Air Quality Permitting
Technical Analysis

May 15, 2003

Tier II Operating Permit No. T2-9512-147-1

Bennett Forest Industries, Inc.
Elk City, Idaho

AIRS Facility No. 049-00001

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FINAL PERMIT

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ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AP-42	Environmental Protection Agency's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, October 2001, Volume I: *Stationary Point and Area Sources*
BDT/hr	bone dry tons per hour
Btu/lb	British thermal units per pound
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
E	allowable emissions
gr/dscf	grains per dry standard cubic feet
GT/day	green tons per day
GT/hr	green tons per hour
GT/yr	green tons per year
HAP	Hazardous Air Pollutant
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound(s) per hour
lbs/Mbf	pounds per thousand board feet throughput
MACT	Maximum Available Control Technology
Mbf/hr	thousand board feet per hour
Mbf/yr	thousand board feet per consecutive 12-month period
MMbf	million board feet
MMbf/yr	million board feet per consecutive 12-month period
MMBtu/hr	million British thermal units per hour
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
PSD	Prevention of Significant Deterioration
PW	process weight
PWR	process weight rate
SIP	State Implementation Plan
SO_2	sulfur dioxide
T/yr	tons per year
ug/m^3	microgram per cubic meter
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01 Sections 400 through 461, *Rules for the Control of Air Pollution in Idaho,* for Tier II operating permits.

2. PROJECT DESCRIPTION

This project is for the issuance of a Tier II operating permit for Bennett Forest Industries, Inc. (formerly Shearer Lumber Products, Inc.) located in Elk City, Idaho. Bennett Forest Industries, Inc. (Bennett) has the potential to be a major facility, but has limited the throughput of wood products to the Stirling boilers, kilns, and cyclones to qualify as a synthetic minor.

Department of Environmental Quality (DEQ) staff has reviewed the information provided by Bennett regarding the operation of their facility located in Elk City, Idaho. Based on the information submitted, DEQ has drafted a Tier II operating permit for Bennett.

3. SUMMARY OF EVENTS

DEQ received an application for a Tier II operating permit from Bennett.

December 26, 1995	DEQ received a Tier I operating permit application from Shearer Lumber for their dimensional lumber mill located in Elk City, Idaho. The application was prepared by Hoy Environmental, the facility's consulting firm.
September 16, 1998	DEQ received a revised Tier I operating permit application.
November 16,1998	DEQ determined the revised Tier I operating permit application incomplete.
May 14,1999	DEQ received an updated Tier I operating permit application.
July 13, 1999	DEQ determined the updated Tier I operating permit application complete.
March 8, 2000-	30-day comment period for the Shearer Lumber draft Tier I
April 10, 2000	operating permit was held in accordance with IDAPA 58.01.01.364 of the *Rules*. There was no request for a hearing.

A final Tier I operating permit was never issued due to Shearer Lumber changing their source classification to synthetic minor.

March 21, 2002	DEQ received a partial application for a synthetic minor Tier II operating permit from Shearer Lumber that did not contain any modeling data.
May 10, 2002	DEQ received atmospheric dispersion modeling analyses
May 28, 2002	DEQ received an addendum to the synthetic minor Tier II operating permit application
May 29, 2002	DEQ declared the Tier II operating permit application complete.
September 19, 2002	DEQ issued a draft permit for facility review.
October 11, 2002	DEQ received comments from Bennett regarding draft permit. Within comments was a formal request to change facility name from Shearer to Bennett.
April 2, 2003 - May 2, 2003	DEQ held public comment period for proposed Tier II operating permit. DEQ's responses to public comments are presented in Appendix A.

4. FACILITY DESCRIPTION

General Facility Process Description

Bennett is a saw and planing mill located in Elk City, Idaho that manufactures dimensional lumber. The saw and planing mill typically operates in two nine-hour shifts, five days a week, 51 weeks a year. The boilers and kilns operate continuously except during one week when the mill is shut down for maintenance.

Bennett emits mainly particulate matter (PM), particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}), volatile organic compounds (VOCs), and carbon monoxide (CO). Bennett's emissions are primarily from two hog fuel boilers, four kilns, and four cyclones. In addition, there are several fugitive emissions sources.

Production at Bennett varies dependent on the timber species being processed and other factors. However, the operation is capable of producing approximately 100 million board feet per consecutive 12-month period (MMbf/yr). The product is usually kiln-dried dimensional (two inches thick and less) lumber.

Logs are sorted by species and somewhat by size. Logs are debarked and directed to a band saw or a chipper. Band saws and chippers square the log on two sides, producing slabs and chips in the process. Squared logs, called cants, are directed to band saws that reduce them to dimensional lumber.

Most lumber is dried to a predetermined moisture level in a series of steam-heated kilns before being sent to the planing mill for surfacing and final finishing. The planing mill generates shavings that are transferred to the shaving truck bin. The surfaced lumber is graded for quality and sent to trim saws to remove defective trim pieces.

Facility Classification

The facility is not a designated facility as defined in IDAPA 58.01.01.006.27. The facility is classified as a synthetic minor source because the potential emissions of any criteria pollutant are less than 100 tons per year (T/yr) and permitted hazardous air pollutants (HAPs) emissions are below the 10 T/yr for a single HAP and 25 T/yr for aggregated HAPs major source thresholds. This facility is a saw and planing mill manufacturer, Standard Industrial Classification 2421.

Area Classification

The facility is located within Air Quality Control Region 63 and is located in Elk City, Idaho, which is classified as attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen oxides (NO_X), CO, PM_{10}, ozone (O_3), fluorides, and lead (Pb). There are no Class I areas within 10 kilometers of the facility.

5. TECHNICAL ANALYSIS

Emission Estimates

A summary of emissions calculations and assumptions is presented in Appendix B.

Stirling Hog Fuel Boilers (B1):

The primary heat source for Bennett is two water-tube, wood fuel-fired boilers (B1). The boilers were designed by Stirling and constructed in 1957. The boilers have a combined potential steam production rate of 34,500 pounds per hour (lb/hr) of saturated steam. Approximately 96% of the steam is used in plant operations, and the remaining 4% is used for space heating. The boilers are fired by any combination of bark, sawdust, and wood shavings. This fuel is transferred to the boiler by the main fuel conveyor.

The facility uses an automatic fuel metering system for the boilers. The combustion gasses exhaust to the atmosphere through a common stack. The stack parameters of the common stack are detailed in Table 5.1. There are no control devices on the boiler exhaust.

Table 5.1 Common Stack Parameters

Parameter	Common Stack
Height (feet)	80
Diameter (feet)	4.2
Flow rate (minimum actual cubic feet per minute)	19,672
Temperature (minimum degrees Farenheit)	420

According to the application, the combined fuel consumption of the boilers is to be limited to 81.3 green tons per day (GT/day) and 29,000 green tons per consecutive 12-month period (GT/yr), and the average heat content of the fuel is approximately 5,405 British Thermal Units per pound (Btu/lb) fuel consumed. According to Section 1.6 of Environmental Protection Agency's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, October 2001, Volume I: *Stationary Point and Area Sources* (AP-42), *External Combustion Sources, Wood Residue Combustion in Boilers*, heating values for wood residues range from about 4,500 Btu/lb of fuel for wet wood to about 8,000 Btu/lb for dry wood. Emissions estimates are presented in the Table 5.2 and are based on emissions factors published in Table 1.6-1 of AP-42.

Table 5.2 Emissions Estimates – Wood-Fired Boilers

Pollutant	AP-42[a] Emissions Factor (lb/MMBtu)	Hourly Emissions Range (4,500 – 8,000 Btu/lb) (lb/hr)	Average Hourly Emissions (5,405 Btu/lb) (lb/hr)	Annual Emissions Range (4,500 – 8,000 Btu/lb) (T/yr)	Annual Emissions (5,405 Btu/lb) (T/yr)
PM	0.577	17.6 – 31.3	21.1	75.3 – 134	90.4
PM_{10}	0.517	15.8 – 28.0	18.9	67.5 – 120	81.0
NO_x[n]	0.22	6.7 – 11.9	8.1	29 – 51	34.5
SO	0.025	0.76 – 1.4	0.92	3.3 – 5.8	3.9
CO	0.60	18.3 – 32.5	22.0	78 – 140	94.0
VOC	0.038	1.2 – 2.1	1.4	5.0 – 8.8	6.0
Lead	4.8E-05	1.5E-03 – 2.6E-03	1.8E-03	6.3E-03 – 1.1E-02	7.5E-03

[a] Environmental Protection Agency's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, October 2001, Volume I: *Stationary Point and Area Sources*

Carbon monoxide and PM_{10} are the limiting pollutants in determining if Bennett classifies as a synthetic minor.

There is a noticeable difference between the emission factor proposed by Bennett and that in Table 1.6-1 of AP-42 for determining PM emissions rates from the Stirling boilers. Table 5.3 compares Bennett's proposed emissions estimates to those found in AP-42.

Table 5.3 BENNETT PROPOSED VS. AP-42 EMISSIONS ESTIMATES

Pollutant	AP-42[a] Emission Factor Range (pound per ton of wood burned)	AP-42 Annual Emissions Range (T/yr)	Proposed Emission Factor[b] (pound per ton of wood burned)	Proposed Annual Emissions (T/yr)
Particulate Matter	5.2 – 9.2	75.3 – 133.9	0.4	5.8

[a] Environmental Protection Agency's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, October 2001, Volume I: *Stationary Point and Area Sources*

[b] From particulate matter source test completed September 1994.

Kilns (P4, P5, P6, and P8):

Four kilns are operated at the facility (Kiln No. 0 [P4], Kiln No. 1 [P5], Kiln No. 2 [P6], and Kiln No. 4 [P8]). The drying kilns use steam from the boiler to dry the lumber. Each drying kiln has several vents located on the roof. These vents have lids that are mechanically controlled by humidity monitors. When the temperature/humidity within the kilns is too high, the lids will open and allow the emissions to escape to the atmosphere. The exhaust streams vary in height from 19 to 23 feet, with a temperature of 150 degrees °F. There are no control devices on the kiln exhaust.

Drying kiln No. 3 (P7) was taken out of operation to help qualify Bennett as a synthetic minor. The remaining drying kilns (P4, P5, P6, and P8) are used to dry the green lumber.

Criteria pollutant emissions from the kilns were estimated based on the material throughput rates presented in the May 28, 2002, addendum to the Tier II application. The average hourly throughputs were reported as 3.116 thousand board feet per hour (Mbf/hr) for Kilns No. 0 and 4, and 1.552 Mbf/hr for Kilns No. 1 and 2. Maximum hourly throughputs were reported as 3.739 Mbf/hr for Kilns No. 0 and 4, and 1.863 Mbf/hr for Kilns No. 1 and 2. Annual emissions were calculated assuming 8,760 hours of operation per year.

Emissions factors for PM, PM_{10}, and VOC emissions from lumber drying kilns were taken from Attachment B of a DEQ memorandum dated June 30, 1997. The memorandum is included as Appendix C. The memorandum stated emissions factors for lumber drying kilns are 0.33 pounds per thousand board feet (lbs/Mbf) for PM emissions, 0.19 lbs/Mbf for PM_{10} emissions, and 1.50 lbs/Mbf for VOC emissions.

Cyclones (P11, P13, P15, and P16):

The stack parameters for the each of the cyclones are detailed in Table 5.4.

Table 5.4 STACK PARAMETERS

Parameter	P11 (Fuel bin sawdust cyclone)	P13 (Chip cyclone)	P15 (Planer shavings cyclone)	P16 (Truck bin shavings cyclone)
Height (feet)	63	27	22	58
Diameter (feet)	4.0	3.0	6.2	4.3
Flow rate (minimum actual cubic feet per minute)	12,000	4,400	38,000	2,400
Temperature (minimum °F)	Ambient	Ambient	Ambient	Ambient

Criteria pollutant emissions from the cyclones were estimated based on the material throughput rates presented in the May 28, 2002, addendum to the Tier II application. Operational hours were assumed to be 13 hours per day and 365 days per year for the fuel bin sawdust cyclone and chip cyclone, and three hours per day and 365 days per year for both shavings cyclones. The throughput rates were reported in the addendum as follows:

- Fuel bin sawdust cyclone (P11): 0.131 bone dry tons per hour (BDT/hr) (average); 0.157 BDT/hr (maximum)
- Chip cyclone (P13): 7.872 BDT/hr (average); 9.447 BDT/hr (maximum)
- Planer shavings cyclone (P15) and Truck bin shavings cyclone (P16): 0.870 BDT/hr (average); 1.044 BDT/hr (maximum)

Emissions factors for PM and PM_{10} emissions from these cyclones were taken from Attachment B of a DEQ memorandum dated June 30, 1997. The memorandum stated emissions factors for medium efficiency cyclones (cyclones P11 and P13) to be 0.5 pounds per bone dry ton (lbs/BDT) for PM emissions and 0.25 lbs/BDT for PM_{10} emissions. The memorandum stated emission factors for high efficiency cyclones (cyclones P15 and P16) to be 0.2 lbs/BDT for PM emissions and 0.16 lbs/BDT for PM_{10} emissions.

Debarker (P1), Hog (P2), and Chipper (P12):

Criteria pollutant emissions from the debarker, hog, and chipper were estimated based on the material throughput rates presented in the May 28, 2002, addendum to the Tier II application. The throughputs were reported as follows:

- Debarker (P1): 56.168 GT/hr (average); 67.401 green tons per hour (GT/hr) (maximum); 257,810 GT/yr
- Hog (P2): 6.124 GT/hr (average); 7.348 GT/hr (maximum); 28,107 GT/yr
- Chipper (P12): 7.872 BDT/hr (average); 9.447 BDT/hr (maximum); 36,133 BDT/yr.

Emissions factors for PM and PM_{10} emissions from the debarker, hog, and chipper were taken from Attachment B of a DEQ memorandum dated June 30, 1997. It was assumed that the emissions from the hog and the chipper would be similar to the emissions from log debarker. The memorandum stated emissions factors to be 0.024 pounds per ton of logs processed for PM emissions and 0.011 pounds per ton of logs processed for PM_{10} emissions. Emissions from the debarker were calculated assuming an 80% capture efficiency of the building.

Wood Byproducts Bins (TR6, TR10, TR17, and TR18):

Wood byproducts generated during the creation of dimensional lumber generally consist of bark, sawdust, and shavings. These byproducts are generally moved from place to place through pneumatic devices that deliver the byproduct to cyclones. These cyclones in turn drop the byproduct into bins. Fugitive emissions are generated when the bins drop the wood byproduct into trucks. The type and approximate amount of material that is handled by each system are detailed in Table 5.5.

Table 5.5 TYPE/AMOUNT OF MATERIAL

Source	Material	Amount (bond dry T/yr)
TR6	Sawdust	12,169
TR10	Bark	20,606
TR17	Shavings	835
TR18	Chip	30,000

Fire Pump Engine and Emergency Standby Generator:

The facility operates a diesel-fired internal combustion engine to provide power to an emergency water pump. The engine has a rated capacity of 80 horsepower and is permitted to run up to one hour per day for testing and maintenance.

The facility operates a diesel-fired emergency standby generator to provide required electrical power when necessary. The engine has a rated capacity of 534 horsepower and is permitted to run up to one hour per day for testing and maintenance.

These engines emit PM_{10}, SO_x, NO_x, CO, and VOCs. Emissions estimates were calculated using emissions factors from Table 3.3-1 of AP-42, *Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines*.

Table 5.6 provides a summary of potential emissions from the facility excluding fugitive emission sources.

Table 5.6 POTENTIAL EMISSIONS

Potential Emissions[a] – Hourly (lb/hr), and Annual[b] (T/yr)												
Source Description	**PM**		**PM_{10}**		**NO_x**		**CO**		**VOC**		**SO_2**	
	lb/hr	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**	**lb/hr**	**T/yr**
Boiler[b]	31	94.5	23	84.7	12	36.0	33	98.3	2.1	6.22	1.4	4.1
Debarker (P1)	0.32	0.089	0.15	0.041	0	0	0	0	0	0	0	0
Hog (P2)	0.18	0.24	0.081	0.11	0	0	0	0	0	0	0	0
Kiln No. 0 (P4)	1.2	4.5	0.595	2.17	0	0	0	0	5.61	20.5	0	0
Kiln No. 1 (P5)	0.61	2.2	0.30	1.08	0	0	0	0	2.79	10.2	0	0
Kiln No. 2 (P6)	0.61	2.2	0.30	1.08	0	0	0	0	2.79	10.2	0	0
Kiln No. 4 (P8)	1.2	4.5	0.595	2.17	0	0	0	0	5.61	20.5	0	0
Fuel Bin Sawdust Cyclone (P11)	0.08	0.2	0.039	0.10	0	0	0	0	0	0	0	0
Chipper (P12)	0.23	0.31	0.10	0.14	0	0	0	0	0	0	0	0
Chip Cyclone (P13)	5	12	2.4	6.1	0	0	0	0	0	0	0	0
Planer Shavings Cyclone (P15)	0.2	0.1	0.17	0.076		0	0	0	0	0	0	0
Truck Bin Shavings Cyclone (P16)	0.2	0.1	0.17	0.076	0	0	0	0	0	0	0	0
Fire Pump Engine	0.176	0.044	0.176	0.044	2.5	0.62	0.534	0.134	0.201	0.050	0.164	0.041
Emergency Generator	1.17	0.294	1.17	0.294	17	4.14	3.57	0.892	1.34	0.335	1.09	0.274
Facility-Wide Potential Emissions	--	121	--	98.2	--	40.8	--	99.3	--	68.0	--	4.4

[a] As determined by a pollutant-specific U.S. EPA reference method, a DEQ-approved alternative, or as determined by the DEQ's emissions estimation methods used in this permit analysis.

[b] As determined by multiplying the actual or allowable (if actual is not available) pound per hour emissions rate by the allowable hours per year that the process(es) may operate, or by actual annual production rates.

Modeling

The modeling was prepared by the URS Corporation (URS). URS chose the EPA-approved ISCST3 model. The model was applied consistent with the EPA's *Guideline on Air Quality Models* (2001) and the state of Idaho's draft *Air Quality Modeling Guideline.*

The modeling demonstrated that ambient impacts of annual SO_2 and 1-hour and 8-hour CO were below the significant contribution levels identified in IDAPA 58.01.01.006.93. Ambient impacts from annual and 24-hour PM_{10}, 3-hour and 24-hour SO_2, and annual NO_2 are presented in Table 2.1. For additional details regarding facility-wide modeling results, please see the modeling memorandum in Appendix D.

Table 2.1 ISCST3 Modeling Findings

Pollutant	Averaging Period	Modeled Impact ($\mu g/m^3$)[a]	Background Concentration ($\mu g/m^3$)	Predicted Total Concentration ($\mu g/m^3$)	Idaho AAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Compliance (Yes/No)
NO_2	Annual	8.9	40	48.9	100	100	Yes
PM_{10}	24-Hour	109	40	146.6	150	150	Yes
	Annual	23.3	24	47.3	50	50	Yes
SO_2	24-Hour	5.93	120	125.93	365	365	Yes
	Annual	0.932	18.3	19.23	80	80	Yes

[a] Micrograms per cubic meter

Toxics

Tables D.1 and D.2 in Appendix E of this memorandum present a HAPs emissions inventory for non-carcinogens and carcinogens from the Stirling boilers. The emissions factors and pollutants are from Table 1.6-3 of AP-42.

The emissions estimates (lb/hr) from Tables B.1 and B.2 were added to determine the aggregate HAP emissions from the Stirling boilers. The aggregate HAP emissions from the Stirling boilers was determined to be 6.06 T/yr, based on the permitted throughput and hours of operation. The HAP emissions from the emergency generator and firepump engine were negligible.

Facility-wide HAP emissions are difficult to quantify due to the lack of emissions factors for HAPs with respect to the kilns, the largest source of HAP emissions at Bennett. The only DEQ-approved kiln emissions study that contained any HAP emissions factors was conducted by Oregon State University entitled, "*Small-Scale Kiln Study Utilizing Ponderosa Pine, Lodgepole Pine, White Fir and Douglas Fir*". The study tested for and derived EFs for methanol and formaldehyde. The worst-case emissions factors for the different types of wood studied were 0.148 lb/Mbf methanol (white fir) and 0.0041 lb/Mbf formaldehyde (lodgepole pine). Using the maximum lumber throughput to the kilns of 80,000 Mbf/yr, the annual emissions of methanol from the kilns would be 5.92 T/yr and formaldehyde would be 0.164 T/yr. The total HAP emissions from the Stirling boilers and kilns equals a facility-wide aggregated HAP emissions of 11.98 T/yr. The largest single HAP would then be methanol at 5.92 T/yr. On the basis of the previous calculations, the HAP emissions from Bennett satisfy the HAP minor source thresholds of 25 T/yr for aggregated HAPs and 10 T/yr for a single HAP.

6. PERMIT REQUIREMENTS

6.1 Regulatory Review

Scope

The purpose of the Tier II permit is to limit potential emissions to below major threshold emissions levels.

Facility-wide Conditions

Fugitive Emissions

The permittee is required to take all reasonable precautions to prevent particulate matter from becoming airborne in accordance with IDAPA 58.01.01.650-651. The permittee is required to perform quarterly fugitive emissions inspections to assure compliance with the fugitive emissions requirements.

Permit Conditions 2.3 and 2.4 require the permittee to take corrective action as expeditiously as practicable. In general, DEQ believes that taking corrective action within 24 hours of receiving a valid complaint, or determining that fugitive PM emissions are not being reasonably controlled, meets the intent of this requirement. However, it is understood that, depending on the circumstances, immediate action or a longer time period may be necessary.

Process Weight Rate

Emissions of PM shall not exceed the amounts allowed in IDAPA 58.01.01.702. IDAPA 58.01.01.702 states that: "No person shall discharge to the atmosphere from any source operating prior to October 1, 1979, particulate matter in excess of the amount shown by the following equations, where E is the allowable emissions from the entire source in pounds per hour, and PW is the process weight in pounds per hour:

a. If PW is less than 17,000 pounds per hour, $E = 0.045(PW)^{0.6}$

b. If PW is equal to or greater than 17,000 pounds per hour, $E = 1.12(PW)^{0.27}$

In addition, PM emissions shall not exceed the amount shown in IDAPA 58.01.01.701. IDAPA 58.01.01.701 states that: "No person shall discharge to the atmosphere from any source operating on or after October 1, 1979, particulate matter in excess of the amount shown by the following equations, where E is the allowable emission from the entire source in pounds per hour, and PW is the process weight in pounds per hour:

a. If PW is less than 9,250 pounds per hour, $E = 0.045(PW)^{0.6}$

b. If PW is equal to or greater than 9,250 pounds per hour, $E = 1.10(PW)^{0.25}$

The kilns, cyclones, and wood byproducts handling units are subject to process weight rate limitations. Table E.1 in Appendix F of this memorandum compares the potential PM emissions to the process weight rate emissions. The process weight emissions limit is not established as an enforceable permit condition because the permitted emissions limits are less than the limits established by the process weight equations.

6.3 *Stirling Hog Fuel Boilers*

Emissions Limits – (Permit Condition 3.2)

The Tier II permit establishes emissions limits for annual CO and PM_{10} emissions based on a 12-month rolling average. These annual emissions limits are established to ensure the facility retains its synthetic minor status. The permit also establishes an hourly PM_{10} emissions limit for the boilers, debarker, hog, sawdust cyclone, chipper, chip cyclone, planer shavings cyclone, and truck bin shavings cyclone. These emissions limits are established to assure compliance with the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS).

The boilers were installed in 1957; therefore, a grain loading emissions limit of 0.200 grains per dry standard cubic feet (gr/dscf) is established for the wood-fired boilers in accordance with IDAPA 58.01.01.677.

Compliance Assurance

To reasonably assure compliance with the annual emission limits and retain synthetic minor facility status, the permit limits the amount of fuel the permittee can burn in the boilers per consecutive 12-month period. The permit also limits the allowable lower heating value of fuels burned in the boilers, based on a weighted average. Based on these permitted limits, emissions calculations indicated CO and PM_{10} emissions are below 100 tons per consecutive 12-month period. The permittee must monitor wood fuel throughput on a monthly basis to reasonably assure emissions are below the 100-ton threshold. Additionally, the permittee must burn only wood products in the boiler because the emissions calculations are based on wood products.

Emissions of CO emissions were calculated using AP-42 emissions factors. The units of AP-42 emissions factors for wood-fired boilers are pounds pollutant per MMBTU of fuel. A performance test to verify the emission factor is required within the first 24 months after the permit is issued. The results are to be reviewed by DEQ. The permittee will use the emission factor, in pounds pollutant per million British thermal units of fuel, determined by the test to calculate CO emissions.

The combustion process and heating value of the fuel source is highly variable, and information submitted in the permit application indicated fuel heating values ranged from approximately 3,750 to 7,700 Btu/lb, with an average value of 5,405 Btu/lb, based on one sample each for four different fuels. The permittee is required to determine lower heating values, in British thermal units (BTU), of each fuel burned in the boilers. A statistical analysis is used to determine the upper end of the true mean BTU value for each fuel based on a 90% confidence interval. The upper end of the true mean value will be used to calculate PM, PM_{10}, and CO emissions to determine compliance with the annual emissions limits. Methods for statistical analysis include the Dixeron criteria for identifying inconsistent data, the Student T-test methodology to determine the 90% confidence intervals, or department approved alternatives. The Dixeron criteria and the Student T-test are presented in Appendix G.

The permittee is required to conduct performance tests to determine PM and PM_{10} emissions from the Stirling boiler stack. The frequency of performance tests is dependent on the proximity of the performance tests results to the daily emissions limits. The performance test(s) will determine compliance with the grain loading standard and hourly PM_{10} emissions limit for the boiler.

6.4 Kilns

Emissions Limits – (Permit Condition 4.2)

The Tier II permit establishes emissions throughput limits for consecutive 12-month periods for the four kilns at the facility.

Compliance Assurance

Emissions from the kilns are estimated assuming continuous operation at maximum production. Emissions estimated in this manner did not contribute to a violation of NAAQS, nor would emissions cause the facility to exceed major facility thresholds. However, it was unclear weather the maximum throughputs reported in the application were actual equipment maximum production rates. Therefore, the permittee is required to monitor and record wood throughputs through each kiln to ensure the throughputs do not exceed the maximum values reported in the permit application.

6.5 Cyclones

Emissions Limits – (Permit Condition 5.2)

The Tier II permit establishes emissions limits for hourly and annual PM_{10} emissions from four cyclones at the facility. Emissions limits are established to assure compliance with the 24-hour PM_{10} NAAQS and to ensure that annual PM_{10} emissions are less than the synthetic minor threshold.

Compliance Assurance

The permittee is required to record daily hours of operation of each cyclone. The daily hours of operation is the operational parameter chosen to monitor to reasonably assure compliance with the annual PM_{10} emissions limit. Since the actual throughputs are difficult to determine, the permittee shall assume that each cyclone is operating at maximum production when in operation.

The permittee is required to develop an Operations and Maintenance Manual for the cyclones at the facility to ensure proper operation. The manual should address normal operating conditions and procedures, and procedures to correct conditions determined to be outside normal operating conditions.

6.6 *Other Wood Processing*

Emissions Limits – (Permit Condition 6.2)

The Tier II permit establishes emissions limits for daily PM_{10} emissions from the debarker, hog, and chipper at the facility. Emissions limits are established to assure compliance with the 24-hour PM_{10} NAAQS and to ensure that annual PM_{10} emissions are less than the synthetic minor threshold.

Compliance Assurance

The permittee is required to record hours of operation of each piece of the debarker, hog, and chipper. . The daily hours of operation is the operational parameter chosen to monitor to reasonably assure compliance with the annual PM_{10} emissions limit. Since the actual throughputs are difficult to determine, the permittee shall assume that the debarker, hog, and chipper are operating at maximum production when in operation.

6.7 *Fire Water Pump Engine and Emergency Standby Generator*

Operating Requirements – (Permit Condition 8.2)

The permittee can operate the fire-water-pump engine and emergency generator a maximum of 500 hours per year. The operational limit is established to limit emissions to less than major threshold levels.

Compliance Demonstration

The permittee is required to monitor the operational time of the fire water pump engine and emergency generator when either piece of equipment is operating.

6.8 *New Source Performance Standards (NSPS) Applicability*

40 CFR Subpart Dc

The provisions of 40 CFR Subpart Dc apply to steam generating units with a maximum design heat capacity of between 10 million British thermal units per hour (MMBtu/hr) and 100 MMBtu/hr (inclusive), and for which construction, modification, or reconstruction commenced after June 9, 1989. According to the permit application, the Stirling hog fuel boilers were last modified in 1992, and the maximum heat capacity is approximately 20 to 28 MMBtu/hr, depending on the fuel combusted. The facility is required to combust wood exclusively in the boiler.

The provisions of 40 CFR Subpart Dc contain standards for SO_2 and PM emissions. The standards for SO_2 emissions apply to facilities that combust coal and/or oil. The standards for PM emissions apply to facilities that combust coal or oil, or wood and have a maximum heat capacity of greater than 30 MMBtu/hr. Since the Bennett facility only combusts wood, the standards of 40 CFR Subpart Dc do not apply.

40 CFR Subpart Kb

The provisions of 40 CFR Subpart Kb apply to volatile organic liquid storage vessels with a capacity of 40 cubic meters (approximately 10,500 gallons) that were constructed, reconstructed, or modified after July 23, 1984. According to the application, one storage vessel at the facility has a capacity of 12,000 gallons; however, the vessel was installed or last modified in 1979. Therefore, Subpart Kb does not apply to the facility.

6.9 *National Emission Standards for Hazardous Air Pollutants (NESHAP) Applicability*

NESHAP standards do not apply to any processes at the facility.

7. AIRS

Table 7.1 AIRS/AFS FACILITY-WIDE CLASSIFICATION DATA ENTRY FORM

AIR PROGRAM / POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N – Nonattainment
Sulfur Dioxide	B						U
Nitrogen Oxides	B						U
Carbon Monoxide	SM					SM	U
PM_{10}	SM					SM	U
PT (Particulate)	A						U
Volatile Organic Compounds	B						U
THAP (Total HAPs)	B						U
			APPLICABLE SUBPART				

AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant, which is below the 10 T/yr threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

8. FEES

Fees apply to this facility in accordance with IDAPA 58.01.01.470. The facility is subject to permit application fees for this revised Tier II operating permit of $500.

9.

10. RECOMMENDATIONS

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that DEQ issue a proposed Tier II operating permit to Bennett. An opportunity for public comment on the air quality aspects of the proposed operating permit shall be provided in accordance with IDAPA 58.01.01.404.01.c. Staff members have notified the facility in writing of the required Tier II application fee of $500. The permit will be issued upon receipt of the fee. DEQ has analyzed the application data and determined the proposed feed rate to the Stirling boilers and the associated emissions rates maintain the facility's synthetic minor status and demonstrate compliance with NAAQS.

MJS/sm T2-9512-147-1

G:\Air Quality\Stationary Source\SS Ltd\t2\Bennett(Shear) Forrest Ind\Public Comment\V3\T2-9512-147-1 Prop TM.doc

cc: Eric Kopczinski, Lewiston Regional Office

APPENDIX A

Response to Public Comments

May 15, 2003

STATE OF IDAHO
DEPARTMENT OF ENVIRONMENTAL QUALITY
RESPONSE TO PUBLIC COMMENTS
ON DRAFT AIR QUALITY TIER II OPERATING PERMIT
FOR BENNETT FOREST INDUSTRIES, INC.'S ELK CITY FACILITY

Introduction

As required by IDAPA 58.01.01.404.01.c (*Rules for the Control of Air Pollution in Idaho*), the Idaho Department of Environmental Quality (DEQ) provided for public comment, including offering an opportunity for a hearing, on the Tier II operating permit proposed for Bennett Forest Industries, Inc.'s (Bennett's) Elk City sawmill facility. Public comment packages, which included the application materials, and draft permit and technical memorandum, were made available for public review at the Elk City School Library, DEQ's Lewiston Regional Office, and DEQ's State Office in Boise. A copy of the proposed permit and technical memorandum was also posted on DEQ's Web site. The public comment period was provided from April 2, 2003 to May 2, 2003. Those comments regarding the air quality aspects of the draft permit are provided below with DEQ's response immediately following.

Public Comments and DEQ Responses

Comment 1:

Permit Condition 5.3.2. The grinder cyclone collects approximately 10 *pounds* of metal dust *annually*. If the cyclone was conservatively assumed to be only 80% efficient, that would mean approximately 0.0005 tons/yr of material would "escape" or "be emitted". Obviously the emissions are de minimus (close to zero), and the cyclone should be allowed to operate.

The most recent addendum to Bennett's synthetic minor Tier II operating permit application was received by DEQ on May 28, 2002. The "Process Emissions" table of this addendum indicated the maximum hourly throughput and the normal hourly throughput to the saw grinder cyclone are 0.000 bone dry tons per hour, and the annual throughput to the saw grinder cyclone is 0 bone dry tons per year. Based on this information, emissions from the operation of the cyclone were assumed to be zero. DEQ cannot estimate annual emissions or model emissions to determine potential ambient air impacts if information regarding throughputs for any equipment is not presented in permit applications.

The Bennett facility is a synthetic minor facility. The proposed Tier II permit establishes an annual emissions limit for particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) of 98.2 tons per year. In addition, DEQ's modeling review indicated the estimated maximum annual ambient concentration for PM_{10} emissions is 146.6 micrograms per cubic meter. The annual National Ambient Air Quality Standard (NAAQS) for PM_{10} is 150 micrograms per cubic meter. Calculations were based on information presented in the May 28, 2002 addendum.

As no information was presented on throughputs to the saw grinder cyclone, DEQ's proposed permit did not allow the permittee to operate the saw grinder cyclone during the permit period. The decision was made to ensure the facility retained a synthetic minor status for annual PM_{10} emissions, and to ensure emissions of PM_{10} from the facility do not cause an exceedence of the annual NAAQS.

Based on the information presented in the comments submitted by Bennett Forest Industries, Inc. on April 3, 2003, it does not appear that operation of the saw grinder cyclone as stated in the comments would cause the facility to emit PM10 in quantities greater than 100 tons per year. Emissions from the cyclone would not appear to threaten the annual NAAQS. Therefore, the permit is amended to allow operation of the saw grinder cyclone.

The permittee should note that emissions from the saw grinder cyclone must be estimated as part of determining annual facility emissions when determining if the facility retains its' synthetic minor status.

Comment 2: **Permit Condition 5.5. We request that burdensome and unrealistic "daily" monitoring for hours of operating the cyclones be deleted, or replaced with monthly estimates. To our knowledge, this requirement has not been made for any other sawmill Tier II (or even Tier I) permit. Again, applying some common sense to the amount of emissions generated from the cyclones.**

The monitoring requirements in Permit Condition 5.5 were established to ensure ambient impacts from PM_{10} emissions from the facility do not exceed the 24-hour NAAQS for PM_{10}. The predicted 24-hour PM_{10} ambient impact from emissions at the Elk City facility is 47.3 micrograms per cubic meter. The 24-hour NAAQS for PM_{10} is 50 micrograms per cubic meter.

If the permittee were allowed to operate the sawdust, chip, planer shavings, and truck shavings cyclones continuously (i.e. 24 hours per day), modeled ambient impacts would exceed the 24-hour PM_{10} NAAQS. DEQ modeling staff discussed the situation with Bennett representatives. Bennett representatives indicated the sawdust and chip cyclones are operated a maximum of 13 hours per day, and the planer shavings and truck shavings cyclones are operated a maximum of 3 hours per day. Ambient air impact modeling was performed assuming the permittee operated the cyclones at their maximum throughput rates for these durations. The modeled concentrations are presented in the paragraph above.

To be protective of an underlying standard, time-frames for operating and monitoring requirements must be at least as short-term as the underlying standard. In this case, the underlying standard is (protection of) the 24-hour NAAQS for PM_{10}. As stated above, ambient impacts for PM_{10} emissions from the facility were partially estimated based on the operating hours of the cyclones. Therefore,

monitoring to ensure compliance with the 24-hour NAAQS must be performed at least daily. The Tier II operating permit reflects this in the creation of daily monitoring requirements for the four cyclones referenced in Permit Condition 5.5. Therefore, no change to the Tier II operating permit is required.

The permittee can submit an application for a permit amendment to request a different operating parameter to be monitored or to request a different monitoring time-frame. To obtain approval from DEQ, the permittee must demonstrate how the proposed alternative monitoring will ensure protection of the 24-hour NAAQS.

APPENDIX B

Emissions Calculations

BOILER EMISSIONS

Pollutant	AP-42 Emissions Factor (lb/MMBtu)	Max. Hourly Emissions (@ 8,000 BTU/lb) (lb/hr)	Max. Annual Emissions (@ 8,000 BTU/lb) (T/yr)
PM	0.58	31	134
PM10	0.52	28	120
NOx	0.22	12	51
SO2	0.025	1.4	5.8
CO	0.60	33	139
VOC	0.038	2.1	8.8
Lead	4.8E-05	0.0026	0.011

Notes: Emissions from two Stirling hog fuel-fired boilers.
Emissions based on combined throughputs of 81.3 GT/day and 29,000 GT/year.
Maximum emissions based on guidance from AP-42, Section 1.6.

EMISSIONS FROM DIESEL-FIRED INTERNAL COMBUSTION ENGINES

Emissions Unit	Pollutant	Emission Factor (lb/hp-hr)	Hourly Emissions (lb/hr)	Annual Emissions (T/yr)
80-hp Firewater Pump Engine	PM10	0.00220	0.176	0.044
	NOx	0.031	2.5	0.620
	CO	0.00668	0.534	0.134
	VOC	0.00251	0.201	0.050
	SOx	0.00205	0.164	0.041
534-hp Emergency Generator	PM10	0.00220	1.17	0.294
	NOx	0.031	17	4.139
	CO	0.00668	3.57	0.892
	VOC	0.00251	1.34	0.335
	SOx	0.00205	1.09	0.274

Notes: Emissions factors from AP-42, Table 3.3-1.
Equipment permitted to run up to 500 hours per year.

EMISSIONS FROM WOOD PROCESSING EQUIPMENT

Emissions Unit	Pollutant	Ave. Hourly Throughput	Max Hourly Throughput	Emission Factor	Ave. Hourly Emissions (lb/hr)	Max. Hourly Emissions (lb/hr)	Annual Emissions (T/yr)
Debarker (P1)	PM	56.168	67.401	0.024	0.27	0.32	0.089
	PM10	56.168	67.401	0.011	0.12	0.15	0.041
Hog (P2)	PM	6.124	7.348	0.024	0.15	0.18	0.24
	PM10	6.124	7.348	0.011	0.067	0.081	0.11
Kiln No. 0 (P4)	PM	3.116	3.739	0.33	1.0	1.2	4.5
	PM10	3.116	3.739	0.159	0.495	0.595	2.17
	VOC	3.116	3.739	1.50	4.67	5.61	20.5
Kiln No. 1 (P5)	PM	1.552	1.863	0.33	0.51	0.61	2.2
	PM10	1.552	1.863	0.159	0.247	0.296	1.08
	VOC	1.552	1.863	1.50	2.33	2.79	10.2
Kiln No. 2 (P6)	PM	1.552	1.863	0.33	0.51	0.61	2.2
	PM10	1.552	1.863	0.159	0.247	0.296	1.08
	VOC	1.552	1.863	1.50	2.33	2.79	10.2
Kiln No. 4 (P8)	PM	3.116	3.739	0.33	1.0	1.2	4.5
	PM10	3.116	3.739	0.159	0.495	0.595	2.17
	VOC	3.116	3.739	1.50	4.67	5.61	20.5
Fuel Bin Sawdust Cyclone (P11)	PM	0.131	0.157	0.5	0.07	0.08	0.2
	PM10	0.131	0.157	0.25	0.033	0.039	0.10
Chipper (P12)	PM	7.872	9.447	0.024	0.19	0.23	0.31
	PM10	7.872	9.447	0.011	0.087	0.10	0.14
Chip Cyclone (P13)	PM	7.872	9.447	0.5	4	5	12
	PM10	7.872	9.447	0.25	2.0	2.4	6.1
Planer Shavings Cyclone (P15)	PM	0.870	1.044	0.2	0.2	0.2	0.1
	PM10	0.870	1.044	0.16	0.14	0.17	0.076
Truck Bin Shavings Cyclone (P16)	PM	0.870	1.044	0.2	0.2	0.2	0.1
	PM10	0.870	1.044	0.16	0.14	0.17	0.076

Notes: Throughput units for debarker (P1) and hog (P2) are green tons per hour.
Assumed capture efficiency of 80% for debarker emissions.
Throughput units for kilns (P4, P5, P6, and P8) are thousand board feet per hour.
Throughput units for chipper (P12) and cyclones (P11, P13, P15 and P16) are bone dry tons per hour.
Emissions factors from Attachment B of 6/30/97 DEQ memorandum.
Emissions factors given in pounds per emission unit's throughput units.

OPERATIONAL PARAMETERS - WOOD PROCESSING

Emissions Unit	Average Hourly Throughput	Maximum Hourly Throughput	Hours of Operation	Annual Hours of Operation
Debarker (P1)	56.168 GT/hr	67.401 GT/hr	13 hours/day; 5 days/week; 51 weeks/year	3,315
Hog (P2)	6.124 GT/hr	7.348 GT/hr	13 hours/day; 5 days/week; 51 weeks/year	3,315
Kiln No. 0 (P4)	3.116 MBF/hr	3.739 MBF/hr	24 hour/day; 7 days/week; 52 weeks/year	8,760
Kiln No. 1 (P5)	1.552 MBF/hr	1.863 MBF/hr	24 hour/day; 7 days/week; 52 weeks/year	8,760
Kiln No. 2 (P6)	1.552 MBF/hr	1.863 MBF/hr	24 hour/day; 7 days/week; 52 weeks/year	8,760
Kiln No. 4(P8)	3.116 MBF/hr	3.739 MBF/hr	24 hour/day; 7 days/week; 52 weeks/year	8,760
Fuel Bin Sawdust Cyclone (P11)	0.131 BDT/hr	0.157 BDT/hr	13 hours/day; 7 days/week; 52 weeks/year	6,188
Chipper (P12)	7.872 BDT/hr	9.447 BDT/hr	13 hours/day; 5 days/week; 51 weeks/year	3,315
Chip Cyclone (P13)	7.872 BDT/hr	9.447 BDT/hr	13 hours/day; 7 days/week; 52 weeks/year	6,188
Planer Shavings Cyclone (P15)	0.870 BDT/hr	1.044 BDT/hr	3 hours/day; 7 days/week; 52 weeks/year	1,092
Truck Bin Shavings Cyclone (P16)	0.870 BDT/hr	1.044 BDT/hr	3 hours/day; 7 days/week; 52 weeks/year	1,092

APPENDIX C

Wood-Products Emissions Factors

MEMORANDUM

June 30, 1997

TO: A & HW Permit Engineers

FROM: Val Bohdan, Technical Engineer II
Technical Services Bureau

THROUGH: Robert Wilkosz, Chief, Technical Services Bureau (TSB),
Air and Hazardous Waste (A&HW)
Martin Bauer, Chief, AQPB, Air and Hazardous Waste (A&HW)

SUBJECT: Corrections Of Air Emission Factors And Speciated Data for Idaho Wood Industry

I. SUMMARY

Attachment A, the result of recent wood kiln drying studies by the University of Idaho (U of I), provides reliable data of VOC air emission factors for listed species of pine and non-pine lumber. Though EPA is evaluating this data, DEQ's policy is to utilize this information now.

Attachment B, corrected for VOC error in the original 1992 Arizona study, should be distributed for DEQ and wood industry use. The corrected Attachment C, which is more inclusive and also contains wood industry information of Attachment A, is for internal DEQ use only.

II. BACKGROUND

In the latter part of 1996, DEQ compiled air emission data -- lifted from EPA, AP-42, Oregon DEQ, and a 1992 study in Arizona -- as pertinent for the wood industry within our state. However, the whole set of information, as shown in Attachment C, was deemed useful only for internal DEQ distribution. The lower set of data in Attachment C (which became Attachment B) was distributed for internal DEQ and in-state wood industry use. After some effort, DEQ finally was able to get a copy of the Arizona reference (Ref. #4: Gullian and Washington: ET Report 1/20 and 1/25/92 by Environmental Measurement, Flagstaff, AZ) which, upon close examination, merited corrections to be made on the whole "Lumber Drying Kilns" line. Thus, both Attachments B and C (dated 1/08/97) have now been corrected on PM, PM_{10}, and VOC quantities. Note that VOC emission now stated correctly is 1.50 lb. of carbon per thousand board feet of "nominal type of wood," if that is the desired mode of calculation (non-speciated). Likewise PM and PM_{10} emission numbers have also been corrected on the same line.

IV. CONCLUSION

From the standpoint of quality data, Attachment A (dated 6/26/97) merits a high degree of consideration for wood-drying kiln emission calculations of VOCs for the listed species and the pine and non-pine groupings.

The corrected Attachment B (dated 1/08/97) is distributed for internal (DEQ) and external (wood plants) use. Attachment A should be utilized judiciously within Idaho whenever speciation of wood is accounted for in scientifically ascertainable accounting means.

When appropriate, DEQ Air Quality engineers should rely on the attached information for permitting purposes. This will provide guidance to industry and consistency within DEQ regarding the wood industry in Idaho. Of course, facilities can always utilize specific source test information in lieu of the attached data.

VB/rs

Attachments: A, B and C

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cess Equipment	Description	Units	Pounds Pollutant Per Unit Thruput PM	PM-10	SOx	NOx	CO	VOC	PM/PM-10 Adj. Factor	For Condition	Reference
g Debarking	Uncontrolled Emis.	Tons of logs	0.024	0.011	--	--	--	--	--	--	1,2
iwing Logs	Uncontrolled Emis.	Tons of Logs	0.35	0.2	--	--	--	--	0.4-1.0**	55-25% H20 in log	1,2
iwdust Pile	Uncontrolled Emis.	Tons Handled	1.0	0.36	--	--	--	--	0.4-1.0	50-25% H20 in pile	1,2
imber Drying Kilns	Uncontrolled Emis.	M Board Feet	0.33	0.19	--	--	--	1.50	--	--	1,4
yclone Exhaust	Dry & Green Chips,	Bonedry Tons	0.5	0.25 (both for Medium Efficiency)*				--	--	--	3
	Shavings, Hogged	Bonedry Tons	0.2	0.16 (both for High Efficiency)*				--	--	--	3
	Fuel/Bark, Green	Bonedry Tons	0.001	0.001(with Baghouse)				--	--	--	3
	Sawdust.										
	Mill Mix	(grains/scf Air)	0.03	0.015 (both for Medium Efficiency)*				--	0.4-1.0***	50-25% H20 in Mix	2
	Mill Mix	(grains/scf Air)	0.015	0.011 (both for High Efficiency)*				--	0.4-1.0***	50-25% H20 in Mix	2
	Mill Mix	(grains/scf Air)	0.0001	0.0001 (with Baghouse)				--	0.4-1.0***	50-25% H20 in Mix	2
yclone Exhaust	Sanderdust	Bonedry Tons	2.0	1.6 (both for High Efficiency)*				--	--	--	3
	Sanderdust	Bonedry Tons	0.04	0.04 (with Baghouse)				--	--	--	3
	Sanderdust	(grains/scf Air)	0.055	0.028 (both for Medium Efficiency)*				--	0.65-1.0***	50-25% H20 in Mix	2
	Sanderdust	(grains/scf Air)	0.025	0.02 (both for High Efficiency)*				--	0.65-1.0***	50-25% H20 in Mix	
	Sanderdust	(grains/scf Air)	0.0001	0.0001 (with Baghouse)				--	0.65-1.0***	50-25% H20 in Mix	
arget Box	Medium Efficiency	Bonedry Tons	0.1	0.05	--	--	--	--	--	--	3
/aste Wood	Bin Venting	Tons Handled	1.0	0.58	--	--	--	--	0.4-1.0	50-25% H2O content	1,2
	Bin Unloading	Tons Handled	2.0	1.2	--	--	--	--	0.4-1.0	50-25% H2O content	1,2

. EPA 450/4-90-003, March 1990, "AIRs Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Pollutants."
. AP-42, dated February 1980.
. Oregon DEQ/AQ Permitting and Inspection Manual, November 1993.
. Gullian, R. and Washington, E., ET Report 1/20 and 1/25/92 by Environmental Measurement, Flagstaff, AZ, 1992.
. AP-42, dated January 1995.
Efficiency range determined per C. E. Lapple equations (Air Pollution Control by C. Cooper and F. C. Alley; Chapter 4).
* Consider also whether operation is inside and how well enclosed.
**Mill Mix is less dry and more coarse than Sander Dust.

APPENDIX D

Modeling Memorandum

MEMORANDUM

TO: Mike Simon, Air Quality Division

FROM: Mary Anderson, Air Quality Division

SUBJECT: Compliance demonstration for Shearer Lumber, Tier II permit application

DATE: February 25, 2003

1. SUMMARY:

After reviewing the modeling technical memorandum, I have determined that Shearer Lumber has demonstrated, to the Department's satisfaction, compliance with all applicable standards for the issuance of a Tier II permit. The technical memo indicated that the modeling was completed with the assumption of the emergency generator only operating 1-hour per day. However, I reran the modeling allowing the emergency generator to operate 24 hours per day (i.e., no restriction). Only NO_2, SO_2, and PM_{10} were re-analyzed. CO was not reanalyzed because the maximum hourly emission rate was used in the initial modeling analysis. Table 1 presents the emission rates for the emergency generator used in the revised modeling. Table 2 presents the summary results for this modeling analysis. All other parameters used in the original modeling were used here. Based on the revised modeling analysis, Shearer Lumber has demonstrated compliance with all applicable requirements without a restriction on the number operational hours for the emergency generator.

Table 1. Emission Rates.

Pollutant	Maximum Hourly Emission Rate (lb/hr)
SO_2	1.1 (short term) 0.628 (annual, 500 hr/yr)
NO_x	0.947 (annual, 500 hr/yr)
PM_{10}	1.17 (short term) 0.0685 (annual, 500 hr/yr)

Table 5. Modeling results.

Pollutant	Averaging Period	Predicted Ambient Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)[a]	Total Ambient Concentration ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Compliant? (Y or N)
SO_2	24-hour	5.93	120	125.93	365	Y
	Annual	.932	18.3	19.23	80	Y
NO_x	Annual	8.9	40	48.9	100	Y
PM_{10}	Annual	23.3	24	47.3	50	Y
	24-hour	109	40	149	150	Y

Electronic copies of the modeling analysis are saved on disk.

MEMORANDUM DRAFT

TO: Michael Stambulis, Staff Engineer, State Office of Technical Services

FROM: Kevin Schilling, Air Quality Scientist, State Office of Technical Services

SUBJECT: Modeling Review for the Shearer Lumber Products, Inc., Tier II Operating Permit Application; Elk City, Idaho

DATE: November 18, 2002

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1. SUMMARY:

Shearer Lumber Products, Inc. (Shearer) submitted a facility-wide Tier II operating permit application to limit potential emissions below major source thresholds at their Elk City, Idaho, facility. Facility-wide modeling was submitted with the Tier II operating permit application to demonstrate that emissions from the facility would not cause or significantly contribute to a violation of an ambient air quality standard, as required by IDAPA 58.01.01.403.02.

The Idaho Department of Environmental Quality (DEQ) has reviewed the analyses and supporting materials submitted, and has verified that operation of the Shearer facility as specified in the Tier II operating permit application and the Tier II operating permit will satisfy the requirements of IDAPA 58.01.01.403.02.

2. DISCUSSION:

This section describes the regulatory modeling requirements and the methodology used for the analyses conducted.

2.1 Introduction and Regulatory Requirements for Modeling

On December 26, 1995, DEQ received a Tier I operating permit application from Shearer for their dimensional lumber mill located in Elk City, Idaho. Revisions and supplemental information were submitted to DEQ on September 16, 1998 and May 14, 1999. Shearer decided to change the source classification of their facility to a synthetic minor source, and on March 21, 2002, DEQ received a partial application from Shearer for a synthetic minor Tier II operating permit. On May 10, 2002, atmospheric dispersion modeling analyses were received by DEQ; and on May 28, 2002, an addendum to the Tier II operating permit application was received by DEQ.

The primary emissions generating activities at the facility include sawdust, shavings, and wood chip handling operations, lumber drying kilns, and exhaust from a wood waste-fired boiler.

Per IDAPA 58.01.01.403, no Tier II operating permit can be granted unless the applicant demonstrates to the satisfaction of DEQ that emissions from the facility "would not cause or significantly contribute to a violation of any ambient air quality standard." Emissions estimates were provided by Shearer's consultant, Hoy Environmental. Atmospheric dispersion modeling was performed by URS Corporation on behalf of Shearer.

2.2 Applicable Air Quality Impact Limits and Required Analyses

The Shearer facility is located in Idaho County, designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}).

If estimated maximum impacts to ambient air from the emissions sources at the facility exceed the "significant contribution" levels of IDAPA 58.01.01.006.93, then DEQ modeling guidance requires a full impact analysis. A full impact analysis for attainment area pollutants requires adding ambient impacts from facility-wide emissions to a DEQ approved background concentration value that is appropriate for each criteria pollutant at the facility location. The resulting maximum ambient air concentration is then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 1. Table 1 also specifies the modeled value that must be used for comparison to the NAAQS.

Table 1. Applicable Regulatory Limits

Pollutant	Averaging Period	Regulatory Limit[a] ($\mu g/m^3$)[b]	Modeled Value Used[c]
Nitrogen dioxide (NO_2)	Annual	100[d]	Maximum 1st highest[e]
Sulfur dioxide (SO_2)	3-hour	1,300[f]	Maximum 2nd highest[e]
	24-hour	365[f]	Maximum 2nd highest[e]
	Annual	80[d]	Maximum 1st highest[e]
Carbon monoxide (CO)	1-hour	40,000[f]	Maximum 2nd highest[e]
	8-hour	10,000[f]	Maximum 2nd highest[e]
PM_{10}[g]	24-hour	150[f]	Maximum 6th highest[e]
	Annual	50[d]	Maximum 1st highest[e]
Lead (Pb)	Quarterly	1.5[d]	Maximum 1st highest[e]

a. IDAPA 58.01.01.577
b. Micrograms per cubic meter
c. When using five years of meteorological data
d. Not to be exceeded
e. Concentration at any modeled receptor
f. Not to be exceeded more than once per year
g. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

An ambient air assessment of Toxic Air Pollutant (TAP) impacts was not performed for the facility to demonstrate compliance with IDAPA 58.01.01.161. DEQ determined that the magnitude and nature of TAP emissions and the distance of the facility from potential offsite public adequately demonstrated compliance with IDAPA 58.01.01.161.

2.3 Background Concentrations

Applicable background concentrations are shown in Table 2. Statewide background concentrations used for the Shearer Tier II operating permit application were provided by DEQ to URS. Appropriate background concentrations for the area were refined during DEQ verification modeling, and Table 2 provides the refined PM_{10} concentrations. The refined background PM_{10} concentrations were based on PM_{10} data collected from remote monitoring sites in Idaho and adjacent states (Improve, 2000 data).

2.4 Modeling Impact Assessment

Table 3 provides a summary of the modeling parameters used for the DEQ analysis.

2.4.1 Modeling Protocol

A modeling protocol was not submitted prior to the application. However, discussion of pertinent modeling issues occurred between URS and DEQ via email correspondence.

Table 2. Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)[a]
Nitrogen dioxide (NO_2)	Annual	4.3
Sulfur dioxide (SO_2)	3-hour	33
	24-hour	26
	Annual	7.5
Carbon monoxide (CO)	1-hour	3,600
	8-hour	2,300
PM_{10}[b]	24-hour	43
	Annual	9.6

[a] Micrograms per cubic meter

[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

Table 3. Modeling Parameters

Parameter	Description/Values	Documentation/Additional Description
Model	ISC-PRIME	Version 99020
Meteorological data	Spokane, Washington	1987-1991; Wind direction rotated by -60 degrees to account for the orientation of the valley Files: GEG8791.ASC
Model options	Regulatory Default	
Land use	Rural	Low population density in area and large fraction of unimproved land
Terrain	Simple and Complex	Elevation data from DEM files File: 7682_75M.DEM
Building downwash	Used building profile input program (BPIP)	Building dimensions obtained from modeling files submitted
Receptor grids (See Figure 1)	Grid 1	25 meter spacing along site boundary out to 100 meters
	Grid 2	50 meter spacing out to 500 meters
Facility location (UTM)[a]	Easting	618.0 kilometers
	Northing	5073.6 kilometers

[a] Universal Transverse Mercator

2.4.2 Model Selection

The initial ambient air impact analyses was performed by URS using the model ISCST3 - Version 00101. DEQ verification modeling was performed using ISC-PRIME, Version 99020. Section 2.4.6 of this memorandum explains that DEQ added receptors along the road and river that bisect the facility. Because some of the receptors along the road and river are within the building cavity region for several of the buildings on the facility, DEQ used ISC-PRIME rather than ISCST3. ISC-PRIME calculates ambient air concentrations at locations within building cavities whereas ISCST3 does not.

2.4.3 Meteorological Data

Meteorological data from Spokane, Washington, were used in the modeling because local data were not available. Five years of National Weather Service data, from January 1987 through December 1991, were used for modeling. The wind flow vectors were rotated by –60 degrees to account for valley orientation differences between the site and Spokane.

2.4.4 Terrain Effects and Facility Layout

Elevations of receptors, buildings, and sources were considered in the modeling analyses. DEQ used USGS 7.5 minute Digital Elevation Model (DEM) files to import elevations for sources, receptors, and

buildings. The DEM file used to determine elevations could not adequately resolve the elevation of receptors in the river. In many instances the elevation of the river receptors were higher than the elevation of buildings and sources. DEQ manually set river receptors located north of the pump house to 1,180 meters and those south of the pump house to 1,181 meters. The elevation of facility buildings ranged from 1,179 meters to 1,187 meters as determined by the DEM file. Base elevations of emissions sources ranged from 1,180 meters to 1,181 meters.

DEQ also verified proper identification of the facility boundary and buildings on the site by comparing the modeling input to a facility plot plan submitted and aerial photographs of the area. Figure 1 shows the emission sources, buildings, and receptors included in the dispersion modeling analyses.

2.4.5 Building Downwash Effects

Plume downwash effects caused by structures present at the facility were accounted for in the modeling analyses. The Building Profile Input Program for ISC-PRIME (BPIP-PRIME) was used to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and emissions release parameters.

2.4.6 Receptors

The modeling analyses submitted by URS did not consider ambient air receptors along the public road and the river that bisect the facility. DEQ added these receptors for the verification modeling.

DEQ verification modeling was conducted using the following grid of ambient air receptors:

- Receptors every 25 meters along the boundary identifying the location of ambient air, extending out 100 meters from the ambient air boundary.
- Receptor spacing of 50 meters out 500 meters from the ambient air boundary.

2.4.7 Emissions Rates

Table 4 provides emissions rates used in the dispersion modeling analysis. Emissions rates used in the dispersion modeling analysis submitted by the applicant were reviewed against those in the permit application and the emissions limits in the draft permit. Where appropriate, revisions were made to ensure consistency between the modeling analyses and the permit. Appendix A to this memorandum provides additional details on emissions calculations. The following approach was used for DEQ verification modeling:

- All modeled emissions rates were equal to or greater than allowable emissions rates in the permit.
- Where emissions estimates were a function of throughput, and the permit only had throughput limits, the throughput limits were used to calculate the emissions for modeling.
- For sources with intermittent emissions of less than 13 hours per day (hr/day), daily emissions were calculated on the basis of throughput and then were evenly distributed throughout a 13-hour period.

The emergency generator was not considered in the initial dispersion modeling conducted by URS. This emissions source is operated less than 30 minutes every few months. Emissions were estimated by assuming that the generator could operate 1.0 hour on any day. These emissions were modeled for 24-hour and annual averaging periods by distributing them evenly throughout a 13-hour period of plant operation. Annual impacts were conservatively modeled by assuming the engine could be run for 1.0 hour each day. Impacts for 1-hour, 3-hour, and 8-hour averaging periods were calculated by conservatively assuming the engine could run at maximum rates for the entire period.

Table 4. Pollutant Emissions Rates Used for Modeling

Source (Id Code)	Maximum Hourly Emissions Rate[a] (lb/hr)[b]				Hourly Rate Used for Annual Modeling[c] (lb/hr)			
Pollutant	PM_{10}[d]	SO_2[e]	NO_x[f]	CO[g]	PM_{10}	SO_2	NO_x	CO
Boiler (B1)	23	1.4	NM[h]	33	23	1.4	11.6	NM[h]
Emergency Generator (EMERGEN)[i]	0.090	1.1[j] 0.084	NM[h]	3.6[k]	0.090	0.084	1.26	NM[h]
Debarker (P1)[i]	0.15	0.0	NM[h]	0.0	0.15	0.0	0.0	NM[h]
Hog (P2)[i]	0.081	0.0	NM[h]	0.0	0.081	0.0	0.0	NM[h]
Kiln 0 (P41 – P48)	0.0744	0.0	NM[h]	0.0	0.0744	0.0	0.0	NM[h]
Kiln 1 (P51 – P58)	0.0375	0.0	NM[h]	0.0	0.0375	0.0	0.0	NM[h]
Kiln 2 (P61 – P68)	0.0375	0.0	NM[h]	0.0	0.0375	0.0	0.0	NM[h]
Kiln 4 (P81 – P88)	0.0744	0.0	NM[h]	0.0	0.0744	0.0	0.0	NM[h]
Fuel Bin Sawdust Cyclone (P11)[i]	0.039	0.0	NM[h]	0.0	0.039	0.0	0.0	NM[h]
Chipper (P12)[i]	0.10	0.0	NM[h]	0.0	0.10	0.0	0.0	NM[h]
Chip Cyclone (P13)[i]	2.4	0.0	NM[h]	0.0	2.4	0.0	0.0	NM[h]
Shavings Cyclone - Planer (P15)[i]	0.039	0.0	NM[h]	0.0	0.039	0.0	0.0	NM[h]
Shavings Cyclone – Truck Bin (P16)[i]	0.039	0.0	NM[h]	0.0	0.039	0.0	0.0	NM[h]

a. Emissions rate used for 24-hour, 8-hr, 3-hr, and 1-hr averaging periods
b. pounds per hour
c. Emissions rate used for annual averaging period
d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
e. Sulfur dioxide
f. Oxides of nitrogen
g. Carbon monoxide
h. Not modeled because there is no standard associated with the specified averaging period
i. Emissions modeled for 13 hr/day between 6 am and 7 pm – emissions rate equal to daily emissions divided by 13
j. Emissions rate used for 3-hour averaging period – equal to 1-hour maximum emissions
k. Emissions rate used for 1-hour and 8-hour averaging periods – equal to 1-hour maximum emissions

Fugitive emissions were originally included in the modeling assessment submitted by URS. Fugitive emissions sources include wood waste bins and transfers of wood waste from the bins to haul trucks. These sources were not included in the DEQ verification modeling for the following reasons:

- Emissions estimates from these sources are very uncertain. The factors are best suited for the handling of wood waste from dry cutting. The wood waste handled at Shearer is from green cut lumber having a higher moisture content and lower PM_{10} content.
- Regional DEQ inspectors indicated that the bins were in good working order and emissions were never visible during inspections.
- The issued Tier II operating permit will require that there be no visible emissions beyond 10 feet from the bins.
- Wind barriers are present around the material drop areas.

2.4.8 Emission Release Parameters

Table 5 provides emissions parameters. Stack location, stack height, stack diameter, stack gas temperature, and stack gas flow rate were provided by Hoy Environmental and URS. DEQ conducted verification modeling for the facility, making several modifications to various modeling parameters.

Stack velocities for stacks with horizontal discharge or rain covers were set to 0.001 m/sec to represent the absence of any plume rise resulting from vertical momentum.

Lumber drying kilns were originally modeled by URS as a single point source for each kiln. The exhaust from Kiln 0 and Kiln 4 (sources P4 and P8 in the modeling analyses) are emitted to the atmosphere through 20 vents in the roof of the kiln, each 21 inches square. The exhaust from Kiln 1 and Kiln 2 (sources P5 and P6 in the modeling analyses) are emitted through 26 vents, each 11

inches square. DEQ determined that the kilns are more accurately modeled as a series of point sources rather than one single point source. Modeling the sources as a single point source could result in over-accounting for both momentum and buoyancy plume rise, thereby under-predicting pollutant concentrations in ambient air.

Table 5. Emissions and Stack Parameters

Source / Location	Source Type	Stack Height (m)[a]	Stack Diameter (m)	Stack Gas Temp. (K)[b]	Stack Gas Flow Velocity (m/sec)
Boiler (B1)	Point	24	1.28	489	7.2
Emergency Generator (EMERGEN)	Point	5.5	0.15	477	22
Hog (P2)	Point	4.3	3.0	295	0.1
Kiln 0 (P41 – P46)	Point	7.3	1.12	339	0.8
Kiln 1 (P51 – P58)	Point	6.7	0.57	339	1.16
Kiln 2 (P61 – P68)	Point	7.0	0.57	339	1.16
Kiln 4 (P81 – P86)	Point	7.0	1.12	339	0.8
Fuel Bin Sawdust Cyclone (P11)	Point	19.2	1.2	289	0.001
Chip Cyclone (P13)	Point	8.2	0.91	295	0.001
Shavings Cyclone - Planer (P15)	Point	6.7	0.001[c]	295	0.001
Shavings Cyclone – Truck Bin (P16)	Point	17.7	1.30	295	0.001
VOLUME SOURCES		**Release Height. (m)**	**δ_{yo}[d]**	**δ_{zo}[e]**	
Debarker (P1)	volume	0.0	1.63	3.5	
AREA SOURCES		**Release Height. (m)**	**δ_{zo}**	**length (m)**	**width (m)**
Chipper (P12)	area	3.7	0.14	0.43	0.43

a. Meters
b. Kelvin
c. Diameter set to 0.001 meters to efectively turn stack tip downwash off because the source vents to the atmosphere in a horizontal direction
d. Initial horizontal dispersion coefficient (meters)
e. Initial vertical dispersion coeficient (meters)

Because the flow from the kilns is uncertain, DEQ calculated the flow based on the estimated volume of water driven from lumber in the kilns, assuming that the water vapor exits the kiln as air saturated with water vapor at 150° F. An actual offgas exit velocity for each vent was estimated by dividing the flow amongst all the kiln vents. Appendix A to this memorandum provides details on the calculation of offgas flows.

Each Kiln was modeled as eight point sources. The stack diameter of each point was calculated by setting the exit velocity equal to the calculated value specified in the above paragraph and setting the total offgas flow from the modeled kiln equal to the flow calculated based on water vapor released. This method more appropriately considered buoyancy plume rise.

3. MODELING RESULTS:

This Section describes dispersion modeling results from the significant impact analysis and the full impact analysis. A significant impact analysis was initially performed to determine if emissions from the facility would "significantly contribute" to pollutant concentrations in ambient air, as per IDAPA 58.01.01.006.93. A full impact analysis was then performed for those pollutants emitted from the facility that were estimated to have a maximum ambient impact exceeding "significant contribution" levels. The full impact analysis involved modeling impacts from the facility's emissions and adding those impacts to background concentrations.

3.1 Significant Impact Analysis Results

Modeled pollutant impacts to ambient air obtained from the significant impact analysis are provided in Table 6. The values reported in this memorandum were obtained from DEQ verification modeling. Because the potential ambient impact of the facility emissions exceeds "significant contribution" levels for annual PM_{10}, 24-hour PM_{10}, 3-hour SO_2, 24-hour SO_2, and annual NO_2, a full impact analysis was performed for those pollutants and averaging times.

Table 6. Significant Impact Analysis for Criteria Pollutants (Facility-wide Emissions)

Pollutant	Averaging Period	Ambient Impact ($\mu g/m^3$)[a]	Significant Contribution[b] ($\mu g/m^3$)	Full Impact Analysis Required (Y or N)
PM_{10}[c]	24-hour	138	5.0	Y
	Annual	23.3	1.0	Y
Sulfur dioxide (SO_2)	3-hour	118	25	Y
	24-hour	8.5	5.0	Y
	Annual	0.88	1.0	N
Carbon monoxide (CO)	1-hour	961	2,000	N
	8-hour	446	500	N
Nitrogen dioxide (NO_2)	Annual	8.1	1.0	Y

a. Concentration in micrograms per cubic meter
b. Significant contribution level as per IDAPA 58.01.01.006.93
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

3.2 Full Impact Analysis Results

Results of the full impact analysis are presented in Table 7. Figures 2 and 3 show the maximum 6th highest modeled PM_{10} 24-hour averaged concentration impacts and the maximum annual averaged concentrations, respectively. These concentrations include background concentrations.

Table 7. Full Impact Analysis for Criteria Pollutants (Facility-wide Emissions).

Pollutant	Averaging Period	Ambient Impact. ($\mu g/m^3$)[a]	Background Conc. ($\mu g/m^3$)	Total Ambient Conc. ($\mu g/m^3$)	Regulatory Limit[b] ($\mu g/m^3$)	Compliant (Y or N)
PM_{10}[c]	24-hour	103.6[d]	43	146.6	150	Y
	Annual	23.3[e]	9.6	32.9	50	Y
Sulfur dioxide (SO_2)	3-hour	109[f]	33	142	1,300	Y
	24-hour	7.2[f]	26	37.2	365	Y
Nitrogen dioxide (NO_2)	Annual	8.1[e]	4.3	12.4	100	Y

a. Concentration in micrograms per cubic meter
b. IDAPA 58.01.01.577
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
d. Maximum 6th highest modeled value at any receptor
e. Maximum 1st highest modeled value at any receptor
f. Maximum 2st highest modeled value at any receptor

The maximum 6th highest modeled 24-hour PM_{10} concentration is near the NAAQS limit. DEQ has determined that additional assessment and/or ambient monitoring is not advisable because of the following:

- The background 24-hour PM_{10} concentration of 43 $\mu g/m^3$ is likely conservative. With the exception of several months during summer, when concentrations are impacted by regional forest fires, the PM_{10} concentrations are seldom above 30 $\mu g/m^3$.

- The only locations where modeled PM_{10} concentrations were near the NAAQS were on the hillside, west of the site, and along the road, east of the kilns. There is very limited potential for public exposure at these locations.

4. CONCLUSION

Review of materials submitted in the PTC application, combined with DEQ's analyses, show to the satisfaction of DEQ that the modification would not cause or significantly contribute to a violation of any ambient air quality standard, as required by IDAPA 58.01.01.403.02.

Electronic copies of the modeling analysis are saved on disk. Table 8 provides a summary of the files used in the modeling analysis. The permitting engineer has reviewed this modeling memo to ensure consistency with the Tier II operating permit and technical memorandum.

Table 8. Dispersion Modeling Files

Type of File	**Description**	**File Name**
Met data	1987-1991 consistent with DEQ data	GEG8791.ASC – 5 year data set
BEEST input files	Facility 24-hour PM_{10}, SO_2, CO	ShearISCNoFugAdj.BST
	Facility 1-hour, 3-hour, 8-hour SO_2 and CO	ShearISCNoFugAdjShort.BST
	Facility for each of five years PM_{10}	ShearISCNoFugAdjAnnYY.BST (YY = year 87 – 91)
Each BST file has the following type of files associated with it:		
Input file for BPIP program		.PIP
BPIP output file		.TAB
Concise BPIP output file		.SUM
BEE-Line file containing direction specific building dimensions		.SO
ISCST3 input file for each pollutant		.DTA
ISCST3 output list file for each pollutant		.LST
User summary output file for each pollutant		.USF
Master graphics output file for each pollutant		.GRF
Some modeling files have the following type of graphics files associated with them:		
Surfer data file		.DAT
Surfer boundary file		.BLN
Surfer post file containing source locations		.TXT
Surfer plot file		.SRF

KS: G:\Technical Services\Modeling\Schilling\Shearer\modeling Tech memo.doc

Figure 1 - Bennett Tier II Dispersion Modeling

Facility Buildings, Emission Sources, and Receptors

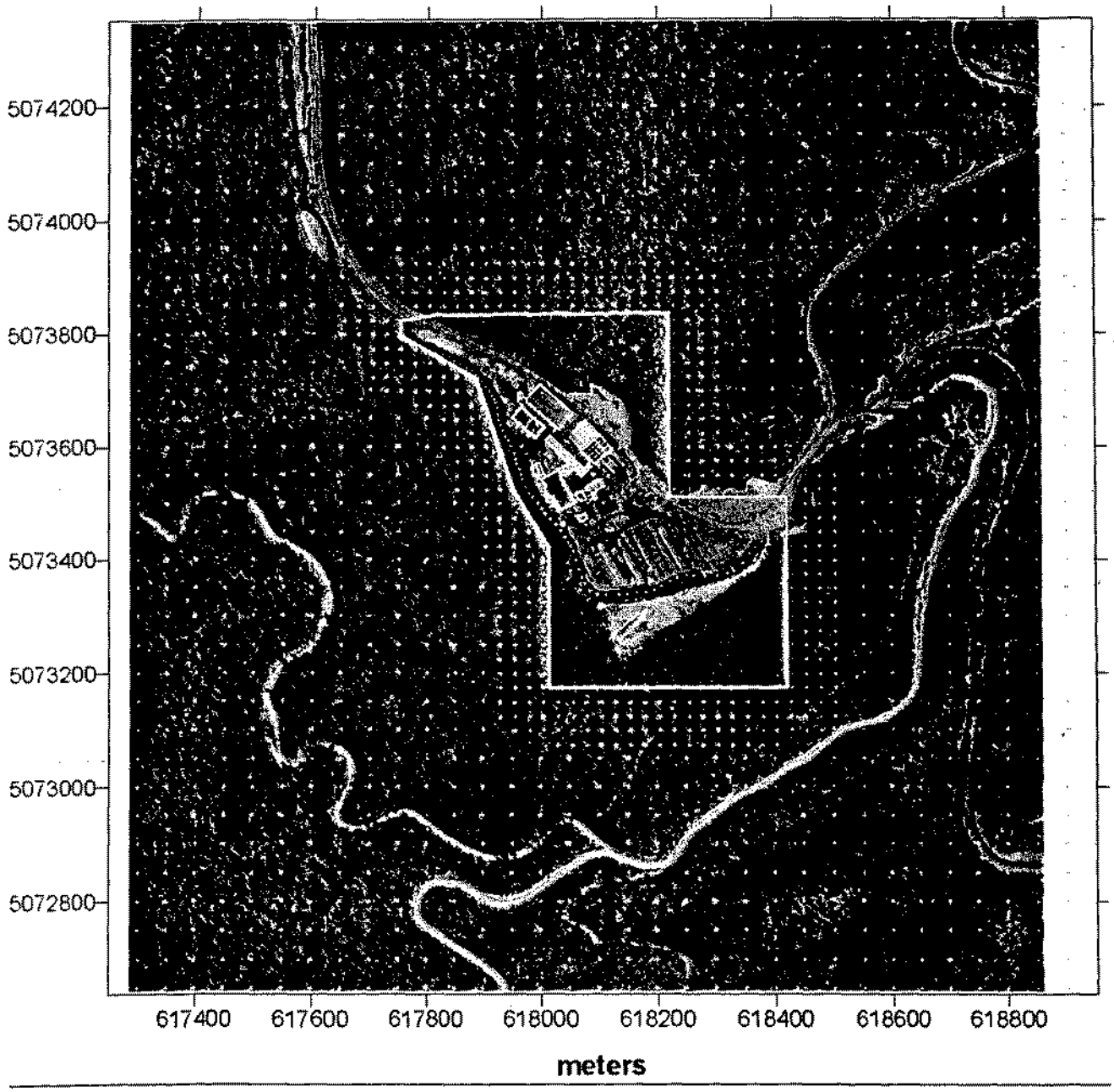


Figure 2 - Bennett Tier II Dispersion Modeling

6th Highest 24-Hour PM-10 Concentrations

Includes Background of 43 ug/m3

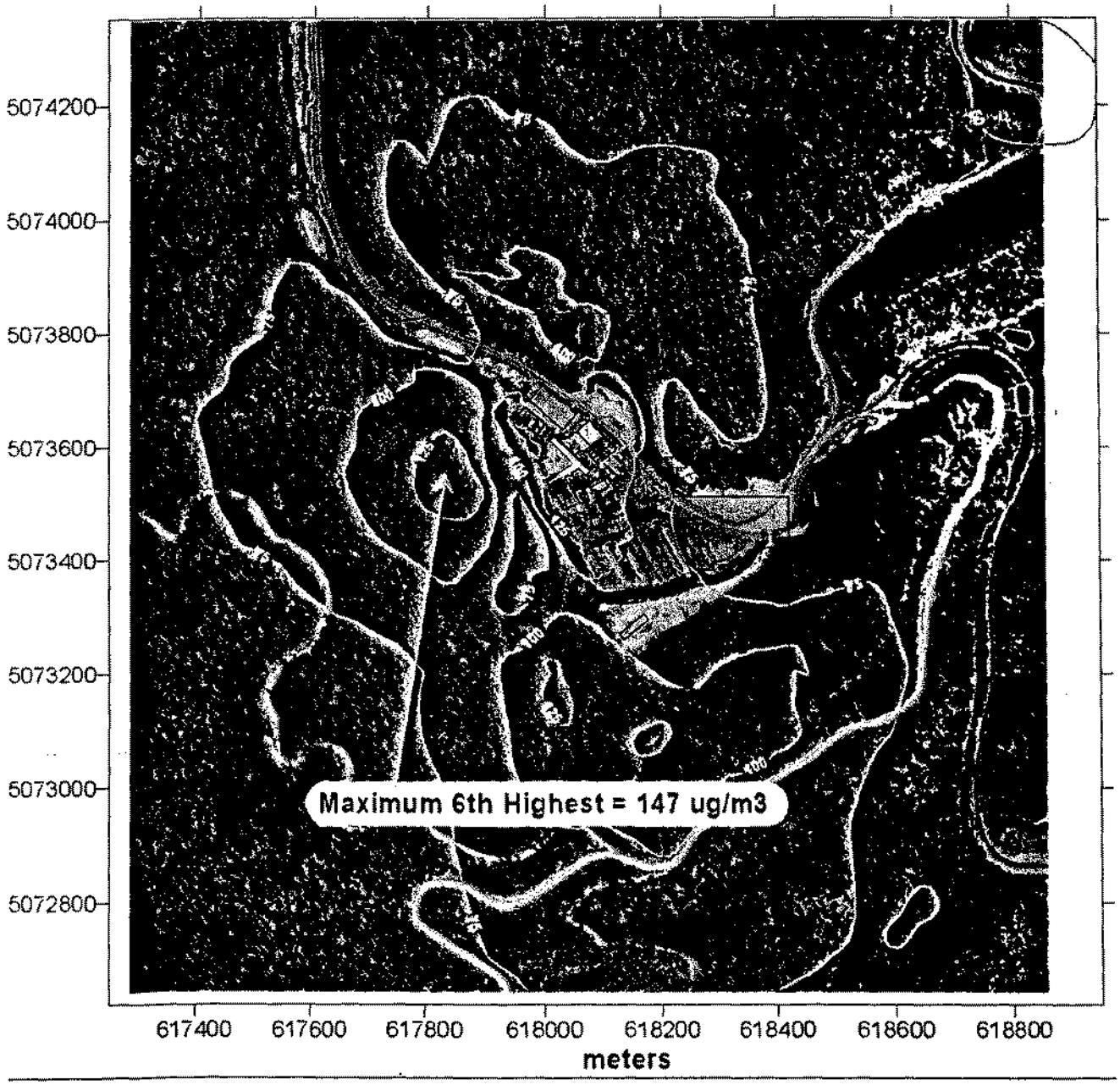
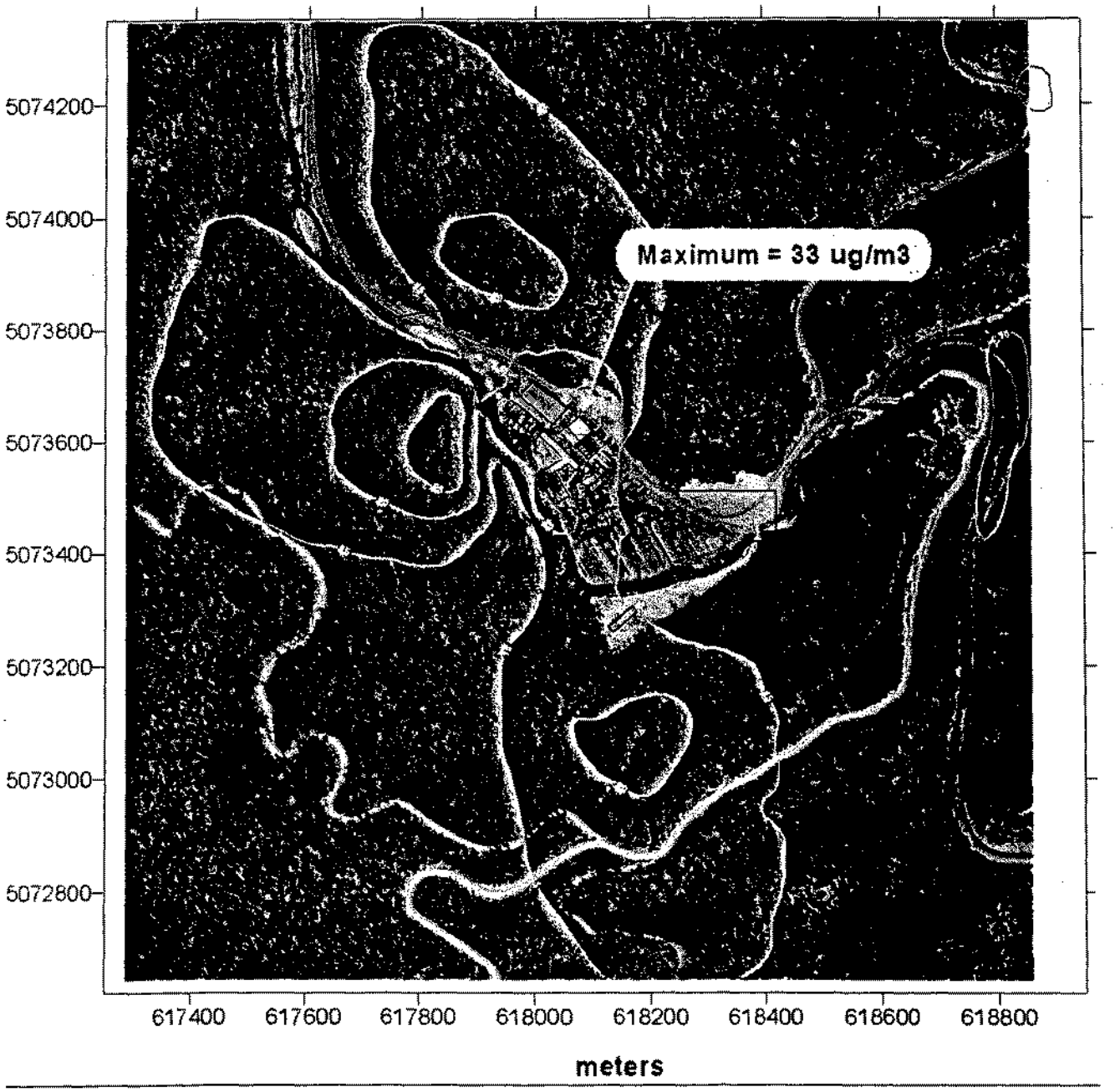


Figure 3 - Bennett Tier II Dispersion Modeling

Highest Annual PM-10 Concentrations

Includes Background of 9.6 ug/m3



APPENDIX E

HAPs Emissions Estimates

Table D.1. Non-Carcinogenic HAP emissions from Boilers

Non-carcinogenic HAPS	Emissions Factor (lb/MMBTU)	Emissions Factor (lb/T)	Hourly Emissions (lb/hr)	Annual Emissions (lb/hr)
Acetone	1.90E-04	2.15E-03	7.27E-03	3.11E-02
Acrolein	4.00E-03	4.52E-02	1.53E-01	6.55E-01
Chlorine	7.90E-04	8.93E-03	3.02E-02	1.29E-01
Chlorobenzene	3.30E-05	3.73E-04	1.26E-03	5.41E-03
2-Chlorophenol	2.40E-08	2.71E-07	9.19E-07	3.93E-06
Crotonaldehyde	9.90E-06	1.12E-04	3.79E-04	1.62E-03
Dichloropropane	3.30E-05	3.73E-04	1.26E-03	5.41E-03
Ethylbenzene	3.10E-05	3.50E-04	1.19E-03	5.08E-03
Hydrogen chloride	1.90E-02	2.15E-01	7.27E-01	3.11E+00
Naphthlene	9.70E-05	1.10E-03	3.71E-03	1.59E-02
Pentachlorobiphenol	5.10E-08	5.76E-07	1.95E-06	8.36E-06
Phenol	5.10E-05	5.76E-04	1.95E-03	8.36E-03
Styrene	1.90E-03	2.15E-02	7.27E-02	3.11E-01
Toluene	9.20E-04	1.04E-02	3.52E-02	1.51E-01
Trichloroethylene	3.00E-05	3.39E-04	1.15E-03	4.92E-03
O-xylene	2.50E-05	2.83E-04	9.57E-04	4.10E-03
Total Annual Non-Carcinogenic HAP Emissions:				**4.44E+00**

Table D.2. Carcinogenic HAP Emissions from Boilers

Non-carcinogenic HAPS	Emissions Factor (lb/MMBTU)	Emissions Factor (lb/T)	Hourly Emissions (lb/hr)	Annual Emissions (lb/hr)
Acetaldehyde	8.30E-04	9.38E-03	3.18E-02	1.36E-01
Benzene	4.20E-03	4.75E-02	1.61E-01	6.88E-01
Benzo(a)pyrene	2.60E-06	2.94E-05	9.95E-05	4.26E-04
Bis(2-ethylhexyl)phthalate	4.70E-08	5.31E-07	1.80E-06	7.70E-06
Carbon tetrachloride	4.50E-05	5.09E-04	1.72E-03	7.37E-03
Chloroform	2.80E-05	3.16E-04	1.07E-03	4.59E-03
1,2 dichloroethane	2.90E-05	3.28E-04	1.11E-03	4.75E-03
Dichloromethane	2.90E-04	3.28E-03	1.11E-02	4.75E-02
Formaldehyde	4.40E-03	4.97E-02	1.68E-01	7.21E-01
Nickel	3.30E-05	3.73E-04	1.26E-03	5.41E-03
2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.60E-12	9.72E-11	3.29E-10	1.41E-09
Tetrachloroethylene	3.80E-05	4.29E-04	1.45E-03	6.23E-03
2,4,6-Trichlororphenol	2.20E-08	2.49E-07	8.42E-07	3.60E-06
Vinyl chloride	1.80E-05	2.03E-04	6.89E-04	2.95E-03
Total Annual Carcinogenic HAP Emissions:				**1.62E+00**

Note: Emissions estimates based on permitted limits of 29,000 green tons per year and a heating value of 5,650 Btu/lb.

APPENDIX F

Process Weight Rate Evaluation

Table E.1. Process Weight Calculations

Unit Name	Emission Factor*** (lb PM/ton)	Maximum Process Rate (lb/hr)	Potential Emissions (lb PM/hr)	PWR Emission Limit** (lb PM/hr)
Debarker (P1)	0.024	134,802	1.6	27.2
Hog (P2)	0.024	14,696	0.2	14.2
Drying Kilns #0 and #4* (P4 & P8 Combined)	0.33	3,739 (99,667 lb/hr****)	1.2	25.1
Drying Kilns #1 and #2* (P5 & P6 Combined)	0.33	1,863 (49,679 lb/hr****)	0.6	20.8
Sawdust Cyclone (P11)	0.5	314	0.1	1.4
Chipper (P12)	0.024	18,894	0.2	16.0
Chips Cyclone (P13)	0.5	18,894	4.7	16.0
Shavings Cyclone (P15)	0.2	2,088	0.2	4.4
Shavings Cyclone (P16)	0.2	2,088	0.2	4.4
Sawdust Bin Truck Loadout (TR6)	2	12,169	2.8	12.7
Bark Bin Truck Loadout (TR10)	2	20,606	4.8	15.6
Shavings Bin Truck Loadout (TR17)	2	835	0.2	4.4
Chip Bin Truck Loadout (TR18)	2	30,000	7.0	14.7

*Units in thousand board feet per hour

**From IDAPA 58.01.01.702

***Emission Factors taken from "Idaho DEQ Emission Factor Guide for Wood Industry".

****Using the following conversion factors: 1bdft = 0.8333cft; and wood density of 32lb/cft~Douglas Fir (Perry's Chemical Engineer's Handbook, 7th Ed.)

APPENDIX G

Statistical Evaluation Methods

STATSITCAL EVALUATION METHODS

1. The permittee shall collect at least five samples of each fuel type burned in the boilers and analyze each sample for the fuel British thermal unit value. Each set of five samples for each fuel type will represent one data set.

2. The permittee shall identify data outliers for each data set using the Dixon criterion:

   (a) Order the data from lowest through highest, and identify as X_1 (lowest value) through X_n (highest value).

   (b) Determine R_n value for the highest value (X_n) using Equation 1:

   Equation 1: $R_n = (X_n - X_{n-1})/(X_n - X_1)$; for 3 through 7 data points

   $R_n = (X_n - X_{n-1})/(X_n - X_2)$; for 8 through 10 data points

   $R_n = (X_n - X_{n-2})/(X_n - X_2)$; for 11 through 13 data points

   $R_n = (Xn - X_{n-2})/(X_n - X_3)$; for 14 through 25 data points

   (c) Compare R_n calculated for X_n to Criterion Value in Table 10.1 for appropriate number data points.

   (d) If R_n is greater than Criterion Value, reject X_n as data outlier, and proceed to analyze X_{n-1} by returning to step (b).

   (e) If R_n is less than Criterion Value, accept X_n as valid data point and proceed to analyze X_1 by proceeding to step (g).

   (f) Determine R_1 value for the lowest value (X1) using Equation 2:

   Equation 2: $R_1 = (X_2 - X_1)/(X_n - X_1)$; for 3 through 7 data points

   $R_1 = (X_2 - X_1)/(X_{n-1} - X_1)$; for 8 through 10 data points

   $R_1 = (X_3 - X_1)/(X_{n-1} - X_1)$; for 11 through 13 data points

   $R_1 = (X_3 - X_1)/(X_{n-2} - X_1)$; for 14 through 25 data points

   Where X_n is the value of the highest remaining valid data point.

   (g) Compare R_1 calculated for X_1 to Criterion Value in Table 10.1 for appropriate number of valid data points remaining.

   (h) If R_1 is greater than Criterion Value, reject X_1 as data outlier. Renumber data starting at X_1 for lowest value, and proceed to analyze remaining data by returning to step (g).

   (i) If R_1 is less than Criterion Value, accept X_1 as valid data point and end analysis.

   (j) The analysis may also end if only two data points remain.

Table 10.1. CRITERIA FOR REJECTION OF OUTLYING OBSERVATIONS

Number of Data Points	Criterion Value	Number of Data Points	Criterion Value
3	0.941	15	0.525
4	0.765	16	0.507
5	0.642	17	0.490
6	0.560	18	0.475
7	0.507	19	0.462
8	0.554	20	0.450
9	0.512	21	0.440
10	0.477	22	0.430
11	0.576	23	0.421
12	0.546	24	0.413
13	0.521	25	0.406
14	0.546		

3. For each data set, establish the true mean value of the fuel British thermal unit using the Student's t-test:

(a) Compute the standard deviation, s, using Equation 3:

Equation 3: $s = ((\Sigma(X_i - X)^2)/(n - 1))^{1/2}$

Where: s = standard deviation of data set

X_i = individual measurement

X = arithmetic mean of all measurements in data set

n = number of measurements

(b) Calculate the true mean of the data set using Equation 4:

Equation 4: $\mu = X \pm (s * c)$

Where: s = standard deviation as determined in Step (a)

μ = true mean of data set

X = arithmetic mean of all measurements in data set

c = statistical constant as determined from Table 10.2

(c) For the purposes of this permit, the high value of the true mean (i.e. $\mu = X + (s * c)$) shall be used as the fuel British thermal unit value when calculating emissions.

Table 10.2. VALUES OF C

Number of Samples (n)	Value of c
2	4.47
3	1.68
4	1.175
5	0.954
6	0.822
7	0.735
8	0.669
9	0.620
10	0.580