August 24, 2001

MEMORANDUM

TO: James Bellatty
Regional Administrator, Lewiston Regional Office

FROM: Steve Ogle, Associate Engineer
State Office of Technical Services

SUBJECT: ***PERMIT TO CONSTRUCT TECHNICAL ANALYSIS***
P-010203, Potlatch Corporation, Idaho Pulp and Paperboard Division, Lewiston
(Installation and Operation of Two Thermocompressors)

PURPOSE

The purpose of this memorandum is to explain the requirements for a Permit to Construct (PTC).

PROJECT DESCRIPTION

Potlatch Corporation (Potlatch) is proposing to install and operate a set of two thermocompressors at the Idaho Pulp and Paperboard Division (IPP) in Lewiston, Idaho. The proposed project also involves increases in steam generation from the existing No. 1, 2, and 3 power boilers and cogeneration electricity produced in existing turbine generator No. 2. Installation and operation of the thermocompressors will allow the generation of additional electricity at/for the Potlatch facility in the present time of high energy demand.

Potlatch has requested the application be processed expeditiously as a power generation project consistent with Governor Kempthorne's Directive 2001-02, dated February 22, 2001. The directive instructs the Idaho Department of Environmental Quality (DEQ) to expedite review of applications for energy generation projects.

SUMMARY OF EVENTS

On May 10, 2001, DEQ issued Potlatch a Consent Order to modify existing steam lines at the IPP facility in Lewiston in preparation for installation of a set of two thermocompressors at a future date. On May 18, 2001, the DEQ received a PTC application from Potlatch for the installation and operation of the two thermocompressors. On July 3, 2001, the application was determined complete. Additional information regarding the proposed project was received by DEQ on July 13, 2001. A meeting involving Potlatch and DEQ personnel was held on July 24, 2001, at the state office in order to clarify the nature of the proposed project and discuss permitting criteria and concerns. A Consent Order for the installation and operation of the two thermocompressors was issued to Potlatch on August 9, 2001. DEQ received comments regarding the terms and conditions of the Consent Order and technical memorandum on August 20, 2001. After consideration of Potlatch's comments, DEQ incorporated the comments into a PTC and issued the permit to Potlatch.

An opportunity for public comment on the proposed project was held from July 13, 2001, through August 13, 2001. No request for a public comment period was received.

DISCUSSION

1. Process Description

Refer to Appendix A for schematic diagrams of the process before and after the proposed project.

1.1 Current Process

Both digesters currently use 75,000 pounds per hour (lb/hr) of 215-pound-per square-inch-gauge (psig) steam each, which is produced by running 150,000 lb/hr of steam directly from the 600-psig header through a pressure-reducing valve and splitting the reduced steam into two lines. The No. 2 turbine generator is operated on a separate steam line connected directly to the 600-psig steam header. The No. 2 generator discharges to a 170-psig header.

1.2 Proposed Process

The proposed project would continue to use 75,000 lb/hr of 215-psig steam for each digester, although the steam supply for each digester would come from one of two thermocompressors. The steam feeds for the thermocompressors are supplied by 1) a direct line from the 600-psig header, split to supply 37,500 lb/hr of 600-psig steam to each thermocompressor, and 2) a direct line from the 170-psig header, split to supply 37,500 lb/hr of 170-psig steam to each thermocompressor.

Due to the reduced demand on the 600-psig header, the #2 turbine generator could receive an additional 75,000 lb/hr of steam for generation of an extra 1.75 megawatts of electrical power. However, the increased electrical production would cause the enthalpy of the No. 2 generator steam discharge to drop, and additional steam generation will be required to rectify the impact to the 170-psig system. The additional steam will be generated by increasing the fuel combusted in the No. 1, 2, and 3 power boilers.

2. Equipment Listing

The equipment listed below is involved with the proposed project.

- Two 6-inch Schutte and Koerting thermocompressors
- Power boiler No. 1, Combustion Engineering, Model XV-50X
- Power boiler No. 2, Babcock and Wilcox FM
- Power boiler No. 3, Combustion Engineering, Model 40-A-16
- Turbine Generator No. 2
- The 600 and 170-psig steam systems
- The No. 1 and 2 M & D Digesters

3. Emission Estimates

Estimations for the increases in criteria and toxic air pollutant (TAP) emissions from the power boilers are based on the increase in fuel consumption for the boilers, along with a series of emissions factors. The sources of the emissions factors include stack testing data, *Compilation of Air Pollutant Emission Factors* (AP-42), and the National Council of the Paper Industry for Air and Stream Improvement, Incorporated. Since the incremental increase in fuel would be fired in one or more of the boilers, the total incremental increase was applied to each of the boilers to determine the worst-case scenario. The calculation

estimating emissions from the increased fuel consumption and emissions estimates for the three boilers can be found in Appendix B of this technical memorandum.

Table 1 shows a summary of the worst-case increases, from current actual to future potential, in criteria pollutants. These increases are not significant, as defined by IDAPA 58.01.01.006.92; therefore, this project does not represent a major modification (IDAPA 58.01.01.006.56).

Table 1: A Summary of Emissions Increases for Criteria Pollutants

Pollutant	Emissions Increase (T/yr)[1]
Particulate Matter	0.26
Particulate Matter with an Aerodynamic Diameter of 10 Microns or Less	0.26
Sulfur Dioxide	0.02
Carbon Monoxide	2.90
Nitrogen Oxides	20.94
Volatile Organic Compounds	0.19

[1]Tons per year

The estimated increases for TAP emissions (refer to Appendix B) indicated that arsenic, cadmium, and formaldehyde emissions have the potential to exceed the screening emissions limits listed in IDAPA 58.01.01.586. Therefore, modeling is required to show compliance with the acceptable ambient concentrations for carcinogens (AACC).

4. Modeling

The facility submitted an ISC-ST3 model to demonstrate compliance with all ambient air quality standards for criteria pollutants (AAQS) and TAPs. The model was reviewed, modified, and analyzed by DEQ Meteorologist, Mary Anderson. A copy of the technical analysis for the model and modeled output is given in Appendix C.

The model successfully demonstrates compliance with AAQS and AACC standards. None of the ambient increases in criteria pollutant emissions meets the definition of significant contribution (IDAPA 58.01.01.006.93); therefore, a facility-wide model is not required for this proposed project.

5. Facility Classification

This facility is a major facility as defined in IDAPA 58.01.01.006.55. The facility is a designated facility as defined in IDAPA 58.01.01.006.27. The facility is subject to federal New Source Performance Standards in accordance with 40 CFR 60, Subpart BB. The facility is subject to federal National Emission Standards for Hazardous Air Pollutants and federal Maximum Achievable Control Technology standards in accordance with 40 CFR 63, Subpart S. The Standard Industrial Code of the facility is 2812, and the facility classification is A.

6. Area Classification

The Potlatch facility is located in the town of Lewiston in western Nez Perce County, Air Quality Control Region 62, UTM Zone 11. Nez Perce County is designated as attainment or unclassifiable for all regulated criteria air pollutants.

7. Regulatory Review

7.1 IDAPA 58.01.01.201 Permit to Construct Required

The facility has proposed physical changes that will result in increased emissions of regulated air pollutants. The proposed changes increase emissions from the power boilers due to increased utilization and therefore, per IDAPA 58.01.01.006.58, the proposed project is a modification. In accordance with IDAPA 58.01.01.201, a PTC is required for a modification to any stationary source.

7.2 IDAPA 58.01.01.210 Demonstration of Preconstruction Compliance with Toxic Standards

In accordance with IDAPA 58.01.01.210.10, modeling was carried out to demonstrate compliance with the AACC for the net increases in arsenic, cadmium, and formaldehyde emissions as a result of this project (refer to Section 4 of this memorandum). The modeling exercise satisfies the requirements of IDAPA 58.01.01.210.10 (c), and demonstrates preconstruction compliance with toxic standards.

7.3 IDAPA 58.01.01.577 Ambient Air Quality Standards for Specific Air Pollutants

Modeling was carried out to demonstrate conformance with the requirements of IDAPA 58.01.01.577 (refer to Section 4 of this memorandum). The modeling exercise satisfies the requirements of IDAPA 58.01.01.577, and demonstrates compliance with the ambient air quality standards.

7.4 IDAPA 58.01.01.675 Fuel Burning Equipment – Particulate Matter

A person shall not discharge into the atmosphere from any fuel burning equipment with a maximum rated input of ten million Btus per hour (MMBtu/hr) or more, particulate matter in excess of 0.050 grains per dry standard cubic foot corrected to three percent oxygen. Each of the three power boilers have an input capacity greater than 10 MMBtu/hr and are required to comply with the grain-loading standard in operating permit (OP) No. 1140-0001, issued to Potlatch on August 22, 1984.

7.5 40 CFR 52 Prevention of Significant Deterioration

The increase in future potential emissions of all regulated air pollutants is below the criteria of significance as defined at IDAPA 58.01.01.006.92. Therefore, this modification is not a major modification, in accordance with IDAPA 58.01.01.006.56 and does not trigger Prevention of Significant Deterioration requirements.

7.6 40 CFR 60 New Source Performance Standards

The No. 1 and 2 power boilers were installed in the early 1950s, and there are no new source performance standards (NSPS) for boilers constructed before 1971. The No. 3 power boiler was installed in 1973; however, it has an input capacity of less than 250 MMBtu/hr and is therefore not subject to the NSPS standards listed in 40 CFR 60.40, Subpart D.

7.7 40 CFR 61 and 63 National Emission Standards for Hazardous Air Pollutants and Maximum Achievable Control Technology

Not applicable.

8. Permit Requirements

8.1 Emission Limits

There are no specific emissions limits involved with this PTC. The boilers are currently permitted in OP No. 1140-0001 issued on August 22, 1984, with no emissions limits. Since this project involves a minor increase in current emissions, no emissions limits have been established in the PTC. The basis for calculating emissions increases and demonstrating compliance with AAQS and AACC standards is the incremental increase in fuel consumption. A limit on the increase in fuel consumed is enforced by utilizing operating requirements. For this proposed project, public health and air quality are protected by the operating requirements as described in Section 8.2 of this technical memorandum.

Steam generation is not a limiting factor with respect to increasing production at the facility. The current limit (i.e., bottleneck) for production stems from the white liquor delivery system, which is not affected by streaming rate. Since the production rate at the facility is not limited by steaming rate, no other process emissions have a potential to increase as a result of this proposed project, nor can the extra steam be used to increase operation, and thereby, potential emissions from of any facility processes. Therefore, no process or emissions constraints were implemented.

8.2 Operating Requirements

The proposed operation of the thermocompressors requires 75,000 lb/hr of steam from the 170-psig header. The steam throughput in this line represents the additional steam generated for the proposed project. By limiting the steaming rate to the thermocompressors to 75,000 lb/hr, DEQ ensures that there will be no excess fuel (i.e., fuel fired in excess of the increment used to determine emissions involved with this modification) fired in the boilers for the proposed project.

The steaming rate will be continuously monitored, allowing five percent of downtime each month for maintenance and calibration activities. Potlatch shall maintain all records of the most recent two-year period for steaming rate monitoring on site.

Nitrogen oxide emissions are the only pollutant resulting from this project that has the potential to have a significant ambient impact (refer to Table 5 in Appendix C). Nitrogen oxide emissions are subject to an annual averaging period, while the steaming rate limit is based on an hourly period. Therefore, the

hourly steaming limit was scaled up to a monthly limit of 55.8 million pounds of steam per month (MMlb/month) and Potlatch is required to record the steaming rate based on a monthly average of all steaming rate measurements taken during each monthly period of thermocompressor operation.

9. Permit Coordination

The Potlatch facility currently operates under an OP issued on August 22, 1984. The conditions of the PTC for this proposed project do not violate any of the terms in the existing OP; therefore, Potlatch may continue to operate under the terms of the OP concurrently with the terms of the PTC.

The Potlatch facility is currently addressing PSD issues with a lime kiln. Since the lime kiln project commenced approximately a year in advance of the proposed project, and has no readily established connection with the proposed project, it was determined that the proposed project can be permitted independently of the PSD actions involved with the lime kiln.

The Potlatch facility is currently working with the DEQ Air Quality Program to develop a facility-wide PSD permit application to increase the production capacity of the facility. Although the proposed project could potentially be contemporaneously linked to the facility-wide expansion, the governor's Directive 2001-02 allows expedient permitting of energy-related projects. Therefore, the proposed project will be allowed.

10. AIRS Information

This permit does not represent a new source at the Potlatch facility; therefore, no Abbreviated AIRS Data Entry Sheet is required.

AIRS/AFS[1] FACILITY-WIDE CLASSIFICATION[2] DATA ENTRY FORM

Air Program Description	SIP[3]	PSD[4]	NESHAP[5]	NSPS[6]	MACT[7]	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N - Nonattainment
SO_2[8]	A	A				A	A
NOx[9]	A	A				A	A
CO[10]	A	A				A	A
PM_{10}[11]	A	A		A		A	A
PM[12]	A	A		A		A	A
VOC[13]	B	B	B		B	B	U
Total HAPs[14]	A	A	A	A	A	A	U
VE/FE/FD[15]	ND	ND	ND	ND	ND	ND	

1 Aerometeric Information Retrieval System/AIRS Facility Subsystem
2 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 ton-per-year (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).
3 State Implementation Plan
4 Prevention of Significant Deterioration
5 National Emission Standards for Hazardous Air Pollutants
6 New Source Performance Standards
7 Maximum Achievable Control Technology
8 Sulfur Dioxide
9 Nitrogen Oxide
10 Carbon Monoxide
11 Particulate matter with an aerodynamic diameter of 10 microns or less
12 Particulate Matter
13 Volatile Organic Compounds
14 Hazardous Air Pollutants
15 VE/FE/FD (visible emissions, fugitive emissions, and fugitive dust) are entered for compliance purposes only and do not require evaluation by the permit engineer.

FEES

The Potlatch facility is a major facility as defined in IDAPA 58.01.01.008.10 and is therefore subject to registration and registration fees in accordance with IDAPA 58.01.01.527. According to the Air Emissions Data Base Master List for 2001, the Potlatch, Idaho Pulp and Paperboard Division facility has registered 3,138 tons of pollutants by paying fees. This modification has the potential to increase annual fees.

RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, DEQ staff recommends that Potlatch be issued a PTC for the installation and operation of the two thermocompressors.

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cc: Eric Kopczynski, Lewiston Regional Office

Appendix A
Potlatch Corporation, Idaho Pulp and Paperboard Division
Installation and Operation of Two Thermocompressors/P-010203
Process Schematics

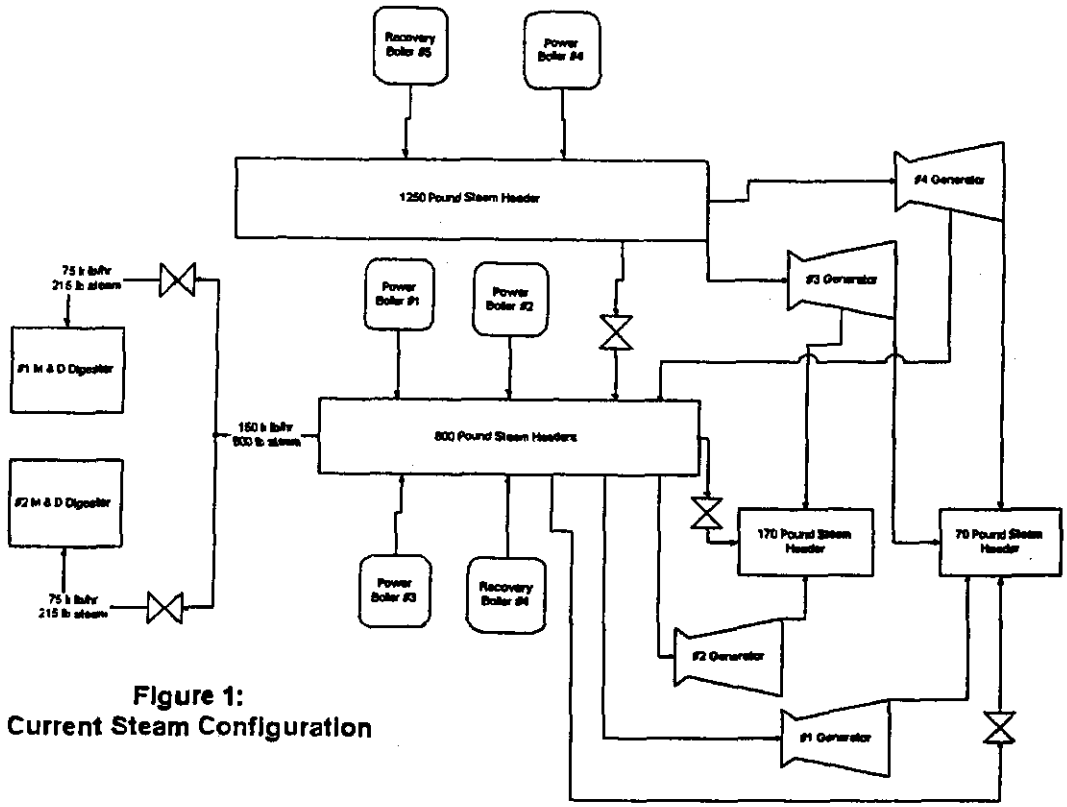

Figure 1:
Current Steam Configuration

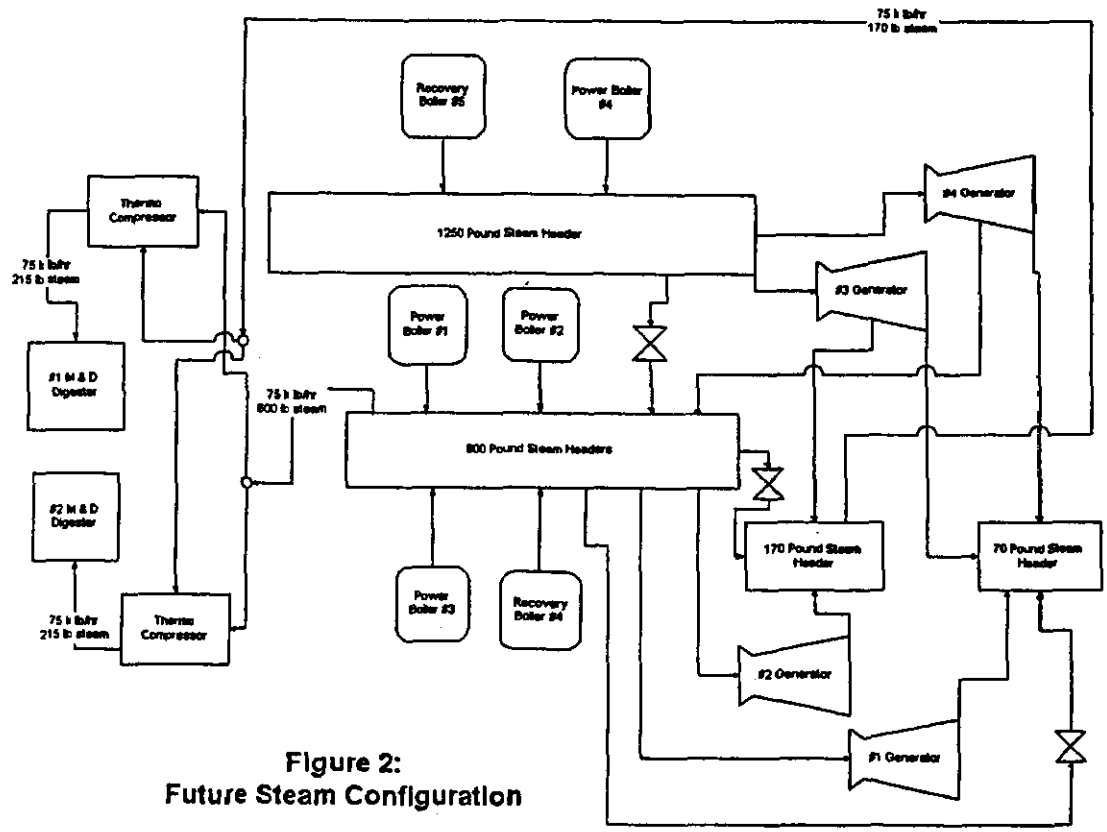

Figure 2:
Future Steam Configuration

Appendix B
Potlatch Corporation, Idaho Pulp and Paperboard Division
Installation and Operation of Two Thermocompressors/*P-010203*
Emissions Increases for the #1, #2, and #3 Power Boilers

① ENERGY REQUIRED FOR MAKE-UP STEAM:

- TRANSFER EFFICIENCY OF STEAM SYSTEM: 87%
- COMBUSTION EFFICIENCY OF STEAM SYSTEM (BOILERS): 84%
- POWER GAINED FROM EXTRA GENERATOR OPERATION: 1.75 MW

$$\therefore 1.75\,MW\left(\frac{1000\,kw}{MW}\right)\left(3412\,\frac{BTU}{kw\cdot hr}\right)\left(\frac{1}{0.87}\right)\left(\frac{1}{0.84}\right) = \underline{\underline{8.17\times10^{6}\,BTU/hr}}$$

- HEAT CONTENT OF FUEL: 1035 BTU/ft3

$$\therefore 8.17\,MMBTU/hr\left(\frac{ft^3}{1035\,BTU}\right) = \underline{\underline{0.189\,MMft^3/day}}$$

TABLE 5-2
Power Boiler No. 1 Incremental Emissions Increase

	Fuel Firing Rates			Estimated Emissions			
Pollutants	Peak Hour Average	Incremental Average	Units	Peak Hour (lbs/hr)	Incremental (lbs/hr)	Incremental (tons/yr)	EL (lbs/hr)
PM	9.005	0.189	MMcf/day	2.85	0.06	0.26	
PM10	9.005	0.189	MMcf/day	2.85	0.06	0.26	
SOx	9.005	0.189	MMcf/day	0.23	4.7E-03	0.02	
CO	9.005	0.189	MMcf/day	31.52	0.66	2.9	
NOx	9.005	0.189	MMcf/day	74.67	1.57	6.86	
VOC	9.005	0.189	MMcf/day	2.06	0.04	0.19	N/A
Total TAPs							
Arsenic	9.005	0.189	MMcf/day	7.50E-05	1.58E-06	6.90E-06	1.50E-06
Barium	9.005	0.189	MMcf/day	1.65E-03	3.47E-05	1.52E-04	0.033
Cadmium	9.005	0.189	MMcf/day	4.13E-04	8.66E-06	3.79E-05	3.70E-06
Chromium	9.005	0.189	MMcf/day	5.25E-04	1.10E-05	4.83E-05	3.30E-03
Cobalt	9.005	0.189	MMcf/day	3.15E-05	6.62E-07	2.90E-06	3.30E-03
Copper	9.005	0.189	MMcf/day	3.19E-04	6.69E-06	2.93E-05	0.013
Lead	9.005	0.189	MMcf/day	1.88E-04	3.94E-06	1.72E-05	
Manganese	9.005	0.189	MMcf/day	1.43E-04	2.99E-06	1.31E-05	0.067
Mercury	9.005	0.189	MMcf/day	9.76E-05	2.05E-06	8.97E-06	1.00E-03
Molybdenum	9.005	0.189	MMcf/day	4.13E-04	8.66E-06	3.79E-05	0.333
Nickel	9.005	0.189	MMcf/day	7.88E-04	1.65E-05	7.24E-05	2.70E-05
Vanadium	9.005	0.189	MMcf/day	8.63E-04	1.81E-05	7.93E-05	3.00E-03
Zinc	9.005	0.189	MMcf/day	1.09E-02	2.28E-04	1.00E-03	0.333
Benzene	9.005	0.189	MMcf/day	7.88E-04	1.65E-05	7.24E-05	8.00E-04
Dichlorobenzene	9.005	0.189	MMcf/day	4.50E-04	9.45E-06	4.14E-05	20.0
Formaldehyde	9.005	0.189	MMcf/day	2.81E-02	5.91E-04	2.59E-03	5.10E-04
Hexane	9.005	0.189	MMcf/day	6.75E-01	1.42E-02	6.21E-02	12.0
Naphthalene	9.005	0.189	MMcf/day	2.29E-04	4.80E-06	2.10E-05	3.33
Pentane	9.005	0.189	MMcf/day	9.76E-01	2.05E-02	8.97E-02	118.0
Toluene	9.005	0.189	MMcf/day	1.28E-03	2.68E-05	1.17E-04	25.0

TABLE 5-3
Power Boiler No. 2 Incremental Emissions Increase (Gas-Fired)

	Fuel Firing Rates			Estimated Emissions			
Pollutants	Peak Hour Average	Incremental Average	Units	Peak Hour (lbs/hr)	Incremental (lbs/hr)	Incremental (tons/yr)	EL (lbs/hr)
PM	8.04	0.189	MMcf/day	2.55	0.06	0.26	
PM10	8.04	0.189	MMcf/day	2.55	0.06	0.26	
SOx	8.04	0.189	MMcf/day	0.2	4.7E-03	0.02	
CO	8.04	0.189	MMcf/day	11.39	0.27	1.17	
NOx	8.04	0.189	MMcf/day	203.35	4.78	20.94	
VOC	8.04	0.189	MMcf/day	1.84	0.04	0.19	N/A
Total TAPs							
Arsenic	8.04	0.189	MMcf/day	6.70E-05	1.58E-06	6.90E-06	1.50E-06
Barium	8.04	0.189	MMcf/day	1.47E-03	3.47E-05	1.52E-04	0.033
Cadmium	8.04	0.189	MMcf/day	3.69E-04	8.66E-06	3.79E-05	3.70E-06
Chromium	8.04	0.189	MMcf/day	4.69E-04	1.10E-05	4.83E-05	0.033
Cobalt	8.04	0.189	MMcf/day	2.81E-05	6.62E-07	2.90E-06	3.30E-03
Copper	8.04	0.189	MMcf/day	2.85E-04	6.69E-06	2.93E-05	0.013
Lead	8.04	0.189	MMcf/day	1.68E-04	3.94E-06	1.72E-05	
Manganese	8.04	0.189	MMcf/day	1.27E-04	2.99E-06	1.31E-05	0.067
Mercury	8.04	0.189	MMcf/day	8.71E-05	2.05E-06	8.97E-06	1.00E-03
Molybdenum	8.04	0.189	MMcf/day	3.69E-04	8.66E-06	3.79E-05	0.333
Nickel	8.04	0.189	MMcf/day	7.04E-04	1.65E-05	7.24E-05	2.70E-05
Vanadium	8.04	0.189	MMcf/day	7.71E-04	1.81E-05	7.93E-05	3.00E-03
Zinc	8.04	0.189	MMcf/day	9.72E-03	2.28E-04	1.00E-03	0.333
Benzene	8.04	0.189	MMcf/day	7.04E-04	1.65E-05	7.24E-05	8.00E-04
Dichlorobenzene	8.04	0.189	MMcf/day	4.02E-04	9.45E-06	4.14E-05	20.0
Formaldehyde	8.04	0.189	MMcf/day	2.51E-02	5.91E-04	2.59E-03	5.10E-04
Hexane	8.04	0.189	MMcf/day	6.03E-01	1.42E-02	6.21E-02	12.0
Naphthalene	8.04	0.189	MMcf/day	2.04E-04	4.80E-06	2.10E-05	3.33
Pentane	8.04	0.189	MMcf/day	8.71E-01	2.05E-02	8.97E-02	118.0
Toluene	8.04	0.189	MMcf/day	1.14E-03	2.68E-05	1.17E-04	25.0

TABLE 5-4
Power Boiler No. 3 Incremental Emissions Increase

	Fuel Firing Rates			Estimated Emissions			
Pollutants	Peak Hour Average	Incremental Average	Units	Peak Hour (lbs/hr)	Incremental (lbs/hr)	Incremental (tons/yr)	EL (lbs/hr)
PM	5.789	0.189	MMcf/day	1.83	0.06	0.26	
PM10	5.789	0.189	MMcf/day	1.83	0.06	0.26	
SOx	5.789	0.189	MMcf/day	0.14	4.7E-03	0.02	
CO	5.789	0.189	MMcf/day	20.26	0.66	2.9	
NOx	5.789	0.189	MMcf/day	37.87	1.24	5.42	
VOC	5.789	0.189	MMcf/day	1.33	0.04	0.19	N/A
Total TAPs							
Arsenic	5.789	0.189	MMcf/day	4.82E-05	1.58E-06	6.90E-06	1.50E-06
Barium	5.789	0.189	MMcf/day	1.06E-03	3.47E-05	1.52E-04	0.033
Cadmium	5.789	0.189	MMcf/day	2.65E-04	8.66E-06	3.79E-05	3.70E-06
Chromium	5.789	0.189	MMcf/day	3.38E-04	1.10E-05	4.83E-05	3.30E-03
Cobalt	5.789	0.189	MMcf/day	2.03E-05	6.62E-07	2.90E-06	3.30E-03
Copper	5.789	0.189	MMcf/day	2.05E-04	6.69E-06	2.93E-05	0.013
Lead	5.789	0.189	MMcf/day	1.21E-04	3.94E-06	1.72E-05	
Manganese	5.789	0.189	MMcf/day	9.17E-05	2.99E-06	1.31E-05	0.067
Mercury	5.789	0.189	MMcf/day	6.27E-05	2.05E-06	8.97E-06	1.00E-03
Molybdenum	5.789	0.189	MMcf/day	2.65E-04	8.66E-06	3.79E-05	0.333
Nickel	5.789	0.189	MMcf/day	5.07E-04	1.65E-05	7.24E-05	2.70E-05
Vanadium	5.789	0.189	MMcf/day	5.55E-04	1.81E-05	7.93E-05	3.00E-03
Zinc	5.789	0.189	MMcf/day	7.00E-03	2.28E-04	1.00E-03	0.333
Benzene	5.789	0.189	MMcf/day	5.07E-04	1.65E-05	7.24E-05	8.00E-04
Dichlorobenzene	5.789	0.189	MMcf/day	2.89E-04	9.45E-06	4.14E-05	20.0
Formaldehyde	5.789	0.189	MMcf/day	1.81E-02	5.91E-04	2.59E-03	5.10E-04
Hexane	5.789	0.189	MMcf/day	4.34E-01	1.42E-02	6.21E-02	12.0
Naphthalene	5.789	0.189	MMcf/day	1.47E-04	4.80E-06	2.10E-05	3.33
Pentane	5.789	0.189	MMcf/day	6.27E-01	2.05E-02	8.97E-02	118.0
Toluene	5.789	0.189	MMcf/day	8.20E-04	2.68E-05	1.17E-04	25.0

Appendix C
Potlatch Corporation, Idaho Pulp and Paperboard Division
Installation and Operation of Two Thermocompressors/P-010203
Technical Memorandum for Modeling Analysis

MEMORANDUM

TO: Steve Ogle, State Office of Technical Services

FROM: Mary Anderson, Air Quality Modeler, State Office of Technical Services

SUBJECT: Modeling Review for the Installation and Operations of Two M&D Digester Thermocompressors at Potlatch's Pulp and Paper Division in Lewiston, Idaho

DATE: August 2, 2001

1. SUMMARY:

Potlatch Corporation submitted a Permit to Construct (PTC) application for the installation and operation of two M&D Digester thermocompressors. This PTC was processed under the Consent Order process for energy processes. A small increase in steam production from the No. 1 and No. 2 Power Boilers is anticipated as a result of this project. The criteria pollutants of concern for this project are oxides of nitrogen (NO_x), particulate matter with an aerodynamic diameter less than or equal to a nominal 10 μm (PM_{10}), carbon monoxide (CO), and sulfur dioxide (SO_2). The emissions of three toxic air pollutants (TAPs), arsenic, cadmium, and formaldehyde will increase above the screening levels listed in IDAPA 58.01.01.585 and 586. The modeling analysis provided by Potlatch Corporation demonstrated compliance with all regulatory requirements.

2. DISCUSSION:

2.1 Applicable Air Quality Impact Limits

This facility is located in Nez Perce County which is designated an attainment or unclassifiable area for PM_{10}, CO, SO_2, NO_x. Therefore, total ambient impacts for these criteria pollutants must be below the National Ambient Air Quality Standards, listed in Table 1. The incremental ambient impacts for the TAPs must be below the acceptable ambient concentration.

Table 1. Applicable regulatory limits

Pollutant	Averaging Period	Significant Contribution Levels ($\mu g/m^3$)[1, 2]	Regulatory Limit ($\mu g/m^3$)[3]
PM_{10}	Annual	1	50
	24-hour	5	150
CO	8-hour	500	10,000
	1-hour	2000	40,000
SO_2	Annual	1	80
	24-hour	5	365
	3-hour	25	1,300
NO_x	Annual	1	100
Arsenic	Annual	N/A	2.3E-04
Cadmium	Annual	N/A	5.6E-04
Formaldehyde	Annual	N/A	7.7E-02

1. IDAPA 58.01.01.006.93
2. Micrograms per cubic meter
3. IDAPA 58.01.01.577 for criteria pollutants and IDAPA 58.01.01.586 for toxic pollutants

2.2 Background Concentrations

Background concentrations were not required for this analysis because the estimated ambient impacts due to this project were less than the significant contribution level and a full impact analysis was not required.

2.3 Modeling Impact Assessment

In May 2001, Potlatch Corporation submitted a PTC application for the installation and operation of two M&D Digester thermocompressors. This PTC was processed under the Consent Order process for energy processes. This project will allow for the more efficient use of generated steam and an increase in the amount of cogeneration electricity produced in existing cogeneration equipment. A small increase in steam production from the No. 1, 2 and/or 3 Power Boilers is anticipated as a result of this project. The criteria pollutants of concern for this project are PM_{10}, CO, SO_2, and NO_x. The emissions of three TAPs, arsenic, cadmium, and formaldehyde will increase above the screening levels listed in IDAPA 58.01.01.585 and 586.

CH2MHill, consultant to Potlatch, used the most current version of ISCST3. They assumed rural dispersion and used 1997 on-site meteorological data. CH2MHill used all regulatory default options. All of these assumptions are appropriate for this analysis.

The original application assumed the total increase of steam could come from any of the three power boilers. Therefore, Potlatch presented the resulting emission increases for each boiler. However, only Boiler 2 was modeled using the maximum emission rates estimated. After review, the Idaho Department of Environmental Protection Agency (DEQ) determined that Boiler 3 had worse dispersion characteristics than Boiler 2. Therefore, DEQ modeling staff requested the Universal Transverse Mercator (UTM) coordinates for both Boilers 1 and 3. The stack information for each boiler is presented in Table 2. Each boiler was modeled separately using the emission rates listed in Table 3.

The results presented in Table 4 show that the ambient air impacts due to this project are below the significant contribution levels for all pollutants except NO_x. Normally, any increase in emissions that result in ambient concentrations greater than the significant contribution levels would trigger a full impact analysis. However, Potlatch Corporation is in the process of completing a Prevention of Significant Deterioration (PSD) application for the Idaho Pulp and Paper facility in Lewiston. Potlatch will be performing a full impact analysis for NO_x during the PSD analysis. Therefore, DEQ modeling staff determined that a full impact analysis is not required for this project.

Table 2. Stack information[1].

Stack Parameter	Boiler 1	Boiler 2	Boiler 3
UTM Easting (meter)[2]	502050.70	502013.70	502021.03
UTM Northing (meter)[2]	5141621.67	5141634.76	5141631.10
Height (foot)	83	83	73
Exit Diameter (foot)	7.92	6.58	6.00
Exit Gas Volume (acfm)	211,800	157,500	96,300
Exit Gas Temperature (°F)	470	330	331

1. Taken from PTC application.
2. Received in email from George Fink of CH2MHill on June 26, 2001.

Table 3. Emission rates[1].

Pollutant	Emission Rate (lb/hr)[2]		
	Boiler 1	Boiler 2	Boiler 3
PM_{10}	0.06	0.06	0.06
CO	0.66	0.27	0.66
SO_2	4.7E-03	4.7E-03	4.7E-03
NO_x	1.57	4.78	1.24
Arsenic	1.58E-06	1.58E-06	1.58E-06
Cadmium	8.66E-06	8.66E-06	8.66E-06
Formaldehyde	5.91E-04	5.91E-04	5.91E-04

1. Taken directly from Tables 5-2 through 5-4 in the PTC application. The incremental emission increase is associated with this project only. These emission rates assume all increases will be through each boiler. Only one boiler with be operated with these increases at a time.
2. pound per hour

3. MODELING RESULTS:

Tables 4 through 6 present the ambient impacts for Boilers 1, 2, and 3, respectively.

Table 4. Ambient impacts for Boiler 1.

Pollutant	Averaging Period	Emission Rate Increase (lb/hr)[1]	Unit Ambient Concentration ($\mu g/m^3$ per lb/hr)	Actual Ambient Concentration ($\mu g/m^3$)[2]	Significant Contribution Levels/AACC ($\mu g/m^3$)	Exceeds the Standard (Y or N)
PM_{10}[3]						
	24-hour	0.06	1.91	0.12	5	N
	Annual	0.06	0.10	0.0062	1	N
CO[4]						
	1-hour	0.66	14.40	9.51	2000	N
	8-hour	0.66	3.45	2.28	500	N
SO_2[5]						
	3-hour	4.70E-03	6.88	0.032	25	N
	24-hour	4.70E-03	1.91	0.0090	5	N
	Annual	4.70E-03	0.10	0.00049	1	N
NO_2[6]						
	Annual	1.57	0.10	0.16[7]	1	N
TOXICS						
Arsenic	Annual	1.58E-06	0.10	1.64E-07	2.30E-04	N
Cadmium	Annual	8.66E-06	0.10	9.01E-07	5.60E-04	N
Formaldehyde	Annual	5.91E-04	0.10	6.15E-05	7.70E-02	N

1. pound per hour
2. micrograms per cubic meter
3. particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometer
4. carbon monoxide
5. sulfur dioxide
6. nitrogen oxide
7. tier I of the Ambient Ratio Method: Assumes ratio of $NO_2/NO_x = 1.0$

Table 5. Ambient impacts for Boiler 2 (Natural Gas only).

Pollutant	Averaging Period	Emission Rate Increase (lb/hr)[1]	Unit ambient Concentration ($\mu g/m^3$ per lb/hr)	Actual Ambient Concentration ($\mu g/m^3$)[2]	Significant Contribution Levels/AACC ($\mu g/m^3$)	Exceeds the Standard (Y or N)
PM_{10}[3]						
	24-hour	0.06	2.32	0.14	5	N
	Annual	0.06	0.33	0.02	1	N
CO[4]						
	1-hour	0.66	19.91	13.14	2000	N
	8-hour	0.66	5.21	3.44	500	N
SO_2[5]						
	3-hour	4.57E-03	9.25	0.042	25	N
	24-hour	4.57E-03	5.21	0.024	5	N
	Annual	4.57E-03	0.33	0.001	1	N
NO_2[6]						
	Annual	4.77	0.33	1.56[7] 1.17[9]	1	Y[8]
TOXICS						
Arsenic	Annual	1.58E-06	0.33	5.15E-07	2.30E-04	N
Cadmium	Annual	8.66E-06	0.33	2.82E-06	5.60E-04	N
Formaldehyde	Annual	5.91E-04	0.33	1.93E-04	7.70E-02	N

1. pound per hour
2. micrograms per cubic meter
3. particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
4. carbon monoxide
5. sulfur dioxide
6. nitrogen oxide
7. tier I of the Ambient Ratio Method: Assumes ratio of $NO_2/NO_x = 1.0$
8. Normally, any increase in emissions that result in ambient concentrations greater than the significant contribution levels would trigger a full impact analysis. However, Potlatch Corporation is in the process of completing a PSD application for the Idaho Pulp and Paper facility in Lewiston. Potlatch will be performing a full impact analysis for NO_x during the PSD analysis. Therefore, DEQ modeling staff determined that a full impact analysis is not required for this project.
9. Tier II of the Ambient Ratio Method: Assumes ratio of $NO_2/NO_x = 0.75$

Table 6. Ambient impacts for Boiler 3 (Natural Gas only).

Pollutant	Averaging Period	Emission Rate Increase (lb/hr)[1]	Unit Ambient Concentration ($\mu g/m^3$ per lb/hr)	Actual Ambient Concentration ($\mu g/m^3$)[2]	Significant Contribution Levels/AACC ($\mu g/m^3$)	Exceeds the Standard (Y or N)
PM_{10}[3]						
	24-hour	0.06	3.14	0.19	5	N
	Annual	0.06	0.59	0.04	1	N
CO[4]						
	1-hour	0.66	15.32	10.11	2000	N
	8-hour	0.66	7.07	4.66	500	N
SO_2[5]						
	3-hour	4.70E-03	9.65	0.05	25	N
	24-hour	4.70E-03	3.14	0.01	5	N
	Annual	4.70E-03	0.59	0.00	1	N
NO_2[6]						
	Annual	1.24	0.59	0.73[7]	1	N
TOXICS						
Arsenic	Annual	1.58E-06	0.59	0.00	2.30E-04	N
Cadmium	Annual	8.66E-06	0.59	0.00	5.60E-04	N
Formaldehyde	Annual	5.91E-04	0.59	0.00	7.70E-02	N

1. pound per hour
2. micrograms per cubic meter
3. particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometer
4. carbon monoxide
5. sulfur dioxide
6. nitrogen dioxide
7. tier I of the Ambient Ratio Method: Assumes ratio of $NO_2/NO_x = 1.0$

Electronic copies of the modeling analysis are saved on disk. Steve Ogle reviewed this modeling memo to ensure consistency with the permit and Technical Memorandum.

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