IDAHO FOREST
— GROUP —

P.O. BOX 557 LEWISTON, ID 83501 IDAHOFORESTGROUP.COM 208.255.3200

June 22, 2012

RECEIVED
JUN 29 2012
DEPARTMENT OF ENVIRONMENTAL QUALITY
STATE A Q PROGRAM
✓# 0083647 $1000.00

Bill Rogers, P.E.
Idaho Department of Environmental Quality
Air Quality Division
1410 N. Hilton
Boise, ID 83706
Tel: (208) 373 – 0502

Re: IFG – Lewiston, Tier I Permit Renewal Application and Permit to Construct Application

Dear Bill:

Idaho Forest Group (IFG) transferred the air quality permits for the Lewiston sawmill from Clearwater Paper Corporation (CWP) on November 15, 2011. The Lewiston mill is regulated under Tier I operating permit T1-2008.0183. IFG filed for ownership transfer of the Tier I permit and PTC permits PTC P-2010.0131 and PTC P-2011.0135, which are incorporated into Tier I permit T1-2008.0183.

Tier I permit T1-2008.0183 has an expiration date of January 23, 2013, and the Tier I renewal permit application is due before July 23, 2012. The Tier I renewal application materials are Form GI, Form CSTI, Form CAM, Form FRA, and a complete emissions inventory, including $PM_{2.5}$. This letter describes specific changes requested to the Tier I permit.

IFG is simultaneously submitting a PTC application to modify the Tier I permit to reflect changes in the facility since the permit was transferred from CWP. The PTC permit application materials are Form GI, Form CSPTC, and the permit changes described in this letter. A check for the $1000 PTC application fee is also enclosed.

Most of the proposed permit changes are removal of equipment that no longer operating or belongs to CWP. The permit application also includes addition of the Dry Fuel Bin source that is currently listed in the CWP permit (T1-2010.0030). IFG is requesting changes that will clarify the tracking of dry kiln production by species. Finally, the identifiers assigned to each emitting unit have been renumbered.

Removal of Internal Combustion Engines from Permit

The Tier I permit includes 4 diesel-fired water pump engines for fire suppression, and a diesel-fired generator engine. These sources are not associated with the IFG sawmill and are still operating on CWP property. Removal of these units from the IFG permit is not considered an emissions reduction.

Shutdown of Lewiston Cedar Product Sources

The IFG Tier I permit includes equipment associated with Lewiston Cedar Products. The cedar products operations were discontinued in August and September of 2011 and the equipment has been either removed or disconnected from any process. Emissions sources that were associated with Lewiston Cedar Products are no longer in use. Removal of these sources from the IFG permit constitutes an actual emissions decrease.

The cedar products emissions sources are listed below. Since the cedar products division was shut down during 2011, the reported emissions from 2009 and 2010 are most representative of the actual emissions from the sources. IFG may file for Emissions Reduction Credits (ERCs) for this equipment after the permit modification is complete.

REMOVED SOURCES ASSOCIATED WITH LEWISTON CEDAR PRODUCTS

Source ID	2-Year Average Actual PM_{10} Emissions (tpy)	2-Year Average Actual $PM_{2.5}$ Emissions (tpy)	2-Year Average Actual VOC Emissions (tpy)
LWP-CY-1	0.09	0.09	---
LWP-CY-2	0.02	0.02	---
LWP-CY-3	0.04	0.04	---
LWP-CY-4	0.22	0.22	---
LWP-CY-6	0.14	0.14	---
LWP-BH-4	1.54	1.54	---
LWP-BH-5	1.06	1.06	---
LWP-BH-6	0.86	0.86	---
LWP-BH-7	1.12	1.12	---
GL-1	---	---	0.23
TOTAL	5.09	5.09	0.23

Proposed Changes to Lumber Dry Kiln Throughput Limits

PTC P-2010.0131, which is incorporated in permit T1-2080.0183, limits the total lumber throughput to the dry kilns to 351,009 thousand board feet (Mbf) during any consecutive 12-month period. It also limits the throughput of pine species 35,101 Mbf during any consecutive 12-month period. These limits are PTC Condition 7 and are incorporated into the Tier I permit as Condition 3.2.

This PTC application does not request any change to the total dry kiln throughput, but IFG would like to eliminate the specific limit on pine species. IFG is proposing with more detailed kiln throughput tracking conditions to verify compliance with applicable regulations. Kiln throughput tracking is required in PTC Condition 8 and Tier I Condition 3.3. IFG proposes modification of the kiln throughput monitoring condition to include all lumber species dried. The proposed language is as follows:

> *Each month, the permittee shall monitor and record the throughput of all wood species of lumber and also the total throughput processed in the drying kilns in units of thousand board feet (Mbf) for that month and for the most recent consecutive 12-month period. The permittee shall calculate actual VOC emissions for the most recent consecutive 12-month period using emission factors agreed upon by IDEQ.*

The purpose of the specific limit on pine species was to prevent the mill from emitting un-permitted levels of volatile organic carbon (VOC) emissions. Dry Kiln VOC is the highest emitted pollutant from the Lewiston sawmill. The mill is required to have a Tier I permit because the kiln Potential to Emit (PTE) for VOCs is greater than 100 tpy.

The AIRS/AFS Facility-wide Classification Form for the IFG Lewiston sawmill shows that the source does not have a Prevention of Significant Deterioration (PSD) permit. Although it isn't a permit condition, the non-PSD status sets a facility-wide limit on actual VOC emissions of less than 250 tpy. After the engines and cedar products sources are removed from the permit, the dry kilns will be only remaining source of VOC emissions at the mill. Therefore, the allowable actual from the dry kilns are essentially 249 tpy.

VOC emissions from dry kilns are estimated using emission factors developed through various research sources. The most recent and credible research on dry kiln VOC emission factors has come from the University of Oregon, as published in the July/August, 2008 issue of the Forest Products Journal. This article was cited in the Statement of Basis (SOB) for PTC P-2010.0103. The SOB stated that the highest published VOC emission factor for drying non-pine species of wood is up to 1.206 pounds per thousand board foot (lb/Mbf). Using this factor the SOB identified the potential to emit VOC from the dry kilns as 211.7 tpy. However, this calculation does not account for the higher VOC emission potential of pine species.

The 2008 VOC research included dry kiln HAP and VOC emission factors for a variety of wood species, and at different drying temperatures. IFG has developed an emissions tracking spreadsheet to calculate the rolling 12-month actual VOC and HAP emissions from the dry kilns based on species dried and kiln temperatures. IFG will use the kiln production records (by species) and the calculations demonstrated in the emissions spreadsheet to calculate the actual VOC for every consecutive 12-month period. These records will verify that actual VOC emissions from the facility are below the 250 tpy trigger level for PSD.

The emissions spreadsheet in Attachment A demonstrates the kiln VOC emissions calculations. The spreadsheet file has been provided electronically to IDEQ via email. IFG dries each wood species at a different kiln set temperature ranging from 185 to 235 degrees F (^{o}F). The attached VOC emissions calculations are based on an example species mix. The emissions calculations are based on total kiln production of 351,009 Mbf per year. Calculations shown in Attachment A demonstrate that the kiln VOC emissions will remain below 249 tpy.

Transfer of 'Dry Fuel Bins' Emitting Unit from CWP Permit to IFG Permit

IFG has agreed to include the Dry Fuel Bins and associated emissions in the sawmill air quality permit. Inclusion of this source is not an emissions increase because the unit has been in continual operation at the current location. This emitting unit is currently included in Section 16 the CWP Tier I permit (T1 -010.0030) as source number 432, Dry Fuel Bins. The permit states that the process weight rule for new sources (IDAPA 58.01.01.701) applies to this source. The CWP permit includes CAM conditions for the Dry Fuel Bin baghouse.

Residual materials from the sawmill process, including green sawdust fines, dry planer shavings and dry planer chips are collected pneumatically and transferred to cyclones located on top of the truck bins. IFG is labeling the truck bin cyclones IFG-CY6, IFG-CY7 and IFG-CY8. These cyclones are not currently listed as emitting units in the CWP permit because exhaust from the cyclones is directed to the Dry Fuel Bin baghouse, which IFG is labeling IFG-BH4.

The pneumatic fuel transport system is shown in the attached flow diagram for the sawmill facility (Attachment B). Sawdust that is picked up pneumatically and transferred to cyclones IFG-CY3, IFG-CY4A and IFG-CY4B drops to a high pressure line and is transported pneumatically to the cyclones on the truck bins (IFG-CY6, IFG-CY7 and IFG-CY8). If needed, the sawdust can be diverted from cyclones IFG-CY3, IFG-CY4A and IFG-CY4B to the floor of the chip vault. The amount of chips potentially diverted to the floor of the chip vault has been estimated, and associated emissions calculations are included in the emissions spreadsheet.

Planer shavings that are picked up pneumatically and transferred to baghouses IFG-BH1, IFG-BH2 and IFG-BH3 drop from the baghouses to a high pressure line. The shavings are transported pneumatically to the cyclones on the truck bins (IFG-CY6, IFG-CY7 and IFG-CY8). Planer chip collected by cyclones IFG-CY1 and IFG-CY2 are also blown to IFG-CY6, IFG-CY7 and IFG-CY8.

The pneumatic transport systems from the sawmill and planer mill are equipped with diversion gates, upstream of IFG-CY6, IFG-CY7 and IFG-CY8. If the truck bins cannot receive material, the diversion gates allow material to be blown directly into a truck or to the ground, bypassing the cyclones. The diversion system is equipped with water spray for dust control. The cyclone diversion system is part of normal mill operations, and emissions estimates are included for this activity. The material from the bins is dropped into trucks for transport to the CWP fuel pile.

The Dry Fuel Bin baghouse was included in the previous facility-wide modeling for the entire Lewiston complex as source PNP432. An additional source PNP383 was also included in the model with similar dispersion characteristics and identical UTM coordinates. The modeled PTE emission rate from PNP432 was 16.2 tpy, and the modeled PTE emission rate from PNP383 was 11.9 tpy. PM_{10} emissions from IFG-BH4 have been estimated in the attached spreadsheet as equaling 16.2 tpy. Fugitive PM_{10} emissions from dumping material from the Dry Fuel Bins to trucks have been estimated to be 11.7 tpy.

Proposed Changes to T1-2008.0183 Section 1

IFG is requesting that Table 1.1 in Tier I Section 1.0 be updated to reflect the emissions source descriptions provided in this letter. An example of Table 1.1 with the proposed changes follows. The cyclone names have changed as follows: CY18 is IFG-CY1, CY25 is IFG-CY2, CY26 is IFG-CY3, CY27A&B are IFG-CY4A&B, fuel hog cyclone is IFG-CY5.

Table 1.1 REGULATED SOURCES

Permit Section	Source Description	Emission Control
3.0	4 Double-Track Kilns – manufactured by Wellons	None
4.0	27-inch, 35-inch, and 50-inch debarkers; 27-inch, 35-inch cutoff saws	Reasonable control
4.0	Ambient building air from all machine centers, including headrig, sharp chain, reducing band saw, rotary gang saw, horizontal band saw, quad band saw, No. 1 and No. 2 optimizing edgers, trimmers and other machine centers routed to process cyclones IFG-CY3, IFG-CY4A and IFG-CY4B. Cyclones IFG-CY4A and IFG-CY4B emit through a common stack.	None
4.0	Chip conveyor belt to CWP pulp and paper mill.	None
4.0	No. 4 Splitter, IFG-CY1	None
4.0	Chips from Bruks chipper, IFG-CY2	None
4.0	Planer shavings from No. 2 planer, No. 3 planer and No. 4 planer, and sawdust from Nos. 2, 3 and 4 trimmers.	Baghouses IFG-BH1, IFG-BH2 and IFG-BH3
4.0	Dry fuel bin cyclones IFG-CY6, IFG-CY7, and IFG-CY8	Baghouse IFG-BH4
5.0	Fuel hog cyclone, IFG-CY5	None

Proposed Changes to T1-2008.0183 Section 3

The second sentence of the summary description should be changed as follows: *Process steam is supplied to IFG by the Clearwater Paper Corporation Pulp and Paper Division.*

Proposed changes to conditions 3.2 and 3.3 have been described earlier in this letter.

Proposed Changes to T1-2008.0183 Section 4

IFG proposes to change the title of Section 4 as follows:

4. SAWMILL, PLANER MILL AND MATERIAL HANDLING EQUIPMENT

IFG is requesting that Table 4.1 in Tier I Section 4. be updated to reflect the emissions source descriptions provided in this letter. An example of Table 4.1 with the proposed changes follows.

Table 4.1 EMISSIONS UNITS AND EMISSIONS CONTROL DEVICES

Emissions Point/Source Identification	Emissions Unit/Process	Emissions Control Device
Debarking, cutoff saws	27-inch, 35-inch, and 50-inch debarkers; 27-inch, 35-inch cutoff saws	Reasonable control
IFG-CY3, IFG-CY4A and IFG-CY4B (common stack)	Ambient building air from all machine centers, including headrig, sharp chain, reducing band saw, rotary gang saw, horizontal band saw, quad band saw, No. 1 and No. 2 optimizing edgers, trimmers and other machine centers routed to process cyclones IFG-CY3, IFG-CY4A and IFG-CY4B. Cyclones IFG-CY4A and IFG-CY4B emit through a common stack.	None
Chip belt	Chip conveyor belt to CWP pulp and paper mill.	Reasonable control
IFG-CY1	No. 4 Splitter	None
IFG-CY2	Chips from Bruks chipper	None
IFG-BH1, IFG-BH2 and IFG-BH3	Planer shavings from No. 2 planer, No. 3 planer and No. 4 planer, and sawdust from Nos. 2, 3 and 4 trimmers.	Baghouses IFG-BH1, IFG-BH2 and IFG-BH3
IFG-CY6, IFG-CY7 and IFG-CY8	Pneumatic transfer system to the Dry Fuel Bins	Baghouse IFG-BH4

IFG is requesting that Table 4.2 be updated to reflect the changes described in this letter. An example of Table 4.2 with the proposed changes follows. Table 4.2 includes CAM conditions 4.3, 4.4 and 4.5, which may be moved into a separate permit section in the renewed Tier I permit.

Table 4.2 APPLICABLE REQUIREMENTS SUMMARY

Permit Conditions	Source ID	Parameter	Permit Limit/Standard Summary	Applicable Requirements Reference	Operating and Monitoring and Recordkeeping Requirements
4.1	IFG-CY1, IFG-CY2, IFG-CY3	PM	Process Weight	IDAPA 58.01.01.702	4.7, 2.11
4.2	IFG-CY4A, IFG-CY4B	PM	Process Weight	IDAPA 58.01.01.701	4.7, 2.11
4.2	IFG-BH1, IFG-BH2, IFG-BH3, IFG-BH4	PM	Process Weight	IDAPA 58.01.01.701	4.7, 2.11, 4.3, 4.4, 4.5
2.7	IFG-CY1, IFG-CY2, IFG-CY3, IFG-CY4A, IFG-CY4B	Visible Emissions	20% opacity for no more than three minutes in any 60-minute period	IDAPA 58.01.01.625	4.7, 2.11
2.7	IFG-BH1, IFG-BH2, IFG-BH3, IFG-BH4	Visible Emissions	20% opacity for no more than three minutes in any 60-minute period	IDAPA 58.01.01.625	4.7, 2.11, 4.3, 4.4, 4.5
2.1	27-inch, 35-inch, and 50-inch debarkers; 27-inch, 35-inch cutoff saws; Chip conveyor belt to CWP pulp and paper mill	Fugitive emissions	Reasonable control	IDAPA 58.01.01.625	2.2, 2.4, 2.11

Proposed Changes to T1-2008.0183 Section 5

The only change requested in Section 5 is that the first paragraph be revised as follows:

The Fuel Hog is used to chop scrap wood into smaller pieces for use as boiler fuel at CWP. The Fuel Hog emission point is cyclone IFG-CY5, which is used to pneumatically transfer the hogged fuel to the storage pile at the CWP pulp and paper mill.

Proposed Changes to T1-2008.0183 Section 6

Section 6 of the Tier I permit lists Insignificant Activities. Many of the insignificant activities have changed since the permit was last updated. IFG requests that the list of insignificant activities be replaced with the following list:

Table 6.1 INSIGNIFICANT ACTIVITIES

Description	Insignificant Activities IDAPA 58.01.01.317(b)(i) Citation
Conveyors in log handling areas	b.i.(30)
Belt conveyors from IFG sawmill to CWP pulp and paper mill	b.i.(30)
500-gallon diesel storage tank	b.i.(2)
500-gallon gasoline storage tank	b.i.(2)
Various storage and on-board hydraulic fluid tanks	b.i.(2)
1,800 gallon propane tank filling station	b.i.(4)
1,000 gallon diesel tank in the log yard	b.i.(2)
Sawmill grinding room dust collection cyclone	b.i.(30)
Sawmill filing room dust collection cyclone	b.i.(30)
Planer filing room dust collection cyclone	b.i.(30)

Contact Information

Thank you for your assistance in coordinating the PTC and Tier I permit applications. If you have technical questions about this permit application, please contact Jim Miller at (208)-848-2322 or Diane Lorenzen at (406)-549-0210.

Sincerely,

Jesse Short
Mill Manager

Attachments

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

General Information **Form GI**
Revision 7
2/18/10

Please see instructions on page 2 before filling out the form.

All information is required. If information is missing, the application will not be processed.

IDENTIFICATION

1. Company Name	2. Facility Name
Idaho Forest Group LLC	IFG - Lewiston
3. Brief Project Description	Renew Tier I Permit

FACILITY INFORMATION

4. Primary Facility Permit Contact Person/Title	Jim Miller		Technical Manger	
5. Telephone Number and Email Address	(208) 848-2322		jdmiller@idfg.com	
6. Alternate Facility Contact Person/Title	Jesse Short		Mill Manager	
7. Telephone Number and Email Address	(208) 762-2999		jshort@idfg.com	
8. Address to Which the Permit Should be Sent	P.O. Box 557			
9. City/County/State/Zip Code	Lewiston	Nez Perce	Idaho	83501
10. Equipment Location Address (if different than the mailing address above)	807 Mill Road			
11. City/County/State/Zip Code	Lewiston	Nex Perce	Idaho	83501
12. Is the Equipment Portable?	☐ Yes ☒ No			
13. SIC Code(s) and NAICS Code	Primary SIC: 2421	Secondary SIC:	NAICS: 321113	
14. Brief Business Description and Principal Product	Sawmill, dry kilns and planer mill that produce finished lumber			
15. Indentify any adjacent or contiguous facility that this company owns and/or operates	None			
16. Specify the reason for the application	☐ Permit to Construct (PTC) For Tier I permitted facilities only: If you are applying for a PTC then you must also specify how the PTC will be incorporated into the Tier I permit. ☐ Incorporate the PTC at the time of the Tier I renewal ☐ Co-process the Tier I modification and PTC ☐ Administratively amend the Tier I permit to incorporate the PTC upon your request (IDAPA 58.01.01.209.05.a, b, or c) ☒ Tier I Permit ☐ Tier II Permit ☐ Tier II/Permit to Construct			

CERTIFICATION

In accordance with **IDAPA 58.01.01.123** (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the document(s) are true, accurate, and complete.

17. Responsible Official's Name/Title	Scott Atkison	President	
18. Responsible Official's Signature	[signature]	Date	6/27/12

19. ☒ Check here to indicate that you would like to review the draft permit prior to final issuance.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Cover Sheet for Air Permit Application – Tier I **Form CSTI**
Revision 5
08/28/08

Please see instructions on page 2 before filling out the form.

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER

1. Company Name	Idaho Forest Group LLC		
2. Facility Name	IFG - Lewiston	3. Facility ID No.	069-00003
4. Brief Project Description - One sentence or less	Tier I Renewal, with changes as described in PTC Application		

PERMIT APPLICATION TYPE

5. ☐ Initial Tier I ☐ Tier I Administrative Amendment ☐ Tier I Minor Modification ☐ Tier I Significant Modification
☒ Tier I Renewal: Permit No.: T1-2008.0183 Date Issued: Jan. 23, 2008, Revised Jan. 17, 2012

FORMS INCLUDED

Included	N/A	Forms		DEQ Verify
☒	☐	Form CSTI – Cover Sheet		☐
☒	☐	Form GI – Facility Information		☐
☐	☐	Form EU0 – Emissions Units General		☐
☐	☒	Form EU1– Industrial Engine Information	Please specify number of EU1s attached: _____	☐
☐	☒	Form EU2– Nonmetallic Mineral Processing Plants	Please specify number of EU2s attached: _____	☐
☐	☒	Form EU3– Spray Paint Booth Information	Please specify number of EU3s attached: _____	☐
☐	☒	Form EU4– Cooling Tower Information	Please specify number of EU4s attached: _____	☐
☐	☒	Form EU5 – Boiler Information	Please specify number of EU5s attached: _____	☐
☐	☒	Form CBP– Concrete Batch Plant	Please Specify number of CBPs attached: _____	☐
☐	☒	Form HMAP – Hot Mix Asphalt Plant	Please specify number of HMAPs attached:	☐
☐	☒	PERF – Portable Equipment Relocation Form		☐
☐	☒	Form BCE– Baghouses Control Equipment		☐
☐	☒	Form SCE– Scrubbers Control Equipment		☐
☐	☒	Form VSCE – Venturi Scrubber Control Equipment		☐
☐	☒	Form ESP – Electrostatic Precipitator		☐
☐	☒	Form AO – Afterburner/Oxidizer		☐
☐	☒	Form CYS – Cyclone Separator		☐
☐	☒	Form CA – Carbon Adsorber		☐
☐	☒	Forms EI-CP1 - EI-CP4– Emissions Inventory– criteria pollutants	(Excel workbook, all 4 worksheets)	☐
☒	☐	Form CAM – Compliance Assurance Monitoring		☐
☒	☐	Form FRA – Federal Regulation Applicability		☐

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

AIR PERMIT APPLICATION

Revision 6
10/7/09

For each box in the table below, CTRL+click on the blue underlined text for instructions and information.

IDENTIFICATION	
1. Company Name: Idaho Forest Group LLC	2. Facility Name: Idaho Forest Group - Lewiston
3. Brief Project Description:	Modify PTC to reflect equipment removed and to transfer existing equipment from the Clearwater Pulp and Paper permit to the IFG-Lewiston sawmill permit.
APPLICABILITY DETERMINATION	
4. List applicable subparts of the New Source Performance Standards (NSPS) (40 CFR part 60). Examples of NSPS affected emissions units include internal combustion engines, boilers, turbines, etc. The applicant must thoroughly review the list of affected emissions units.	List of applicable subpart(s): **Not Applicable**
5. List applicable subpart(s) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) found in 40 CFR part 61 and 40 CFR part 63. Examples of affected emission units include solvent cleaning operations, industrial cooling towers, paint stripping and miscellaneous surface coating. EPA has a web page dedicated to NESHAP that should be useful to applicants.	List of applicable subpart(s): **NESHAP Subpart DDDD – Plywood and Composite Wood Products MACT** . The facility does not have any emergency or non-emergency SI or CI RICE units.
6. For each subpart identified above, conduct a complete a regulatory analysis using the instructions and referencing the example provided on the following pages. **Note** - Regulatory reviews must be submitted with sufficient detail so that DEQ can verify applicability and document in legal terms why the regulation applies. Regulatory reviews that are submitted with insufficient detail will be determined incomplete.	☐ A detailed regulatory review is provided (Follow instructions and example). ☐ DEQ has already been provided a detailed regulatory review. Give a reference to the document including the date.

IF YOU ARE UNSURE HOW TO ANSWER ANY OF THESE QUESTIONS, CALL THE AIR PERMIT HOTLINE AT 1-877-5PERMIT

It is emphasized that it is the applicant's responsibility to satisfy all technical and regulatory requirements, and that DEQ will help the applicant understand what those requirements are prior to the application being submitted but that DEQ will not perform the required technical or regulatory analysis on the applicant's behalf.

Applicability Review for Attachment to Idaho Form FRA

TITLE 40--PROTECTION OF ENVIRONMENT, CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY, PART 63_NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES. Subpart DDDD - National Emission Standards for Hazardous Air Pollutants: Plywood and Composite Wood Products

Sec. 63.2231 Does this subpart apply to me?

This subpart applies to you if you meet the criteria in paragraphs (a) and (b) of this section.
(a) You own or operate a PCWP manufacturing facility. A PCWP manufacturing facility is a facility that manufactures plywood... and/or composite wood... **Plywood and composite wood products manufacturing facilities also include facilities that manufacture dry veneer and lumber kilns located at any facility.** Plywood and composite wood products include, but are not limited to, plywood, veneer, particleboard, oriented strandboard, hardboard, fiberboard, medium density fiberboard, laminated strand lumber, laminated veneer lumber, wood I-joists, **kiln-dried lumber**, and glue-laminated beams.
(b) The PCWP manufacturing facility is located at a major source of HAP emissions.

The IFG Lewiston facility is a major source of HAPs and includes lumber dry kilns. Therefore the PCWP NESHAPS applies.

Sec. 63.2232 What parts of my plant does this subpart cover?

(a) This subpart applies to each new, reconstructed, or existing affected source at a PCWP manufacturing facility. (b) ... **The affected source includes lumber kilns at PCWP manufacturing facilities and at any other kind of facility.** (c) An affected source is a new affected source if you commenced construction of the affected source after January 9, 2003, and you meet the applicability criteria at the time you commenced construction. (d) An affected source is reconstructed if you meet the criteria as defined in Sec. 63.2. (e) An affected source is existing if it is not new or reconstructed.

The lumber kilns at the Lewiston sawmill are an affected existing source.

Sec. 63.2252 What are the requirements for process units that have no control or work practice requirements?

...For process units not subject to the compliance options or work practice requirements specified in Sec. 63.2240 (including, but not limited to, lumber kilns), you are not required to comply with the compliance options, work practice requirements, performance testing, monitoring, SSM plans, and recordkeeping or reporting requirements of this subpart, or any other requirements in subpart A of this part, except for the initial notification requirements in Sec. 63.9(b).

There are no applicable requirements in the PCWP MACT regulations for lumber dry kilns except for initial notification requirements. The previous owner of the Lewiston sawmill submitted the initial notification for the PCWP MACT as required.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Compliance Assurance Monitoring - **Form CAM**
Revision 2
08/28/08

Please see instructions on pages 3-8 before filling out the form.

IDENTIFICATION

1. Company Name:	Idaho Forest Group LLC	2. Facility Name:	IFG – Lewiston	3. Facility ID	No.: 069-00003
4. Brief Project Description:	CAM monitoring conditions update for permit renewal.				

MONITORING APPROACH SUBMITTAL

Background		
5. Emissions Unit	Description (type of emission point): Planer Shavings Transfer System	Identification (emission point number): IFG-BH1, IFG-BH2, IFG-BH3
6. Applicable Regulation, Emission Limits, and Monitoring Requirements	Applicable regulation citation: IDAPA 58.01.01.701 IDAPA 58.01.01.625 Tier I No. T1-2008.0183	Pollutant: PM Emission Limit: Process Weight Rule Pollutant: Visibility Emission Limit: not more than 20% opacity for six minutes
		Monitoring requirements: NSPS does not apply, so there are no regulatory monitoring requirements.
7. Control Technology	Brief description: Planer shavings and trimmer sawdust are collected pneumatically and blown to BH1, BH2 and BH3, then transferred to a high-pressure line.	

Table 1. Monitoring Approach

	Indicator No. 1, BH1, BH2, BH3	Indicator No. 2, BH1, BH2, BH3	
I. Indicator Description	Visible Emissions	Opacity	
Measurement Approach	Observation of visible emissions	EPA Method 22, one-minute observation. If emissions are observed, EPA Method 9, 6-minute averaging period.	
II. Indicator Range (Quality improvement plan threshold optional)	If visible emissions are present, corrections are made.	Not more than 20% opacity over a 6-minute averaging period.	
III. Performance Criteria	——	——	
A. Data Representativeness	Under normal operations, emissions from the baghouses are rarely visible. If visible emissions are noted, it may indicate an operational problem with the baghouse.	EPA Method 22 is a measure of opacity for diffuse sources. Method 9 is the EPA reference method for quantifying opacity from point sources.	
B. Verification of Operational Status	Observations must be made during daylight hours while equipment is operating.	Observations must be made during daylight hours while equipment is operating.	
C. QA/QC Practices and Criteria	Not applicable	Observer performing EPA Method 9 test must be certified.	
D. Monitoring Frequency	Once per day	Monthly	
E. Data Collection Procedures	Daily observations are included in daily log forms and maintained on-site for 5 years.	Data is recorded on Method 22 and Method 9 log sheets and maintained on-site for 5 years.	
F. Averaging Period	Visible emissions observations are instantaneous at the time made.	Method 22, one minute average. Method 9, six minute average.	

Justification	Present justification for selection of monitoring approach(es) and indicator range(s): **Justification for Indicator 1:** Under normal operations, emissions from the baghouse are not visible. Therefore, visible emissions may indicate a problem within the baghouse. **Justification for Indicator 2:** The monthly Method 22 test identifies the presence of opacity. If opacity is observed in the Method 22 test, the Method 9 test quantifies the opacity level of the baghouse emissions.

Compliance Assurance Monitoring **Form CAM**

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Compliance Assurance Monitoring - **Form CAM**
Revision 2
08/28/08

Please see instructions on pages 3-8 before filling out the form.

IDENTIFICATION

1. Company Name:	Idaho Forest Group LLC	2. Facility Name:	IFG – Lewiston	3. Facility ID	No.: 069-00003
4. Brief Project Description:	CAM monitoring conditions update for permit renewal.				

MONITORING APPROACH SUBMITTAL

Background		
5. Emissions Unit	Description (type of emission point): Dry fuel bin cyclones.	Identification (emission point number): IFG-BH4
6. Applicable Regulation, Emission Limits, and Monitoring Requirements	Applicable regulation citation: IDAPA 58.01.01.701 IDAPA 58.01.01.625 Tier I No. T1-2008.0183	Pollutant: PM Emission Limit: Process Weight Rule Pollutant: Visibility Emission Limit: not more than 20% opacity for six minutes Monitoring requirements: NSPS does not apply, so there are no regulatory monitoring requirements.
7. Control Technology	Brief description: Planer shavings, trimmer sawdust, planer chips and green sawdust are transported pneumatically and blown CY6, CY7 and CY8 on the dry fuel bins. Emissions from CY6, CY7 and CY8 are controlled by the dry fuel bin baghouse, BH4.	

Table 1. Monitoring Approach

	Indicator No. 1, BH4	Indicator No. 2, BH4	
I. Indicator Description	Visible Emissions	Opacity	
Measurement Approach	Observation of visible emissions	EPA Method 22, one-minute observation. If emissions are observed, EPA Method 9, 6-minute averaging period.	
II. Indicator Range (Quality improvement plan threshold optional)	If visible emissions are present, corrections are made.	Not more than 20% opacity over a 6-minute averaging period.	
III. Performance Criteria	——	——	
A. Data Representativeness	Under normal operations, emissions from the baghouse are rarely visible. If visible emissions are noted, it may indicate an operational problem with the baghouse.	EPA Method 22 is a measure of opacity for diffuse sources. Method 9 is the EPA reference method for quantifying opacity from point sources.	
B. Verification of Operational Status	Observations must be made during daylight hours while equipment is operating.	Observations must be made during daylight hours while equipment is operating.	
C. QA/QC Practices and Criteria	Not applicable	Observer performing EPA Method 9 test must be certified.	
D. Monitoring Frequency	Once per day	Monthly	
E. Data Collection Procedures	Daily observations are included in daily log forms and maintained on-site for 5 years.	Data is recorded on Method 22 and Method 9 log sheets and maintained on-site for 5 years.	
F. Averaging Period	Visible emissions observations are instantaneous at the time made.	Method 22, one minute average. Method 9, six minute average.	

Justification	Present justification for selection of monitoring approach(es) and indicator range(s): **Justification for Indicator 1:** Under normal operations, emissions from the baghouse are not visible. Therefore, visible emissions may indicate a problem within the baghouse. **Justification for Indicator 2:** The monthly Method 22 test identifies the presence of opacity. If opacity is observed in the Method 22 test, the Method 9 test quantifies the opacity level of the baghouse emissions.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

General Information **Form GI**
Revision 7
2/18/10

Please see instructions on page 2 before filling out the form.

All information is required. If information is missing, the application will not be processed.

IDENTIFICATION

1. Company Name	2. Facility Name
Idaho Forest Group LLC	IFG - Lewiston
3. Brief Project Description	Remove equipment from permit and transfer sources from Clearwater Pulp and Paper permit to IFG-Lewiston sawmill permit.

FACILITY INFORMATION

4. Primary Facility Permit Contact Person/Title	Jim Miller		Technical Manger	
5. Telephone Number and Email Address	(208) 848-2322		jdmiller@idfg.com	
6. Alternate Facility Contact Person/Title	Jesse Short		Mill Manager	
7. Telephone Number and Email Address	(208) 762-2999		jshort@idfg.com	
8. Address to Which the Permit Should be Sent	P.O. Box 557			
9. City/County/State/Zip Code	Lewiston	Nez Perce	Idaho	83501
10. Equipment Location Address (if different than the mailing address above)	807 Mill Road			
11. City/County/State/Zip Code	Lewiston	Nex Perce	Idaho	83501
12. Is the Equipment Portable?	☐ Yes ☒ No			
13. SIC Code(s) and NAICS Code	Primary SIC: 2421	Secondary SIC:		NAICS: 321113
14. Brief Business Description and Principal Product	Sawmill, dry kilns and planer mill that produce finished lumber			
15. Indentify any adjacent or contiguous facility that this company owns and/or operates	None			

16. Specify the reason for the application

☒ Permit to Construct (PTC)

> <u>For Tier I permitted facilities only:</u> If you are applying for a PTC then you must also specify how the PTC will be incorporated into the Tier I permit.
>
> ☒ Incorporate the PTC at the time of the Tier I renewal
>
> ☐ Co-process the Tier I modification and PTC
>
> ☐ Administratively amend the Tier I permit to incorporate the PTC upon your request (IDAPA 58.01.01.209.05.a, b, or c)

☐ Tier I Permit

☐ Tier II Permit

☐ Tier II/Permit to Construct

CERTIFICATION

In accordance with **IDAPA 58.01.01.123** (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the document(s) are true, accurate, and complete.

17. Responsible Official's Name/Title	Scott Atkison	President	
18. Responsible Official's Signature		Date	

19. ☒ Check here to indicate that you would like to review the draft permit prior to final issuance.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Cover Sheet for Air Permit Application – Permit to Construct **Form CSPTC**

Please see instructions on page 2 before filling out the form.

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER

1. Company Name	Idaho Forest Group LLC		
2. Facility Name	IFG – Lewiston	3. Facility ID No.	069-00003
4. Brief Project Description - One sentence or less	Modify PTC to reflect equipment removed and to transfer existing equipment from the Clearwater Pulp and Paper permit to the IFG-Lewiston sawmill permit.		

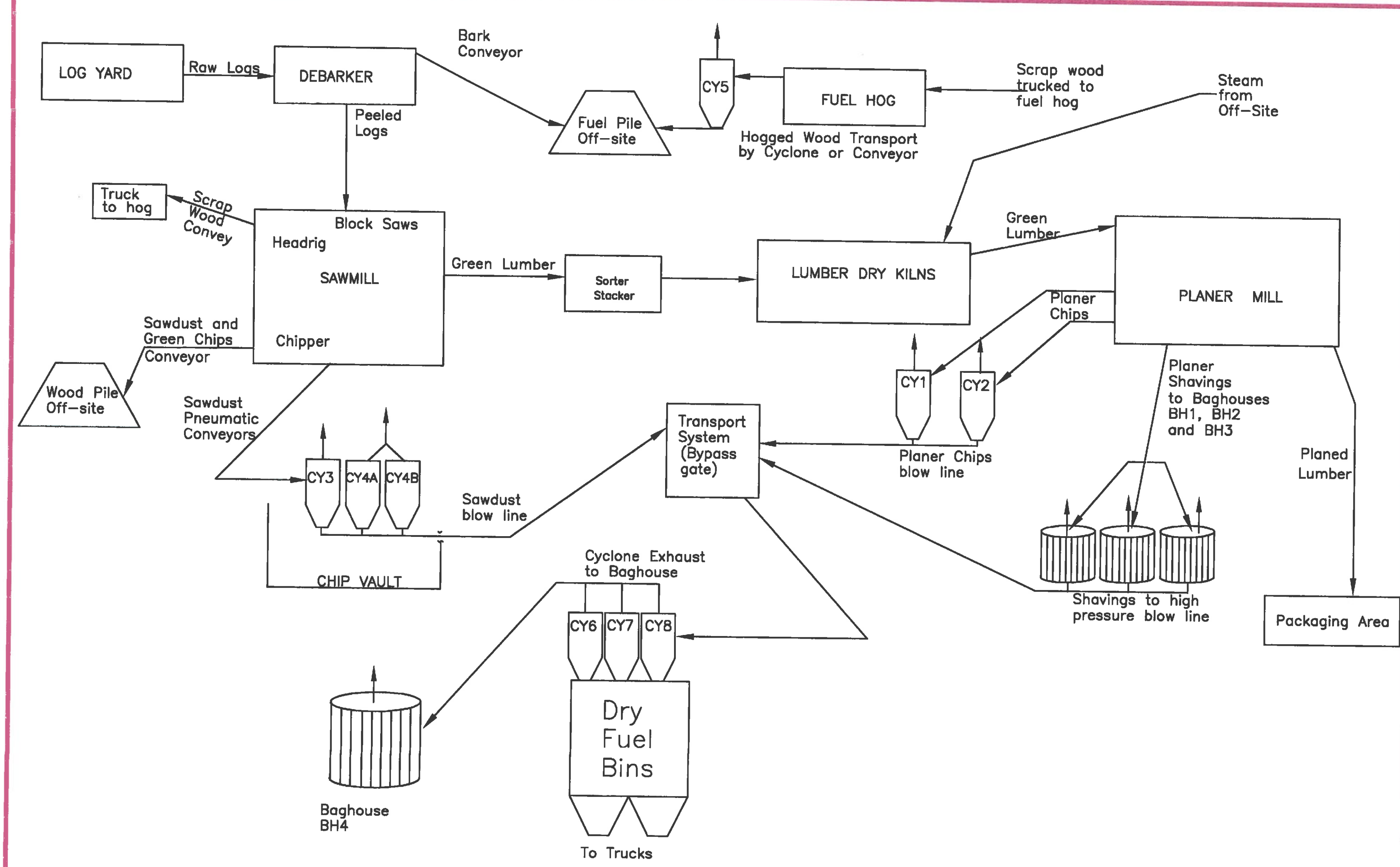
PERMIT APPLICATION TYPE

5. ☐ New Source ☐ New Source at Existing Facility ☒ PTC for a Tier I Source Processed Pursuant to IDAPA 58.01.01.209.05.c
☐ Unpermitted Existing Source ☐ Facility Emissions Cap ☐ Modify Existing Source: Permit No.:____ Date Issued:____
☐ Required by Enforcement Action: Case No.:____

6. ☒ Minor PTC ☐ Major PTC

FORMS INCLUDED

Included	N/A	Forms		DEQ Verify
☒	☐	Form CSPTC – Cover Sheet		☐
☒	☐	Form GI – Facility Information		☐
☐	☒	Form EU0 – Emissions Units General		☐
☐	☒	Form EU1– Industrial Engine Information	Please specify number of EU1s attached: ____	☐
☐	☒	Form EU2– Nonmetallic Mineral Processing Plants	Please specify number of EU2s attached: ____	☐
☐	☒	Form EU3– Spray Paint Booth Information	Please specify number of EU3s attached: ____	☐
☐	☒	Form EU4– Cooling Tower Information	Please specify number of EU3s attached: ____	☐
☐	☒	Form EU5 – Boiler Information	Please specify number of EU4s attached: ____	☐
☐	☒	Form CBP– Concrete Batch Plant	Please specify number of CBPs attached: ____	☐
☐	☒	Form HMAP – Hot Mix Asphalt Plant	Please specify number of HMAPs attached: ____	☐
☐	☒	PERF – Portable Equipment Relocation Form		☐
☐	☒	Form AO – Afterburner/Oxidizer		☐
☐	☒	Form CA – Carbon Adsorber		☐
☐	☒	Form CYS – Cyclone Separator		☐
☐	☒	Form ESP – Electrostatic Precipitator		☐
☐	☒	Form BCE– Baghouses Control Equipment		☐
☐	☒	Form SCE– Scrubbers Control Equipment		☐
☐	☒	Form VSCE – Venturi Scrubber Control Equipment		☐
☐	☒	Form CAM – Compliance Assurance Monitoring		☐
☐	☒	Forms EI-CP1 - EI-CP4– Emissions Inventory– criteria pollutants	(Excel workbook, all 4 worksheets)	☐
☒	☐	PP – Plot Plan		☐
☐	☐	Forms MI1 – MI4 – Modeling	(Excel workbook, all 4 worksheets)	☐
☒	☐	Form FRA – Federal Regulation Applicability		☐



6/21/2012 10:26:02 AM P:\IFG SAWMILL\DRAWINGS\IFG_LEWISTON_FG_DIA_001-12.DWG

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: NA
SOURCE: PIONEER

SCALE IN FEET
0 NA NA

FIGURE 1

PIONEER TECHNICAL SERVICES, INC.
820 E. BROADWAY
MISSOULA, MT
(406) 549-0210

PROCESS FLOW DIAGRAM
IFG SAWMILL
LEWISTON, IDAHO

DATE: 6/21/12

IDAHO FOREST GROUP
LEWISTON, IDAHO
Emission Inventory/Calculations
PTE Emission Calculations

Fugitive Sources	**PM (ton/yr)**	**PM10 (ton/yr)**	**PM2.5 (ton/yr)**	**SO_2 (ton/yr)**	**NOx (ton/yr)**	**VOC (ton/yr)**	**CO (ton/yr)**	**HAPS (ton/yr)**
Log and Bark Handling, Fugitives								
DEBARKER	12.6	6.95	2.02	---	---	---	---	---
FUEL HOG	1.21	0.30	0.17	---	---	---	---	---
BARK TRANSFER TO OFF-SITE FUEL PILE	5.35	2.68	0.78	---	---	---	---	---
SCRAP WOOD HANDLING	2.41	1.21	0.12					
Sawmill, Fugitives								
SAWMILL, INDOOR	2.21	1.26	0.37	---	---	---	---	---
SAWMILL CHIPPER, INDOOR	1.32	0.66	0.19	---	---	---	---	---
SAWDUST AND CHIP CONVEY OFF-SITE	6.58	3.29	0.95	---	---	---	---	---
SAWDUST DIVERT TO CHIP VAULT	0.02	0.04	0.01					
Truck Bin Loadout, Fugitives								
TRUCK BIN LOADOUT, GREEN	6.84	4.10	1.19	---	---	---	---	---
TRUCK BIN LOADOUT, DRY	12.30	7.38	3.69	---	---	---	---	---
PNEUMATIC DIVERT - GREEN AND DRY MATERIAL	0.34	0.20	0.10					
Fugitive Road Dust								
Fugitive Dust - PAVED ROADS	3.40	0.68	0.17	---	---	---	---	---
Fugitive Dust - UNPAVED ROADS	55.82	10.40	1.04	---	---	---	---	---
Fugitive Totals	**110.4**	**39.1**	**10.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Point Sources								
Lumber Drying								
LUMBER DRY KILNS	3.51	3.51	1.76	---	---	140	---	36.5
Cyclones								
IFG-CY1, Planer #4 Splitter	1.26	0.50	0.07	---	---	---	---	---
IFG-CY2, Planer Chipper	6.53	2.61	0.88	---	---	---	---	---
IFG-CY3, Sawmill all Machine Centers	3.13	1.59	0.47	---	---	---	---	---
IFG-CY4A, Sawmill all Machine Centers	14.83	7.56	2.22	---	---	---	---	---
IFG-CY4B, Sawmill all Machine Centers	14.83	7.56	2.22	---	---	---	---	---
IFG-CY5, Fuel Hog	4.10	2.09	0.62	---	---	---	---	---
Baghouses								
PLANER SHAVINGS BAGHOUSE (IFG-BH1)	4.05	4.05	2.03	---	---	---	---	---
PLANER SHAVINGS BAGHOUSE (IFG-BH2)	4.28	4.28	2.14	---	---	---	---	---
PLANER SHAVINGS BAGHOUSE (IFG-BH3)	4.62	4.62	2.03	---	---	---	---	---
TRUCK BIN CYCLONES BAGHOUSE (IFG-BH4)	16.22	16.22	8.11					
Point Source Totals	**77.4**	**54.6**	**22.5**	**0.00**	**0.00**	**140**	**0**	**37**
Plant Wide Total	**188**	**93.7**	**33.3**	**0.0**	**0.0**	**140**	**0**	**36.5**

The Lewiston sawmill does not have any combustion sources, so has negligible greenhouse gas.

IDAHO FOREST GROUP, LEWISTON
Emission Inventory/Calculations
Production Information Supporting PTE Calculations

Lumber Production

Sawmill	351,009	mbdft/year, from permit
Dry Kilns	351,009	mbdft/year
Planer	351,009	mbdft/year
Logs Used	1,263,632	tons/year, based on std. ratio
Sawmill Hours	8,760	hours/year, PTE
Planer Hours	8,760	hours/year, PTE
Kiln Hours	8,760	hours/year, PTE

Residuals Production

	tons/year	**Ratio from typical mill production**	
Sawmill Chips to convey	263,000	1500	lb chips/mbdft sawmill
Sawdust to cyclones	114,000	650	lb sawdust/mbdft sawmill
Bark	107,000	170	lb bark/ton logs
Planer Chips	21,000	120	lb chips/mbdft planer
Shavings	61,000	350	lb shavings/mbdft planer
Wood to Fuel Hog	48,200	from PTC permit	

LUMBER DRY KILNS

Wood mix is general, to demonstrate calculation method.

CRITERIA POLLUTANTS

351,009 Mbf/yr, lumber dried
8760 hours per year

PM/PM10 :			
	Emission Factor:	0.02 lbs/Mbf	Oregon General Permit
	Emissions:	3.51 tons/year	AQGP-010
PM2.5 :			
	Emission Factor:	0.01 lbs/Mbf	Assume PM2.5 is 50% of PM10
	Emissions:	1.76 tons/year	AQGP-010
VOC:			
	Emission Factor:	0.80 lbs/Mbf	VOC Emissions based on
	Emissions:	140 tons/year	mix shown below.

Wood Species:	% of Total	VOC (lb/Mbf)	Weighted (lb/Mbf)
Redwood (use white spruce)	0%	0.11	0.00
Cedar (use white spruce)	15%	0.11	0.02
Hemlock	50%	0.24	0.12
Red Fir and Larch (used DF)	15%	1.21	0.18
White Fir (use white wood)	0%	2.31	0.00
Douglas Fir , all	0%	1.21	0.00
Ponderosa Pine	10%	2.46	0.25
Lodgepole (white wood)	0%	2.31	0.00
White Wood (white pine, ESLPAF)	10%	2.31	0.23
Other (use DF)	0%	1.21	0.00
Total	100%		**0.80**

Idaho Forest Group - Lewiston

Dry Kiln Haps, based on 2008 Research and kiln temperatures

Wood mix for calculation demonstration

EMISSIONS YEAR	PTE

* white wood is Engelmann spruce, white fir, etc.

ENTER		
Total MBF processed	**351,009**	
% Douglas Fir /Larch	15%	52,651 *MBF/Yr by species*
% Hemlock	50%	175,505
% Ponderosa Pine	10%	35,101
% White Wood*	10%	35,101
% Cedar	15%	52,651
% Other (name species)	0%	0
	100%	351,009

EMISSION FACTORS:

Pollutant	Total HAP	Methanol	Formal-dehyde	Acetal-dehyde	Propion-aldehyde	Acrolein
Douglas Fir	0.1530	0.0955	0.0035	0.0522	0.0007	0.0010
Western Hemlock	0.2549	0.1565	0.0037	0.0824	0.0107	0.0017
Ponderosa Pine	0.1483	0.1021	0.0067	0.0334	0.0027	0.0034
White Fir (white wood)	0.2572	0.1880	0.0101	0.0490	0.0043	0.0058
Cedar (use white spruce)	0.1151	0.0780	0.0044	0.0310	0.0007	0.0010

EMISSIONS

Emission lb/Yr

Species	Total HAP	Methanol	Formal-dehyde	Acetal-dehyde	Propion-aldehyde	Acrolein
Douglas Fir	8056	5030	184	2750	37	55
Western Hemlock	44738	27458	641	14455	1883	300
Ponderosa Pine	5205	3583	235	1172	95	120
White Fir (white wood)	9028	6599	355	1720	151	204
Cedar	6060	4107	232	1632	37	53
TOTAL, lb/yr	73,087	46,777	1,647	21,729	2,203	731
TOTAL, ton/yr	36.54	23.39	0.82	10.86	1.10	0.37

LOGS AND BARK, FUGITIVE EMISSIONS

DEBARKER

1,263,632 Tons of Logs/Year
8,760 Hours/Year

PM:	Emission Factor:	0.02 lbs/ton	AIRS 3-07-008-01
	Emissions:	12.64 tons/year	
PM10:	Emission Factor:	0.011 lbs/ton	AIRS 3-07-008-01
	Emissions:	6.95 tons/year	
PM2.5:	Emission Factor:	0.00319 lbs/ton	29% of PM10 for green material
	Emissions:	2.02 tons/year	

BARK TRANSFER TO OFF-SITE FUEL PILE

107,000 Tons of Bark/Year
8,760 Hours/Year

PM:	Emission Factor:	0.1 lbs/ton	General Material Handling Factor
	Emissions:	5.35 tons/year	
PM10:	Emission Factor:	0.05 lbs/ton	General Material Handling Factor
	Emissions:	2.68 tons/year	
PM2.5:	Emission Factor:	0.0145 lbs/ton	29% of PM10 for green material
	Emissions:	0.78 tons/year	

FUEL HOG

48,200 Tons of wood/Year
8,760 Hours/Year

PM:	Emission Factor:	0.1 lbs/ton	General Material Handling Factor
	Controlled EF:	0.05 lbs/ton	Hog is partially enclosed, 50% control.
	Emissions:	1.21 tons/year	
PM10:	Emission Factor:	0.025 lbs/ton	General Material Handling Factor
	Controlled EF:	0.0125 lbs/ton	Hog is partially enclosed, 50% control.
	Emissions:	0.30 tons/year	Hog is partially enclosed, 50% control.
PM2.5:	Emission Factor:	0.00725 lbs/ton	29% of PM10 for green material
	Emissions:	0.17 tons/year	

SCRAP WOOD HANDLING

Includes wood from headrig and bins transported to fuel hog

48,200 Tons of wood/Year
8,760 Hours/Year

PM:	Emission Factor:	0.1 lbs/ton	General Material Handling Factor
	Emissions:	2.41 tons/year	
PM10:	Emission Factor:	0.050 lbs/ton	General Material Handling Factor
	Emissions:	1.21 tons/year	
PM2.5:	Emission Factor:	0.005 lbs/ton	29% of PM10 for green material
	Emissions:	0.12 tons/year	

SAWMILL PROCESSES

SAWMILL, INDOOR

1,263,632 Tons of Logs/Year
8,760 hr/yr

PM:	Emission Factor:	0.35	lbs/ton	Idaho Factor
	Controlled EF:	0.0035	lbs/ton	Indoors with pneumatic dust pickup.
	Emissions:	2.21	tons/year	99% removal efficiency.
PM10:	Emission Factor:	0.2	lbs/ton	Idaho Factor
	Corrected Factor:	0.002	lbs/ton	Indoors with pneumatic dust pickup.
	Emissions:	1.26	tons/year	99% removal efficiency.
PM2.5:	Emission Factor:	0.00058	lbs/ton	29% of PM10 for green material
	Emissions:	0.37	tons/year	

SAWMILL CHIPPER, INDOOR

263,000 Tons of Chips/Year
8,760 hr/yr

PM:	Emission Factor:	0.1	lbs/ton	General Material Handling Factor
	Controlled EF:	0.01	lbs/ton	Enclosed process, 90% control.
	Emissions:	1.32	tons/year	
PM10:	Emission Factor:	0.05	lbs/ton	General Material Handling Factor
	Controlled EF:	0.005	lbs/ton	Enclosed process, 90% control.
	Emissions:	0.66	tons/year	
PM2.5:	Emission Factor:	0.00145	lbs/ton	29% of PM10 for green material
	Emissions:	0.19	tons/year	

PLANER PROCESSES

PLANERS, INDOOR

This is an insignificant source because the planer emissions pneumatically controlled through the shavings transport system. Planer shavings are picked up inside the building and blown to three baghouses. The baghouses transfer the shavings to a high-pressure line for pneumatic transport to the truck bins.

PLANER SHAVINGS BAGHOUSE (IFG-BH1)

		36,000 scfm	Rated Flow
		8,760 hours/yr	Potential Hours
PM/PM10:	Emission Factor:	0.003 gr/dscf	Manufacturer Baghouse Emission Rate
	Emissions:	4.05 tons/year	
		0.93 lbs/hr	
PM2.5:	Emission Factor:	0.0015 gr/dscf	50% of PM10 for Dry Material
	Emissions:	2.03 tons/year	
		0.46 lbs/hr	

PLANER SHAVINGS BAGHOUSE (IFG-BH2)

		38,000 scfm	Rated Flow
		8,760 hours/yr	Potential
PM/PM10:	Emission Factor:	0.003 gr/dscf	Manufacturer Baghouse Emission Rate
	Emissions:	4.28 tons/year	
		0.98 lbs/hr	
PM2.5:	Emission Factor:	0.0015 gr/dscf	50% of PM10 for Dry Material
	Emissions:	2.14 tons/year	
		0.49 lbs/hr	

PLANER SHAVINGS BAGHOUSE (IFG-BH3)

		41,000 scfm	Rated Flow
		8,760 hours/yr	Potential
PM/PM10:	Emission Factor:	0.003 gr/dscf	Manufacturer Baghouse Emission Rate
	Emissions:	4.62 tons/year	
		1.05 lbs/hr	
PM2.5:	Emission Factor:	0.0015 gr/dscf	50% of PM10 for Dry Material
	Emissions:	2.03 tons/year	
		0.46 lbs/hr	

MATERIAL HANDLING CYCLONES

The previous permittee developed cyclone emission factors for PM. IFG is using those emissions factors where possible, and have made corresponding factors for PM10 and PM2.5.

PTE Emission Calculations

Cyclone	Throughput (tons/yr)	PM (tpy)	PM10 (tpy)	PM2.5 (tpy)	comments:
IFG-CY1, Planer #4 Splitter	4,200	1.26	0.50	0.07	Assume 20% of total planer chips
IFG-CY2, Planer Chipper	16,800	6.53	2.61	0.88	Assume 80% of total planer chips
IFG-CY3, Sawmill all Machine Centers	38,000	3.13	1.59	0.47	1/3 to each cyclone
IFG-CY4A, Sawmill all Machine Centers	38,000	14.83	7.56	2.22	1/3 to each cyclone
IFG-CY4B, Sawmill all Machine Centers	38,000	14.83	7.56	2.22	1/3 to each cyclone
IFG-CY5, Fuel Hog	48,200	4.10	2.09	0.62	This may be removed

Source	PM Emission Factor From Potlatch (1)	PM10 Emission Factor	PM2.5 Emission Factor	Comments:
CY-1, Specialties Gang Rip Cyclone	0.778 lb/ton	0.311 lb/ton (2)	0.156 lb/ton (2)	REMOVED
CY-2, Specialties Gang Rip Cyc.	0.164 lb/ton	0.066 lb/ton (2)	0.033 lb/ton (2)	REMOVED
CY-3, Specialties GRECON	0.164 lb/ton	0.066 lb/ton (2)	0.033 lb/ton (2)	REMOVED
CY-4, Specialties NULOC	0.522 lb/ton	0.209 lb/ton (2)	0.104 lb/ton (2)	REMOVED
CY-6, Specialties	0.164 lb/ton	0.066 lb/ton (2)	0.033 lb/ton (2)	REMOVED
CY-18, Surfacing, #4 Splitter	0.600 lb/ton	0.240 lb/ton (2)	0.120 lb/ton (2)	IFG-CY1
CY-24, Surfac., Brooks Chip., Fines	0.778 lb/ton	0.311 lb/ton (2)	0.156 lb/ton (2)	REMOVED IN PAST
CY-25, Surfac., Brooks Chip., Chips (3)	0.062 lb/ton	0.025 lb/ton (2)	0.012 lb/ton (2)	IFG-CY2
CY-26, Sawmill, All Machine Ctrs	0.165 lb/ton	0.084 lb/ton (3)	0.025 lb/ton (3)	IFG-CY3
CY-27A, Sawmill, All Machine Ctrs	0.780 lb/ton	0.398 lb/ton (3)	0.117 lb/ton (3)	IFG-CY4A
CY-27B, Sawmill, All Machine Ctrs	0.780 lb/ton	0.398 lb/ton (3)	0.117 lb/ton (3)	IFG-CY4B
CY-FH, Complex, Fuel Hog	0.170 lb/ton	0.087 lb/ton (3)	0.026 lb/ton (3)	IFG-CY5

Notes:

(1) Original note from Potlatch said: Calculated using cyclone and dust parameters per Rex. M. Robbins, Pollution Engineering, March, 1988 , with number of turns (Ne) calc. According to Wark and Warner, 1981

(2) SCC Code, Info from PM Calculator, 307008(PM10 is 40% of PM and PM2.5 is 20% of PM, dry wood

(3) Emission factor is not plausible for a planer chipper cyclone. Use the emission factors for removed cyclone CY-24

(2) SCC Code, Info from PM Calculator, 307008: PM10 is 51% of PM and PM2.5 is 15% of PM, green wood

TRUCK BIN LOADOUT

Sawdust picked up pneumatically and transferred to cyclones IFG-CY3, IFG-CY4A and IFG-CY4B drops to a high pressure line and is transported pneumatically to the cyclones on the truck bins (IFG-CY6, IFG-CY7 and IFG-CY8). If needed, the sawdust can be diverted from cyclones IFG-CY3, IFG-CY4A and IFG-CY4B to the floor of the chip vault.

TRUCK BIN LOADOUT, GREEN

114,000 Tons of Sawdust/Year
8,760 Hours per year, PTE

PM:	Emission Factor:	0.80 lbs/ton	Idaho DEQ Bin Unloading Factor, green material
	Controlled EF:	0.12 lbs/ton	85% control for side enclosures
	Emissions:	6.84 tons/year	
PM10:	Emission Factor:	0.48 lbs/ton	Idaho DEQ Bin Unloading Factor, green material
	Controlled EF:	0.07 lbs/ton	85% control for side enclosures
	Emissions:	4.10 tons/year	Based on site observations
PM2.5:	Emission Factor:	0.02088 lbs/ton	PM2.5 is 29% of PM10 for green material handling
	Emissions:	1.19 tons/year	Based on EPA's PM Calculator Program

SAWDUST DIVERT TO CHIP VAULT

Chip vault is enclosed on the sides.
Allow 50% control efficiency

200 units per year
1.68 tons per unit
336 tons per year diverted

PM:	Emission Factor:	0.80 lbs/ton	Idaho DEQ Bin Unloading Factor, green material
	Controlled EF:	0.12 lbs/ton	85% control for side enclosures
	Emissions:	0.02 tons/year	
PM10:	Emission Factor:	0.48 lbs/ton	Idaho DEQ Bin Unloading Factor
	Controlled EF:	0.24 lbs/ton	85% control for side enclosures
	Emissions:	0.04 tons/year	
PM2.5:	Emission Factor:	0.0696 lbs/ton	PM2.5 is 29% of PM10 for green material handling
	Emissions:	0.01 tons/year	

Planer shavings picked up pneumatically and transferred to baghouses IFG-BH1, IFG-BH2 and IFG-BH3 drop to a high pressure line and are transported pneumatically to the cyclones on the truck bins (IFG-CY6, IFG-CY7 and IFG-CY8). Planer chips from cyclones IFG-CY1 and IFG-CY2 are also blown to the cyclones on the truck bins.

TRUCK BIN LOADOUT, DRY

61,000 Tons of shavings/year
21,000 Tons of planer chips/year
82,000 Total dry tons/year
8,760 Hours per year, PTE

PM:	Emission Factor:	2.00 lbs/ton	Idaho DEQ Bin Unloading Factor, dry material
	Controlled EF:	0.30 lbs/ton	85% control for side enclosures
	Emissions:	12.30 tons/year	
PM10:	Emission Factor:	1.20 lbs/ton	Idaho DEQ Bin Unloading Factor, dry material
	Controlled EF:	0.18 lbs/ton	85% control for side enclosures
	Emissions:	7.38 tons/year	
PM2.5:	Emission Factor:	0.09 lbs/ton	PM2.5 is 50% of PM10 for dry material handling
	Emissions:	3.69 tons/year	Based on EPA's PM Calculator Program

TRUCK BIN LOADOUT, CONTINUED

The pneumatic transport systems for green and dry material are equipped with diversion gates, upstream of the cyclones.
If the bins cannot receive material, the diversion gates allow material to be blown direcetly into a truck or to the ground.
This is part of the system, and emissions have been estimated for this operation.

PNEUMATIC DIVERT - GREEN AND DRY MATERIAL

Divert is equipped with water sprays		28 tons per truck	
Allow 50% control efficiency		24 trucks per year	
		672 tons per year diverted	
PM:	Emission Factor:	2.0 lbs/ton	Idaho DEQ Bin Unloading Factor, dry material
	Controlled EF:	1.0 lbs/ton	50% control for water spray
	Emissions:	0.34 tons/year	
PM10:	Emission Factor:	1.2 lbs/ton	Idaho DEQ Bin Unloading Factor, dry material
	Controlled EF:	0.6 lbs/ton	50% control for water spray
	Emissions:	0.20 tons/year	
PM2.5:	Emission Factor:	0.3 lbs/ton	PM2.5 is 50% of PM10 for dry material handling
	Emissions:	0.10 tons/year	(use dry factor for green and dry material)

The air exhaust streams from the cyclones on the truck bins (IFG-CY6, IFG-CY7 and IFG-CY8) are routed through a pollution control baghouse, IFG-BH4. Emissions from baghouse IFG-BH4 are calculated below.

Total Fugitive Emissions Associated with Dry Fuel Bins
Former CWP Source PNP383

Total PM:	Total PM:	19.50 tons/year	
Total PM10:	Total PM10:	11.73 tons/year	(PNP383 was 11.9 tpy)
Total PM2.5:	Total PM2.5:	4.99 tons/year	

TRUCK BIN CYCLONES BAGHOUSE (IFG-BH4)

		72,000 scfm	Rated Flow
		8,760 hours/yr	Potential
PM/PM10:	Emission Factor:	0.006 gr/dscf	Manufacturer Baghouse Emission Rate
	Emissions:	16.22 tons/year	
		3.70 lbs/hr	
PM2.5:	Emission Factor:	0.003 gr/dscf	PM2.5 is 50% of PM10 for dry material handling
	Emissions:	8.11 tons/year	
		1.85 lbs/hr	

Fugitive Dust - PAVED ROADS

Calculations based on AP-42 Section 13.2.1.3, rev. 1/11

Source	Class	Number Trips Per Year	Distance per Trip (miles)	VMT per Year	Avg. Vehicle Weight W	Weighted Vehicle Weight
Fork Lifts	Paved, Loaded	2,106,054	0.10	210,605	4.2	1.97
	Paved, Empty	2,106,054	0.10	210,605	1	0.47
LumberTrucks	Paved, Loaded	19,501	0.70	13,650	40	1.22
	Paved, Empty	19,501	0.70	13,650	13	0.40
Other	Paved, Loaded	0	0.00	0	0	0.00
	Paved, Empty	0	0.00	0	0	0.00
Misc. Vehicles incl employee	Paved	0	0.00	0	3	0.00
		4,251,109		448,512		4

E=k(sL)^0.91(W)^1.02 *[1-1.2*P/N]

	PM	PM10	PM2.5
k =	0.011	0.0022	0.00054
sL=	1.1	1.1	1.1
W =	4	4	4
E=	0.030	0.006	0.001
	lb/VMT	lb/VMT	lb/VMT
% control from washing/sw	50%	50%	50%

P= 120
N= 365

Total PM Emissions:	**3.4**	**tpy**
Total PM10 Emissions:	**0.68**	**tpy**
Total PM2.5 Emissions:	**0.17**	**tpy**

Fugitive Dust - UNPAVED ROADS

Calculations based on AP-42 Section 13.2.2, rev. 12/06

Source	Class	Number Trips Per Year	Distance per Trip (miles)	VMT per Year	Avg. Vehicle Weight W	Weighted Vehicle Weight
Log Trucks	Unpaved, Loaded	45,130	1.00	45,130	42.5	13.6
	Unpaved, Empty	45,130	1.00	45,130	17.0	5.4
Log Yard Loaders	Unpaved, Loaded	63,182	0.10	6,318	78.0	3.5
	Unpaved, Empty	63,182	0.10	6,318	53.0	2.4
Dump Truck Scrap Wood	Unpaved, Loaded	4,820	0.20	964	52.5	0.4
	Unpaved, Empty	4,820	0.20	964	15.0	0.1
Bucket Loaders Scrap Wood	Unpaved, Loaded	9,640	0.10	964	15.0	0.1
	Unpaved, Empty	9,640	0.10	964	10.0	0.1
Shavings/Sawdust Trucks	Unpaved, Loaded	9,608	0.50	4,804	52.5	1.8
	Unpaved, Empty	9,608	0.50	4,804	18.0	0.6
Misc. Vehicles incl employee	Unpaved	50,000	0.50	25,000	1.0	0.2
		314,758		141,360		28.1

E = [k(s/12)^a*(w/3)^b]

	PM	PM10	PM2.5	
k =	4.9	1.5	0.15	
Composite s=	1	1	1	Only a little traffic is in the logyard at 4.8% silt.
W =	28	28	28	The rest is on graveled plant areas.
a=	0.7	0.9	0.9	Use s=1%
b=	0.45	0.45	0.45	
Uncontrolled E=	2.353 lb/VMT	0.438 lb/VMT	0.044 lb/VMT	
Uncontrolled Eext=	1.58 lb/VMT	0.29 lb/VMT	0.03 lb/VMT	P= 120 N= 365
Controlled E=	0.790 lb/VMT	0.147 lb/VMT	0.015 lb/VMT	Watering provides 50% control

Total PM Emissions:	**55.8**	**tpy**
Total PM10 Emissions:	**10.40**	**tpy**
Total PM2.5 Emissions:	**1.04**	**tpy**

Emissions of hazardous air pollutants from lumber drying

Mike Milota*
Paul Mosher

Abstract

NCASI Method 105 was used during lumber drying to measure emissions of methanol, phenol, formaldehyde, acetaldehyde, propionaldehyde, and acrolein from red alder (*Alnus rubra*), ponderosa pine (*Pinus ponderosa*), white wood (a mix of western pines, fir, and spruce), Douglas-fir (*Pseudotsuga menzeisii*), western hemlock (*Tsuga heterophylla*) and white spruce (*Picea glauca*). Methanol and acetaldehyde were emitted in the greatest quantities. Results indicate a strong dependence on temperature for methanol and formaldehyde while the other compounds do not show a consistent trend. At conventional temperature, the acetaldehyde was often emitted in a greater amount than the methanol. At the higher temperature the reverse was true. The information should be helpful to mills drying these species for making a decision about whether they are a major source for HAPs as defined by the Environmental Protection Agency. The results should also be helpful in planning future testing.

The emission of organic compounds is of great importance to the forest products industry due to current and pending federal maximum achievable control technology (MACT) rules related to the hazardous air pollutants (HAPs) emitted from dryers, presses, and boilers. Hazardous air pollutants are a subset of the total organic material or volatile organic compounds (VOCs) emitted during processing. For purposes of the MACT rules, methanol, phenol, formaldehyde, acetaldehyde, propionaldehyde, and acrolein are considered surrogates for all HAPs from wood dryers and presses. These HAPs were measured for some western species in the work presented.

A facility with the potential to emit greater than 10 t/y (tons per year) of any one HAP or 25 t/y of combined HAPs from the site is considered a major source for HAPs and must comply with the MACT rules. This means adding end-of-pipe control equipment on certain dryers, presses and boilers, continuous monitoring, and certain reporting requirements. Lumber dry kilns were excluded from the requirement for controls; however, this exclusion is in review due to court rulings in June of 2007.

Facilities had the opportunity to demonstrate that the concentration of HAPs crossing the fence line did not pose a health risk to neighbors in lieu of control equipment (known as the low-risk option). Qualifying for this required knowing how much HAPs are emitted and modeling the dispersion of the HAPs into the environment. Lumber dry kilns were particularly problematic in qualifying for this option because of small amounts of acrolein and the lack of a single discharge point. This option was also affected by recent court rulings and will probably not be available in the future.

Three methods are generally accepted by regulatory agencies for HAP testing from wood processing equipment. All can be found in the National Council for Air and Stream Improvement's Methods Manual (NCASI 2007). Methanol, formaldehyde, and phenol are measured using NCASI Method CI/WP–98.01 by bubbling a gas sample through water in chilled impingers and absorbing the HAPs into the water phase. The other HAPs are too volatile or unstable for Method 98.01 to work well. This is compensated for in NCASI Method 99.02 by sampling the gas leaving the impingers using an evacuated Summa canister. This method, however, is expensive, much more complex, and can give variable results. NCASI Method ISS/FP–A105.01 was recently developed as a modification to Method 98.01 to eliminate the need for canisters by derivatizing the aldehydes to more stable and less volatile aldehyde oximes which remain in the water phase.

NCASI (2002), one in a series of technical bulletins on the emissions from many types of wood processing equipment,

The authors are, respectively, Professor and Research Assistant, Wood Science and Engineering, Oregon State University, Corvallis, Oregon (Mike.Milota@OregonState.edu, Paul.Mosher@OregonState.edu). The authors appreciate support from AMEC, Hampton Affiliates, National Council for Air and Stream Improvement, Rosboro Lumber, West Fraser, and Weyerhaeuser. This paper was received for publication in August 2007. Article No. 10394.
*Forest Products Society Member.

Forest Prod. J. 58(7/8):50–55.

Table 1. — Past studies of MACT HAP emissions.

Source	Species	Temperature	MC Initial	MC Final	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
		(°F (°C))	(percent)		(lb/mbf)				
NCASI 2002	Loblolly pine[1]	235 (112.7)	NA	22	0.240	0.018	0.044	0.002	0.006
NCASI 2002	Loblolly pine[2]	235 (112.7)	NA	12 to 15	0.200	0.013	--	--	--
Milota 2005	White spruce[1]	221 (105)	32.4	15	0.021	0.0014	0.018	NA	0.0006
McDonald 2002	Radiata pine	212 (100)	140	3.5	0.139	0.005	0.042	NA	NA

[1]Measured using NCASI Method 99.02.
[2]Measured using NCASI Method 98.01.

reports on southern pine lumber dried in commercial and laboratory kilns. The HAPs were measured by Method 99.02, and the results are shown in **Table 1**. This was some of the first work on HAPs from lumber drying and formed a basis for regulations and agency testing requirements. Methanol was the HAP emitted in the largest quantity, and it seemed clear from the results that a producer would reach 10 t/y of methanol before reaching 25 t/y of combined HAPs from lumber kilns. Based on this assumption, most testing of kiln exhaust has been conducted using NCASI Method 98.01 for methanol and formaldehyde and, at least for lumber, the other four MACT HAPs have been largely ignored.

MacDonald et al. (2002) measured the full spectrum of compounds emitted from radiata pine. The methanol emissions from the radiata were lower than the southern pine, however, the drying temperature was lower. Milota and Mosher (2006) demonstrated that there is a strong effect of temperature on methanol emissions. In unpublished work done in 2005, Milota found low levels of HAP emissions from white spruce (**Table 1**). This was consistent with the low starting moisture content.

The present work was initiated after higher than expected levels of acetaldehyde were measured from lumber as it dried. This work had two main objectives. One was to determine the HAP emissions for several species. A second was to determine how the emissions of the lesser reported HAPs, such as acetaldehyde, vary with kiln temperature. The results are significant to many facilities that have based operating permits only on the levels of methanol and formaldehyde emitted. They are also important to facilities that want to use actual measured emission factors rather than Environmental Protection Agency (EPA) estimates.

Procedures

Red alder (*Alnus rubra*), ponderosa pine (*Pinus ponderosa*), white wood (a mix of western pines, fir, and spruce), Douglas-fir (*Pseudotsuga menzeisii*), and western hemlock (*Tsuga heterophylla*) were obtained from mills in western Oregon and Washington. White spruce (*Picea glauca*) was obtained from a western Canadian mill. All lumber was sampled by mill personnel, cut to 4-foot (1.22-m) lengths, and wrapped in plastic. Sampling was conducted over an extended time at the mills to assure that pieces from different logs were sampled. The lumber arrived in Corvallis within 48 hours of shipping. The lumber was then stored in either a refrigerator or freezer, depending on the length of time until it would be dried. The red alder lumber was 5/4 random width. The softwoods were 2 by 4 or 2 by 6 dimension lumber.

The small laboratory kiln and procedures described in Milota and Mosher (2006) were used to dry the wood. The kiln is approximately 1.22 m (4 ft.) on each side. Dry- and wet-bulb temperatures are measured on the entering-air side of the load. The kiln is indirectly heated by steam to maintain the desired dry-bulb temperature. Humidity is controlled by regulating dry compressed air entering the kiln to maintain the desired wet-bulb temperature.

Prior to drying, the lumber was trimmed to 1.12 m (44 in) by removing 50 mm from each end and placed in the kiln on 19-mm-thick stickers (3/4 in). The loads were two to three boards wide, depending on the lumber width, and 10 to 14 courses high, depending on thickness. The conventional temperature drying schedules (<94 °C) were provided by the mills supplying the lumber. The higher temperature drying schedule was selected to match that used in NCASI (2002). The final dry-bulb setting for each schedule is shown in the results. The air velocity was 750 ft/min (3.8 m/s). Each board was weighed prior to and after drying, then ovendried and reweighed so that the initial and kiln-dry moisture contents could be determined. Drying from green to the final moisture content was accomplished without opening the kiln or other interruptions.

Hydrocarbon measurement

A 1.8 L/min gas sample was withdrawn from the kiln near the exhaust port and directed to a JUM VE7 hydrocarbon analyzer. Heated dilution gas was metered into the hydrocarbon sample gas, if necessary, to lower the gas moisture content to less than 15 percent. All components were heated to prevent the condensation of water or organics. The hydrocarbon analyzer was calibrated every three to six hours by introducing calibration gases (EPA protocol 601 ppm, EPA Protocol 300 ppm, and < 0.1 ppm air) near the probe tip at ambient pressure. The methodology followed is similar to EPA Method 25A (Code of Federal Regulations 1991).

HAP sampling

The sampling train for Method 105 is shown in **Figure 1**. The impingers were in a stirred glycol solution maintained at −1 °C. Prior to each sampling interval, the impingers were lab washed and 15 mL of BHA solution were added to each. The solution contained a stoichiometric excess of 0-benzylhydroxylamine hydrochloride for derivitization of the aldehydes to aldehyde oximes. After assembly, the sampling train was checked for leaks by drawing a vacuum. The gas flow rate through the sampling train, 450 to 500 mL/min, was measured using a bubble meter before and after each sampling interval. There were 7 to 28 sampling intervals per kiln charge, each from two to three hours in duration after which the liquid from the impingers was weighed and placed in a vial. The impingers were rinsed with water, then hexane, and these rinses

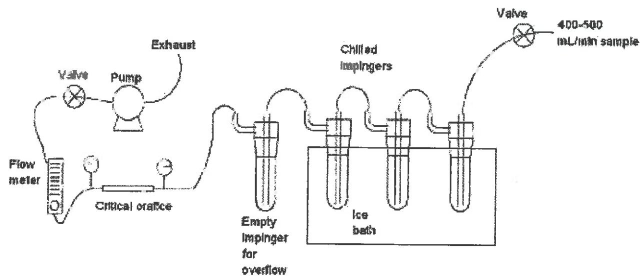


Figure 1. — HAPs sampling train. Three trains were used so that duplicates and recovery spikes could be run.

were added to the vial. It was then refrigerated. Blanks of BHA solution, duplicate samples, and recovery spikes were collected for almost every charge. In the lab the samples were extracted with hexane. The aqueous fraction was analyzed by gas chromatography with a flame ionization detector for methanol and phenol. The hexane fraction was analyzed by gas chromatography with a nitrogen-phosphorous detector for the oximes of formaldehyde, acetaldehyde, propionaldehyde, and acrolein. The complete procedures are described in NCASI (2007).

A kiln blank and a sticker blank were run by bringing the kiln to 82.2 °C over a 30-minute period with no wood or stickers. At this point, a 2-hour Method 105 sample was taken. The kiln was then briefly opened, the stickers normally used for drying were placed in the kiln, and the kiln was closed. Another 2-hour Method 105 sample was then taken. The samples were then analyzed as described above.

Calculations

Hydrocarbon emissions are calculated from the concentration detected by the analyzer and the vent rate of the dryer. The analyzer reading in parts per million is converted to a dry gas concentration (mass/volume) using psychrometric relations and the ideal gas law. This value is then is multiplied by the dry gas flow rate (volume/time) and the result integrated over time. The total hydrocarbon values are expressed as carbon (denoted as lb_c) meaning that only the mass of the carbon is used in calculating the hydrocarbon mass in the wood exhaust. No correction is made for the response of the analyzer to oxygenated compounds.

The mass of HAPs in the impingers is determined from the concentrations detected in the water or hexane and quantity of each solvent. The HAPs emitted from the kiln are calculated by scaling up the mass collected in the impingers by the ratio of the gas flow rate through the kiln to the gas flow rate through the impingers. This ratio varies from approximately 20 to 400 depending on the vent rate of the kiln. HAP sampling at the kiln occurred during 60 to 80 percent of the kiln cycle. For the periods between samples, an average emission rate was calculated based on the mass collected during the periods before and after the interval.

Results and discussion

VOC emissions of 1.6 and 3.0 lb_c/mbf were measured from ponderosa pine lumber at conventional and high temperature, respectively (**Table 2**). The value measured at low temperature compares favorably with1.42 lb_c/mbf measured previously (Milota 2006b) for drying at 82.2 °C. The value measured at high temperature was within the range of 2.4 to 4.4 reported in NCASI (2002) for loblolly pine dried at 112 °C. For Douglas-fir and western hemlock (**Tables 3** and **4**), the levels of VOC emissions are similar to those reported in Milota (2006b) and Milota and Mosher (2006), respectively. There are no values for comparison to the VOC emissions for the spruce and white wood (**Tables 5** and **6**). The 0.17 lb/mbf of VOC emissions from red alder lumber during drying (**Table 7**) are slightly lower than previously reported (Milota 2006a), 0.2 lb/mbf. However, given the variability in the past work, the present value is not inconsistent. VOC emissions increased to 0.66 at 235 °F. Current industrial practices do not use this high of a temperature; however, red alder can be dried with good quality at high temperature (Kozlik and Boone 1987).

The methanol emissions from ponderosa pine at conventional temperature were lower (0.035 versus 0.065 lb/mbf) and the formaldehyde emissions were similar (0.0027 versus 0.0029 ln/mbf) to those reported in Milota (2006b) for ponderosa pine at 82.2 °C. At high temperature, the methanol and formaldehyde emissions were lower than reported for loblolly pine dried at the same temperature (**Table 1**), 0.144 compared to 0.22 to 0.24 lb/mbf and 0.009 versus 0.013 to 0.018 lb/mbf, respectively.

The acetaldehyde and propionaldehyde emissions from ponderosa pine were similar to those reported for loblolly pine and the acrolein emissions were higher. The acrolein reported by NCASI was measured using Method 99.02 and the stability of acrolein might result in a low value. Phenol emissions were not detected for ponderosa pine or any other species in this study.

The methanol and formaldehyde emissions from Douglas-fir lumber (**Table 3**) measured at 76.7 °C (170 °F), 0.024 and 0.0008 lb/mbf, are almost identical to those previously reported at the same temperature (Milota 2006b), 0.023 and 0.0010 lb/mbf. These increase by over a factor of four as the temperature is raised to 112.7 °C (235 °F). The quantity of acetaldehyde emitted was similar to methanol at conventional temperature; however, at high temperature, the acetaldehyde emitted (0.067 lb/mbf) was considerably less than the methanol (0.117 lb/mbf).

The methanol emissions from western hemlock lumber (**Table 4**) ranged from 0.075 to 0.187 lb/mbf and the formaldehyde emissions from 0.0014 to 0.0045 lb/mbf. These are 10 to 20% lower than predicted by the equation in Milota and Mosher (2006). The equation, however, is based on emissions as measured by Method 98.01. Past work (Milota and Mosher 2008) suggests that Method 105 gives lower results, especially for formaldehyde. The methanol emissions more than double between 82.2 °C and 112.7 °C and the formaldehyde emissions more than triple. The quantity of acetaldehyde emitted was similar to or greater than the methanol at conventional temperature but less than the methanol at the high temperature.

White spruce (**Table 5**) had lower HAP emissions than the other species; however, the wood was at low initial moisture content. The past results in **Table 1** are from the same shipment of spruce; however, the previous work was done using NCASI Method 99.02 during drying at 105 °C. If one adjusts for temperature, it can be seen in **Table 6** that the HAP emissions in the present study are somewhat higher than

Table 2. — HAP emissions from ponderosa pine. The last row is the ratio of the emissions at high temperature to lower temperature.

Temperature	MC Initial	MC Final	VOC	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
(°F (°C))	(percent)		(lb/mbf)					
170 (76.7)	82.6	15.0	1.59	0.035	0.0027	0.042	0.0019	0.0017
235 (112.7)	89.1	15.0	3.00	0.144	0.0092	0.028	0.0032	0.0045
ratio				4.11	3.41	0.66	1.68	2.64

Table 3. — HAP emissions from Douglas-fir.

Sample	Temperature	MC Initial	MC Final	VOC	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
	(°F (°C))	(percent)		(lb/mbf)					
B	170 (76.7)	56.9	15.0	0.241	0.024	0.0008	0.030	0.0004	0.0005
C	180 (82.2)	43.7	15.0	0.575	0.050	0.0023	0.050	0.0005	0.0009
A	200 (93.3)	64.3	15.0	0.707	0.068	0.0018	0.043	0.0005	0.0009
A	200 (93.3)	59.5	15.0	0.879	0.069	0.0019	0.071	0.0006	0.0004
C	235 (112.7)	47.7	15.0	1.206	0.117	0.0043	0.067	0.0008	0.0012

Table 4. — HAP emissions from western hemlock.

Sample	Temperature	MC Initial	MC Final	VOC	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
	(°F (°C))	(percent)		(lb/mbf)					
D	180 (82.2)	102.3	15.0	0.142	0.075	0.0014	0.078	0.0020	0.0012
F	180 (82.2)	93.5	17.5	0.236	0.094	0.0015	0.141	0.0008	0.0012
E	200 (93.3)	83.9	15.0	0.214	0.044	0.0008	0.133	0.0008	0.0024
E	200 (93.3)	98.6	15.0	0.239	0.077	0.0014	0.128	0.0010	0.0011
F	235 (112.7)	81.6	15.0	0.247	--	--	--	--	--
F	235 (112.7)	76.2	15.0	0.226	0.187	0.0045	0.084	0.0014	0.0019

Table 5. — HAP emissions from white spruce. The last row is the ratio of the emissions at high temperature to lower temperature.

Temperature	MC Initial	MC Final	VOC	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
(°F (°C))	(percent)		(lb/mbf)					
180 (82.2)	33.5	15.0	NA	0.025	0.0013	0.036	0.0003	0.0005
235 (112.7)	32.7	15.0	0.11	0.078	0.0044	0.031	0.0007	0.0010
ratio				3.12	3.38	0.86	2.33	2.00

Table 6. — HAP emissions from white wood. The last row is the ratio of the emissions at high temperature to lower temperature.

Temperature	MC Initial	MC Final	VOC	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
(°F (°C))	(percent)		(lb/mbf)					
190 (87.7)	119.2	15.0	1.39	0.074	0.0045	0.144	0.0044	0.0050
235 (112.7)	106.8	15.0	2.31	0.188	0.0101	0.049	0.0043	0.0058
ratio			1.66	2.54	2.24	0.34	0.97	1.16

previously measured; however, the measurement method is different. Again in this data set, the methanol emissions greatly increase with temperature while the acetaldehyde emissions do not.

The exact values for the HAP emissions from the white wood sample are of limited value because it is a mixture of species that can change with log supply. The sample dried was at least 50 percent ponderosa pine accounting for the relatively high VOC emissions. The important thing to note from this data is the trend for methanol emissions to increase with temperature while acetaldehyde emissions do not (**Table 6**).

The methanol emissions from red alder at the lower temperature, 0.173 lb/mbf, were greater than for many of the softwoods. This may be due to the greater number of methoxy

Table 7. — HAP emissions from red alder. The last row is the ratio of the emissions at high temperature to lower temperature.

Temperature	MC Initial	MC Final	VOC	Methanol	Formaldehyde	Acetaldehyde	Propionaldehyde	Acrolein
(°F (°C))	(percent)		(lb/mbf)					
180 (82.2)	102.1	8.0	0.173	0.124	0.0009	0.114	0.0014	0.0011
235 (112.7)	100.1	10.2	0.659	0.416	0.0048	0.129	0.0016	0.0018
ratio				3.55	5.45	1.13	1.14	1.64

groups on the hardwood lignin compared to softwood lignin. Acidic conditions in the wood in the presence of water at the temperatures encountered during drying might cleave these groups. The acetaldehyde was also relatively high for the red alder compared to most of the softwoods. The glucuronoxylan component of the hardwood hemicellullose has a greater number of acetyl groups per monomer unit than the hemicellulose in softwoods. Acid hydrolysis of these groups at the dryer temperature may contribute to acetaldehyde formation. Neither of these suggested mechanisms has been proven, however. As with the softwoods, the HAP emissions increase with temperature. Despite the HAP emissions being higher from the red alder, hardwood mills tend to be smaller than softwood mills and are unlikely to be a major source for HAPs.

All of the HAPs measured in this paper were obtained by NCASI Method 105. The spike recoveries ranged from approximately 60 to 99 percent. The poorest spike recoveries were for the formaldehyde. The best spike recoveries were for methanol (usually > 90%) and acetaldehyde (usually > 80%). While these are satisfactory in the published method for the concentrations measured, they indicate that another method might give higher results for the emissions. A comparison of Method 105 to 98.01 can be found in Milota and Mosher (2008).

The pattern of emissions during the kiln cycle is shown for hemlock at high and conventional temperature in **Figure 2**. At the conventional temperature (top graph), the rate of emissions decreases with time for all compounds after the initial warm up period. This was generally true for all species tested. Acetaldehyde emissions in particular are high early in the cycle while the temperature is lower. At high temperature (bottom graph), the rate of methanol and formaldehyde emissions increased dramatically as the wood dries. This occurred with every species tested. At high temperature, the rate of emission of the other HAPs do not follow a consistent pattern.

The kiln and sticker blanks had minimal emissions. When the stickers were present, the emissions were similar to or less than less than from the empty kiln for all HAPs except methanol. Methanol was not detected from the empty kiln. We therefore conclude that the stickers are not contributing to the HAPs, except methanol. If the sticker blank had been a 48-hour cycle, the methanol, acetaldehyde, and formaldehyde released would have been approximately 1, 0.01, and 9 percent, respectively, of that emitted during a typical kiln cycle. The formaldehyde value is higher; however, it still constitutes only about 1 to 3 percent of the total HAPs that would be detected during a kiln cycle. Thus, any effect on total HAPs due the kiln and stickers is minor. Also, if the kiln had been run longer prior to testing, the results would likely be lower because the kiln would have had time to bake out. As run, the kiln and sticker blanks represent a worst case. The results suggest that either HAPs are adsorbing onto the kiln walls or absorbing in the wet-bulb water and desorbing or, that residue in the kiln is degrading.

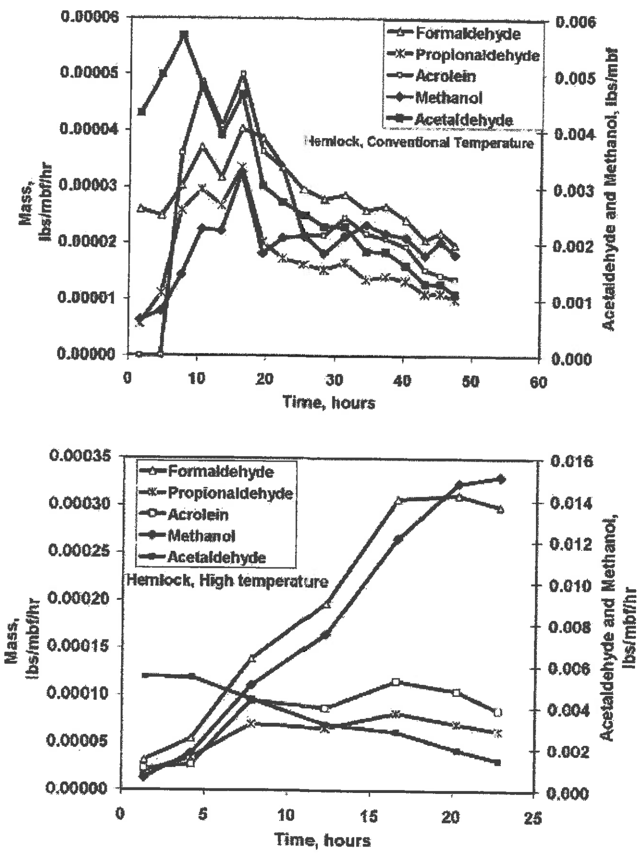


Figure 2. — Rate of HAP emissions (lb/mbf/hr) from hemlock lumber drying at conventional- (upper) and high-temperature (lower) drying.

Subpart DDDD (Code of Federal Regulations 2004) contains some emission factors intended to be used with the low-risk option; however, they tend to be more broadly applied by state regulatory agencies. Data in this paper suggest that the acrolein estimate in Subpart DDDD is high by a factor of eight or more and mills could easily justify a lower value by site specific testing. The EPA estimate for acetaldehyde, 0.065 lb/mbf, is low for hemlock and alder and high for the other species tested. Similarly, the estimate for formaldehyde (0.034 lb/mbf) is high in many cases, but low at high temperature. In contrast to the EPA estimate of 0.01 lb/mbf, no phenol was detected.

To date, the industry has not paid much attention to acetaldehyde emissions from lumber drying when deciding if a facility is a major source for HAPs because the methanol emissions from lumber drying were assumed to be so much greater than the other HAPs. This assumption was based on the NCASI (2002) study in which southern pine lumber was dried at a 112.7 °C. As a result, other studies have concentrated on quantifying the methanol. The current research suggests that this is a poor assumption and the acetaldehyde emissions may be at least equal to and often greater than the methanol emissions at conventional kiln temperatures.

Conclusions

HAP emissions vary greatly among species. The hardwood species tested had the highest HAP emissions, probably due to the great number of methoxy groups in hardwood lignin and the higher hemicellulose content and number of acetyl groups.

Overall, HAP emissions increase with temperature; however, not all the HAPs are affected by temperature in the same way. Methanol and formaldehyde emissions increase dramatically with temperature while acetaldehyde emissions may decrease.

At conventional temperatures, the acetaldehyde emissions are on the same order as the methanol emissions and should not be neglected when calculating total HAPs.

Literature cited

Code of Federal Regulations (CFR). 1991. Method 25A – Determination of total gaseous organic concentration using a total hydrocarbon analyzer. Protection of the Environment, CFR 40 Part 60, Appendix A, Method 25A. pp. 1070–1073.

__________. 2004. National emission standards for hazardous air pollutants: plywood and composite wood products. CFR 40 Part 63, subpart DDDD. pp. 221–270.

Kozlik, C.J. and R.S. Boone. 1987 High-temperature kiln-drying of 1-inch red alder lumber. Forest Prod. J. 37(6):21–24.

McDonald, A.G., P.H. Dare, J.S. Gifford, D. Steward, and S. Riley. 2002. Assessment of air emissions from industrial kiln drying of *Pinus radiata* wood. Holz als Roh- und Werkstoff. 60(3):181–190.

Milota, M.R. 2006a. Total hydrocarbon emissions from red alder lumber during drying. Forest Prod. J. 56(2):30–32.

__________. 2006b. Hazardous air pollutant emissions from lumber drying. Forest Prod. J. 56(7/8):79–84.

__________ and P. Mosher. 2006. Emissions from western hemlock lumber during drying. Forest Prod. J. 56(5):66–70.

__________ and P. Mosher. 2008. A comparison of methods for measuring hazardous air pollutants from lumber dry kilns. Forest Prod. J. 58(7/8):46–49.

National Council for Air and Stream Improvement (NCASI). 2002. A comparative study of VOC emissions from small-scale and full-scale lumber kilns drying southern pine. Technical Bulletin #845. NCASI, Gainesville, Florida.

__________. 2007. NCASI Methods Manual. http://www.ncasi.org/publications/TOC/Default.aspx?id=6. Accessed Aug. 7, 2007. NCASI, Gainesville, Florida.

Vendor ID	Vendor Check Name	Date	
DEP001	DEPARTMENT OF ENVIRONMENTAL QUALITY	06/25/2012	0083647

Invoice Number	Date	PO Number	Description	Amount	Discount
062512	06/25/2012		PTC and Tier I Permit App Fee	$1,000.00	$0.00

	Amount	Discount	Paid Amount
TOTAL:	$1,000.00	$0.00	$1,000.00

ORIGINAL DOCUMENT PRINTED ON CHEMICAL REACTIVE PAPER WITH MICROPRINTED BORDER

IDAHO FOREST GROUP
Laclede Mill
PO Box 220
Laclede, ID 83841
(208) 255-3200

Mountain West Bank
125 Ironwood Drive
Coeur d' Alene, ID 83814
92-7195/123

0083647

Security Features Included. Details on back.

	DATE	AMOUNT
Pay One Thousand Dollars And 00 Cents	Jun 25, 2012	$1,000.00

to the Order of:

DEPARTMENT OF ENVIRONMENTAL QUALITY
FISCAL OFFICE - AQ TIER I REGISTRATION FEES
1410 NORTH HILTON
BOISE, ID 83706

SAFEGUARD SECURE

THIS DOCUMENT CONTAINS HEAT SENSITIVE INK. TOUCH OR PRESS HERE - RED IMAGE DISAPPEARS WITH HEAT.

⑈0083647⑈ ⑆123171955⑆ 10800151830⑈