adjusts the basis of the FARR emission limit from 7% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and X_{O2FARR} = 7. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the FARR baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60. • $CF_{ppm\rightarrow lb/dscfSO2}$ = 1.660 X 10^{-7} lb SO_2/dscf / ppm SO_2. See Table 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60. • F_d = 9,190 dscf/MMBtu for combustion of oil. See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.
	FARR 500 ppm Calculate SO_2 EF (lb/MMBtu) | FARR SO_2 Emission (ppmvd@7%O_2) | $CF_{7\rightarrow 0\%O2}$ (unitless) | $CF_{ppm\rightarrow lb/dscfSO2}$ (lb/dscf / ppm) | F_d (dscf/MMBtu) 1.147 | 500 | 1.504 | 1.66E-07 | 9190
4	EPA's March 2011 guidance document "PSD and Title V Permitting Guidance for Greenhouse Gases" states that the GHG Report Rule (40 CFR 98), "should be considered a primary reference for sources and permitting authorities in estimating GHG emissions and establishing measurement techniques when preparing or processing permit applications." Therefore, GHG Reporting Rule emission factors will be employed to determine GHG PTE. Carbon Dioxide (CO_2) EF (lb CO_2e/MMBtu) = EF (kg CO_2/MMBtu) X $CF_{kg\rightarrow lb}$ (lb/kg) X GWP_{CO2} (lb CO_2e/lb CO_2)
	Calculated CO_2e EF for CO_2 (lb CO_2e/MMBtu) | 40 CFR 98 Table C-2 EF (kg CO_2/MMBtu) | $CF_{kg\rightarrow lb}$ (lb/kg) | 40 CFR 98 Table A-1 GWP_{CO2} (lb CO_2e/lb CO_2) 163.054 | 73.96 | 2.20462262 | 1
	Methane (CH_4) EF (lb CO_2e/MMBtu) = EF (kg CH_4/MMBtu) X $CF_{kg\rightarrow lb}$ (lb/kg) X GWP_{CH4} (lb CO_2e/lb CH_4)
	Calculated CO_2e EF for CH_4 (lb CO_2e/hp-hr) | 40 CFR 98 Table C-2 EF (kg CH_4/MMBtu) | $CF_{kg\rightarrow lb}$ (lb/kg) | 40 CFR 98 Table A-1 GWP_{CO2} (lb CO_2e/lb CH_4) 0.139 | 0.003 | 2.20462262 | 21
	Nitrous Oxide (N_2O) EF (lb CO_2e/MMBtu) = EF (kg N_2O/MMBtu) X $CF_{kg\rightarrow lb}$ (lb/kg) X GWP_{N2O} (lb CO_2e/lb N_2O)
	Calculated CO_2e EF for N_2O (lb CO_2e/hp-hr) | 40 CFR 98 Table C-2 EF (kg N_2O/MMBtu) | $CF_{kg\rightarrow lb}$ (lb/kg) | 40 CFR 98 Table A-1 GWP_{CO2} (lb CO_2e/lb N_2O) 0.410 | 0.0006 | 2.20462262 | 310

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **ENG-2**
Description: Cummins NT-280-IF compression-ignition diesel-fired engine. Manufactured 1971. Installed circa 1995. Rebuilt circa 2011. Engine supplies mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency.
Control Device: none
Fuel: Distillate Fuel Oil No. 2
Design Maximum Power Output: 255.00 horsepower
Design Maximum Heat Input Capcity: 1.785 MMBtu/hr[1]
Operation: 500 hours per year[2]

NON-FUGITIVE EMISSIONS
Potential to Emit, (tons per year)

Criteria Pollutant Emissions	EF (lb/MMBtu)	PTE (tpy)	EF Reference
Carbon Monoxide (CO)	0.95	0.4	1
Lead (Pb)	-	0.0	1
Nitrogen Oxides (NO_x)	4.41	2.0	1
Particulate Matter (PM)	0.1974	0.1	2
Particulate Matter (PM_{10})	0.1974	0.1	2
Particulate Matter ($PM_{2.5}$)	0.1974	0.1	2
Sulfur Dioxide (SO_2)	0.50357	0.2	3
Volatile Organic Compounds (VOC)	0.36	0.2	1

Greenhouse Gas Emissions (CO_2 Equivalent)	EF (lb/MMBtu)	PTE (tpy)	EF Reference
Carbon Dioxide (CO_2)	163.054	72.8	4
Methane (CH_4)	0.139	0.1	4
Nitrous Oxide (N_2O)	0.410	0.2	4
TOTAL		73	

[1] Heat Input = Power Output (MMBtu/hr) X Average BSFC (Btu/hp-hr) X (MMBtu/1x10^6 Btu), where BSFC stands for brake-specific fuel consumption. See footnote A of Table 3.3-1 of AP-42, October 1996.
8.4483 MMBtu/hr = (1,206.9 hp-hr) X (7,000 Btu/hp-hr) X (MMBtu/1x10^6 Btu)
[2] September 6, 1995 EPA memorandum entitled, "Calculating Potential to Emit (PTE) for Emergency Generators"

EF Reference	Description
1	Table 3.3-1 of AP-42, October 1996.
2	Basis: FARR combustion source stack PM emission limit of 0.1 gr/dscf corrected to 7% O_2 at 40 CFR 49.125(d)(1) EF (lb/MMBtu) = FARR PM Limit (gr/dscf@7%O_2) X $CF_{7\rightarrow 0\%O2}$ X F_d (dscf/MMBtu) / $CF_{gr\rightarrow lb}$ (gr/lb) • $CF_{7\rightarrow 0\%O2}$ = (20.9 - X_{O2Fd}) / (20.9 - X_{O2FARR}). To create a correction factor that adjusts the basis of the FARR emission limit from 7% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and X_{O2FARR} = 7. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the FARR baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60. • F_d = 9,190 dscf/MMBtu for combustion of oil. See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.
	FARR PM Calculated EF (lb/MMBtu) | FARR PM Emission Limit (gr/dscf @7%O_2) | $CF_{7\rightarrow 0\%O2}$ (unitless) | F_d (dscf/MMBtu) | $CF_{gr\rightarrow lb}$ (gr/lb) 0.1974 | 0.1 | 1.504 | 9,190 | 7,000
	• Assume $PM_{2.5}$ = PM_{10} = PM
3	Option 1: 0.50357 lb/MMBtu. This emission factor is employed to determine PTE as it limits emissions to less than Option 2 below. Basis: FARR distillate fuel oil No. 2 sulfur limit of 0.5% by weight at 40 CFR 49.130(d)(2) EF (lb/MMBtu) = [FARR Fuel S Limit (%S) / 100] X $CF_{S\rightarrow SO2}$ X $CF_{lb\rightarrow gal}$ (lb/gal) X $CF_{Btu\rightarrow MMBtu}$ (Btu/MMBtu) / $CF_{gal\rightarrow Btu}$ (Btu/gal) • $CF_{S\rightarrow SO2}$ = 2 lb SO_2/lb S. S + O_2 → SO_2. For every 1 mol S (16 lb/lb-mol) reactant, there is 1 mol SO_2 (32 lb/lb-mol) product. 32 / 16 = 2. • $CF_{lb\rightarrow gal}$ = 7.05 lb/gal fuel. See weight of distillate oil on page A-6 of Appendix A to AP-42, September 1985. • $CF_{gal\rightarrow Btu}$ = 140,000 Btu/gal fuel. See heating value of distillate oil on page A-5 of Appendix A to AP-42, September 1985.
	FARR Fuel S Calculate SO_2 EF (lb/MMBtu) | FARR Fuel Sulfur Limit (% by weight) | $CF_{S\rightarrow SO2}$ (lb SO_2/lb S) | $CF_{lb\rightarrow gal}$ (lb/gal fuel) | $CF_{gal\rightarrow Btu}$ (Btu/gal fuel) | $CF_{Btu\rightarrow MMBtu}$ (Btu/MMBtu) 0.50357 | 0.5 | 2 | 7.05 | 140,000 | 1.E+06
	Option 2: 1.147 lb/MMBtu. Basis: FARR combustion source stack SO_2 emission limit of 500 parts per million by volume dry basis (ppmvd) corrected to 7% O_2 at 40 EF (lb/MMBtu) = FARR SO_2 Limit (ppmvd@7%O_2) X $CF_{7\rightarrow 0\%O2}$ X $CF_{ppm\rightarrow lb/dscfSO2}$ X F_d (dscf/MMBtu) • $CF_{7\rightarrow 0\%O2}$ = (20.9 - X_{O2Fd}) / (20.9 - X_{O2FARR}). To create a correction factor that adjusts the basis of the FARR emission limit from 7% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and X_{O2FARR} = 7. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the FARR baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60. • $CF_{ppm\rightarrow lb/dscfSO2}$ = 1.660 X 10^{-7} lb SO_2/dscf / ppm SO_2. See Table 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60. • F_d = 9,190 dscf/MMBtu for combustion of oil. See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.
	FARR 500 ppm Calculate SO_2 EF (lb/MMBtu) | FARR SO_2 Emission (ppmvd@7%O_2) | $CF_{7\rightarrow 0\%O2}$ (unitless) | $CF_{ppm\rightarrow lb/dscfSO2}$ (lb/dscf / ppm) | F_d (dscf/MMBtu) 1.147 | 500 | 1.504 | 1.66E-07 | 9190
4	EPA's March 2011 guidance document "PSD and Title V Permitting Guidance for Greenhouse Gases" states that the GHG Report Rule (40 CFR 98), "should be considered a primary reference for sources and permitting authorities in estimating GHG emissions and establishing measurement techniques when preparing or processing permit applications." Therefore, GHG Reporting Rule emission factors will be employed to determine GHG PTE. Carbon Dioxide (CO_2) EF (lb CO_2e/MMBtu) = EF (kg CO_2/MMBtu) X $CF_{kg\rightarrow lb}$ (lb/kg) X GWP_{CO2} (lb CO_2e/lb CO_2)
	Calculated CO_2e EF for CO_2 (lb CO_2e/MMBtu) | 40 CFR 98 Table C-2 EF (kg CO_2/MMBtu) | $CF_{kg\rightarrow lb}$ (lb/kg) | 40 CFR 98 Table A-1 GWP_{CO2} (lb CO_2e/lb CO_2) 163.054 | 73.96 | 2.20462262 | 1
	Methane (CH_4) EF (lb CO_2e/MMBtu) = EF (kg CH_4/MMBtu) X $CF_{kg\rightarrow lb}$ (lb/kg) X GWP_{CH4} (lb CO_2e/lb CH_4)
	Calculated CO_2e EF for CH_4 (lb CO_2e/hp-hr) | 40 CFR 98 Table C-2 EF (kg CH_4/MMBtu) | $CF_{kg\rightarrow lb}$ (lb/kg) | 40 CFR 98 Table A-1 GWP_{CO2} (lb CO_2e/lb CH_4) 0.139 | 0.003 | 2.20462262 | 21
	Nitrous Oxide (N_2O) EF (lb CO_2e/MMBtu) = EF (kg N_2O/MMBtu) X $CF_{kg\rightarrow lb}$ (lb/kg) X GWP_{N2O} (lb CO_2e/lb N_2O)
	Calculated CO_2e EF for N_2O (lb CO_2e/hp-hr) | 40 CFR 98 Table C-2 EF (kg N_2O/MMBtu) | $CF_{kg\rightarrow lb}$ (lb/kg) | 40 CFR 98 Table A-1 GWP_{CO2} (lb CO_2e/lb N_2O) 0.410 | 0.0006 | 2.20462262 | 310

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **KLN**
Description: Lumber drying
Control Device: None
Work Practice: None
Fuel: None - indirect steam provided by BLR-1 and BLR-2
Predominant Species Dried: Douglas Fir , Ponderosa Pine, White Fir, Western White Pine and Cedar
Installed: 7 double-track kilns (No.'s 1 - 7) installed ?
Annual Capacity: 174,000 mbf/yr

NON-FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Criteria Pollutant Emissions	EF (lb/mbf)	PTE (tpy)	EF Reference
Carbon Monoxide (CO)	0	0	
Lead (Pb)	0	0	
Nitrogen Oxides (NO_X)	0	0	
Particulate Matter (PM)	0.05	4.4	1
Particulate Matter (PM_{10})	0.05	4.4	1,2
Particulate Matter ($PM_{2.5}$)	0.05	4.4	1,2
Sulfur Dioxide (SO_2)	0	0	
Volatile Organic Compounds (VOC)	3.8087	331.4	3

Greenhouse Gas Emissions (CO_2 Equivalent)	EF (lb/mbf)	PTE (tpy)	EF Reference
Carbon Dioxide (CO_2)	0	0	
Methane (CH_4)	0	0	
Nitrous Oxide (N_2O)	0	0	
TOTAL	0	0	

EF Reference	Description
1	ODEQ ACDP Application Guidance AQ-EF02 (4/25/00), lumber drying Hemlock (highest EF).
2	Conservative engineering assumption that all PM is also PM_{10} and $PM_{2.5}$.
3	EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, December 2012. See WPP1 VOC EF for drying western white pine at temperatures exceeding 200°F.

Abbreviations
ACDP: air construction discharge permit
mbf: 1,000 board feet lumber
ODEQ: Oregon Department of Environmental Conservation
WPP1: Wood Products Protocol 1

Appendix A: Potential Emissions Inventory

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **CYC**

Description: Pneumatic Conveyance of Wood Residual Materials

NON-FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Emissions Generating Activity	Annual Capacity (bdt/yr)	EF			PTE		
		PM	PM_{10}	$PM_{2.5}$	PM	PM_{10}	$PM_{2.5}$
		(lb/bdt)			(tpy)		
W4 - Planer shavings cyclone		0.5	0.425	0.25	0.0	0.0	0.0
H1 - Planer mill chipped trim end hog cyclone		0.5	0.425	0.25	0.0	0.0	0.0
W3 - Atlas fuel bin cyclone		0.5	0.425	0.25	0.0	0.0	0.0
W5 - Shavings cyclone on top of shavings/sawdust bin		0.5	0.425	0.25	0.0	0.0	0.0
T1 - Sawmill trimmer sawdust cyclone on top of shavings/sawdust bin		0.5	0.425	0.25	0.0	0.0	0.0
					0.0	0.0	0.0

PM, PM_{10} and $PM_{2.5}$ EF Basis: EPA Region 10 Particulate Matter Emission Factors for Sawmills, February 2013.

Annual Capacity Basis: BNFP Title V renewal application supplemental information

Abbreviations

bdt: bone dry ton

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **BIN**
Description: Mechanical Conveyance and Storage of Residual Materials

NON-FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Emissions Generating Activity	Annual Capacity	EF				PTE			
		PM	PM_{10}	$PM_{2.5}$	VOC	PM	PM_{10}	$PM_{2.5}$	VOC
	(bdt/yr)	(lb/bdt)				(tpy)			
GS - Green sawdust bin loading		0.00075	0.00035	0.00005		0.00	0.00	0.00	
GS - Green sawdust bin offgas					9.3741				0.00
GS - Green sawdust bin unloading		0.00075	0.00035	0.00005		0.00	0.00	0.00	
GC - Green chip bin loading		0.00075	0.00035	0.00005		0.00	0.00	0.00	
GC - Green chip bin offgas					4.9196				0.00
GC - Green chip bin unloading		0.00075	0.00035	0.00005		0.00	0.00	0.00	
AF - Atlas fuel bin offgas					5.4704				0.00
AF- Atlas fuel bin unloading		0.0015	0.0007	0.0001		0.00	0.00	0.00	
SS - Shavings and green trimmer sawdust bin offgas					5.4704				0.00
SS - Shavings and green trimmer sawdust bin unloading		0.0015	0.0007	0.0001		0.00	0.00	0.00	
HF - Hog fuel bin loading		0.00075	0.00035	0.00005		0.00	0.00	0.00	
HF - Hog fuel bin offgas (including storage pile)					2.9738				0.00
HF - Hog fuel bin unloading		0.00075	0.00035	0.00005		0.00	0.00	0.00	
					TOTAL	0.0	0.0	0.00	0.00

PM, PM_{10} and $PM_{2.5}$ EF Basis: EPA Region 10 Particulate Matter Emission Factors for Sawmills, February 2013.

VOC EF Basis: NCASI Technical Bulletin No. 723 entitled, "Laboratory and Limited Field Measurements of VOC Emissions from Wood Residuals," September 1996. Assume processing of ponderosa pine logs harvested during season resulting in highest emissions. To convert NCASI emission factor from units of carbon to units of propane (estimate of VOC emitted), multiply by propane mass conversation factor of 1.2238. For further explanation for expressing emissions as propane, see Interim VOC Measurement Protocol for the Wood Products Industry - July 2007. See also Appendix C of NCASI's Technical Bulletin No. 991 entitled, "Characterization, Measurement, and Reporting of Volaitle Organic Compounds Emitted from Southern Pine Wood Products Sources," September 2011. For ponderosa pine sawdust, (7.66 lb C/bdt) X 1.2238 = 9.3741 lb VOC/bdt. For shavings, (4.47 lb C/bdt) X 1.2238 = 5.4704. For chips, (4.02 lb C/bdt) X 1.2238 = 4.9196. For ponderosa pine bark, (2.43 lb C/bdt) X 1.2238 = 2.9738.

Annual Capacity Basis: BNFP Title V renewal application supplemental information

Abbreviations
bdt: bone dry ton
NCASI: National Council for Air and Stream Improvement

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **SMI**
Description: Sawmill operations inside a building

NON-FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Emissions Generating Activity	Annual Capacity		EF			PTE		
			PM	PM_{10}	$PM_{2.5}$	PM	PM_{10}	$PM_{2.5}$
			(lb/ton log, lb/bdt or lb/mbf; as applicable)			(tpy)		
"Wet" Material Sawing		tons log/yr	0.07	0.035	0.0175	0.0	0.0	0.0
"Wet" Material Chipping		bdt/yr	0.01	0.005	0.0025	0.0	0.0	0.0
Planing Activities		mbf/yr	0.0812	0.0406	0.0203	0.0	0.0	0.0
					TOTAL	0.0	0.0	0.0

EF Basis: Particulate Matter Emission Factors for Sawmills, February 2013. For sawing and chipping, emissions are discounted 80% from uncontrolled emissions because activity occurs within a building. The planing emission factor from the reference document is assumed to already reflect activity occuring within a building.

Annual Capacity Basis: BNFP Title V renewal application supplemental information

Abbreviations
bdt: bone dry ton
mbf: 1,000 board feet lumber

Regulated NSR Air Pollutant Potential Emissions Inventory

Emission Unit: **SMO**
Description: Sawmill operations outside a building

FUGITIVE EMISSIONS

Potential to Emit, (tons per year)

Emissions Generating Activity	Annual Capacity		EF			PTE		
			PM	PM_{10}	$PM_{2.5}$	PM	PM_{10}	$PM_{2.5}$
			(lb/ton log or lb/bdt; as applicable)			(tpy)		
Log Bucking (Cut off saw)		tons log/yr	0.035	0.0175	0.00875	0.0	0.0	0.0
Log Debarking		tons log/yr	0.024	0.012	0.006	0.0	0.0	0.0
Bark Hogging		bdt/yr	0.05	0.025	0.0125	0.0	0.0	0.0
Bark Mechanical Conveyance		bdt/yr	0.0045	0.0021	0.0003	0.0	0.0	0.0
					TOTAL	0.0	0.0	0.0

EF Basis: EPA Region 10 Particulate Matter Emission Factors for Sawmills, February 2013. For bark mechanical conveyance, EPA assumed six "wet" material drops between debarker and hog fuel bin.

Annual Capacity Basis: BNFP Title V renewal application supplemental information

Abbreviations
bdt: bone dry ton
mbf: 1,000 board feet lumber

Hazardous Air Pollutant Potential Emissions Inventory

Emission Unit: **BLR-1**
Description: Hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace. Induced draft. Water-cooled fixed grate.
Maximum Steam Production: 14,000 lb/hr at 110 psig
Particulate Matter Control Device: Multiclone (required by permit)
Fuel: Biomass (hog fuel, wood residue)
Commence Construction: Prior to NSPS Dc applicabity with no known NSPS reconstruction or modification.
Startup: 1948
Design Maximum Heat Input Capcity: 31.7 MMBtu/hr
Operation: 8760 hours per year

Potential to Emit, (tons per year)

Hazardous Air Pollutants	EF (lb/MMBtu)	PTE (tpy)
Trace Metal Compounds		
Antimony Compounds	7.90E-06	1.10E-03
Arsenic Compounds (including arsine)	2.20E-05	3.05E-03
Beryllium Compounds	1.10E-06	1.53E-04
Cadmium Compounds	4.10E-06	5.69E-04
Chromium Compounds (including hexavalent)	2.10E-05	2.92E-03
Cobalt Compounds	6.50E-06	9.02E-04
Lead Compounds (not elemental lead)	4.80E-05	6.66E-03
Manganese Compounds	1.60E-03	2.22E-01
Mercury Compounds	3.50E-06	4.86E-04
Nickel Compounds	3.30E-05	4.58E-03
Phophorus	2.70E-05	3.75E-03
Selenium Compounds	2.80E-06	3.89E-04
Other Inorganic Compounds		
Chlorine	7.90E-04	1.10E-01
Hydrochloric acid (hydrogen chloride)	1.90E-02	2.64E+00
Organic Compounds		
Acetaldehyde	8.30E-04	1.15E-01
Acetophenone	3.20E-09	4.44E-07
Acrolein	4.00E-03	5.55E-01
Benzene	4.20E-03	5.83E-01
Bis(2-ethylhexyl)phthalate (DEHP)	4.70E-08	6.53E-06
Carbon tetrachloride	4.50E-05	6.25E-03
Chlorobenzene	3.30E-05	4.58E-03
Chloroform	2.80E-05	3.89E-03
Dibenzofurans*	1.87E-09	2.59E-07
2,4-Dinitrophenol	1.80E-07	2.50E-05
Ethyl benzene	3.10E-05	4.30E-03
Ethylene dichloride (1,2-Dichloroethane)	2.90E-05	4.03E-03
Formaldehyde	4.40E-03	6.11E-01
Methyl bromide (Bromomethane)	1.50E-05	2.08E-03
Methyl chloride (Chloromethane)	2.30E-05	3.19E-03
Methyl chloroform (1,1,1-trichloroethane)	3.10E-05	4.30E-03
Methylene chloride (Dichloromethane)	2.90E-04	4.03E-02
Naphthalene*	9.70E-05	1.35E-02
4-Nitrophenol	1.10E-07	1.53E-05
Pentachlorophenol	5.10E-08	7.08E-06
Phenol	5.10E-05	7.08E-03
Polychlorinated biphenyls (PCB)	7.93E-09	1.10E-06
Polycyclic Organic Matter (POM)	1.27E-04	1.76E-02
Propionaldehyde	6.10E-05	8.47E-03
Propylene dichloride (1,2-Dichloropropane)	3.30E-05	4.58E-03
Styrene	1.90E-03	2.64E-01
2,3,7,8-Tetrachlorodibenzo-p-dioxin*	8.60E-12	1.19E-09
Tetrachloroethylene (tetrachloroethene)	3.80E-05	5.28E-03
Toluene	9.20E-04	1.28E-01
Trichloroethylene (Trichloroethene)	3.00E-05	4.17E-03
2,4,6-Trichlorophenol	2.20E-08	3.05E-06
Vinyl chloride	1.80E-05	2.50E-03
Xylenes (inlc isomers and mixtures)	2.50E-05	3.47E-03
TOTAL[1]	3.87E-02	5.4

* designates a HAP that is subject individually to the 10 tpy major source threshold, but that is also one of several polycyclic organic matter (POM) compounds that, in aggregate, are subject to the same 10 tpy major source threshold.

[1] Because dibenzofurans, naphthalene and 2,3,7,8-Tetrachlorodibenzo-p-dioxin (one of several dibenzodioxins) are accounted for individually and in the calculation of POM EF, their individual contribution here is discounted so as to avoid double-counting.

EF Reference: Hazardous Air Pollutant Potential to Emit Emission Factors for Wood Residue-fired Boilers, July 2013.

Hazardous Air Pollutant Potential Emissions Inventory

Emission Unit: **BLR-2**
Description: Hog fuel-fired Sterling-design water-tube boiler with dutch oven furnace. Induced draft. Water-cooled fixed grate.
Maximum Steam Production: 14,000 lb/hr at 110 psig
Particulate Matter Control Device: Multiclone (required by permit)
Fuel: Biomass (hog fuel, wood residue)
Commence Construction: Prior to NSPS Dc applicabity with no known NSPS reconstruction or modification.
Startup: 1948
Design Maximum Heat Input Capcity: 31.7 MMBtu/hr
Operation: 8760 hours per year

Potential to Emit, (tons per year)

Hazardous Air Pollutants	EF (lb/MMBtu)	PTE (tpy)
Trace Metal Compounds		
Antimony Compounds	7.90E-06	1.10E-03
Arsenic Compounds (including arsine)	2.20E-05	3.05E-03
Beryllium Compounds	1.10E-06	1.53E-04
Cadmium Compounds	4.10E-06	5.69E-04
Chromium Compounds (including hexavalent)	2.10E-05	2.92E-03
Cobalt Compounds	6.50E-06	9.02E-04
Lead Compounds (not elemental lead)	4.80E-05	6.66E-03
Manganese Compounds	1.60E-03	2.22E-01
Mercury Compounds	3.50E-06	4.86E-04
Nickel Compounds	3.30E-05	4.58E-03
Phophorus	2.70E-05	3.75E-03
Selenium Compounds	2.80E-06	3.89E-04
Other Inorganic Compounds		
Chlorine	7.90E-04	1.10E-01
Hydrochloric acid (hydrogen chloride)	1.90E-02	2.64E+00
Organic Compounds		
Acetaldehyde	8.30E-04	1.15E-01
Acetophenone	3.20E-09	4.44E-07
Acrolein	4.00E-03	5.55E-01
Benzene	4.20E-03	5.83E-01
Bis(2-ethylhexyl)phthalate (DEHP)	4.70E-08	6.53E-06
Carbon tetrachloride	4.50E-05	6.25E-03
Chlorobenzene	3.30E-05	4.58E-03
Chloroform	2.80E-05	3.89E-03
Dibenzofurans*	1.87E-09	2.59E-07
2,4-Dinitrophenol	1.80E-07	2.50E-05
Ethyl benzene	3.10E-05	4.30E-03
Ethylene dichloride (1,2-Dichloroethane)	2.90E-05	4.03E-03
Formaldehyde	4.40E-03	6.11E-01
Methyl bromide (Bromomethane)	1.50E-05	2.08E-03
Methyl chloride (Chloromethane)	2.30E-05	3.19E-03
Methyl chloroform (1,1,1-trichloroethane)	3.10E-05	4.30E-03
Methylene chloride (Dichloromethane)	2.90E-04	4.03E-02
Naphthalene*	9.70E-05	1.35E-02
4-Nitrophenol	1.10E-07	1.53E-05
Pentachlorophenol	5.10E-08	7.08E-06
Phenol	5.10E-05	7.08E-03
Polychlorinated biphenyls (PCB)	7.93E-09	1.10E-06
Polycyclic Organic Matter (POM)	1.27E-04	1.76E-02
Propionaldehyde	6.10E-05	8.47E-03
Propylene dichloride (1,2-Dichloropropane)	3.30E-05	4.58E-03
Styrene	1.90E-03	2.64E-01
2,3,7,8-Tetrachlorodibenzo-p-dioxin*	8.60E-12	1.19E-09
Tetrachloroethylene (tetrachloroethene)	3.80E-05	5.28E-03
Toluene	9.20E-04	1.28E-01
Trichloroethylene (Trichloroethene)	3.00E-05	4.17E-03
2,4,6-Trichlorophenol	2.20E-08	3.05E-06
Vinyl chloride	1.80E-05	2.50E-03
Xylenes (inlc isomers and mixtures)	2.50E-05	3.47E-03
TOTAL[1]	3.87E-02	5.4

* designates a HAP that is subject individually to the 10 tpy major source threshold, but that is also one of several polycyclic organic matter (POM) compounds that, in aggregate, are subject to the same 10 tpy major source threshold.

[1] Because dibenzofurans, naphthalene and 2,3,7,8-Tetrachlorodibenzo-p-dioxin (one of several dibenzodioxins) are accounted for individually and in the calculation of POM EF, their individual contribution here is discounted so as to avoid double-counting.

EF Reference: Hazardous Air Pollutant Potential to Emit Emission Factors for Wood Residue-fired Boilers, July 2013.

Hazardous Air Pollutant Potential Emissions Inventory

Emission Unit: **ENG-1**
Description: Cummins NT-280-IF compression-ignition diesel-fired engine. Manufactured 1971. Installed circa 1995. Rebuilt circa 2011. Engine supplies mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency.
Control Device: none
Fuel: Distillate Fuel Oil No. 2
Design Maximum Power Output: 255.00 horsepower
Design Maximum Heat Input Capcity: 1.785 MMBtu/hr[1]
Operation: 500 hours per year[2]

Potential to Emit, (tons per year)

Hazardous Air Pollutants	EF (lb/MMBtu)	PTE (tpy)
Acealdehyde	7.67E-04	3.42E-04
Acrolein	9.25E-05	4.13E-05
Benzene	9.33E-04	4.16E-04
1,3-Butadiene	3.91E-05	1.74E-05
Formaldehyde	1.18E-03	5.27E-04
Naphthalene[3]	8.48E-05	3.78E-05
Polycyclic Organic Matter (POM)[4]	1.63E-04	7.29E-05
Toluene	4.09E-04	1.83E-04
Xylenes	2.85E-04	1.27E-04
TOTAL[5]	0.004	0.002

EF Basis: AP-42, October 1996. Table 3.3-2. Although the engine is subject to RICE MACT (NESHAP ZZZZ), no emission limits apply.

[1] Heat Input = Power Output (MMBtu/hr) X Average BSFC (Btu/hp-hr) X (MMBtu/1x10^6 Btu), where BSFC stands for brake-specific fuel consumption. See footnote A of Table 3.3-1 of AP-42, October 1996. 8.4483 MMBtu/hr = (1,206.9 hp-hr) X (7,000 Btu/hp-hr) X (MMBtu/1x10^6 Btu)

[2] September 6, 1995 EPA memorandum entitled, "Calculating Potential to Emit (PTE) for Emergency Generators"

[3] Naphthalene is a HAP that is subject individually to the 10 tpy major source threshold, but that is also one of several polycyclic organic matter (POM) compounds that, in aggregate, are subject to the same 10 tpy major source threshold.

[4] See table below for list of individual polycyclic organic matter (POM) compounds. POM defines a broad class of compounds that generally includes all organic structures having two or more fused aromatic rings (i.e., rings that share a common border), and that have a boiling point greater than or equal to 212°F (100°C). See http://www.epa.gov/ttn/atw/hlthef/polycycl.html#ref11

[5] Because naphthalene are accounted for individually and in the calculation of POM EF, their individual contribution here is discounted so as to avoid double-counting.

POM Compounds	EF (lb/MMBtu)
Acenaphthene*	1.42E-06
Acenaphthylene*	5.06E-06
Anthracene*	1.87E-06
Benzo(a)anthracene*	1.68E-06
Benzo(b)fluoranthene*	9.91E-08
Benzo(k)fluoranthene*	1.55E-07
Benzo(g,h,l)perylene*	4.89E-07
Benzo(a)pyrene*	1.88E-07
Benzo(e)pyrene*	2.60E-09
Chrysene*	3.53E-07
Dibenzo(a,h)anthracene*	5.83E-07
Fluoranthene*	7.61E-06
Fluorene*	2.92E-05
Indeno(1,2,3-cd)pyrene*	3.75E-07
Naphthalene***	8.48E-05
Phenanthrene*	2.94E-05
SUBTOTAL	1.63E-04

EF Basis: AP-42, October 1996. Table 3.3-2. Although the engine is subject to RICE MACT (NESHAP ZZZZ), no emission limits apply.

* designates a polycyclic aromatic hydrocarbon (PAH). PAHs are potent atmospheric pollutants that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. See http://en.wikipedia.org/wiki/Polycyclic_aromatic_hydrocarbon#PAH_compounds

** designates a POM compound that is also an individual HAP.

Hazardous Air Pollutant Potential Emissions Inventory

Emission Unit: **ENG-2**
Description: Cummins NT-280-IF compression-ignition diesel-fired engine. Manufactured 1971. Installed circa 1995.
Engine supplies mechanical work to water pump for fire suppression in the event facility loses electricity in an emergency.
Control Device: none
Fuel: Distillate Fuel Oil No. 2

Design Maximum Power Output:	255.00	horsepower
Design Maximum Heat Input Capcity:	1.785	MMBtu/hr[1]
Operation:	500	hours per year[2]

Potential to Emit, (tons per year)

Hazardous Air Pollutants	EF (lb/MMBtu)	PTE (tpy)
Acealdehyde	7.67E-04	3.42E-04
Acrolein	9.25E-05	4.13E-05
Benzene	9.33E-04	4.16E-04
1,3-Butadiene	3.91E-05	1.74E-05
Formaldehyde	1.18E-03	5.27E-04
Naphthalene[3]	8.48E-05	3.78E-05
Polycyclic Organic Matter (POM)[4]	1.63E-04	7.29E-05
Toluene	4.09E-04	1.83E-04
Xylenes	2.85E-04	1.27E-04
TOTAL[5]	0.004	0.002

EF Basis: AP-42, October 1996. Table 3.3-2. Although the engine is subject to RICE MACT (NESHAP ZZZZ), no emission limits apply.

[1] Heat Input = Power Output (MMBtu/hr) X Average BSFC (Btu/hp-hr) X (MMBtu/1x10^6 Btu), where BSFC stands for brake-specific fuel consumption. See footnote A of Table 3.3-1 of AP-42, October 1996. 8.4483 MMBtu/hr = (1,206.9 hp-hr) X (7,000 Btu/hp-hr) X (MMBtu/1x10^6 Btu)

[2] September 6, 1995 EPA memorandum entitled, "Calculating Potential to Emit (PTE) for Emergency Generators"

[3] Naphthalene is a HAP that is subject individually to the 10 tpy major source threshold, but that is also one of several polycyclic organic matter (POM) compounds that, in aggregate, are subject to the same 10 tpy major source threshold.

[4] See table below for list of individual polycyclic organic matter (POM) compounds. POM defines a broad class of compounds that generally includes all organic structures having two or more fused aromatic rings (i.e., rings that share a common border), and that have a boiling point greater than or equal to 212°F (100°C). See http://www.epa.gov/ttn/atw/hlthef/polycycl.html#ref11

[5] Because naphthalene are accounted for individually and in the calculation of POM EF, their individual contribution here is discounted so as to avoid double-counting.

POM Compounds	EF (lb/MMBtu)
Acenaphthene*	1.42E-06
Acenaphthylene*	5.06E-06
Anthracene*	1.87E-06
Benzo(a)anthracene*	1.68E-06
Benzo(b)fluoranthene*	9.91E-08
Benzo(k)fluoranthene*	1.55E-07
Benzo(g,h,l)perylene*	4.89E-07
Benzo(a)pyrene*	1.88E-07
Benzo(e)pyrene*	2.60E-09
Chrysene*	3.53E-07
Dibenzo(a,h)anthracene*	5.83E-07
Fluoranthene*	7.61E-06
Fluorene*	2.92E-05
Indeno(1,2,3-cd)pyrene*	3.75E-07
Naphthalene***	8.48E-05
Phenanthrene*	2.94E-05
SUBTOTAL	1.63E-04

EF Basis: AP-42, October 1996. Table 3.3-2. Although the engine is subject to RICE MACT (NESHAP ZZZZ), no emission limits apply.

* designates a polycyclic aromatic hydrocarbon (PAH). PAHs are potent atmospheric pollutants that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. See http://en.wikipedia.org/wiki/Polycyclic_aromatic_hydrocarbon#PAH_compounds

** designates a POM compound that is also an individual HAP.

Hazardous Air Pollutant Potential Emissions Inventory

Emission Unit: **KLN**
Description: Lumber drying
Control Device: None
Work Practice: None
Fuel: None - indirect steam provided by BLR-1 and BLR-2
Predominant Species Dried: Douglas Fir , Ponderosa Pine, White Fir, Western White Pine and Cedar
Installed: 7 double-track kilns (No.'s 1 - 7) installed ?
Annual Capacity: 174,000 mbf/yr

Potential to Emit, (tons per year)

Hazardous Air Pollutants	EF (lb/mbf)	PTE (tpy)
Methanol	0.4200	36.5
Formaldehyde	0.0163	1.4
Acetaldehyde	0.0550	4.8
Propionaldehyde	0.0018	0.2
Acrolein	0.0026	0.2
TOTAL		43.1

EF Reference: EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, December 2012. See HAP EF for drying white fir at temperatures exceeding 200°F.

Abbreviations
mbf: 1,000 board foot lumber

EPA Region 10 Regulated NSR Air Pollutant Potential to Emit Emission Factors for Wood Residue-Fired Boilers, July 2013.

No.	Criteria Pollutant	EF (lb/MMBtu)
1	Carbon Monoxide (CO)[1]	0.6
2	Lead (Pb)	4.8E-05
3	Nitrogen Oxides (NO_X)	0.49
4	Particulate Matter (PM)[2]	0.412
5	Respirable Particulate (PM_{10})[2]	0.429
6	Fine Particulate ($PM_{2.5}$)[2]	0.429
7	Sulfur Dioxide (SO_2)	1.198
8	Volatile Organic Compounds (VOC)	0.023

No.	Greenhouse Gas Pollutant	EF (lb CO_2e/MMBtu)
9	Carbon Dioxide (CO_2)[3]	~~206.8~~
10	Methane (CH_4)	1.5
11	Nitrous Oxide (N_2O)	2.9
	TOTAL	4.4

[1] If boiler is subject to Major Source Boiler MACT ("NESHAP Subpart DDDDD" or "NESHAP 5D"), do not use CO EF listed in table. Instead, calculate EF based upon applicable NESHAP 5D emission limit as illustrated below. Existing sources must comply with NESHAP 5D emission limits beginning January 31, 2016. The Potlatch facility in St. Maries, Idaho on the Coeur d'Alene Reservation is the only major HAP source operating a biomass boiler in Pacific Northwest Indian Country

[2] If boiler is subject to NSPS Db or Dc or NESHAP 5D or Minor Source Boiler MACT ("NESHAP Subpart JJJJJJ" or "NESHAP 6J"), do not use PM, PM_{10} and $PM_{2.5}$ EF listed in table. Instead, calculate EF based upon most stringent applicable emission limit as illustrated below. Existing sources must comply with NESHAP 5D emission limits beginning January 31, 2016.

[3] Prior to July 21, 2014, CO_2 emissions resulting from biomass combustion are not considered in determining PSD and Title V applicability pursuant to 40 CFR 52.21(b)(49)(ii)(a) and 40 CFR 71.2 definition of "subject to regulation." For further details, see explanation for exemption provided by EPA at 76 FR 43490.

No. | **Reference**

Option 1: 0.6 lb/MMBtu

Basis: AP-42, September 2003. Table 1.6-2.

Option 2: 0.243 - 2.281 lb/MMBtu (EPA Reference Method 5)

Basis: NESHAP 5D

In order to create an EF in units of "lb/MMBtu heat input" based upon NESHAP 5D CO emission limits expressed in units of "ppm @3%O_2," the following equation must be employed:

EF (lb/MMBtu) = NESHAP 5D CO Limit (ppmvd@3%O_2) X $CF_{3\rightarrow 0\%O2}$ X $CF_{ppm\rightarrow lb/dscfCO}$ X F_d (dscf/MMBtu)

• NESHAP 5D specifies a range of different CO emission limits based upon (a) the date the boiler commenced construction or reconstruction, (b) the design of the boiler and (c) type of fuel combusted. For the purpose of this PTE EF exercise, only the emission limits in units of "ppm" will be employed here. The alternative "lb/MMBtu steam output" or "lb/MWh electric generation output" emission limits could be employed if the efficiency of the boiler is known.

Maximum Design Heat Input Capacity (MMBtu/hr)	Date Construction or Reconstruction Commenced	Boiler Design	NESHAP 5D CO Emission Limit (ppmvd@3%O_2)	Regulatory Citation 40 CFR 63.7500(a)(1) and NESHAP 5D…
10 ≤ X	Y ≤ 06/04/10	Stokers/sloped grate/others designed to burn wet biomass fuel	1,500 (3-run avg) 720 (30-day rolling avg)	Table 2, Row 7
		Stokers/sloped grate/others designed to burn kiln-dried biomass fuel	460 (3-run avg)	Table 2, Row 8
		Fluidized bed units designed to burn biomass/bio-based solid	470 (3-run avg) 310 (30-day rolling avg)	Table 2, Row 9
		Suspension burners designed to burn biomass/bio-based solid	2,400 (3-run avg) 2,000 (10-day rolling avg)	Table 2, Row 10
		Dutch ovens/pile burners designed to burn biomass/bio-based solid	770 (3-run avg) 520 (10-day rolling avg)	Table 2, Row 11
		Fuel cell units designed to burn biomass/bio-based solid	1,100 (3-run avg)	Table 2, Row 12
		Hybrid suspension grate boiler designed to burn biomass/bio-based solid	2,800 (3-run avg) 900 (30-day rolling avg)	Table 2, Row 13
	06/04/10 < Y	Stokers/sloped grate/others designed to burn wet biomass fuel	620 (3-run avg) 390 (30-day rolling avg)	Table 1, Row 7
		Stokers/sloped grate/others designed to burn kiln-dried biomass fuel	460 (3-run avg)	Table 1, Row 8
		Fluidized bed units designed to burn biomass/bio-based solid	230 (3-run avg) 310 (30-day rolling avg)	Table 1, Row 9
		Suspension burners designed to burn biomass/bio-based solid	2,400 (3-run avg) 2,000 (10-day rolling avg)	Table 1, Row 10
		Dutch ovens/pile burners designed to burn biomass/bio-based solid	330 (3-run avg) 520 (10-day rolling avg)	Table 1, Row 11
		Fuel cell units designed to burn biomass/bio-based solid	910 (3-run avg)	Table 1, Row 12
		Hybrid suspension grate boiler designed to burn biomass/bio-based solid	1,100 (3-run avg) 900 (30-day rolling avg)	Table 1, Row 13

• $CF_{3\rightarrow 0\%O2}$ (unitless) = (20.9 - X_{O2Fd}) / (20.9 - $X_{O2NESHAP5D}$). To create a conversion factor that adjusts the basis of the NESHAP 5D CO emission limit from 3% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and $X_{O2NESHAP5D}$ = 3. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the NESHAP 5D CO baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

• $CF_{ppm \rightarrow lb/dscfCO}$ (lb CO/dscf / ppm CO) = [CO Concentration (ppm)] X [$CF_{ppm \rightarrow unitless}$ (1/ppm)] X [MW CO (g/mol)] X [Ideal Gas Constant @ EPA Standard Conditions (L/mol)]$^{-1}$ X [$CF_{L \rightarrow ft3}$ (L/ft^3)] X [$CF_{g \rightarrow lb}$ (g/lb)]$^{-1}$. This factor converts CO concentration from units "ppm" to "lb/dscf." To create the conversion factor, start by assuming CO concentration of 1 ppm and dividing by 1,000,000 to create a volumetric ratio of CO to exhaust gas. The molecular weight of CO is 28.010 g/mol. EPA standard conditions for reference method testing are a temperature of 20°C and a pressure of 1 atm. See Footnote 1 of Table 19-2 of EPA Method 19. The ideal gas constant is 0.08205746 L-atm/°K-mol. At EPA standard conditions, the value for ideal gas constant becomes 24.05514 L/mol through the following calculation: (0.08205746 L-atm/°K-mol) X (1 atm)$^{-1}$ X (293.15°K). Note that °K = [°C] + 273.15. There are around 28.32 liters (L) in a cubic foot (ft^3) and around 453.6 grams (g) in a pound (lb).

1

The calculation to determine $CF_{COvolume}$ is presented in the following table:

$CF_{ppm \rightarrow lb/dscfCO}$	CO Concentration (ppm)	$CF_{ppm \rightarrow unitless}$ (1/ppm)	CO Molecular Weight (g/mol)	Ideal Gas Constant (L/mol)	$CF_{L \rightarrow ft3}$ (L/ft^3)	$CF_{g \rightarrow lb}$ (g/lb)
7.27E-08	1	1.E-06	28.010	24.05514	28.3168466	453.59237

• F_d = 9,240 dscf/MMBtu for combustion of "wood" or 9,600 dscf/MMBtu for combustion of "wood bark." See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

Returning to the equation, EF (lb/MMBtu) = NESHAP 5D CO Limit (ppmvd@3%O_2) X $CF_{3 \rightarrow 0\%O2}$ X $CF_{ppm \rightarrow lb/dscfCO}$ X F_d (dscf/MMBtu), the wood residue-fired boiler NESHAP 5D EF can now be calculated assuming combustion of two different types of solid biomass as illustrated in the following two tables:

For "Existing" Units (Commencing Construction or Reconstruction on or before June 4, 2010)

Boiler Design	Fuel	NESHAP 5D CO Calculated EF (lb/MMBtu)	NESHAP 5D CO Limit Emission Limit[1] (ppmvd@3%O_2)	$CF_{3 \rightarrow 0\%O2}$ (unitless)	$CF_{ppm \rightarrow lb/dscfCO}$ (lb/dscf / ppm)	F_d (dscf/MMBtu)
Stokers/sloped grate/others designed to burn wet biomass fuel	Wood	1.176	1500	1.168	7.27E-08	9240
	Bark	1.222	1500			9600
Stokers/sloped grate/others designed to burn kiln-dried biomass fuel	Wood	0.361	460			9240
	Bark	0.375	460			9600
Fluidized bed units designed to burn biomass/bio-based solids	Wood	0.369	470			9240
	Bark	0.383	470			9600
Suspension burners designed to burn biomass/bio-based solids	Wood	1.882	2400			9240
	Bark	1.956	2400			9600
Dutch ovens/pile burners designed to burn biomass/bio-based solids	Wood	0.604	770			9240
	Bark	0.627	770			9600
Fuel cell units designed to burn biomass/bio-based solids	Wood	0.863	1100			9240
	Bark	0.896	1100			9600
Hybrid suspension grate boiler designed to burn biomass/bio-based solids	Wood	2.196	2800			9240
	Bark	2.281	2800			9600

[1] Least stringent emission limit selected to calculate EF when NESHAP 5D allows source to choose from among more than one.

For "New" Units (Commencing Construction or Reconstruction after June 4, 2010)

Boiler Design	Fuel	NESHAP 5D CO Calculated EF (lb/MMBtu)	NESHAP 5D CO Limit Emission Limit[1] (ppmvd@3%O_2)	$CF_{3 \rightarrow 0\%O2}$ (no units)	$CF_{ppm \rightarrow lb/dscfCO}$ (lb/dscf / ppm)	F_d (dscf/MMBtu)
Stokers/sloped grate/others designed to burn wet biomass fuel	Wood	0.486	620	1.168	7.27E-08	9240
	Bark	0.505	620			9600
Stokers/sloped grate/others designed to burn kiln-dried biomass fuel	Wood	0.361	460			9240
	Bark	0.375	460			9600
Fluidized bed units designed to burn biomass/bio-based solids	Wood	0.243	310			9240
	Bark	0.253	310			9600
Suspension burners designed to burn biomass/bio-based solids	Wood	1.882	2400			9240
	Bark	1.956	2400			9600
Dutch ovens/pile burners designed to burn biomass/bio-based solids	Wood	0.408	520			9240
	Bark	0.424	520			9600
Fuel cell units designed to burn biomass/bio-based solids	Wood	0.714	910			9240
	Bark	0.741	910			9600
Hybrid suspension grate boiler designed to burn biomass/bio-based solids	Wood	0.863	1100			9240
	Bark	0.896	1100			9600

[1] Least stringent emission limit selected to calculate EF when NESHAP 5D allows source to choose from among more than one.

Selection: Option 1. No FARR, NSPS or NESHAP 6J CO limits apply to wood residue-fired boilers. If the wood residue-fired boiler is subject to NESHAP 5D, employ NESHAP 5D CO emission limits as PTE EF as illustrated in Option 2.

Option 1: 4.8×10^{-5} lb/MMBtu

2 Basis: AP-42, September 2003. Table 1.6-4.

Selection: Option 1. Note that no FARR, NESHAP or NSPS lead limits apply to wood residue-fired boilers.

Option 1: 0.22 lb/MMBtu

Basis: AP-42, September 2003. Table 1.6-2 for wet wood-fired boiler

Option 2: 0.49 lb/MMBtu

3 Basis: AP-42, September 2003. Table 1.6-2 for dry wood-fired boiler

Selection: Option 2. The NO_X emission factors for combusting wet and dry wood are 0.22 and 0.49 lb/MMBtu, respectively. Because each source in Pacific Northwest Indian Country is allowed to combust dry wood in its biomass boiler, it is appropriate to assume combustion of that higher-emitting dry wood in determining NO_X PTE. Note that no FARR, NESHAP or NSPS NO_X limits apply to wood residue-fired boilers.

Option 1: 0.030 - 0.20 lb/MMBtu (EPA Reference Method 5)

Basis: NSPS Subpart Db as follows:

Maximum Design Heat Input Capacity (MMBtu/hr)	Action*	Date Action Commenced	ACF	NSPS Db PM Emission Limit (lb/MMBtu)	NSPS Db PM Emission Limit (% removal)	Regulatory Citation
100 < X	C, R, M	06/19/84 < Y ≤ 02/28/05	30% < Z	0.10	N/A	60.43b(c)(1)
100 < X ≤ 250	C, R, M	06/19/84 < Y ≤ 02/28/05	30% ≥ Z	0.20	N/A	60.43b(c)(2)
100 < X	C, R, M	02/28/05 < Y	N/A	0.030	N/A	60.43b(h)(1)
100 < X	M	02/28/05 < Y	N/A	0.051	99.8	60.43b(h)(2)
100 < X ≤ 250	M	02/28/05 < Y	30% < Z	0.10	N/A	60.43b(h)(3)
250 < X	M	02/28/05 < Y	30% < Z	0.085	N/A	60.43b(h)(4)

* C - construction, R - reconstruction and M - modification

Option 2: 0.030 - 0.30 lb/MMBtu (EPA Reference Method 5)

Basis: NSPS Subpart Dc as follows:

Maximum Design Heat Input Capacity (MMBtu/hr)	Action*	Date Action Commenced	ACF	NSPS Dc PM Emission Limit (lb/MMBtu)	NSPS Dc PM Emission Limit (% removal)	Regulatory Citation
30 ≤ X ≤ 100	C, R, M	06/09/89 < Y ≤ 02/28/05	30% < Z	0.10	N/A	60.43c(b)(1)
	C, R, M	06/09/89 < Y ≤ 02/28/05	30% ≥ Z	0.30	N/A	60.43c(b)(2)
	C, R, M	02/28/05 < Y	N/A	0.030	N/A	60.43c(e)(1)
	M	02/28/05 < Y	N/A	0.051	99.8	60.43c(e)(2)
	M	02/28/05 < Y	30% < Z	0.10	N/A	60.43c(e)(3)

* C - construction, R - reconstruction and M - modification

Option 3: 0.03 - 0.07 lb/MMBtu (EPA Reference Method 5)

Basis: NESHAP 6J as follows:

Maximum Design Heat Input Capacity (MMBtu/hr)	Date Construction or Reconstruction Commenced	NESHAP 6J PM Emission Limit (lb/MMBtu)	Regulatory Citation 40 CFR 63.11201(a) and NESHAP 5D…
30 ≤ X	06/04/10 < Y	0.03	Table 1, Row 3
10 ≤ X < 30	06/04/10 < Y	0.07	Table 1, Row 4

Option 4: 0.0032 - 0.44 lb/MMBtu (EPA Reference Method 5)

Basis: NESHAP 5D as follows:

• NESHAP 5D specifies a range of different PM emission limits based upon (a) the date the boiler commenced construction or reconstruction, (b) the design of the boiler and (c) type of fuel combusted. For the purpose of this PTE EF exercise, only the emission limits in units of "lb/MMBtu heat input" will be employed here. The source may choose to comply with an alternative "lb/MMBtu heat input" emission limit for total selected metals (TSM). Because TSM constitutes only a fraction of total PM, TSM emission limits will not be considered in determining PM PTE EF. TSM is limited to arsenic, beryllium, cadmium, chromium, lead, manganese, nickel and selenium.

Maximum Design Heat Input Capacity (MMBtu/hr)	Date Construction or Reconstruction Commenced	Boiler Design	NESHAP 5D PM Emission Limit (lb/MMBtu; 3-run avg)	Regulatory Citation 40 CFR 63.7500(a)(1) and NESHAP 5D…
10 ≤ X	Y ≤ 06/04/10	Stokers/sloped grate/others designed to burn wet biomass fuel	0.037	Table 2, Row 7
		Stokers/sloped grate/others designed to burn kiln-dried biomass fuel	0.32	Table 2, Row 8
		Fluidized bed units designed to burn biomass/bio-based solid	0.11	Table 2, Row 9
		Suspension burners designed to burn biomass/bio-based solid	0.051	Table 2, Row 10
		Dutch ovens/pile burners designed to burn biomass/bio-based solid	0.28	Table 2, Row 11
		Fuel cell units designed to burn biomass/bio-based solid	0.02	Table 2, Row 12
		Hybrid suspension grate boiler designed to burn biomass/bio-based solid	0.44	Table 2, Row 13
	06/04/10 < Y	Stokers/sloped grate/others designed to burn wet biomass fuel	0.03	Table 1, Row 7
		Stokers/sloped grate/others designed to burn kiln-dried biomass fuel	0.03	Table 1, Row 8
		Fluidized bed units designed to burn biomass/bio-based solid	0.0098	Table 1, Row 9
		Suspension burners designed to burn biomass/bio-based solid	0.03	Table 1, Row 10
		Dutch ovens/pile burners designed to burn biomass/bio-based solid	0.0032	Table 1, Row 11
		Fuel cell units designed to burn biomass/bio-based solid	0.02	Table 1, Row 12
		Hybrid suspension grate boiler designed to burn biomass/bio-based solid	0.026	Table 1, Row 13

4

Option 5: 0.397 lb/MMBtu for wood and 0.412 lb/MMBtu for bark (EPA Reference Method 5)

Basis: FARR wood-fired boiler stack PM emission limit of 0.2 gr/dscf corrected to 7% O_2 at 40 CFR 49.125(d)(2)

EF (lb/MMBtu) = FARR PM Limit (gr/dscf@7%O_2) X $CF_{7\rightarrow 0\%O2}$ X F_d (dscf/MMBtu) / $CF_{gr\rightarrow lb}$

• $CF_{7\rightarrow 0\%O2}$ = (20.9 - X_{O2Fd}) / (20.9 - X_{O2FARR}). To create a correction factor that adjusts the basis of the FARR emission limit from 7% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and X_{O2FARR} = 7. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the FARR baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

• F_d = 9,240 dscf/MMBtu for combustion of "wood" or 9,600 dscf/MMBtu for combustion of "wood bark." See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

Fuel	FARR PM Calculated EF (lb/MMBtu)	FARR PM Emission Limit (gr/dscf @7%O_2)	$CF_{7\rightarrow 0\%O2}$ (unitless)	F_d (dscf/MMBtu)	$CF_{gr\rightarrow lb}$ (gr/lb)
Wood	0.397	0.2	1.504	9240	7000
Bark	0.412	0.2	1.504	9600	7000

Option 6: 0.35 lb/MMBtu (EPA Reference Method 5)

Basis: (a) AP-42, September 2003. Table 1.6-1. (b) Fuel blending and installation of mechanical collectors to comply with FARR PM limit.

According to AP-42 Table 1.6-1, combustion of dry and wet wood in the absence of control equipment results in PM emissions of 0.40 and 0.33 lb/MMBtu, respectively. Combustion of bark and wet wood together without controls results in PM emissions of 0.56 lb/MMBtu. While combustion of wood alone may result in exceedances of the FARR PM emission limit (40 CFR 49.152(d)(2)) if controls are not installed (0.40 and 0.33 ~ 0.397), combustion of bark and wet wood together will likely result in exceedances (0.56 > 0.412). Installing mechanical collectors and blending bark with wood results in PM emissions less than or equal to 0.35 lb/MMBtu.

Selection: Option 5. Because each source in Pacific Northwest Indian Country is subject to the FARR and allowed to combust bark in its biomass boiler, it is appropriate to assume compliance with the FARR and combustion of that slightly higher-emitting bark in determining PM PTE. If the wood residue-fired boiler is subject to NSPS Db or Dc or NESHAP 6J or 5D, employ NSPS and NESHAP PM emission limits as PTE EF.

5

Option 1: 0.047 - 0.217 lb/MMBtu

Basis: NSPS Subpart Db (0.03 - 0.20 lb/MMBtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 2: 0.047 - 0.317 lb/MMBtu

Basis: NSPS Subpart Dc (0.03 - 0.30 lb/MMBtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 3: 0.047 - 0.087 lb/MMBtu

Basis: NESHAP 6J (0.03 - 0.07 lb/MMbtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 4: 0.0202 - 0.457 lb/MMBtu

Basis: NESHAP 5D (0.0032 - 0.44 lb/MMBtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 5: 0.429 lb/MMBtu

Basis: FARR wood-fired boiler stack PM emission limit of 0.2 gr/dscf corrected to 7% O_2 at 40 CFR 49.125(d)(2) for filterable portion and AP-42 for condensible portion.

As stated previously in analysis of PM EF, an EF of 0.412 is calculated assuming compliance with FARR PM limit and combustion of bark. EPA Reference Method 5 is the test method employed to determine compliance with the limit. EPA Reference Method 5 measures only filterable PM, but PM_{10} consists of both a filterable and condensible portion. AP-42 estimates the condensible contribution to be 0.017 lb/MMBtu. Adding the two together, 0.412 + 0.017 = 0.429 lb/MMBtu.

Selection: Option 5. If the wood residue-fired boiler is subject to NSPS Db or Dc or NESHAP 6J or 5D, employ NSPS and NESHAP PM emission limits as PTE EF.

6

Option 1: 0.047 - 0.217 lb/MMBtu

Basis: NSPS Subpart Db (0.03 - 0.20 lb/MMBtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 2: 0.047 - 0.317 lb/MMBtu

Basis: NSPS Subpart Dc (0.03 - 0.30 lb/MMBtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 3: 0.047 - 0.087 lb/MMBtu

Basis: NESHAP 6J (0.03 - 0.07 lb/MMbtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 4: 0.0202 - 0.457 lb/MMBtu

Basis: NESHAP 5D (0.0032 - 0.44 lb/MMBtu) as noted above for PM plus 0.017 lb/MMBtu condensible portion as noted in AP-42.

Option 5: 0.429 lb/MMBtu

Basis: FARR wood-fired boiler stack PM emission limit of 0.2 gr/dscf corrected to 7% O_2 at 40 CFR 49.125(d)(2) for filterable portion and AP-42 for condensible portion.

As stated previously in analysis of PM EF, an EF of 0.412 is calculated assuming compliance with FARR PM limit and combustion of bark. EPA Reference Method 5 is the test method employed to determine compliance with the limit. EPA Reference Method 5 measures only filterable PM, but $PM_{2.5}$ consists of both a filterable and condensible portion. AP-42 estimates the condensible contribution to be 0.017 lb/MMBtu. Adding the two together, 0.412 + 0.017 = 0.429 lb/MMBtu.

Selection: Option 5. If the wood residue-fired boiler is subject to NSPS Db or Dc or NESHAP 6J or 5D, employ NSPS and NESHAP PM emission limits as PTE EF.

7

Option 1: 1.153 lb/MMBtu for wood and 1.198 lb/MMBtu for bark

Basis: FARR combustion source stack SO_2 emission limit of 500 parts per million by volume dry basis (ppmvd) corrected to 7% O_2 at 40 CFR 49.129(d)(1)

EF (lb/MMBtu) = FARR SO_2 Limit (ppmvd@7%O_2) X $CF_{7\rightarrow 0\%O2}$ X $CF_{ppm\rightarrow lb/dscfSO2}$ X F_d (dscf/MMBtu)

• $CF_{7\rightarrow 0\%O2}$ = (20.9 - X_{O2Fd}) / (20.9 - X_{O2FARR}). To create a correction factor that adjusts the basis of the FARR emission limit from 7% O_2 to 0% O_2 (the basis for F_d), X_{O2Fd} = 0 and X_{O2FARR} = 7. The value 20.9 is the percent by volume of the ambient air that is O_2. Decreasing the O_2 from the FARR baseline increases the pollutant concentration. See Equation 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

• $CF_{ppm\rightarrow lb/dscfSO2}$ = 1.660 X 10^{-7} lb SO_2/dscf / ppm SO_2. See Table 19-1 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

• F_d = 9,240 dscf/MMBtu for combustion of "wood" or 9,600 dscf/MMBtu for combustion of "wood bark." See Table 19-2 of EPA Method 19 at Appendix A-7 to 40 CFR Part 60.

Fuel	FARR 500 ppm Calculate SO_2 EF (lb/MMBtu)	FARR SO_2 Emission Limit (ppmvd@7%O_2)	$CF_{7\rightarrow 0\%O2}$ (unitless)	$CF_{ppm\rightarrow lb/dscfSO2}$ (lb/dscf / ppm)	F_d (dscf/MMBtu)
Wood	1.153	500	1.504	1.66E-07	9240
Bark	1.198	500	1.504	1.66E-07	9600

Option 2: 4.615 lb/MMBtu for wood and 4.444 lb/MMBtu for bark

Basis: FARR solid fuel sulfur limit of 2% by weight (dry) at 40 CFR 49.130(d)(7)

EF (lb/MMBtu) = {[FARR Fuel S Limit (%S) / 100] X $CF_{S\rightarrow SO2}$ / HV_{fuel} (Btu/lb)} X $CF_{Btu\rightarrow MMBtu}$ (Btu/MMBtu)

• $CF_{S\rightarrow SO2}$ = 2 lb SO_2/lb S. S + $O_2 \rightarrow SO_2$. For every 1 mol S (16 lb/lb-mol) reactant, there is 1 mol SO_2 (32 lb/lb-mol) product. 32 / 16 = 2.

• HV (heating value) wood (dry) = 8,667 Btu/lb. (5200/(1-0.4)). HV bark (dry) = 9,000 Btu/lb. (4500/(1-0.5)). See page A-5 of Appendix A to AP-42, September 1985.

Fuel	FARR Fuel S Calculate SO_2 EF (lb/MMBtu)	FARR Fuel Sulfur Limit (% by weight)	$CF_{S\rightarrow SO2}$ (lb SO_2/lb S)	HV_{fuel} (Btu/lb)	$CF_{Btu\rightarrow MMBtu}$ (Btu/MMBtu)
Wood	4.615	2	2	8667	1.0E+06
Bark	4.444	2	2	9000	1.0E+06

Option 3: 0.025 lb/MMBtu

Basis: AP-42, September 2003. Table 1.6-2.

Selection: Option 1. Most stringent limit selected to calculate EF.

Option 1: 0.023 lb/MMBtu

Basis: AP-42, September 2003. Table 1.6-3 and calculating VOC as compound emitted.

Calculating VOC (as weighted-average VOC)

VOC (as weighted-average VOC) = (VOC_C) X [($MW_{wt\text{-}avg\ VOC}$) / (MW_C)] X [(#C_C) / (#$C_{wt\text{-}avg\ VOC}$)]

where:

VOC_C equals "0.017 lb/MMBtu" from AP-42, September 2003. Table 1.6-3.

$MW_{wt\text{-}avg\ VOC}$ equals "64.689 lb/lb-mol" and is the weighted-average molecular weight for VOC assuming speciated organic compound ratios supported by AP-42 Table 1.6-3

MW_C equals "12.0110 lb/lb-mol" and represents the molecular weight for carbon

#C_C equals "1" as the single carbon atom was the "basis" for which Method 25 VOC test results were determined

#$C_{wt\text{-}avg\ VOC}$ equals "3.975" and is the weighted-average number of carbon atoms present in VOC assuming speciated organic compound ratios supported by AP-42 Table 1.6-3

Calculating value for VOC (as weighted-average VOC):

VOC (as carbon):	0.017	lb/MMBtu
$MW_{wt\text{-}avg\ VOC}$:	64.689	lb/lb-mol
MW_C:	12.011	lb/lb-mol
#C_C:	1	
#$C_{wt\text{-}avg\ VOC}$:	3.975	
VOC (as weighted average VOC)	0.023	lb/MMBtu

The first two columns of the following table are extracted from AP-42, September 2003. Table 1.6-3. The third and fourth columns were created based upon information widely available over the internet. The fifth and sixth columns illustrate calculations necessary to determine weighted-average molecular weight and weighted-average number of carbon atoms comprising VOC emissions resulting from wood residue combustion.

Wood Residue Combustion Organic Compounds	EF (lb/MMBtu)	MW lb/lb-mol	Number of Carbon Atoms	EF x MW	EF X #C atoms
Acenaphthene	9.10E-07	154.21	12	1.40E-04	1.09E-05
Acenaphthylene	5.00E-06	152.19	12	7.61E-04	6.00E-05
Acetaldehyde	8.30E-04	44.05	2	3.66E-02	1.66E-03
Acetone	1.90E-04	58.08	3	1.10E-02	5.70E-04
Acetophenone	3.20E-09	120.15	8	3.84E-07	2.56E-08
Acrolein	4.00E-03	56.06	3	2.24E-01	1.20E-02
Anthracene	3.00E-06	178.23	14	5.35E-04	4.20E-05
Benzaldehyde	8.50E-07	106.12	7	9.02E-05	5.95E-06
Benzene	4.20E-03	78.11	6	3.28E-01	2.52E-02
Benzo(a)anthracene	6.50E-08	228.29	18	1.48E-05	1.17E-06
Benzo(a)pyrene	2.60E-06	252.31	20	6.56E-04	5.20E-05
Benzo(b)fluoranthene	1.00E-07	252.31	20	2.52E-05	2.00E-06
Benzo(e)pyrene	2.60E-09	252.31	20	6.56E-07	5.20E-08
Benzo(g,h,i)perylene	9.30E-08	276.33	22	2.57E-05	2.05E-06
Benzo(j,k)fluoranthene	1.60E-07	202.26	16	3.24E-05	2.56E-06
Benzo(k)fluoranthene	3.60E-08	252.31	20	9.08E-06	7.20E-07
Benzoic acid	4.70E-08	122.12	7	5.74E-06	3.29E-07
Bis(2-ethylhexyl)phthalate (DEHP)	4.70E-08	390.56	24	1.84E-05	1.13E-06
Bromomethane (Methyle bromide)	1.50E-05	94.94	1	1.42E-03	1.50E-05
2-Butanone (MEK)	5.40E-06	72.11	4	3.89E-04	2.16E-05
Carbazole	1.80E-06	167.21	12	3.01E-04	2.16E-05
Carbon tetrachloride	4.50E-05	153.82	1	6.92E-03	4.50E-05
Chlorobenzene	3.30E-05	112.56	6	3.71E-03	1.98E-04
Chloroform	2.80E-05	119.38	1	3.34E-03	2.80E-05
Chloromethane (Methyl chloride)	2.30E-05	50.49	1	1.16E-03	2.30E-05
2-Chloronaphthalene	2.40E-09	162.62	10	3.90E-07	2.40E-08
2-Chlorophenol	2.40E-08	128.56	6	3.09E-06	1.44E-07
Chrysene	3.80E-08	228.28	18	8.67E-06	6.84E-07
Crotonaldehyde	9.90E-06	70.09	4	6.94E-04	3.96E-05
Decachlorobiphenyl	2.70E-10	498.6584	12	1.35E-07	3.24E-09
Dibenzo(a,h)anthracene	9.10E-09	278.35	22	2.53E-06	2.00E-07
1,2-Dibromoethene	5.50E-05	185.85	2	1.02E-02	1.10E-04
Dichlorobiphenyl	7.40E-10	223.09792	12	1.65E-07	8.88E-09
8 1,2-Dichloroethane (Ethylene dichloride)	2.90E-05	98.96	2	2.87E-03	5.80E-05
Dichloromethane (Methylene chloride)	2.90E-04	84.93	2	2.46E-02	5.80E-04
1,2-Dichloropropane (Propylene dichloride)	3.30E-05	122.99	3	4.06E-03	9.90E-05
2,4-Dinitrophenol	1.80E-07	184.11	6	3.31E-05	1.08E-06
Ethyl benzene	3.10E-05	106.17	8	3.29E-03	2.48E-04
Fluoranthene	1.60E-06	202.26	16	3.24E-04	2.56E-05
Fluorene	3.40E-06	166.22	13	5.65E-04	4.42E-05
Formaldehyde	4.40E-03	30.03	1	1.32E-01	4.40E-03
Heptachlorobiphenyl	6.60E-11	395.32322	12	2.61E-08	7.92E-10
Hexachlorobiphenyl	5.50E-10	360.87816	12	1.98E-07	6.60E-09
Hexanal	7.00E-06	100.15888	6	7.01E-04	4.20E-05
Heptachlorodibenzo-p-dioxins	2.00E-09	425.30614	12	8.51E-07	2.40E-08
Heptachlorodibenzo-p-furans	2.40E-10	409.30674	12	9.82E-08	2.88E-09
Hexachlorodibenzo-p-dioxins	1.60E-06	390.82	12	6.25E-04	1.92E-05
Hexachlorodibenzo-p-furans	2.80E-10	374.86168	12	1.05E-07	3.36E-09
Indeno(1,2,3-cd)pyrene	8.70E-08	326.34	22	2.84E-05	1.91E-06
Isobutyraldehyde	1.20E-05	72.10572	4	8.65E-04	4.80E-05
2-Methylnaphthalene	1.60E-07	142.20	11	2.28E-05	1.76E-06
Monochlorobiphenyl	2.20E-10	187.64492	12	4.13E-08	2.64E-09
Naphthalene	9.70E-05	128.17	10	1.24E-02	9.70E-04
2-Nitrophenol	2.40E-07	139.11	6	3.34E-05	1.44E-06
4-Nitrophenol	1.10E-07	139.11	6	1.53E-05	6.60E-07
Octachlorodibenzo-p-dioxins	6.60E-08	459.7512	12	3.03E-05	7.92E-07
Octachlorodibenzo-p-furans	8.80E-11	443.7518	12	3.91E-08	1.06E-09
Pentachlorodibenzo-p-dioxins	1.50E-09	356.41602	12	5.35E-07	1.80E-08
Pentachlorodibenzo-p-furans	4.20E-10	340.41662	12	1.43E-07	5.04E-09
Pentachlorobiphenyl	1.20E-09	326.4331	12	3.92E-07	1.44E-08
Pentachlorophenol	5.10E-08	266.34	6	1.36E-05	3.06E-07
Perylene	5.20E-10	252.31	20	1.31E-07	1.04E-08
Phenanthrene	7.00E-06	178.23	14	1.25E-03	9.80E-05
Phenol	5.10E-05	94.11	6	4.80E-03	3.06E-04
Propanal	3.20E-06	58.08	3	1.86E-04	9.60E-06
Propionaldehyde	6.10E-05	58.08	3	3.54E-03	1.83E-04
Pyrene	3.70E-06	202.25	16	7.48E-04	5.92E-05
Styrene	1.90E-03	104.15	8	1.98E-01	1.52E-02
2,3,7,8-Tetrachlorodibenzo-p-dioxins	8.60E-12	321.97096	12	2.77E-09	1.03E-10
Tetrachlorodibenzo-p-dioxins	4.70E-10	321.97096	12	1.51E-07	5.64E-09
2,3,7,8-Tetrachlorodibenzo-p-furans	9.00E-11	305.97156	12	2.75E-08	1.08E-09

	Tetrachlorodibenzo-p-furans	7.50E-10	305.97156	12	2.29E-07	9.00E-09
	Tetrachlorobiphenyl	2.50E-09	291.98804	12	7.30E-07	3.00E-08
	Tetrachloroethene (Tetrachloroethylene)	3.80E-05	165.83	2	6.30E-03	7.60E-05
	o-Tolualdehyde	7.20E-06	120.15	8	8.65E-04	5.76E-05
	p-Tolualdehyde	1.10E-05	120.15	8	1.32E-03	8.80E-05
	Toluene	9.20E-04	92.14	7	8.48E-02	6.44E-03
	Trichlorobiphenyl	2.60E-09	257.54298	12	6.70E-07	3.12E-08
	1,1,1-trichloroethane (Methyl chloroform)	3.10E-05	133.40	2	4.14E-03	6.20E-05
	Trichloroethene (Trichloroethylene)	3.00E-05	131.39	2	3.94E-03	6.00E-05
	Trichlorofluoromethane	4.10E-05	137.37	1	5.63E-03	4.10E-05
	2,4,6-Trichlorophenol	2.20E-08	197.45	6	4.34E-06	1.32E-07
	Vinyl chloride	1.80E-05	62.50	2	1.13E-03	3.60E-05
	o-Xylene	2.50E-05	106.16	8	2.65E-03	2.00E-04
	TOTAL	1.75E-02			1.13E+00	6.96E-02
				weighted-average molecular weight of VOC →	64.689	3.975 ← weighted-average number of carbon atoms comprising VOC

9

Option 1: 195 lb CO_2e/MMBtu

Basis: (a) AP-42, September 2003. Table 1.6-3. (b) 40 CFR 98, Subpart A. Table A-1.

EF (lb CO_2e/MMBtu) = EF (lb CO_2/MMBtu) X GWP_{CO2} (lb CO_2e/lb CO_2)

AP-42 Calculated CO_2e EF (lb CO_2e/MMBtu)	AP-42 EF (lb CO_2/MMBtu)	40 CFR 98 GWP_{CO2} (lb CO_2e/lb CO_2)
195.0	195	1

Option 2: 206.8 lb CO_2e/MMBtu

Basis: (a) 40 CFR 98, Subpart C. Table C-1. (b) 40 CFR 98, Subpart A. Table A-1.

EF (lb CO_2e/MMBtu) = EF (kg CO_2/MMBtu) X $CF_{kg \to lb}$ (lb/kg) X GWP_{CO2} (lb CO_2e/lb CO_2)

40 CFR 98 Calculated CO_2e EF (lb CO_2e/MMBtu)	40 CFR 98 EF (kg CO_2/MMBtu)	$CF_{kg \to lb}$ (lb/kg)	40 CFR 98 GWP_{CO2} (lb CO_2e/lb CO_2)
206.8	93.8	2.20462262	1

Selection: Option 2. EPA's March 2011 guidance document "PSD and Title V Permitting Guidance for Greenhouse Gases" states that the GHG Report Rule (40 CFR 98), "should be considered a primary reference for sources and permitting authorities in estimating GHG emissions and establishing measurement techniques when preparing or processing permit applications."

10

Option 1: 0.4 lb CO_2e/MMBtu

Basis: (a) AP-42, September 2003. Table 1.6-3. (b) 40 CFR 98, Subpart A. Table A-1.

EF (lb CO_2e/MMBtu) = EF (lb CH_4/MMBtu) X GWP_{CH4} (lb CO_2e/lb CH_4)

AP-42 Calculated CO_2e EF (lb CO_2e/MMBtu)	AP-42 EF (lb CH_4/MMBtu)	40 CFR 98 GWP_{CH4} (lb CO_2e/lb CH_4)
0.4	0.021	21

Option 2: 1.5 lb CO_2e/MMBtu

Basis: (a) 40 CFR 98, Subpart C. Table C-2. (b) 40 CFR 98, Subpart A. Table A-1.

EF (lb CO_2e/MMBtu) = EF (kg CH_4/MMBtu) X $CF_{kg \to lb}$ (lb/kg) X GWP_{CH4} (lb CO_2e/lb CH_4)

40 CFR 98 Calculated CO_2e EF (lb CO_2e/MMBtu)	40 CFR 98 EF (kg CH_4/MMBtu)	$CF_{kg \to lb}$ (lb/kg)	40 CFR 98 GWP_{CH4} GWP_{CH4} (lb CO_2e/lb CH_4)
1.5	0.032	2.20462262	21

Selection: Option 2. EPA's March 2011 guidance document "PSD and Title V Permitting Guidance for Greenhouse Gases" states that the GHG Report Rule (40 CFR 98), "should be considered a primary reference for sources and permitting authorities in estimating GHG emissions and establishing measurement techniques when preparing or processing permit applications."

11

Option 1: 4.0 lb CO_2e/MMBtu

Basis: (a) AP-42, September 2003. Table 1.6-3. (b) 40 CFR 98, Subpart A. Table A-1.

EF (lb CO_2e/MMBtu) = EF (lb N_2O/MMBtu) X GWP_{N2O} (lb CO_2e/lb N_2O)

AP-42 Calculated CO_2e EF (lb CO_2e/MMBtu)	AP-42 EF (lb N_2O/MMBtu)	40 CFR 98 GWP_{N2O} (lb CO_2e/lb N_2O)
4.0	0.013	310

Option 2: 2.9 lb CO_2e/MMBtu

Basis: (a) 40 CFR 98, Subpart C. Table C-2. (b) 40 CFR 98, Subpart A. Table A-1.

EF (lb CO_2e/MMBtu) = EF (kg N_2O/MMBtu) X $CF_{kg \to lb}$ (lb/kg) X GWP_{N2O} (lb CO_2e/lb N_2O)

40 CFR 98 Calculated CO_2e EF (lb CO_2e/MMBtu)	40 CFR 98 EF (kg N_2O/MMBtu)	$CF_{kg \to lb}$ (lb/kg)	40 CFR 98 GWP_{N2O} (lb CO_2e/lb N_2O)
2.9	0.0042	2.20462262	310

Selection: Option 2. EPA's March 2011 guidance document "PSD and Title V Permitting Guidance for Greenhouse Gases" states that the GHG Report Rule (40 CFR 98), "should be considered a primary reference for sources and permitting authorities in estimating GHG emissions and establishing measurement techniques when preparing or processing permit applications."

ACF: Annual Capacity Factor for Wood
C: Construction
CF: Conversion Factor
EF: Emission Factor
FARR: Federal Air Rules for Reservations
GWP: Global Warming Potential
HV: Heating Value
M: Modification
MW: Molecular Weight
PTE: Potential to Emit
R: Reconstruction

EPA Region 10 Hazardous Air Pollutant Potential to Emit Emission Factors for Wood Residue-Fired Boilers, July 2013.

HAP Categories	EF (lb/MMBtu)
Trace Metal Compounds[1]	1.78E-03
Other Inorganic Compounds[2]	1.98E-02
Organic Compounds[3]	1.72E-02
TOTAL	3.87E-02

[1] See Table 1.

[2] See Table 2.

[3] See Table 3.

Table 1 - Trace Metal HAP EF[1]

Trace Metal Compounds	EF (lb/MMBtu)
Antimony Compounds	7.90E-06
Arsenic Compounds (including arsine)	2.20E-05
Beryllium Compounds	1.10E-06
Cadmium Compounds	4.10E-06
Chromium Compounds (including hexavalent)	2.10E-05
Cobalt Compounds	6.50E-06
Lead Compounds (not elemental lead)	4.80E-05
Manganese Compounds	1.60E-03
Mercury Compounds[2]	3.50E-06
Nickel Compounds	3.30E-05
Phophorus	2.70E-05
Selenium Compounds	2.80E-06
SUBTOTAL	1.78E-03

EF Basis: AP-42, September 2003. Table 1.6-4.

[1] Major Source Boiler MACT ("NESHAP Subpart DDDDD" or "NESHAP 5D") provides a source the option of complying with an emission limit for either PM or total selected metals (TSM). TSM includes only arsenic, beryllium, cadmium, chromium, lead, manganese, nickel and selenium. Because NESHAP 5D does not limit TSM compounds individually, it is not possible to create compound-specific EF. AP-42 will remain the basis for the PTE EF even if a boiler is subject to NESHAP 5D.

[2] If boiler is subject to NESHAP 5D, do not use mercury EF listed in table. Instead, employ emission limits specified in table immediately below beginning on source's compliance date. Existing sources must comply with NESHAP 5D emission limits beginning circa January 1, 2016.

Maximum Design Heat Input Capacity (MMBtu/hr)	Date Construction or Reconstruction Commenced	NESHAP 5D Mercury Emission Limit (lb/MMBtu)	Regulatory Citation 40 CFR 63.7500(a)(1) and NESHAP 5D…
10 ≤ X	Y ≤ 06/04/10	5.7E-06	Table 2, Row 1
	06/04/10 < Y	8.0E-07	Table 1, Row 1

Table 2 - Other Inorganic HAP EF

Other Inorganic Compounds	EF (lb/MMBtu)
Chlorine	7.90E-04
Hydrochloric acid (hydrogen chloride)[1]	1.90E-02
SUBTOTAL	1.98E-02

EF Basis: AP-42, September 2003. Table 1.6-3.

[1] If boiler is subject to NESHAP 5D, do not use hydrogen chloride EF listed in table. Instead, employ emission limits specified in table immediately below beginning on source's compliance date. Existing sources must comply with NESHAP 5D emission limits beginning circa January 1, 2016.

Maximum Design Heat Input Capacity (MMBtu/hr)	Date Construction or Reconstruction Commenced	NESHAP 5D Hydrogen Chloride Emission Limit (lb/MMBtu)	Regulatory Citation 40 CFR 63.7500(a)(1) and NESHAP 5D…
10 ≤ X	Y ≤ 06/04/10	2.2E-02	Table 2, Row 1
10 ≤ X	06/04/10 < Y	2.2E-02	Table 1, Row 1

Table 3 - Organic HAP EF

Organic Compounds	EF (lb/MMBtu)
Acetaldehyde	8.30E-04
Acetophenone	3.20E-09
Acrolein	4.00E-03
Benzene	4.20E-03
Bis(2-ethylhexyl)phthalate (DEHP)	4.70E-08
Carbon tetrachloride	4.50E-05
Chlorobenzene	3.30E-05
Chloroform	2.80E-05
Dibenzofurans*[1]	1.87E-09
2,4-Dinitrophenol	1.80E-07
Ethyl benzene	3.10E-05
Ethylene dichloride (1,2-Dichloroethane)	2.90E-05
Formaldehyde	4.40E-03
Methyl bromide (Bromomethane)	1.50E-05
Methyl chloride (Chloromethane)	2.30E-05
Methyl chloroform (1,1,1-trichloroethane)	3.10E-05
Methylene chloride (Dichloromethane)	2.90E-04
Naphthalene*	9.70E-05
4-Nitrophenol	1.10E-07
Pentachlorophenol	5.10E-08
Phenol	5.10E-05
Polychlorinated biphenyls (PCB)[2]	8.15E-09
Polycyclic Organic Matter (POM)[3]	1.27E-04
Propionaldehyde	6.10E-05
Propylene dichloride (1,2-Dichloropropane)	3.30E-05
Styrene	1.90E-03
2,3,7,8-Tetrachlorodibenzo-p-dioxin*	8.60E-12
Tetrachloroethylene (tetrachloroethene)	3.80E-05
Toluene	9.20E-04
Trichloroethylene (Trichloroethene)	3.00E-05
2,4,6-Trichlorophenol	2.20E-08
Vinyl chloride	1.80E-05
Xylenes (inlc isomers and mixtures)	2.50E-05
SUBTOTAL[4]	1.72E-02

EF Basis: AP-42, September 2003. Table 1.6-3.

* designates a HAP that is subject individually to the 10 tpy major source threshold, but that is also one of several polycyclic organic matter (POM) compounds that, in aggregate, are subject to the same 10 tpy major source threshold.

[1] See Table 4 for list of individual dibenzofurans.

[2] See Table 5 for list of individual polychlorinated biphenyls (PCBs).

[3] See Table 6 for list of individual polycyclic organic matter (POM) compounds. POM defines a broad class of compounds that generally includes all organic structures having two or more fused aromatic rings (i.e., rings that share a common border), and that have a boiling point greater than or equal to 212°F (100°C). See http://www.epa.gov/ttn/atw/hlthef/polycycl.html#ref11

[4] Because dibenzofurans, naphthalene and 2,3,7,8-Tetrachlorodibenzo-p-dioxin (one of several dibenzodioxins) are accounted for individually and in the calculation of POM EF, their individual contribution here is discounted so as to avoid double-counting.

Table 4 - Dibenzofurans EF

Dibenzofurans	EF (lb/MMBtu)
Heptachlorodibenzo-p-furans	2.40E-10
Hexachlorodibenzo-p-furans	2.80E-10
Octachlorodibenzo-p-furans	8.80E-11
Pentachlorodibenzo-p-furans	4.20E-10
2,3,7,8-Tetrachlorodibenzo-p-furans	9.00E-11
Tetrachlorodibenzo-p-furans	7.50E-10
SUBTOTAL	1.87E-09

EF Basis: AP-42, September 2003. Table 1.6-3.

Table 5 - PCB EF

PCB Compounds	EF (lb/MMBtu)
Decachlorobiphenyl	2.70E-10
Dichlorobiphenyl	7.40E-10
Heptachlorobiphenyl	6.60E-11
Hexachlorobiphenyl	5.50E-10
Monochlorobiphenyl	2.20E-10
Pentachlorobiphenyl	1.20E-09
Tetrachlorobiphenyl	2.50E-09
Trichlorobiphenyl	2.60E-09
SUBTOTAL	8.15E-09

EF Basis: AP-42, September 2003. Table 1.6-3.

Table 6 - POM EF

POM Compounds	EF (lb/MMBtu)
Acenaphthene*	9.10E-07
Acenaphthylene*	5.00E-06
Anthracene*	3.00E-06
Benzo(a)anthracene*	6.50E-08
Benzo(b)fluoranthene*	1.00E-07
Benzo(j,k)fluoranthene*	1.60E-07
Benzo(k)fluoranthene*	3.60E-08
Benzo(g,h,i)perylene*	9.30E-08
Benzo(a)pyrene*	2.60E-06
Benzo(e)pyrene*	2.60E-09
2-Chloronaphthalene	2.40E-09
Chrysene*	3.80E-08
Dibenzo(a,h)anthracene*	9.10E-09
Dibenzodioxins**,[1]	1.67E-06
Dibenzofurans**,[2]	1.87E-09
Fluoranthene*	1.60E-06
Fluorene*	3.40E-06
Indeno(1,2,3-cd)pyrene*	8.70E-08
2-Methylnaphthalene	1.60E-07
Naphthalene***	9.70E-05
Perylene	5.20E-10
Phenanthrene*	7.00E-06
Pyrene*	3.70E-06
SUBTOTAL	1.27E-04

EF Basis: AP-42, September 2003. Table 1.6-3.

* designates a polycyclic aromatic hydrocarbon (PAH). PAHs are potent atmospheric pollutants that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. See http://en.wikipedia.org/wiki/Polycyclic_aromatic_hydrocarbon#PAH_compounds

** designates a POM compound that is also an individual HAP. For Dibenzodioxins, only 2,3,7,8-Tetrachlorodibenzo-p-dioxins is also an individual HAP.

[1] See Table 7.

[2] See Table 4.

Table 7 - Dibenzodioxins EF

Dibenzodioxins	EF (lb/MMBtu)
Heptachlorodibenzo-p-dioxins	2.00E-09
Hexachlorodibenzo-p-dioxins	1.60E-06
Octachlorodibenzo-p-dioxins	6.60E-08
Pentachlorodibenzo-p-dioxins	1.50E-09
2,3,7,8-Tetrachlorodibenzo-p-dioxins	8.60E-12
Tetrachlorodibenzo-p-dioxins	4.70E-10
SUBTOTAL	1.67E-06

EF Basis: AP-42, September 2003. Table 1.6-3.

Appendix A: Potential Emissions Inventory

EPA Region 10 Particulate Matter Emission Factors for Sawmills, February 2013

No.	Emissions Generating Activity	PM EF	PM_{10} % of PM	PM_{10} EF	$PM_{2.5}$ % of PM	$PM_{2.5}$ EF	Units[1]
Sawmill Activities (upstream of lumber drying)							
IMPORTANT: If sawmill activities (categories No. 1 - 5 listed below) occur within a building, reduce the PM, PM_{10} and $PM_{2.5}$ EF listed below by 80 percent (engineering judgement) as emissions struggle to escape through doorways and other openings. If an activity occurs within an interior enclosure of the building and the activity's by-products are evacuated pneumatically from the building to a target box, cyclone or bag filter system, then only the associated downstream "material handling" emissions are counted.							
1	Log Bucking	0.035	50	0.0175	25	0.00875	lb/ton log
2	Log Debarking	0.024	50	0.012	25	0.006	lb/ton log
3	Hogging	0.050	50	0.025	25	0.0125	lb/bdt material
4	Sawing	0.350	50	0.175	25	0.0875	lb/ton log
5	Chipping	0.050	50	0.025	25	0.0125	lb/bdt material
Planing Activities (downstream of lumber drying)							
6	Accumulation of activities that generate planed dry lumber, chips, sawdust and shavings from rough dried lumber	0.0812	50	0.0406	25	0.0203	lb/mbf
By-Product Conveying or "Material Handling" Activities							
IMPORTANT: The "material" in the "material handling" entries listed below refers to bark, hogged fuel, green chips, dry chips, green sawdust, dry sawdust, shavings and any other woody by-product of lumber production. In the case of material "drops," EF are to be applied to each "drop" separately. Similarly, EF are to be applied to each "material handling" device separately.							
7	"Drop" of "wet" material from one surface to another including, but not limited to, (a) each mechanical conveyance drop between point of generation and target box, (b) loadout from target box into a truck bed or railcar and (c) drop onto a pile.	0.00075	N/A	0.00035	N/A	0.00005	lb/bdt material
8	"Drop" of "dry" material from one surface to another including, but not limited to, (a) each mechanical conveyance drop between point of generation and target box, (b) loadout from target box into a truck bed or railcar and (c) drop onto a pile.	0.0015	N/A	0.0007	N/A	0.0001	lb/bdt material
9	Pneumatically convey material through medium efficiency cyclone to bin	0.5	85	0.425	50	0.25	lb/bdt material
10	Pneumatically convey material through high efficiency cyclone to bin	0.2	95	0.19	80	0.16	lb/bdt material
11	Pneumatically convey material through cyclone to bin. Exhaust routed through baghouse.	0.001	99.5	0.000995	99	0.00099	lb/bdt material
12	Pneumatically convey material into target box	0.1	85	0.085		0	lb/bdt material
Yard Activities							
13	Wind Erosion of Pile	0.38	50	0.19	25	0.095	ton/acre-yr
14	Paved Roads	Emission factors based upon site-specific parameters.					lb/VMT
15	Unpaved Roads	Emission factors based upon site-specific parameters.					lb/VMT

Acronyms

bdt: bone dry ton
mbf: 1000 board foot lumber
VMT: vehicle mile traveled

[1] EF for log bucking, debarking and sawing are expressed in units of "lb/ton log" in the table above. The EF can be expressed in units of "lb/mbf" lumber as follows:

lb/mbf = (lb PM/ton log) X (ton/2000 lb) X (LD lb/ft^3) X (LRF bf lumber/ft^3 log) X (1000 bf/mbf)

where "LD" stands for log density and "LRF" stands for log recovery factor

• LD values are species-specific and are provided by The Engineering ToolBox and are listed at http://www.engineeringtoolbox.com/weigt-wood-d_821.html

• LRF value of 6.33 bf/ft^3 log is specific to softwood species of the Pacific Coast East. See Section 2 of Appendix D to Forest Products Measurements and Conversion Factors with Special Emphasis on the U.S. Pacific Northwest. College of Forest Resources, University of Washington. 1994. See http://www.ruraltech.org/projects/conversions/briggs_conversions/briggs_append2/appendix02_combined.pdf

No.	Reference

1

For PM, PM_{10}, and $PM_{2.5}$ EF, apply engineering judgement to estimate that log bucking emissions are one-tenth sawing emissions. EPA has stated that log bucking is normally a negligible source of fugitive PM emissions. See page 2-125 of Assessment of Fugitive Particulate Emission Factor for Industrial Processes, EPA-450/3-78-107, September 1978. The document can be downloaded from internet at http://nepis.epa.gov/Simple.html by entering EPA publication number. For sawing emissions details, see Reference No. 4 below.

2

• For PM EF, see Table 2-47 of Assessment of Fugitive Particulate Emission Factor for Industrial Processes, EPA-450/3-78-107, September 1978. See also Table 2-59 of Technical Guidance for Controls of Industrial Process Fugitive Particulate Emissions, EPA-450/3-77-010, March 1977. Both documents can be downloaded from internet at http://nepis.epa.gov/Simple.html by entering EPA publication number. EPA revoked the PM EF from WebFIRE on January 1, 2002. See detailed search results for SCC 3-07-008-01 (include revoked factors) at http://cfpub.epa.gov/webfire/index.cfm?action=fire.detailedSearch

• For PM_{10} and $PM_{2.5}$ EF, apply engineering judgement to estimate that (a) PM_{10} emissions are one-half PM emissions and (b) $PM_{2.5}$ emissions are one-half PM_{10} emissions.

3

Apply engineering judgement to estimate that (a) hogging PM emissions are one-half pneumatic target box emissions, (b) hogging PM_{10} emisions are one-half hogging PM emissions and (c) hogging $PM_{2.5}$ emissions are one-half hogging PM_{10} emissions.

4

• Sawing consists of the following cummulative activities: breaking the log into cants and flitches with a smooth edge, breaking cant further down into multiple flitches and/or boards, taking the flitch and trim off all irregular edges to leave four-sided lumber and trimming to square the ends.

• For PM EF, see Table 2-47 of Assessment of Fugitive Particulate Emission Factor for Industrial Processes, EPA-450/3-78-107, September 1978. See also Table 2-59 of Technical Guidance for Controls of Industrial Process Fugitive Particulate Emissions, EPA-450/3-77-010, March 1977. Both documents can be downloaded from internet at http://nepis.epa.gov/Simple.html by entering EPA publication number. EPA revoked the PM EF from WebFIRE on January 1, 2002. See detailed search results for SCC 3-07-008-01 (include revoked factors) at http://cfpub.epa.gov/webfire/index.cfm?action=fire.detailedSearch

• For PM_{10} and $PM_{2.5}$ EF, apply engineering judgement to estimate that (a) PM_{10} emissions are one-half PM emissions and (b) $PM_{2.5}$ emissions are one-half PM_{10} emissions.

5

Apply engineering judgement to estimate that (a) chipping PM emissions are one-half pneumatic target box emissions, (b) chipping PM_{10} emisions are one-half chipping PM emissions and (c) chipping $PM_{2.5}$ emissions are one-half chipping PM_{10} emissions.

6

• For PM, see Table 1.4 on page 8 of CORRIM: Phase I Final Report, Module B, Softwood Lumber - Pacific Northwest Region. June 1, 2004 Review Draft prepared by Michael Milota, Oregon State University.

• For PM_{10} and $PM_{2.5}$ EF, apply engineering judgement to estimate that (a) PM_{10} emissions are one-half PM emissions and (b) $PM_{2.5}$ emissions are one-half PM_{10} emissions.

7
8

• See Section 13.2.4 of EPA's AP-42, November 2006 at http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.pdf. Apply Equation 1 on page 13.2.4-4 to estimate emissions resulting from material loadout from target box as follows: E [lb PM/ton] = (k) X (0.0032) X $(U/5)^{1.3}$ / $(M/2)^{1.4}$

Wet Material Loadout

Particulate	k	0.0032	$(U/5)^{1.3}$	$(M/2)^{1.4}$	lb PM / ton
PM	0.74	0.0032	6.6693	21.0552	0.00075
PM_{10}	0.35				0.00035
$PM_{2.5}$	0.053				0.00005

The following conservative assumptions were

Mean wind speed (U) = 15 miles per hour

$(U/5)^{1.3}$ = 6.66930

Material moisture content (M) = 34 percent. Value based upon observations

$(M/2)^{1.4}$ = 21.05520

Note: • Mean wind speed of 15 mph is a reasonable upper bounder estimate.

• Moisture content of 34 percent for "wet" material is based upon observation that average moisture content (dry basis) of green douglas fir lumber (common to the Pacific Northwest) is 51 percent as recorded prior to lab scale kiln VOC emissions testing conducting by Oregon State University's Mike Milota and organized in Microsoft Excel workbook entitled, "EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, December 2012." 51 percent moisture content (dry basis) is equivalent to 34 percent moisture content (wet basis) as illustrated below:

MCD = MCW / (1-MCW); where

MCD: moisture content dry basis

MCW: moisture content wet basis

0.51 = MCW / (1 - MCW)

0.51 - (0.51)(MCW) = MCW

(1.51)(MCW) = 0.51

MCW = 0.34, or 34 percent

Dry Material Loadout

Particulate	k	0.0032	$(U/5)^{1.3}$	$(M/2)^{1.4}$	lb PM / ton
PM	0.74	0.0032	6.6693	10.5552	0.0015
PM_{10}	0.35				0.0007
$PM_{2.5}$	0.053				0.0001

The following conservative assumptions were

	Mean wind speed (U) = 15 miles per hour $(U/5)^{1.3}$ = 6.6693 Material moisture content (M) = 13 percent $(M/2)^{1.4}$ = 10.5552 Note: • Mean wind speed of 15 mph is a reasonable upper bounder estimate. • Moisture content of 13 percent for "dry" material is based upon observation that typical moisture content (dry basis) of kiln-dried lumber is 15 percent as recorded during lab scale kiln emissions testing conducting by Oregon State University's Mike Milota and organized in Microsoft Excel workbook entitled, "EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, December 2012." 15 percent moisture content (dry basis) is equivalent to 13 percent moisture content (wet basis) as illustrated below: MCD = MCW / (1-MCW); where MCD: moisture content dry basis MCW: moisture content wet basis 0.15 = MCW / (1 - MCW) 0.15 - (0.15)(MCW) = MCW (1.15)(MCW) = 0.15 MCW = 0.13, or 13 percent
9 10 11 12	• For PM EF, see Oregon Department of Environmental Quality (ODEQ) Wood Products Emission Factors, AQ-EF02 Revised 08/01/11. http://www.deq.state.or.us/aq/permit/acdp/docs/AQ-EF02.pdf • For PM_{10} and $PM_{2.5}$ EF, see ODEQ Wood Products Emission Factors - $PM_{10}/PM_{2.5}$ Fractions, AQ-EF03 Revised 08/01/11. http://www.deq.state.or.us/aq/permit/acdp/docs/AQ-EF03.pdf
13	• For PM EF, see last row of Table 11.9-4 on page 11.9-11 of Section 11.9 of EPA's AP-42, July 1998 at http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf. • For PM_{10} and $PM_{2.5}$ EF, apply engineering judgement to estimate that (a) PM_{10} emissions are one-half PM emissions and (b) $PM_{2.5}$ emissions are one-half PM_{10} emissions.
14	See Equation 1 on page 13.2.1-4 of Chapter 13.2.1 of AP-42, January 2011 at http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf
15	See Equation 1a on page 13.2.2-4 of Chapter 13.2.2 of AP-42, November 2006 at http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.pdf

EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, December 2012

This spreadsheet calculates and compiles volatile organic compound (VOC) and hazardous air pollutant (HAP) emission factors (EF) in units of pounds of pollutant per thousand board feet of lumber dried (lb/mbf) that are preferred by EPA Region 10 for estimating emissions from lumber drying kilns. The EFs are based on actual lab-scale emission test data when available; when not available, EFs for similar species are substituted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

A summary of the EFs for each species of wood is included on this sheet. The sheets that follow present the original test data as well as the calculations for creating each EF. There are two sheets per lumber species: one for HAPs and one for VOCs. To assure adequate conservatism for use in applicability determinations and compliance assurance applications, the EFs represent the 90th percentile of the data when three or more test values are available and the maximum test value of the data when less than three test values are available.

Species	Maximum Kiln Temperature (°F)	WPP1 VOC[1] (lb/mbf)	Total HAP (lb/mbf)	Methanol[2] (lb/mbf)	Formaldehyde[2] (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
Non-Resinous Softwood Species								
White Fir[3]	≤200	0.8388	0.2107	0.1480	0.0034	0.0550	0.0018	0.0026
	>200	1.0902	0.4956	0.4200	0.0163			
Western Hemlock	≤200	0.5253	0.2921	0.1484	0.0016	0.1378	0.0018	0.0026
	>200	0.6615	0.3661	0.2196	0.0044			
Western Red Cedar	≤200	0.3631	0.2939	0.1484	0.0034	0.1378	0.0018	0.0026
	>200	1.1453	0.5784	0.4200	0.0163			
Resinous Softwood Species (Non-Pine Family)								
Douglas Fir	≤200	1.1576	0.1409	0.0690	0.0019	0.0682	0.0007	0.0011
	>200	1.6969	0.1913	0.1170	0.0043			
Engelmann Spruce	≤200	0.1775	0.0640	0.0250	0.0013	0.0360	0.0007	0.0010
	>200	0.2161	0.1201	0.0780	0.0044			
Larch	≤200	1.1576	0.1409	0.0690	0.0019	0.0682	0.0007	0.0011
	>200	1.6969	0.1914	0.1170	0.0044			
Resinous Softwood Species (Pine Family)								
Lodgepole Pine	≤200	1.5293	0.1125	0.0628		0.0420	0.0032	0.0045
	>200	1.5293	0.1166	0.0628	0.0041			
Ponderosa Pine	≤200	2.3450	0.1271	0.0740	0.0034	0.0420	0.0032	0.0045
	>200	3.8087	0.2029	0.1440	0.0092			
Western White Pine	≤200	2.8505	0.1271	0.0740	0.0034	0.0420	0.0032	0.0045
	>200	3.8087	0.2029	0.1440	0.0092			

[1] VOC emissions have been approximated consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC). Employing WPP1 VOC underestimates emissions when the mass-to-carbon ratio of unidentified VOC exceeds that of propane. Ethanol and acetic acid are examples of compounds that contribute to lumber drying VOC emissions (for some species more than others), and both have mass-to-carbon ratios exceeding that of propane.

[2] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

[3] White fir in this context refers to any one of several species of true fir grown in the West. The collection of timber commonly referred to as "white fir" includes the following species: white fir, grand fir, noble fir and subalpine fir.

Hazardous Air Pollutant Emission Factors for Drying White Fir Lumber

This sheet presents lab-scale test data and calculations used to create HAP EF for drying any one of several species of true fir grown in the West commonly referred to as "white fir." True fir includes the following species: white fir, grand fir, noble fir and subalpine fir; all classified in the same Abies genus. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Step One: Compile White Fir HAP Emission Test Data by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial / Final)	Time to Final Moisture Content (hours)	HAP Sample Collection Technique	Reference
180	0.096	0.0022	no data	no data	no data	2x6	122.0 / 15	42.6	NCASI Method IM/CAN/WP-99.01 without cannisters.	3, 4, 5, 12, 14
180	0.148	0.0034	no data	no data	no data	2x6	133.2 / 15	46.9		
225	no data	no data	0.0550	no data	no data	2x4	170 / 13	54	Dinitrophenylhydrazine coated cartridges.	7
240	0.42	0.0156	no data	no data	no data	2x6	126.3 / 15	24	NCASI chilled impinger method.	5
240	0.419	0.0163	no data	no data	no data	2x6	119.0 / 15	24		

[1] Yellow highlight denotes data not considered by EPA Region 10 in 2007 when providing notice of original EFs prior to initial PCWP (Plywood and Composite Wood Products) MACT compliance date.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate White Fir HAP Emission Factors Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde[2] (lb/mbf)	Acrolein[2] (lb/mbf)
≤ 200°F	0.1480	0.0034	0.0550	0.0018	0.0026
> 200°F	0.4200	0.0163			

[1] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

[2] In the absence of white fir test data for propionaldehyde and acrolein, western hemlock test data has been substituted. The two wood species are similar in that both are non-resinous softwood species in the scientific classification family Pinaceae. See western hemlock HAP sheet for lab-scale test data and calculations.

Volatile Organic Compound Emission Factors for Drying White Fir Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying any one of several species of true fir grown in the West commonly referred to as "white fir." True fir includes the following species: white fir, grand fir, noble fir and subalpine fir; all classified in the same Abies genus. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile White Fir VOC Emission Test Data by Drying Temperature

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[1] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
180	0.26	2x6	106.3 / 15	36.6	JUM 3-200	3, 4
180	0.27	2x6	113.6 / 15	43.2		
180	0.22	2x6	122.0 / 15	42.6	JUM 3-200	3, 4, 5, 12
180	0.25	2x6	133.2 / 15	46.9		
190	0.63	2x4	138.1 / 15	70	JUM VE-7	2
190	0.50	2x4	138.1 / 15	75		
200	0.53	2x4	96.1 / 15	47		
225	0.39	2x4	170 / 13	54	JUM VE-7	7
240	0.62	2x6	126.3 / 15	25	JUM 3-200	5
240	0.6	2x6	119.0 / 15	25		

[1] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate White Fir VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	0.5700
> 200°F	0.6160

[1] Because VOC emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Step Three: Compile White Fir Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.1480	0.0034	0.0550	0.0018	0.0026
> 200°F	0.4200	0.0163			

[1] See white fir HAP sheet for lab-scale test data and calculations.

Step Four: Convert White Fir Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0399	0	0.0150	0.0007	0.0011	SUM ⇨	0.0567
> 200°F	0.1134	0					0.1302

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from White Fir VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR		Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	Propane Mass Conversion Factor	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS ⇨	Speciated Compounds as Carbon (lb/mbf)	EQUALS ⇨			
≤ 200°F	0.5700		0.0567		0.5133	X 1.2238 =	0.6281
> 200°F	0.6160		0.1302		0.4858		0.5946

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to White Fir VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE		FROM STEP THREE						
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)	PLUS	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	EQUALS	WPP1 VOC (lb/mbf)
≤ 200°F	0.6281	⇨	0.1480	0.0034	0.0550	0.0018	0.0026	⇨	0.8388
> 200°F	0.5946		0.4200	0.0163					1.0902

Hazardous Air Pollutant Emission Factors for Western Hemlock Lumber

This sheet presents lab-scale test data and calculations used to create HAP EF for drying western hemlock lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Step One: Compile Western Hemlock HAP Emission Test Data by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial / Final)	Time to Final Moisture Content (hours)	HAP Sample Collection Technique	Reference
180	0.083	0.0013	no data	no data	no data	2x4	102.3 / 14.7	49.5	NCASI Method 98.01	14, 15
180	0.075	0.0014	0.078	0.002	0.0012	2x4	102.3 / 14.7	49.5	NCASI Method 105	14, 15, 18
180	0.094	0.0015	0.141	0.0008	0.0012	2x4 or 2x6	93.5 / 17.5	no data	NCASI Method 105	18
180	0.052	0.0007	no data	no data	no data	2x4	88.8 / 15	46.2	NCASI Method CI//WP-98.01	13
180	0.0312	0.00082	no data	no data	no data	2x4	56.8 / 15	38.35	NCASI Method CI//WP-98.01	8, 11, 14
180	0.0304	0.00082	no data	no data	no data	2x4	51.1 / 15	35.75		
200	0.098	0.0015	no data	no data	no data	2x6	81.0 / 15	45.2	NCASI Method CI//WP-98.01	11, 14
200	0.175	0.0016	no data	no data	no data	2x6	73.7 / 15	36.5		
200	0.154	0.0018	no data	no data	no data	2x6	100.1 / 15	47.4		
200	0.044	0.0008	0.133	0.0008	0.0024	2x4 or 2x6	83.9 / 15.0	no data	NCASI Method 105	14, 18
200	0.077	0.0014	0.128	0.001	0.0011	2x4 or 2x6	98.6 / 15.0	no data		
200	0.057	0.0014	no data	no data	no data	2x4	76.0 / 15	30.25	NCASI Method CI//WP-98.01	9, 11, 14
215	0.138	0.0043	no data	no data	0.0027	2x4	119.7 / 15	38	no data	6, 11, 14
225	0.189	0.0035	no data	no data		2x6	82 / 15	31.3	NCASI Method CI//WP-98.01	11, 14
225	0.167	0.0034	no data	no data	no data	2x6	77.4 / 15	28.6		
225	0.24	0.004	no data	no data	no data	2x6	101.7 / 15	33.5		
235	0.187	0.0045	0.084	0.0014	0.0019	2x4 or 2x6	76.2 / 15.0	no data	NCASI Method 105	18

[1] Yellow highlight denotes data not considered by EPA Region 10 in 2007 when providing notice of original EFs prior to initial PCWP (Plywood and Composite Wood Products) MACT compliance date.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Western Hemlock HAP Emission Factors Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.1484	0.0016	0.1378	0.0018	0.0026
> 200°F	0.2196	0.0044			

[1] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Drying Western Hemlock Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying western hemlock lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile Western Hemlock VOC Emission Test Data by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
180	~~0.73~~	2x6	126.6 / 15	66.5	no data	11
180	~~0.66~~	2x6	139.3 / 15	67.9		
180	~~0.6~~	2x6	127.8 / 15	65.7		
180	~~0.67~~	2x6	132.7 / 15	67		
180	0.17	2x4	114.8 / 15	45	no data	11
180	0.07	2x4	103.1 / 15	40.7		
180	0.12	2x4	98.0 / 15	37.5		
180	0.4	2x4	115.7 / 15	52.9		
180	0.236	2x4 or 2x6	93.5 / 17.5	no data	JUM VE-7	18
180	0.142	2x4	102.3 / 14.7	49.5	JUM VE-7	15, 18
180	0.18	2x4	88.8 / 15	46.2	JUM VE-7	13
180	0.198	2x4	56.8 / 15	38.35		8, 11
180	0.122	2x4	51.1 / 15	35.75		
200	0.24	2x4	112.8 / 15	40	JUM VE-7	2
200	0.2	2x6	81.0 / 15	45.2	no data	11
200	0.15	2x6	73.7 / 15	36.5		
200	0.3	2x6	100.1 / 15	47.4		
200	0.204	2x4	76.0 / 15	30.25	JUM 3-200	9, 11
200	0.214	2x4 or 2x6	83.9 / 15.0	no data	JUM VE-7	18
200	0.239	2x4 or 2x6	98.6 / 15.0	no data		
215	0.34	2x4	112.9 / 15	32.7	no data	11
215	0.34	2x4	119.7 / 15	38	JUM 3-200	6, 11
225	0.28	2x6	82 / 15	31.3	no data	11
225	0.27	2x6	77.4 / 15	28.6		
225	0.31	2x6	101.7 / 15	33.5		
235	0.247	2x4 or 2x6	81.6 / 15.0	no data	JUM VE-7	18
235	0.226	2x4 or 2x6	76.2 / 15.0	no data		

[1] Blue highlight denotes data not considered by EPA Region 10 in 2012. The four test runs not considered here were obtained from a single "sample" and appeared to use a much longer drying cycle than would be in common use in the Pacific Northwest. Therefore, these highlighted values were not used in the EF derivation.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Western Hemlock VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	0.2700
> 200°F	0.3400

[1] Because VOC emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Step Three: Compile Western Hemlock Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.1484	0.0016	0.1378	0.0018	0.0026
> 200°F	0.2196	0.0044			

[1] See western hemlock HAP sheet for lab-scale test data and calculations.

Step Four: Convert Western Hemlock Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0401	0	0.0376	0.0007	0.0011	SUM ⇨	0.0794
> 200°F	0.0593	0					0.0986

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Western Hemlock VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR			Propane Mass Conversion Factor	
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS	Speciated Compounds as Carbon (lb/mbf)	EQUALS	Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	X 1.2238 =	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
≤ 200°F	0.2700		0.0794		0.1906		0.2332
> 200°F	0.3400		0.0986		0.2414		0.2954

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Western Hemlock VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE		FROM STEP THREE						
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)	PLUS	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	EQUALS	WPP1 VOC (lb/mbf)
≤ 200°F	0.2332		0.1484	0.0016	0.1378	0.0018	0.0026		0.5253
> 200°F	0.2954		0.2196	0.0044					0.6615

Hazardous Air Pollutant Emission Factors for Drying Western Red Cedar Lumber

This sheet presents the HAP EF for drying western red cedar lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. EPA Region 10 is not aware of any HAP emission testing of western red cedar. Consistent with other species, when actual test data is not available, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Western Red Cedar HAP Emission Factors[1]

Maximum Dry Bulb Temperature[2] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.1484	0.0034	0.1378	0.0018	0.0026
> 200°F	0.4200	0.0163			

[1] In the absence of western red cedar test data, white fir test data has been substituted for methanol and high-temperature formaldehyde and western hemlock test data has been substituted for acetaldehyde, propionaldehyde, acrolein and low-temperature formaldehyde. Western red cedar is similar to white fir and western hemlock in that all three species are non-resinous softwood species in the scientific classification order Pinales. See the white fir and western hemlock HAP sheets for lab-scale test data and calculations.

[2] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature in other species (no observations for western red cedar), separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Western Red Cedar Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying western red cedar. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile Western Red Cedar VOC Emission Test Data by Drying Temperature

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[1] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
160	0.096	1x4	33.3 / 15	21	JUM VE-7	2
160	0.136	1x4	44.9 / 15	18		
> 200°F	no data					

[1] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Western Red Cedar VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data [1]

Maximum Dry Bulb Temperature[2] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	0.1360
> 200°F	0.6160

[1] In the absence of western red cedar test data for high-temperature drying, white fir test data has been substituted. Western red cedar, white fir and western hemlock are similar in that all three are non-resinous softwood species in the scientific classification order Pinales. See the white fir and western hemlock VOC sheets for lab-scale test data and calculations.

[2] Because VOC emissions appear to be dependent upon drying temperature in other species (no observed high-temperature observations for western red cedar), separate values are calculated for low and high-temperature drying.

Step Three: Compile Western Red Cedar Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data [1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.1484	0.0034	0.1378	0.0018	0.0026
> 200°F	0.4200	0.0163			

[1] See western red cedar HAP sheet for lab-scale test data and calculations.

Step Four: Convert Western Red Cedar Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0401	0	0.0376	0.0007	0.0011	SUM ⇨	0.0794
> 200°F	0.1134	0					0.1527

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Western Red Cedar VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR		Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	Propane Mass Conversion Factor	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS ⇨	Speciated Compounds as Carbon (lb/mbf)	EQUALS ⇨			
≤ 200°F	0.1360		0.0794		0.0566	X 1.2238 =	0.0692
> 200°F	0.6160		0.1527		0.4633		0.5669

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Western Red Cedar VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE	PLUS	FROM STEP THREE					EQUALS	
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)		Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)		WPP1 VOC (lb/mbf)
≤ 200°F	0.0692		0.1484	0.0034	0.1378	0.0018	0.0026		0.3631
> 200°F	0.5669		0.4200	0.0163					1.1453

Hazardous Air Pollutant Emission Factors for Drying Douglas Fir Lumber

This sheet presents lab-scale test data and calculations used to create HAP EF for drying douglas fir lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Step One: Compile Douglas Fir HAP Emission Test Data by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial / Final)	Time to Final Moisture Content (hours)	HAP Sample Collection Technique	Reference
160	0.025	0.0008	no data	no data	no data	2x6	37.3 / 15	23.5	NCASI Method IM/CAN/WP-99.01 without cannisters.	3, 4, 12, 14
160	0.023	0.0008	no data	no data	no data	2x6	44.9 / 15	28.5		
160	0.026	0.0017	no data	no data	no data	2x6	40.3 / 15	27.1		
160	0.018	0.0011	no data	no data	no data	2x6	31.9 / 15	25.2		
170	0.015	0.0005	no data	no data	no data	2x4	79.9 / 15	40.5	NCASI Method CI//WP-	13
170	0.026	0.0008	no data	no data	no data	2x4	56.9 / 15	27.5	NCASI Method 98.01	15
170	0.024	0.0008	0.03	0.0004	0.0005	2x4	56.9 / 15	27.5	NCASI Method 105	15, 18
180	0.050	0.0023	0.050	0.0005	0.0009	2x4	43.7 / 15	48	NCASI Method 105	18, 22
180	0.084	0.0019	0.061	0.0003	0.0007	4x4	44.7 / 15	111	NCASI Method 105	19
200	0.068	0.0018	0.043	0.0005	0.0009	2x4	64.3 / 15	60	NCASI Method 105	14, 18, 22
200	0.069	0.0019	0.071	0.0006	0.0004	2x4	59.5 / 15	56		
220	no data	no data	0.030	no data	no data	2x4	73 / 12	46	Dinitrophenylhydrazine coated cartridges.	7
220	no data	no data	0.022	no data	no data	2x4	73 / 15	46		
235	0.117	0.0043	0.067	0.0008		2x4 or 2x6	47.7 / 15	19	NCASI Method 105	18, 21

[1] Yellow highlight denotes data not considered by EPA Region 10 in 2007 when providing notice of original EFs prior to initial PCWP (Plywood and Composite Wood Products) MACT compliance date.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Douglas Fir HAP Emission Factors Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0690	0.0019	0.0682	0.0007	0.0009
> 200°F	0.1170	0.0043			

[1] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Drying Douglas Fir Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying douglas fir lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile Douglas Fir VOC Emission Test Data by Drying Temperature

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[1] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
160	0.51	2x6	37.3 / 15	23.5	JUM 3-200	3, 4, 12
160	0.55	2x6	44.9 / 15	28.5		
160	0.45	2x6	40.3 / 15	27.1		
160	0.46	2x6	31.9 / 15	25.2		
170	0.65	2x4	79.9 / 15	40.5	JUM VE-7	13
170	0.24	2x4	56.9 / 15	27.5	JUM VE-7	15, 18
180	0.942	2x4	38.9 / 15	63	JUM VE-7	2
180	0.669	2x4	44.9 / 15	42		
180	0.21	2x4	56.3 / 15	27		
180	0.575	2x4 or 2x6	43.7 / 15	no data	JUM VE-7	18
180	0.39	4x4	29.8 / 19	67.5	JUM 3-200	10
180	0.845	4x4	44.7 / 15	111		19
200	0.707	2x4 or 2x6	64.3 / 15	no data	JUM VE-7	18
200	0.879	2x4 or 2x6	59.5 / 15	no data		
220	1.2	2x4	73 / 12	46	JUM VE-7	7
220	1.3	2x4	73 / 15	46		
235	1.206	2x4 or 2x6	47.7 / 15	19	JUM VE-7	18, 21

[1] Dry basis. Moisture content = (weight of water / weight wood) x 100.

Step Two: Calculate Douglas Fir VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	0.8688
> 200°F	1.2812

[1] Because VOC emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Step Three: Compile Douglas Fir Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data [1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0690	0.0019	0.0682	0.0007	0.0009
> 200°F	0.1170	0.0043			

[1] See douglas fir HAP sheet for lab-scale test data and calculations.

Step Four: Convert Douglas Fir Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0186	0	0.0186	0.0003	0.0004	SUM ⇨	0.0379
> 200°F	0.0316	0					0.0508

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Douglas Fir VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR			Propane Mass Conversion Factor	
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS	Speciated Compounds as Carbon (lb/mbf)	EQUALS	Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	X 1.2238 =	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
≤ 200°F	0.8688		0.0379		0.8309		1.0169
> 200°F	1.2812		0.0508		1.2304		1.5057

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Douglas Fir VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE		FROM STEP THREE						
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)	PLUS	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	EQUALS	WPP1 VOC (lb/mbf)
≤ 200°F	1.0169		0.0690	0.0019	0.0682	0.0007	0.0009		1.1576
> 200°F	1.5057		0.1170	0.0043					1.6968

Hazardous Air Pollutant Emission Factors for Engelmann Spruce Lumber

This sheet presents the HAP EF for drying engelmann spruce lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. EPA is not aware of any HAP emission testing of englemann spruce. Consistent with other species, when actual test data is not available, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Step One: Compile HAP Emission Test Data for Similar Species (White Spruce) by Drying Temperature[1,2]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	Lumber Dimensions	Moisture Content[3] (%) (Initial / Final)	Time to Final Moisture Content (hours)	HAP Sample Collection Technique	Reference
180	0.025	0.0013	0.036	0.0003	0.0005	2x4 or 2x6	33.5 / 15	no data	NCASI Method 105	18
235	0.078	0.0044	0.031	0.0007	0.001	2x4 or 2x6	32.7 / 15	no data		

[1] In the absence of engelmann spruce test data, white spruce test data has been substituted. The two wood species are similar in that both are resinous softwood species in the scientific classification genus Picea.

[2] Yellow highlight denotes data not considered by EPA Region 10 in 2007 when providing notice of original EFs prior to initial PCWP (Plywood and Composite Wood Products) MACT compliance date.

[3] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Engelmann Spruce HAP Emission Factors Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0250	0.0013	0.0360	0.0007	0.0010
> 200°F	0.0780	0.0044			

[1] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Drying Engelmann Spruce Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for engelmann spruce lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile VOC Emission Test Data for Similar Species (White Spruce) by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
≤ 200°F	no data					
235	0.11	2x4 or 2x6	32.7 / 15	no data	JUM VE-7	18

[1] In the absence of engelmann spruce test data, white spruce test data has been substituted. The two wood species are similar in that both are resinous softwood species in the scientific classification genus Picea.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Engelmann Spruce VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature[2] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	0.1100
> 200°F	0.1100

[1] In the absence of white spruce test data for low-temperature drying, high-temperature test data has been substituted.

[2] Because VOC emissions appear to be dependent upon drying temperature in other species (no observed low-temperature observations for white spruce), separate values are calculated for low and high-temperature drying.

Step Three: Compile Engelmann Spruce Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0250	0.0013	0.0360	0.0007	0.0010
> 200°F	0.0780	0.0044			

[1] See engelmann spruce HAP sheet for lab-scale test data and calculations.

Step Four: Convert Engelmann Spruce Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0067	0	0.0098	0.0003	0.0004	SUM ⇨	0.0173
> 200°F	0.0211	0					0.0316

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Engelmann Spruce VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR		Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	Propane Mass Conversion Factor	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)				
≤ 200°F	0.1100	MINUS ⇨	0.0173	EQUALS ⇨	0.0927	X 1.2238 =	0.1135
> 200°F	0.1100		0.0316		0.0784		0.0960

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Engelmann Spruce VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE	PLUS	FROM STEP THREE					EQUALS	
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)		Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)		WPP1 VOC (lb/mbf)
≤ 200°F	0.1135		0.0250	0.0013	0.0360	0.0007	0.0010		0.1775
> 200°F	0.0960		0.0780	0.0044					0.2161

Hazardous Air Pollutant Emission Factors for Drying Larch Lumber

This sheet presents the HAP EF for drying larch lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. EPA Region 10 is not aware of any HAP emission testing of larch. Consistent with other species, when actual test data is not available, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Larch HAP Emission Factors[1]

Maximum Dry Bulb Temperature[2] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0690	0.0019	0.0682	0.0007	0.0010
> 200°F	0.1170	0.0044			

[1] In the absence of larch test data, douglas fir test data has been substituted for methanol, acetaldehyde, propionaldehyde, acrolein and low-temperature formaldehyde while white spruce test data has been substituted for high-temperature formaldehyde. Larch is similar to douglas fir, engelmann spruce, white spruce, lodgepole pine, ponderosa pine and western white pine in that all seven species are resinous softwood species in the scientific classification order Pinaceae, but larch does not share a common genus with any of these species. It appears to be most similar to douglas fir, engelmann spruce and white spruce in that the four species have small, sparse resin canals as opposed to the large numerous resin canals of the pines. See hhtp://www.faculty.sfasu.edu/mcbroommatth/lectures/wood_science/lab_2_resin_canal_species.pdf. See the douglas fir and englemann spruce HAP sheets for lab-scale test data and calculations.

[2] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature in other species (no observations for larch), separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Drying Larch Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying larch lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Larch WPP1 VOC Emission Factors[1]

Maximum Dry Bulb Temperature[2] (°F)	WPP1 VOC (lb/mbf)
≤200	1.1576
>200	1.6968

[1] In the absence of larch test data, douglas fir test data has been substituted. Larch is similar to douglas fir, engelmann spruce, white spruce, lodgepole pine, ponderosa pine and western white pine in that all seven species are resinous softwood species in the scientific classification order Pinaceae, but larch does not share a common genus with any of these species. It appears to be most similar to douglas fir, engelmann spruce and white spruce in that the four species have small, sparse resin canals as opposed to the large numerous resin canals of the pines. See hhtp://www.faculty.sfasu.edu/mcbroommatth/lectures/wood_science/lab_2_resin_canal_species.pdf. See the douglas fir and englemann spruce VOC sheets for lab-scale test data and calculations.

[2] Because VOC emissions appear to be dependent upon drying temperature in other species (no observations for larch), separate values are calculated for low and high-temperature drying.

Hazardous Air Pollutant Emission Factors for Drying Lodgepole Pine Lumber

This sheet presents lab-scale test data and calculations used to create HAP EF for drying lodgepole pine lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Step One: Compile Lodgepole Pine HAP Emission Test Data by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial / Final)	Time to Final Moisture Content (hours)	HAP Sample Collection Technique	Reference
195	~~0.073~~	~~no data~~	~~0.012~~	~~no data~~	~~no data~~	no data	no data	no data	no data	14
195	~~0.092~~	~~no data~~	~~no data~~	~~no data~~	~~no data~~	no data	no data	no data	no data	
195	~~0.064~~	~~no data~~	~~no data~~	~~no data~~	~~no data~~	no data	no data	no data	no data	
195	~~0.028~~	~~no data~~	~~no data~~	~~no data~~	~~no data~~	no data	no data	no data	no data	
195	~~0.02~~	~~no data~~	~~no data~~	~~no data~~	~~no data~~	no data	no data	no data	no data	
≤ 200°F	no data									
236	0.063	0.0041	no data	no data	no data	2x4	59.1 / 15	16	NCASI Method IM/CAN/WP-99.01 without cannisters.	3, 4, 12, 14
237	0.062	0.0041	no data	no data	no data	2x4	59.7 / 15	16.6		
238	0.056	0.0039	no data	no data	no data	2x4	56.9 / 15	16		

[1] Blue highlight denotes data not considered by EPA Region 10 in 2012. Five test runs considered by EPA Region 10 in 2007 are not considered here due to lack of documentation. The omitted test values are presented in Oregon Department of Environmental Quality memorandum May 8, 2007 entitled, "Title III Implications of Drying Kiln Source Test Results." The memorandum lists "Forintec #1, #2 and #5" along with "OSU QA # 1 and #2 " as the test data sources.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Lodgepole Pine HAP Emission Factors Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Methanol[2] (lb/mbf)	Formaldehyde[2] (lb/mbf)	Acetaldehyde[3] (lb/mbf)	Propionaldehyde[3] (lb/mbf)	(lb/mbf)
≤ 200°F	0.0628	0.0041	0.0420	0.0032	0.0045
> 200°F	0.0628	0.0041			

[1] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature in other species (no confirmed low-temperature observations for lodgepole pine), separate values are calculated for low and high-temperature drying.

[2] In the absence of lodgepole pine test data for low-temperature drying, high-temperature test data has been substituted.

[3] In the absence of lodgepole pine test data for acetaldeyde, propionaldehyde and acrolein, ponderosa pine test data has been substituted. Lodgepole pine, ponderosa pine and western white pine are similar in that all three are resinous softwood species in the scientific classification genus Pinus. See the ponderosa pine and western white pine HAP sheets for lab-scale test data and calculations.

Volatile Organic Compound Emission Factors for Drying Lodgepole Pine Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying lodgepole pine lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile Lodgepole Pine VOC Emission Test Data by Drying Temperature

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[1] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
≤ 200°F	no data					
236	1.17	2x4	59.1 / 15	16.01	JUM 3-200	3, 4, 12
238	0.87	2x4	56.9 / 15	16.01		
240	1.19	2x4	64.9 / 15	16.81		

[1] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Lodgepole Pine VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data [1]

Maximum Dry Bulb Temperature[2] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	1.1860
> 200°F	1.1860

[1] In the absence of lodgepole pine test data for low-temperature drying, high-temperature test data has been substituted.

[2] Because VOC emissions appear to be dependent upon drying temperature in other species (no observed low-temperature observations for lodgepole pine), separate values are calculated for low and high-temperature drying.

Step Three: Compile Lodgepole Pine Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data [1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0628	0.0041	0.0420	0.0032	0.0045
> 200°F	0.0628	0.0041			

[1] See lodgepole pine HAP sheet for lab-scale test data and calculations.

Step Four: Convert Lodgepole Pine Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0169	0	0.0115	0.0013	0.0019	SUM ⇨	0.0316
> 200°F	0.0169	0					0.0316

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Lodgepole Pine VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR		Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	Propane Mass Conversion Factor	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS ⇨	Speciated Compounds as Carbon (lb/mbf)	EQUALS ⇨			
≤ 200°F	1.1860		0.0316		1.1544	X 1.2238 =	1.4127
> 200°F	1.1860		0.0316		1.1544		1.4127

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Lodgepole Pine VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE		FROM STEP THREE						
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)	PLUS	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	EQUALS	WPP1 VOC (lb/mbf)
≤ 200°F	1.4127		0.0628	0.0041	0.0420	0.0032	0.0045		1.5293
> 200°F	1.4127		0.0628	0.0041					1.5293

Hazardous Air Pollutant Emission Factors for Drying Ponderosa Pine Lumber

This sheet presents lab-scale test data and calculations used to create HAP EF for drying ponderosa pine lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Step One: Compile Ponderosa Pine HAP Emission Test Data by Drying Temperature[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)	Lumber Dimensions	Moisture Content[2] (%) (Initial / Final)	Time to Final Moisture Content (hours)	HAP Sample Collection Technique	Reference
170	0.035	0.0027	0.042	0.0019	0.0017	2x4	82.6 / 15	42	NCASI Method 105	17, 18
176	0.05	0.0022	no data	no data	no data	2x10 & 2x12	107.1 / 12	55	NCASI Method IM/CAN/WP-99.01 without cannisters	3, 4, 12, 14
176	0.08	0.0036	no data	no data	no data	2x10 & 2x12	124.1 / 12	57		
235	0.144	0.0092	0.028	0.0032	0.0045	2x4 or 2x6	89.1 / 15	19	NCASI Method 105	18, 21

[1] Yellow highlight denotes data not considered by EPA Region 10 in 2007 when providing notice of original EFs prior to initial PCWP (Plywood and Composite Wood Products) MACT compliance date.

[2] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Ponderosa Pine HAP Emission Factors Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0740	0.0034	0.0420	0.0032	0.0045
> 200°F	0.1440	0.0092			

[1] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Drying Ponderosa Pine Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying ponderosa pine lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile Ponderosa Pine VOC Emission Test Data by Drying Temperature

Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	Lumber Dimensions	Moisture Content[1] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
170	1.59	2x4	82.6 / 15	42	JUM VE-7	17, 18
170	1.795	1x4	112.8 / 15	29	JUM VE-7	2
170	1.925	1x4	88.7 / 15	28		
176	1.29	2x10 & 2x12	107.1 / 12	55	JUM 3-200	3, 4, 12
176	1.54	2x10 & 2x12	124.1 / 12	57		
176	1.40	2x10 & 2x12	114.8 / 12	58.5	JUM 3-200	3, 4
176	1.30	2x10 & 2x12	93.0 / 12	57.1		
235	3.00	2x4 or 2x6	89.1 / 15	19	JUM VE-7	18, 21

[1] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Ponderosa Pine VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data

Maximum Dry Bulb Temperature[1] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	1.8470
> 200°F	3.0000

[1] Because VOC emissions appear to be dependent upon drying temperature, separate values are calculated for low and high-temperature drying.

Step Three: Compile Ponderosa Pine Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0740	0.0034	0.0420	0.0032	0.0045
> 200°F	0.1440	0.0092			

[1] See ponderosa pine HAP sheet for lab-scale test data and calculations.

Step Four: Convert Ponderosa Pine Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0200	0	0.0115	0.0013	0.0019	SUM ⇨	0.0346
> 200°F	0.0389	0					0.0535

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Ponderosa Pine VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR		Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	Propane Mass Conversion Factor	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS ⇨	Speciated Compounds as Carbon (lb/mbf)	EQUALS ⇨			
≤ 200°F	1.8470		0.0346		1.8124	X 1.2238 =	2.2179
> 200°F	3.0000		0.0535		2.9465		3.6058

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Ponderosa Pine VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE	PLUS	FROM STEP THREE					EQUALS	
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)		Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)		WPP1 VOC (lb/mbf)
≤ 200°F	2.2179	⇨	0.0740	0.0034	0.0420	0.0032	0.0045	⇨	2.3450
> 200°F	3.6058		0.1440	0.0092					3.8087

Hazardous Air Pollutant Emission Factors for Drying Western White Pine Lumber

This sheet presents the HAP EF for drying western white pine lumber. The EFs are based on the 90th percentile value of actual lab-scale HAP test data when three or more data points are available and on the maximum value when less than three data points are available. EPA Region 10 is not aware of any HAP emission testing of western white pine. Consistent with other species, when actual test data is not available, data for a similar species is substituted as noted. When there are more than one similar species, the highest of the EF for the similar species is substituted.

Western White Pine HAP Emission Factors[1]

Maximum Dry Bulb Temperature[2] (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0740	0.0034	0.0420	0.0032	0.0045
> 200°F	0.1440	0.0092			

[1] In the absence of western white pine test data, ponderosa pine test data has been substituted for all HAP. Western white pine is similar to ponderosa pine and lodgepole pine in that all three species are resinous softwood species in the scientific classification genus Pinus. See the ponderosa pine and lodgepole pine HAP sheets for lab-scale test data and calculations.

[2] Because methanol and formaldehyde emissions appear to be dependent upon drying temperature in other species (no observations for western white pine), separate values are calculated for low and high-temperature drying.

Volatile Organic Compound Emission Factors for Drying Western White Pine Lumber

This sheet presents lab-scale VOC and HAP test data and calculations used to create VOC EF for drying western white pine lumber. The VOC test method used (EPA Reference Method 25A) has some limitations in that it misses some HAP (or portions of HAP) compounds that are VOC and known to exist and reports the results "as carbon" which only accounts for the carbon portion of each compound measured. The missed HAP compounds are accounted for through separate testing. The VOC test data is adjusted to fully account for five known HAPs that are VOC using separate HAP (speciated) test data and is reported "as propane" to better represent all of the unspeciated VOC compounds. This technique is consistent with EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 (WPP1 VOC) except that the VOC results are adjusted to account for not only methanol and formaldehyde but also acetaldehyde, propionaldehyde and acrolein.

Specifically, EFs are calculated from the VOC and HAP test data based on the 90th percentile value of actual lab-scale test data when three or more data points are available and on the maximum value when less than three data points are available. When actual test data is not available for this wood species, data for a similar species is substituted. When there are more than one similar species, the highest of the EF for the similar species is substituted. That portion of the (speciated) HAP compounds that are measured by the VOC test method (based on known flame ionization detector response factors) is subtracted from the VOC EF. The remaining "unspeciated" VOC EF is adjusted to represent propane rather than carbon and then added to the speciated HAP EF to provide the "total" VOC EF.

Note that reporting the unspeciated VOC as propane (mass-to-carbon ratio of 1.22 and a response factor of 1) may underestimate the actual mass of VOC for certain wood species because VOC compounds like ethanol and acetic acid with higher mass-to-carbon ratios (1.92 and 2.5, respectively) and lower response factors (0.66 and 0.575, respectively) can be a significant portion of the total VOC. Without reliable test data for such compounds, EPA assumes propane adequately represents the mix of unspeciated VOC.

Step One: Compile Western White Pine VOC Emission Test Data by Drying Temperature

Max Dry Bulb Temperature,°F	Method 25A VOC as Carbon, lb/mbf	Lumber Dimension	Moisture Content[1] (%) (Initial/Final)	Time to Final Moisture Content (hours)	Method 25A Analyzer	Reference
170	2.26	1x4	117.4 / 15	44	JUM VE-7	2
> 200°F	no data					

[1] Dry basis. Moisture content = (weight of water / weight wood) x 100

Step Two: Calculate Western White Pine VOC Emission Factors "as Carbon" Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature[2] (°F)	Method 25A VOC as Carbon (lb/mbf)
≤ 200°F	2.2600
> 200°F	3.0000

[1] In the absence of western white pine test data for high-temperature drying, ponderosa pine test data has been substituted. Western white pine, ponderosa pine and lodgepole pine are similar in that all three are resinous softwood species in the scientific classification genus Pinus. See the ponderosa pine and lodgepole pine sheets for lab-scale test data and calculations.

[2] Because VOC emissions appear to be dependent upon drying temperature in other species (no high-temperature observations for western white pine), separate values are calculated for low and high-temperature drying.

Step Three: Compile Western White Pine Speciated HAP Emission Factors Based on Maximum/90th Percentile Test Data[1]

Maximum Dry Bulb Temperature (°F)	Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
≤ 200°F	0.0740	0.0034	0.0420	0.0032	0.0045
> 200°F	0.1440	0.0092			

[1] See western white pine HAP sheet for lab-scale test data and calculations.

Step Four: Convert Western White Pine Speciated HAP Emission Factors to "as Carbon" and Total

Speciated Compound "X" expressed as carbon = (RF_X) X (SC_X) X $[(MW_C) / (MW_X)]$ X $[(\#C_X) / (\#C_C)]$

where: RF_X represents the flame ionization detector (FID) response factor (RF) for speciated compound "X"

SC_X represents emissions of speciated compound "X" expressed as the entire mass of compound emitted

MW_C equals "12.0110" representing the molecular weight (MW) for carbon as carbon is becoming the "basis" for expressing mass of speciated compound "X"

MW_X represents the molecular weight for speciated compound "X"

$\#C_X$ represents the number of carbon atoms in speciated compound "X"

$\#C_C$ equals "1" as the single carbon atom is becoming the "basis" for expressing mass of speciated compound "X"

Maximum Dry Bulb Temperature (°F)	Methanol as Carbon (lb/mbf)	Formaldehyde as Carbon (lb/mbf)	Acetaldehyde as Carbon (lb/mbf)	Propionaldehyde as Carbon (lb/mbf)	Acrolein as Carbon (lb/mbf)		Speciated Compounds as Carbon (lb/mbf)
≤ 200°F	0.0200	0	0.0115	0.0013	0.0019	SUM ⇨	0.0346
> 200°F	0.0389	0					0.0535

Element and Compound Information

Element / Compound	FID RF[1]	Molecular Weight (lb/lb-mol)	Formula	Number of Carbon Atoms	Number of Hydrogen Atoms	Number of Oxygen Atoms	Reference
Methanol	0.72	32.042	CH_40	1	4	1	1
Formaldehyde	0	30.0262	CH_2O	1	2	1	16
Acetaldehyde	0.5	44.053	C_2H_4O	2	4	1	20
Propionaldehyde	0.66	58.0798	C_3H_6O	3	6	1	20
Acrolein	0.66	56.064	C_3H_4O	3	4	1	20
Propane	1	44.0962	C_3H_8	3	8	0	16
Carbon	-	12.0110	C	1	-	-	-
Hydrogen	-	1.0079	H	-	1	-	-
Oxygen	-	15.9994	O	-	-	1	-

[1] FID RF = volumetric concentration or "instrument display" / compound's actual known concentration. Numerator and denominator expressed on same basis (ie. carbon, propane, etc) and concentration in units of "ppm."

Step Five: Subtract Speciated HAP Compounds from Western White Pine VOC Emission Factors and Convert Result to "as Propane"

	FROM STEP TWO		FROM STEP FOUR		Method 25A VOC as Carbon without Speciated Compounds (lb/mbf)	Propane Mass Conversion Factor	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Carbon (lb/mbf)	MINUS ⇨	Speciated Compounds as Carbon (lb/mbf)	EQUALS ⇨			
≤ 200°F	2.2600		0.0346		2.2254	X 1.2238 =	2.7233
> 200°F	3.0000		0.0535		2.9465		3.6058

Method 25A VOC as propane without speciated compounds = (VOC_C) X $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$

where: VOC_C represents Method 25A VOC as carbon without speciated compounds

RF_{C3H8} equals "1" and represents the FID RF for propane. All alkanes, including propane, have a RF of 1.

MW_{C3H8} equals "44.0962" and represents the molecular weight for propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

MW_C equals "12.0110" and represents the molecular weight for carbon

$\#C_C$ equals "1" as the single carbon atom was the "basis" for which Method 25A VOC test results were determined as illustrated in Step One of this spreadsheet

$\#C_{C3H8}$ equals "3" as three carbon atoms are present within propane; the compound that is the "basis" for expressing mass of VOC per WPP1 VOC

Note: The following portion from the equation immediately above, $(1/RF_{C3H8})$ X $[(MW_{C3H8}) / (MW_C)]$ X $[(\#C_C) / (\#C_{C3H8})]$, equals 1.2238 and can be referred to as the "propane mass conversion factor."

Step Six: Calculate WPP1 VOC by Adding Speciated HAP Compounds to Western White Pine VOC Emission Factors "as Propane"

WPP1 VOC = Method 25A VOC as propane without speciated compounds + ∑ speciated compounds expressed as the entire mass of compound

	FROM STEP FIVE
Maximum Dry Bulb Temperature (°F)	Method 25A VOC as Propane without Speciated Compounds (lb/mbf)
≤ 200°F	2.7233
> 200°F	3.6058

PLUS

FROM STEP THREE				
Methanol (lb/mbf)	Formaldehyde (lb/mbf)	Acetaldehyde (lb/mbf)	Propionaldehyde (lb/mbf)	Acrolein (lb/mbf)
0.0740	0.0034	0.0420	0.0032	0.0045
0.1440	0.0092			

EQUALS

WPP1 VOC (lb/mbf)
2.8505
3.8087

Index to References Appearing in
EPA Region 10 HAP and VOC Emission Factors for Lumber Drying, December 2012

Reference No. 1
(Undated) J.U.M. Flame Ionization Detector Response Factor Technical Information presented at http://www.jum-aerosol.com/images/E-Fakt-02.pdf

Notes
Methanol response factor (RF) of 0.72 equals average of three response factors 0.69, 0.68 and 0.79 for J.U.M. models 3-200 and VE-7. These two models were exclusively employed to determine Method 25A VOC in the testing EPA Region 10 is relying upon to support VOC emission factor derivation.

An alternative RF of 0.65 from Appendix 3 to EPA's Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 at http://www.epa.gov/ttn/emc/prelim/otm26.pdf could have been employed instead.

Employing RF of 0.72 (as opposed to 0.65) generates lower VOC emission factors (EF). A higher RF means that the EPA Method 25A flame ionization detector (FID) measures more of the compound. With the methanol EF having already been determined through speciated sampling and analysis, assuming the FID measures a greater portion of the methanol leaves less of the Method 25A measurement to be accounted for as unspeciated VOC.

Reference No. 2
National Council of the Paper Industry for Air and Stream Improvement, Inc. Technical Bulletin No. 718. July 1, 1996. A Small-Scale Kiln Study on Method 25A Measurements of Volatile Organic Compound Emissions from Lumber Drying.

Notes
To convert Method 25A VOC from "lb C/ODT" to "lb C/mbf," the following calculations were performed:

White Fir – Runs 15 and 16.
(0.85 lb/ODT) X (0.57 lb/mbf) / (0.77 lb/ODT) = 0.63 lb/mbf
(0.68 lb/ODT) X (0.57 lb/mbf) / (0.77 lb/ODT) = 0.50 lb/mbf
See pages 14 and 15 of the reference document.

Western Red Cedar – Runs 10 and 11.
(0.12 lb/ODT) X (0.12 lb/mbf) / (0.15 lb/ODT) = 0.096 lb/mbf
(0.17 lb/ODT) X (0.12 lb/mbf) / (0.15 lb/ODT) = 0.136 lb/mbf
See pages 14 and 15 of the reference document.

Douglas fir – Runs 1 and 3.
(1.00 lb/ODT) X (0.81 lb/mbf) / (0.86 lb/ODT) = 0.942
(0.71 lb/ODT) X (0.81 lb/mbf) / (0.86 lb/ODT) = 0.669
See pages 12 and 15 of the reference document.

Ponderosa Pine – Runs 5 and 6.
(1.92 lb/ODT) X (1.86 lb/mbf) / (1.99 lb/ODT) = 1.795 lb/mbf
(2.06 lb/ODT) X (1.86 lb/mbf) / (1.99 lb/ODT) = 1.925 lb/mbf
See pages 14 and 15 of the reference document.

The moisture content of wood was originally reported on a wet basis. It has been corrected to be on a dry basis using the following equation:
(moisture content on dry basis) = (moisture content on wet basis) / [1 – (moisture content on wet basis)]

Reference No. 3
Small-scale Kiln Study Utilizing Ponderosa Pine, Lodgepole Pine, White Fir, and Douglas-fir. Report by Michael R. Milota to Intermountain Forest Association. September 29, 2000.

Reference No. 4
Milota, Michael. VOC and HAP Emissions from Western Species. Western Dry Kiln Association: May 2001, p. 62-68.

Reference No. 5
Milota, M.R. 2003. HAP and VOC Emissions from White Fir Lumber Dried at High and Conventional Temperatures. Forest Prod. J. 53(3):60-64.

Reference No. 6
VOC and HAP Emissions from the High Temperature Drying of Hemlock Lumber. Report by Michael R. Milota to Hampton Affiliates. June 21, 2004.

Reference No. 7
Fritz, Brad. 2004. Pilot- and Full-Scale Measurements of VOC Emissions from Lumber Drying of Inland Northwest Species. Forest Prod. J. 54(7/8):50-56.

Notes
To convert acetaldehyde from "µg/min-bf" to "lb/mbf," the following calculations were performed:

White fir.
0.0550 lb/mbf = (7.7 µg/min-bf) X (60 min/hr) X (54 hr) X (kg/1x10^9g) X (2.205 lb/kg) X (1,000 bf/mbf).
See page 54 of the reference document.

Douglas fir.
0.030 lb/mbf = (4.9 µg/min-bf) X (60 min/hr) X (46 hr) X (kg/1x10^9g) X (2.205 lb/kg) X (1,000 bf/mbf).
0.022 lb/mbf = (3.6 µg/min-bf) X (60 min/hr) X (46 hr) X (kg/1x10^9g) X (2.205 lb/kg) X (1,000 bf/mbf).
See page 53 of the reference document.

Reference No. 8
VOC and Methanol Emissions from the Drying of Hemlock Lumber. Report by Michael R. Milota to Hampton Affiliates. August 24, 2004.

Reference No. 9
VOC, Methanol, and Formaldehyde Emissions from the Drying of Hemlock Lumber. Report by Michael R. Milota to Hampton Affiliates. October 15, 2004.

Reference No. 10
VOC Emissions from the Drying of Douglas-fir Lumber. Report by Michael R. Milota to Columbia Vista Corporation. June 14, 2005.

Reference No. 11
Milota, M.R. and P. Mosher. 2006. Emissions from Western Hemlock Lumber During Drying. Forest Prod. J. 56(5):66-70.

Reference No. 12
Milota, M.R. 2006. Hazardous Air Pollutant Emissions from Lumber Drying. Forest Prod. J. 56(7/8):79-84.

Reference No. 13
VOC, Methanol, and Formaldehyde Emissions from the Drying of Hemlock, ESLP, and Douglas Fir Lumber. Report by Michael R. Milota to Hampton Affiliates. March 23, 2007.

Reference No. 14
Oregon Department of Environmental Quality memorandum May 8, 2007 entitled, "Title III Implications of Drying Kiln Source Test Results."

Notes
The reference document presents a compilation of EF.

Reference No. 15
HAP Emissions from the Drying of Hemlock and Douglas-fir Lumber by NCASI 98.01 and 105. Report by Michael R. Milota to Hampton Affiliates. May 22, 2007 report.

Reference No. 16
EPA Interim VOC Measurement Protocol for the Wood Products Industry - July 2007 presented at http://www.epa.gov/ttn/emc/prelim/otm26.pdf

Notes
VOC determined through use of this document is referred to as WPP1 VOC. The document is alternatively known as EPA Other Test Method 26 or "OTM26."

Default formaldehyde RF of 0 and propane (an alkane) RF of 1 appear in Appendix 3 – Procedure for Response Factor Determination for the Interim VOC Measurement Protocol for the Wood Products Industry.

Reference No. 17
HAP Emissions by NCASI 98.01 and 105 from Drying of Ponderosa Pine and White Wood Lumber. Report by Michael R. Milota to Hampton Affiliates. July 25, 2007.

Reference No. 18
Milota, M.R. and P. Mosher. 2008. Emission of Hazardous Air Pollutants from Lumber Drying. Forest Prod. J. 58(7/8):50-55.

Reference No. 19
VOC Emissions From the Drying of Douglas-fir Lumber. Report by Michael R. Milota to Columbia Vista Corp. November 12, 2010.

Reference No. 20
NCASI Technical Bulletin No. 991. September 2011. Characterization, Measurement, and Reporting of Volatile Organic Compounds Emitted from Southern Pine Wood Products Sources.

Notes
Acetaldehyde and propionaldehyde RF appear in Table C-1 of Appendix C. The values are estimates based upon dividing the compound's effective carbon numbers (ECN) by the number of carbon atoms in the compound. See Attachment 2 to Appendix C.

Acrolein RF is also an estimate based upon dividing the compound's ECN by the number of carbon atoms in the compound. In this case, the RF estimate does not appear in Table C-1 of Appendix C. The value is calculated as described above pursuant to Attachment 2 to Appendix C.
RF = (ECN) / (number of carbon atoms in compound)
where ECN = 2 given the aliphatic carbon contribution of CH_2CHCHO (see Table 2.1 to Appendix C) and the number of carbon atoms in acrolein = 3.
RF = 2/3 or 0.66

Reference No. 21
Email of 03/26/12 email from Oregon State University's Michael Milota to EPA Region 10's Dan Meyer.

Reference No. 22
Email of 03/27/12 from Oregon State University's Michael Milota to EPA Region 10's Dan Meyer.