

VERMONT AGENCY OF NATURAL RESOURCES  
Department of Environmental Conservation  
Air Pollution Control Division  
Operating Permit Program

**TECHNICAL ANALYSIS OF AN AIR CONTAMINANT SOURCE  
FOR A PERMIT TO OPERATE**

**#AOP-95-031  
PIN# SJ95-0114**

May 29, 1997  
Updated: July 2, 1997

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APPLICANT: Ryegate Associates, Incorporated  
RR 1, Box 4, U.S. Route 5  
East Ryegate, Vermont 05042

SOURCE: Ryegate Power Station  
U.S. Route 5  
East Ryegate, Vermont 05042

RESPONSIBLE OFFICIAL: Eric Heggseth, Vice President  
Ryegate Associates, Incorporated

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COUNTY: Caledonia

AREA DESIGNATION: Attainment for PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, CO, and Pb  
Unclassified for O<sub>3</sub>

UTM COORDINATES: 4899<sup>580</sup> m N, 735<sup>149</sup> m E, Zone 18  
(Main Boiler Stack)

**I. INTRODUCTION**

A. Administrative Milestones

**Table 1-1: Administrative Summary**

Administrative Item		Result or Date				
Date Application Received:		11/03/95				
Date Administratively Complete:		02/05/96				
Date & Location Receipt of Application Noticed:		02/08/96 <i>The Caledonian Record</i>				
Date Technically Complete:		05/29/97				
Date Draft Decision:		05/29/97 Approved				
Date & Location Draft Decision/Comment Period Noticed:		04/24/97 <i>The Caledonian Record</i>				
Date & Location Public Meeting Noticed:		None requested				
Date & Location of Public Meeting:		None requested				
Deadline for Public Comments:		06/30/97				
Date Proposed Decision:		07/02/97				
Classification of Source Under §5-401:		§5-401(3): Electric power generation facilities				
Classification of Application:		Title V Subject Source				
New Source Review Designation of Source:		Major Stationary Source				
Facility SIC Code(s):		4911				
Facility SIC Code Description(s):		Electrical Services				
Allowable Air Contaminant Emissions (tons/year)						
PM/PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOCs	Other	HAPs
22	25	197	394	39	N/A	<5*

\*\*All individual HAP emissions < 10 tpy.

B. Basis of Review

Ryegate Associates, Incorporated (hereinafter "Ryegate Associates" and also referred to herein as "Owner/Operator") owns and operates a twenty (20) megawatt (net) wood-fired power plant in East Ryegate, Vermont (hereinafter "Ryegate Power Station" and also referred to herein as "Facility"). Operations performed at the Ryegate Power Station are classified within the Standard Industrial Classification Code - 4911 (Electrical Services). The Ryegate Power Station is listed as a stationary source of air contaminants under §5-401(3), Electrical power generation facilities, of the *Vermont Air Pollution Control Regulations ("Regulations")*. Prior to commencing the construction and operation of the stationary source, Ryegate Associates was required to obtain approval from the Agency of Natural Resources, Department of Environmental Conservation, Air Pollution Control Division (hereinafter "Agency"). Agency approval was granted, in the form of an air pollution control permit to construct, pursuant to the requirements of Title 10 *Vermont Statutes Annotated ("10 V.S.A.")* §556 and §§5-501 and 5-502 of the

*Regulations* on January 11, 1988. Since this date, the Agency has issued seven (7) amendments to the original permit to construct. The most recent amendment was issued on February 25, 1997. These amendments have primarily been required in order to administratively modify the conditions of the permit.

Based upon its permit, allowable emissions of all air contaminants from the Ryegate Power Station are greater than 10 tons per year ("tpy"). Pursuant to §§5-1002, 5-1003, and 5-1005 of the *Regulations*, the Facility is classified as a "Title V Subject Source" and is subject to the requirement to obtain an air pollution control permit to operate consistent with the requirements of Subchapter X of the *Regulations* and Title 40 *Code of Federal Regulations* ('40 CFR') Part 70.

The applicable requirements for the Facility are contained in the *Regulations*, its existing permit, and 40 CFR Part 60 Subparts A and Db. Currently, the Facility is in compliance with these applicable requirements.

## II. FACILITY DESCRIPTION AND LOCATION

### A. Description of Plant Layout and Surrounding Area

The Facility is located off U.S. Route 5 just north of the village of East Ryegate, Vermont. The area surrounding the Facility property is rural and consists of primarily agricultural and residential uses. The Connecticut River borders the property to the East and U.S. Route 5 to the West. CPM, Incorporated, a paper manufacturing facility, is located within 500 meters to southeast of the Facility. The geographical area is complex terrain in all directions surrounding the site. Figure 1 in Appendix A of this Technical Analysis depicts the location of the Facility.

### B. Explanation of Process (Including SIC Codes)

The operations performed at the Facility are described using the Standard Industrial Classification Code - 4911 (Electrical Services). The Ryegate Power Station is equipped with a wood-fired boiler (hereinafter "Main Boiler"), which is fired with whole wood tree chips delivered in standard chip vans. The fuel is primarily mixed hardwood and softwood, with some lesser amounts of sawdust, mill chips, and bark. The fuel chips are stored in two (2) silos and an uncovered outside storage pile before being mechanically conveyed to the Main Boiler. Wood fuel is fed at a rate of approximately thirty-five (35) tons per hour into a single, high-pressure, boiler designed to burn green fuel. The Facility is operated as a base load plant at or close to 100% capacity at all times, excluding plant outages. The Main Boiler is fitted with a propane (LPG) auxiliary burner having a maximum rated heat input of 50 million British Thermal Units per hour ("MMBTU/hr"). This burner is used primarily for plant start-up and for supplemental fuel. Steam produced by the Main Boiler is passed through a condensing turbine generator set with extraction steam utilized for feedwater heating. Condenser heat is removed via a closed loop circulating water system to a cooling tower structure. The Ryegate Power Station is also equipped with a 430 horsepower ("HP")/300 kilowatt ("kW") propane-fired engine generator set (hereinafter "Emergency Generator") for use during electric power outages, and an auxiliary propane-fired boiler rated at five (5) MMBTU/hr (hereinafter "Auxiliary Boiler"). The Auxiliary Boiler supplies steam for space heating purposes during plant outages.

Air contaminant emissions produced by the Main Boiler are controlled as follows: multicyclones in series with an electrostatic precipitator, flue gas reinjection, selective

non-catalytic reduction system (urea injection), and combustion air control with oxygen trim and underfire/overfire air ratio.

A diagram of the Facility layout may be found in Appendix A of this Technical Analysis.

C. Process Equipment and Stack Information

1. Description of Equipment

See Table 2-1 Equipment Information.

2. Description of Compliance Monitoring Devices

The Main Boiler is equipped with devices to continuously monitor the following air contaminants and operating parameters:

- a. Visible emissions as opacity,
- b. Oxides of nitrogen ("NO<sub>x</sub>"),
- c. Carbon monoxide ("CO"),
- d. Carbon dioxide ("CO<sub>2</sub>"),
- e. Ammonia ("NH<sub>3</sub>"),
- f. Volumetric air flow rate; and
- g. Miscellaneous boiler and steam turbine operational information in the control room.

Up until recently, the Main Boiler was required to continuously monitor emissions of volatile organic compounds ("VOCs") measured as total non-methane hydrocarbons. However, as part of the recent permit amendment for this Facility, the Agency eliminated this requirement based upon the minimal quantity of VOC emissions measured over a period of greater than three years of Facility operation and data collection.

In addition, the Auxiliary Boiler and Emergency Generator are equipped with hourly timers to track hours of operation of this equipment.

**Table 2-1: Equipment and Stack Information**

DESCRIPTION AND MODEL NUMBER*	STACK #	SIZE OR CAPACITY (MAX. ALLOWED)	FUEL TYPE(S) OR PROCESS INPUT	DATE INSTALLED	POLLUTION CONTROL EQUIPMENT (2)	FLOW RATE (ACFM)	STACK HEIGHT (FT Above Grade)	EXIT TEMP. (°K)	MAXIMUM ALLOWABLE EMISSION RATE (lbs/hr)						
									PM/PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOCs	Other	Total HAPs
Main Boiler Manuf.: Riley Stoker Corp.	1	300 MMBTU/hr	Wood	1992	Multicyclone, ESP, selective non-catalytic reduction	See Note (3).	212.3 ft (Stack Dia. = 79 inches)	329 °F	5.0	30 (4)	45.0	90.0	9.0	---	<1
Main Boiler (Auxiliary Burner) Manuf.: Coen Model 230/DAZ-22	1	50 MMBTU/hr (1 Burner)	LPG (propane)	1992	Uncontrolled										
Auxiliary Boiler Manuf.: Weil-McLain Boiler Model: 1688R-W Burner Model: WCR3-G-25B	2	5 MMBTU/hr	LPG (propane)	1992	Uncontrolled	1900 acfm	47.9 ft (Stack Dia. = 16 inches)	424 °F	0.025	0.05	0.75	0.11	0.028	---	N/D
Emergency Generator Engine Manuf.: Cummins Engine Model: GTA-19 Gen. Manuf.: Marathon Electric Gen. Model: 432RSL4015BP-310W	3	Engine Size: 3.7 MMBTU/hr; Operating Speed: 1800 rpm; 6 Cyl.; displace/cylinder - 18.8 liters; Spark ignited; Gen. Rating: 280 kW (Standby)	LPG (propane)	1992	Uncontrolled	600 cfm	47.9 ft (Stack Dia. = 12 inches)	459 °F	neg.	0.28	8.1	26.5	1.9	---	N/D
<i>Diesel Fire Pump(1)</i>	4	< 3 MMBTU/hr	No. 2 Fuel Oil	1992	Uncontrolled	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Fuel Yard Maintenance Building Heater</i>	5	< 3MMBTU/hr	No. 2 Fuel Oil	1992	Uncontrolled	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Main Maintenance Building Heater</i>	6	< 3 MMBTU/hr	LPG (Propane)	1992	Uncontrolled	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Propane System Vaporizer</i>	7	< 3 MMBTU/hr	LPG (Propane)	1992	Uncontrolled	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Notes:
- (1) *Equipment listed in italics indicates that it is an insignificant activity.*
  - (2) C - Cyclone; S - Scrubber; ESP - Electrostatic Precipitator; FF - Fabric Filter; TO - Thermal Oxidizer; AM - Adsorption Media, CN - Condenser; SCR - Selective Catalytic Reduction; O - Other
  - (3) The original construction permit application indicated a maximum design air flow rate for the Main Boiler of 148,000 acfm at a temperature of 350 °F and 15% moisture content. This results in an air flow rate of approximately 84,000 dscfm. This value is within 1000 cfm of the air flow rate of 85,000 cfm listed in the current operating permit application. Therefore, it is assumed that the application identifies the air flow rate in dscfm. Note, compliance emission testing has indicated that the values of 148,000 acfm, 350 °F, and 15% moisture content were appropriate assumptions for this Facility in the air quality impact evaluation.
  - (4) Assumes Main Boiler at 100% load and burning 50 MMBTU/hr of propane fuel and remaining heat input from wood fuel.
- N/A - Not applicable.  
N/Q - Not quantifiable.  
neg. - negligible.

### III. QUANTIFICATION OF POLLUTANTS

#### A. Emission Related Information

Allowable emissions from the Ryegate Power Station have been estimated for the Main Boiler, Auxiliary Boiler, and Emergency Generator. Emissions produced from this fuel burning equipment include: particulate matter ("PM/PM<sub>10</sub>"), sulfur dioxide ("SO<sub>2</sub>"), NO<sub>x</sub>, CO, and VOCs. VOCs from fuel burning equipment are also commonly referred to as non-methane hydrocarbons ("NMHCs") or total organic compounds ("TOCs").

The Facility also has the potential to generate emissions from the following list of other air contaminant generating equipment or processes:

1. VOCs from the cooling tower drift and boiler water deaerator vent;
2. Combustion contaminants from a diesel fire pump, Fuel Yard Maintenance Building Heater, Main Maintenance Building Heater, and propane system vaporizer;
3. Fugitive emissions of VOCs from chemical and fuel storage tanks, and two (2) degreasing/solvent tanks; and
4. Fugitive emissions of PM/PM<sub>10</sub> from activities associated with the handling and storage of wood fuel and ash; and the use of haul roads on-site.

Individual constituents that makeup the categories of PM/PM<sub>10</sub> and VOCs are also regulated by state and federal regulations, and must therefore be quantified. These individual constituents are referred to as hazardous air contaminants ("HACs") and/or hazardous air pollutants ("HAPs"). HAPs are defined as those chemicals listed in the Section 112(b) of the federal *Clean Air Act*, of which there are 189 chemicals. HACs are defined as those chemicals which are listed in Appendix B of the *Regulations*. All of the 189 HAPs are included as HACs.

Further information concerning the derivation of allowable emissions is contained in Appendix B of this Technical Analysis.

#### B. Enforceable Operating Restrictions

The Facility presently operates under the limitations imposed by a permit to construct. Ryegate Associates proposes to maintain these limitations. Below are summarized the limitations on the operation of this Facility.

1. Annual usage of propane fuel in the Main Boiler is restricted to 20 million cubic feet per year ("ft<sup>3</sup>/yr") based on any rolling twelve (12) calendar month period;
2. Propane fuel sulfur content restricted to 10 grains per 100 ft<sup>3</sup> or less;
3. Annual hours of operation for the Auxiliary Boiler may not exceed 720 hours during any rolling twelve (12) calendar month period; and
4. Annual hours of operation for the Emergency Generator may not exceed 720 hours during any rolling twelve (12) calendar month period and may not operate simultaneously with the Main Boiler, except for periods of regularly scheduled Emergency Generator operation necessary for maintenance and testing of the performance of the emergency system.

#### C. Identification of Insignificant and Exempt Activities

Activities which qualify as an "insignificant activity" pursuant to §5-1002(h) of the *Regulations* need not be considered when determining the applicability of Subchapter X of the *Regulations* and must only be listed as such within the Operating Permit Application. In its application, Ryegate Associates has identified the below listed fuel burning equipment as having a heat input rating less than 3 MMBTU/hr, and thus being

classified as an "insignificant activity" pursuant to 5-1002(h)(1)(i):

1. diesel fire pump;
2. Fuel Yard Maintenance Building Heater;
3. Main Maintenance Building Heater; and
4. propane system vaporizer.

D. Allowable Emissions from Each Emission Point, Including Quantifiable Fugitive Emissions, As Necessary to Determine Applicable Requirements

Summarized in Table 3-1 below are the allowable emissions from each potential emission point at the Facility.

**Table 3-1: Summary of Source Allowable Emissions**

Air Contaminant Source	Maximum Allowable Air Contaminant Emissions						
	PM/PM <sub>10</sub>		SO <sub>2</sub>	NO <sub>x</sub>	CO	VOC	HAPs
	lbs/MMBTU*	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr
Main Boiler	0.007 gr/dscf @12% CO <sub>2</sub>	5.0	30.0	45.0	90.0	9.0	<1
Auxiliary Boiler	0.005	0.03	0.05	0.75	0.11	0.028	N/D**
Emergency Generator	negligible	neg.	0.28	8.1	26.5	1.9	N/D**
Cooling Towers & Deaerator Vents	---	---	---	---	---	neg.	neg.
Chemical and Fuel Storage Tanks	---	---	---	---	---	neg.	neg.
Degreasing/Solvent Tanks	---	---	---	---	---	neg.	neg.
Fugitive Dust from Wood Handling/Storage and Haul Roads	N/Q***	---	---	---	---	---	---

\* Units in lbs/MMBTU of heat input unless otherwise noted.

\*\* N/D - No data available, however, not anticipated to be a significant source of hazardous air pollutants.

\*\*\* N/Q - Not quantified, however, not anticipated to be a significant source of particulate matter, due to use of reasonable precautions to minimize the generation of fugitive dust.

**IV. APPLICABLE REQUIREMENTS**

A. Citation and Description of all Applicable Requirements

§5-1006(e)(4) of the *Regulations* requires the Owner/Operator of a stationary air contaminant source to submit a complete application including, but not limited to a demonstration of compliance with all applicable air pollution control requirements. These requirements include state and federal regulations, and the requirements of any construction permit issued under 10 V.S.A. §556. Note that compliance relative to §5-261 and §5-1010 of the *Regulations* will be discussed separately under paragraphs V. and VI. below.

*The compliance analysis and determinations in this technical analysis rely on data and representations provided by the Owner/Operator. Any statements and conclusions*

*regarding the compliance status contained herein are not binding against the state of Vermont in any future legal or administrative proceedings.*

### **Vermont Air Pollution Control Regulations**

**§5-211(2) and (3) - Prohibition of Visible Air Contaminants - Installations Constructed Subsequent to April 30, 1970.** This standard applies to each emission point at the Facility and specifies that visible emissions ("V.E.") may not exceed 20% opacity for a period of six (6) minutes or more in any hour, and at no time may they exceed 60% opacity. Primarily this standard would affect any source of particulate matter including all fuel burning equipment on-site and the wood handling systems (e.g., conveyor belts and transfer points). An exception from this standard exists in §5-211(3) of the *Regulations* for the Main Boiler when burning wood fuel during normal start-up and soot blowing. During normal start-up and soot blowing V.E.s may not exceed 80% opacity. Compliance with this standard is based on Proposed Reference Method F-1 (51 *Federal Register*, Page 31076, August 29, 1986).

Ryegate Associates has stated that it complies with the standard based on their continuous opacity monitoring system for the Main Boiler exhaust, and their visual observation of equipment in use on-site.

The Agency will verify compliance with this standard in the future during any inspections of the Facility, and its receipt and review of quarterly excess emission reports from the opacity monitoring system installed on the Main Boiler exhaust.

**§5-221(1)(a) - Prohibition of Potentially Polluting Materials in Fuel.** This section prohibits the use of any fuel, in stationary fuel burning equipment, with a sulfur content more than 2.0% by weight. This prohibition applies to all stationary fuel burning equipment used on-site. Compliance with this standard is based on fuel analyses following the procedures prescribed by the American Society of Testing Materials ("ASTM").

Ryegate Associates has stated that it complies with this standard based on the use of wood, propane, or No. 2 fuel oil in its fuel burning equipment (Each fuel type has a maximum sulfur content below the 2.0 % by weight restriction.), and its contract with the fuel suppliers.

The continued use of these fuels in the stationary fuel burning equipment is sufficient to ensure compliance with this limitation in the future.

**§5-231(3)(a)(i) - Prohibition of PM; Combustion Contaminants.** This standard applies to the Auxiliary Boiler, Emergency Generator, Diesel Fire Pump, Fuel Yard Maintenance Building Heater, Main Maintenance Building Heater, and Propane System Vaporizer and specifies that PM emissions may not exceed 0.5 lbs/hr/MMBTU of heat input where the heat input is 10 MMBTU/hr or less. Compliance with this standard is based on the use of Reference Method 5 (40 *CFR* Part 60, Appendix A).

Ryegate Associates has stated that it complies with standard based on their emission estimates and their scheduled maintenance of the stationary fuel burning equipment.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain its stationary fuel burning equipment, (2) visual observations of each exhaust will be conducted during

any Agency inspections of the Facility, and (3) if V.E.s are determined to be in excess of the limits specified in §5-211(2) of the *Regulations*, the Agency may require the performance of a stack test to verify compliance with the above referenced PM standard.

**§5-231(3)(a)(ii) - Prohibition of PM; Combustion Contaminants.** The PM standard in this section is applicable to fuel burning equipment with a heat input greater than 10 MMBTU/hr but equal to or less than 250 MMBTU/hr. This PM standard is in units of lbs/hr/MMBTU and varies based upon the heat input of the individual unit. The actual value of the standard is derived using a formula. This standard applies to the Main Boiler when burning propane fuel, and specifies that PM emissions may not exceed 0.23 lbs/hr/MMBTU of heat input. Compliance with this standard is based on the use of Reference Method 5 (40 *CFR* Part 60, Appendix A).

Ryegate Associates has stated that it complies with standard based on their emission estimates, their PM control equipment, and the scheduled maintenance of the Main Boiler.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain its Main Boiler and associated PM control devices, (2) perform visual observations of the exhaust during any Agency inspections of the Facility, (3) review quarterly excess emission reports for opacity, and (4) if V.E.s are determined to be in excess of the limits specified in §5-211(2) of the *Regulations*, the Agency may require the performance of a stack test to verify compliance with the above referenced PM standard.

**§5-231(3)(b)(iii) - Prohibition of PM; Combustion Contaminants.** This standard applies to the Main Boiler when burning wood fuel and specifies that PM emissions may not exceed 0.10 gr/dscf corrected to 12% CO<sub>2</sub> where the rated output is 1300 horsepower (H.P.) or greater and the installation commences operation after December 5, 1997. Additionally, this standard applies when fossil fuel is burned in combination with wood fuel, and the fossil fuel contributes less than 50% of the total heat input. If the fossil fuel contributes greater than 50% of the total heat input, then the requirements of §5-231(3)(a) apply. Compliance with this standard is based upon the use of Reference Method 5 (40 *CFR* Part 60, Appendix A).

Ryegate Associates has stated that it complies with standard based on their emission estimates and their scheduled maintenance of the Main Boiler and its associated PM control equipment.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain its Main Boiler and associated PM control equipment, (2) visual observations of each exhaust will be conducted during any Agency inspections of the Facility, (3) review quarterly excess emission reports of opacity, and (4) if V.E.s are determined to be in excess of the limits specified in §5-211(2) of the *Regulations*, the Agency may require the performance of a stack test to verify compliance with the above referenced PM standard.

**§5-231(4) - Prohibition of PM; Fugitive PM.** This section requires the use of fugitive PM control equipment on all process operations and the application of reasonable precautions to prevent PM from becoming airborne during the handling, transportation, and storage of materials, or use of roads. This requirement applies to the entire Facility and is particular concern with the wood fuel handling and storage activities, and the use

of haul roads on-site.

Ryegate Associates has stated that it complies with this requirement based on the use of the fuel management plan and wet suppression (if found necessary).

The Agency will verify compliance with this requirement in the future as follows: (1) require the application of water or surfactants to the plant haul roads and yard as necessary, (2) assess compliance with this requirement during any inspections of the Facility, and (3) require the use of additional measures if found necessary during a compliance inspection.

**§5-241 - Prohibition of Nuisance and Odor.** This requirement applies to the entire Facility and prohibits the discharge of air contaminants that would be a nuisance to the public or be source of objectionable odors beyond the property-line of the Facility.

Ryegate Associates has stated that it complies with this requirement due to the remoteness of the Facility and their observation of dust and odors from their operations.

The Agency will verify compliance with this requirement in the future during any inspections of the Facility. Additionally, the Agency investigates all complaints that it receives in order to determine whether or not there is a violation of this requirement.

**Subchapter VIII - Registration of Air Contaminant Source.** This Subchapter requires the registration of a stationary source, with the Agency, if it produces five (5) tons per year or greater of actual emissions during the preceding calendar year. Sources are required to submit information regarding their operations and pay a fee based on the quantity of emissions they produce and the fuels that they use.

Ryegate Associates has stated that it complies with this requirement based on the information they have submitted and the fees they have paid for calendar year - 1996.

The Agency will ensure compliance with this requirement in the future during any inspections of the Facility.

#### **Air Pollution Control Permit to Construct**

**Condition (1)** - Construct and operate the Facility in accordance with plans and specifications submitted to the Agency.

Ryegate Associates has stated that it complies with requirement.

The Agency will verify compliance with this standard in the future during any inspections of the Facility.

**Condition (2)** - Limitations on wood fuel. Specifies the type and quality of wood fuel that may be used to feed the Main Boiler.

Ryegate Associates has stated that it complies with requirement based upon their daily monitoring and record keeping of delivered wood chips, and utilization of site forester for the procurement of wood fuel.

The Agency will verify compliance with this standard in the future during any inspections of the Facility.

**Condition (3)** - Limitations on propane fuel. Specifies the amount and quality (i.e., sulfur content) of propane fuel that may be used at the Facility.

Ryegate Associates has stated that it complies with requirement based upon their daily monitoring and record keeping of propane usage, the design of the propane burner, and delivery tickets from the propane fuel supplier.

The Agency will verify compliance with this standard in the future during any inspections of the Facility.

**Condition (4)** - Air pollution control equipment requirements. Specifies the systems that will be equipped and used to control air contaminant emissions from the Main Boiler.

Ryegate Associates has stated that it complies with requirement.

The Agency will verify compliance with this standard in the future during any inspections of the Facility.

**Condition (5)** - Particulate matter emissions limitations. Specifies the PM standard applicable to the Main Boiler.

Ryegate Associates has stated that it complies with requirement based upon their biennial compliance testing, opacity monitoring system, and operator training.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain its Main Boiler and associated PM control equipment, (2) biennial emission testing will be performed to ensure continuing compliance, (3) the quarterly excess emission reports of opacity will be reviewed, and (4) if V.E.s are determined to be in excess of the limits specified in §5-211(2) of the *Regulations*, the Agency may require the performance of additional stack testing to verify compliance with the permitted PM standard.

**Condition (6)** - Visible air contaminant emissions limitations. This specifies the opacity limits that apply to Facility. This standard is based on the limits of §5-211(2) of the *Regulations*.

Ryegate Associates has stated that it complies with this requirement based upon their continuous opacity monitoring system.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain all air contaminant generating equipment and pollution control systems, (2) visual observations of each exhaust will be conducted during any Agency inspections of the Facility, and (3) the Agency will review the quarterly excess emission reports of opacity for the Main Boiler.

**Condition (7)** - NO<sub>x</sub> emission limitations. Specifies the NO<sub>x</sub> emission standard that applies to the Main Boiler.

Ryegate Associates has stated that it complies with this requirement based upon NO<sub>x</sub> control system and continuous emission monitoring system.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain its Main Boiler and

associated NO<sub>x</sub> control system, and (2) the Agency will review the quarterly excess emission reports of NO<sub>x</sub> from the Main Boiler.

**Condition (8)** - Limitations on other air contaminants. Specifies emission limitations for CO, VOCs, Benzo(a)pyrene, and ammonia that applies to the Main Boiler.

Ryegate Associates has stated that it complies with this requirement based on their initial performance testing and continuous monitoring systems for CO, VOCs, and ammonia.

The Agency will assess compliance with this standard in the future as follows: (1) Ryegate Associates will be required to properly operate and maintain its Main Boiler and associated control equipment, (2) biennial emission testing for VOCs, and (3) the Agency will review the quarterly excess emission reports of CO for the Main Boiler.

**Condition (9)** - Continuous emissions monitoring requirements for the Main Boiler. Requires the use of devices for the continuous measurement and determination of emission rates of visible air contaminants, NO<sub>x</sub>, CO, CO<sub>2</sub>, VOCs, and ammonia.

Ryegate Associates has stated that it complies with this requirement based upon their system design and Quality Assurance Plan.

The Agency will verify compliance with this standard in the future during any inspections of the Facility.

**Condition (10)** - Compliance testing and determination of continuing compliance. Specifies the initial performance testing requirements, as well as requirements for the determination of continuing compliance using emission testing and continuous emissions monitoring systems.

Ryegate Associates has stated that it complies with this requirement.

The Agency will verify compliance with this standard in the future during any inspections of the Facility.

**Condition (11)** - Limitations on Auxiliary Boiler and Emergency Generator. Specifies the limitations on design and use of the Auxiliary Boiler and Emergency Generator.

Ryegate Associates has stated that it complies with this requirement based upon their hour meters on the boiler and generator, observation of the exhausts serving each unit, and operator training.

The Agency will verify compliance with these requirements in the future during any inspections of the Facility.

**Condition (12)** - Requirements for the control of fugitive PM. Specifies the precautions that will be used by the Owner/Operator to minimize the generation of fugitive PM at the Facility.

Ryegate Associates has stated that it complies with this requirement based upon their yard maintenance plan.

The Agency will verify compliance with this requirement in the future as follows: (1)

require the application of water or surfactants to the plant haul roads and yard as necessary, (2) assess compliance with this requirement during any inspections of the Facility, and (3) require the use of additional measures if found necessary during a compliance inspection.

**Condition (13)** - Requirements for the control of odors. Requires the Owner/Operator to submit a plan for the control of air contaminants released by the Facility and that may be a source of odors or nuisance to the general public.

Ryegate Associates has stated that it complies with this requirement based upon their wood chip management plan.

The Agency will verify compliance with this requirement in the future during any inspections of the Facility. Additionally, the Agency investigates all complaints that it receives in order to determine whether or not there is a violation of this requirement.

**Condition (14)** - Requirements for start-up, shutdown, and upset conditions. Requires the submittal of a plan to deal with start-up, shutdown, and upset conditions during the operation of stationary fuel burning equipment at the Facility.

Ryegate Associates has stated that it complies with this requirement based upon their start-up, shutdown, and malfunction plan.

The Agency will verify compliance with these requirements in the future during any inspections of the Facility.

**Condition (15)** - Requirements for operation, inspection, and maintenance. Requires the Owner/Operator to properly train individuals responsible for the operation and maintenance of fuel burning equipment and associated air pollution control equipment at the Facility.

Ryegate Associates has stated that it complies with this requirement based upon their inspection and maintenance plan.

The Agency will verify compliance with these requirements in the future during any inspections of the Facility.

**Condition (16)** - Record keeping and reporting requirements. Specifies the records that will be maintained by the Owner/Operator for the Facility, and when such records will be made available for Agency inspection.

Ryegate Associates has stated that it complies with these requirements.

The Agency will verify compliance with these requirements in the future during any inspections of the Facility.

**Conditions (17) through (23)** - Standard conditions.

Ryegate Associates has stated that it complies with these requirements.

The Agency will verify compliance with these requirements in the future during any inspections of the Facility.

### **Federal Air Pollution Control Regulations**

**Section 111 of the Clean Air Act.** The Ryegate Power Station is subject to requirements within 40 *CFR* Part 60, Subpart Db, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units. As a consequence of being subject to Subpart Db, the Facility is also subject to requirements within the General Provisions of 40 *CFR* Part 60 Subpart A.

**40 *CFR* Part 60 Subpart A §60.7 - Notification and record keeping.** Requires the written submittal of (or copies of such submittals to state/local agency) notifications of the commencement of construction, start-up, etc. to the Administrator; the maintenance of records related to start-up, shutdown, or malfunction of the affected facility, malfunction of an air pollution control system, or periods during which a continuous emissions monitoring system ("CEMS") is inoperative; the submittal of excess emission reports for those facilities equipped with a CEMS; and the maintenance of files of all measurements, etc. for a minimum of two (2) years following the date of such measurements.

§60.8 - Performance tests. Requires a performance test and the submittal of a written report of the results of such testing; sampling ports and stack or duct free of cyclonic flow, a safe sampling platform, safe access to the platform, and utilities for the sampling/testing equipment.

§60.11 - Compliance with standards and maintenance requirements. Specifies methods to be used to determine compliance with standards within 40 *CFR* Part 60. Requires the owner or operator of a source to maintain and operate any affected facility, including associated air pollution control equipment, in a manner consistent with good air pollution control practice.

§60.12 - Circumvention. Prohibits the concealing of an emission which would otherwise constitute a violation of an applicable standard.

§60.13 - Monitoring requirements. Specifies that continuous monitoring systems ("CMS") required by an NSPS is subject to §60.13 upon promulgation of a performance specification under 40 *CFR* Part 60 Appendix B and, if the CMS is used to demonstrate compliance with emission limits on a continuous basis, Appendix F, unless otherwise noted in an NSPS or by the Administrator. All CMS must be installed and operational prior to conducting performance testing under §60.8. Requirements if continuous opacity monitoring system ("COMS") data are used for documenting compliance with opacity as provided in §60.11(e)(5). Requires daily checks of zero and span calibration drifts and adjustments, record and quantify, whenever specified, the amount of excess zero and span drift measured at the 24-hour interval checks; cleaning of optical surfaces exposed to effluent gases; all CMS will be in continuous operation and meet minimum frequency of operation requirements; all CMS will be installed such that representative measurements of emission or process parameters from the affected facility are obtained (procedures for locating CMS in 40 *CFR* Part 60 Appendix B); reduction of data for opacity monitoring; Administrator may approve alternative to monitoring procedures or requirements upon written application; alternative to relative accuracy testing specified in performance specification 2 of 40 *CFR* Part 60 may be requested if satisfy specific conditions.

§60.19 - General notification and reporting requirements.

Ryegate Associates has satisfied the requirements of 40 *CFR* Part Subpart A based upon the requirements of its existing permit to construct, performance testing that has been conducted in the past, the design and construction of the affected facility, and the CEMS quality assurance plan required by existing permit.

**40 *CFR* Part 60 Subpart Db §60.43b(c)(1)** - Standard for particulate matter. PM emissions may not exceed 0.10 lbs/MMBTU of heat input if the affected facility has an annual capacity factor greater than 30% for wood. Per §60.43b(e), the annual capacity factor is determined by dividing the actual heat input to the steam generating unit during the calendar year from the combustion of wood, and any other fuels by the potential heat input to the steam generating unit if the steam generating unit has been operated 8,760 hours at the maximum design heat input capacity. §60.43b(f) - Standards for particulate matter. Visible emissions may not exceed 20% opacity (6-minute average), except for one 6-minute period per hour of not more than 27% opacity. Note: Per §60.43b(g), the particulate matter and opacity standards apply at all times, except during periods of startup, shutdown or malfunction.

§60.44b(a) - Standard for nitrogen oxides. Not applicable, since annual capacity factor for LPG usage restricted to 10 percent or less and the LPG rated heat input is less than 250 MMBTU/hr.

§60.46b - Compliance and performance testing for particulate matter. §60.46b(a) specifies that the PM and opacity limits apply at all times except, periods of startup, shutdown, or malfunction. §60.46b(b) and §60.46b(d) requires an initial performance test to be conducted to determine compliance with PM and opacity standards as required by §60.8 and procedures listed within §60.46b(d). The requirements of this section were incorporated into the permit to construct, and initial performance testing was performed in May of 1993. Therefore, Ryegate Associates has complied with this requirement.

§60.48b - Emission monitoring for particulate matter. §60.48b(a) requires the owner or operator subject to the opacity standard in §60.43b to install, calibrate, maintain, and operate a CMS for opacity and record the output of the system. §60.46b(e) specifies that the procedures in §60.13 shall be followed for installation, evaluation, and operation of CMS. Also, for facilities combusting wood the span value for the opacity CMS shall be between 60 and 80 percent.

§60.49b - Reporting and recordkeeping requirements. This section requires the Owner/Operator to record and submit the following information: §60.49b(a) notification of initial startup as provided in §60.7 including: design heat input of affected facility and fuels to be burned, copy of federally enforceable restrictions, and annual capacity factors on various fuels and of the affected facility itself; §60.49b(b) provide the Administrator with test data from the initial performance test and performance evaluation of the CEMS using the applicable performance specifications in 40 *CFR* Part 60 Appendix B; §60.49b(d) maintain and record amounts of each fuel burned during each day and calculate the annual capacity factor for each fuel and calendar quarter; §60.49b(f) maintain records of opacity; §60.49b(h) submit quarterly excess emission reports opacity; and §60.49b(o) maintain records for a period of two (2) years following the date of such record.

Ryegate Associates has satisfied the requirements of 40 *CFR* Part Subpart Db based upon the requirements of its existing permit to construct, performance testing that has been conducted in the past, the design and construction of the affected facility, and the

CEMS quality assurance plan required by the permit to construct.

**Section 504(b) and 114(a)(3) of the Clean Air Act.** Applicability is undetermined at this time, since U.S. EPA has not finalized regulations implementing these requirements. If the Agency determines that Ryegate Associates is subject to any requirements within these regulations, the Agency will reopen the permit to incorporate any new applicable requirements.

B. Equivalency and Streamlining

Particulate Matter Emission Standards

There are three applicable PM emission limits that apply to the Main Boiler: a federal standard of 0.10 lbs/MMBTU contained in 40 *CFR* Part 60, Subpart Db, Section 60.43b(b)(i), a state standard of 0.10 gr/dscf corrected to 12% CO<sub>2</sub> contained in §5-231(3)(b)(iii) of the *Regulations*, and an MSER limit of 0.007 gr/dscf corrected to 12% CO<sub>2</sub>. The PM/PM<sub>10</sub> limit specified by MSER is the most stringent, since it is equivalent to approximately 0.02 lbs/MMBTU of heat input. Ryegate Associates will be required to comply with the MSER emission limit. Compliance with the MSER emission limit shall be determined consistent with the procedures identified within 40 *CFR* Part 60 Subpart Db for determining compliance with the federal emission standard. §5-231(3)(b)(iii) of the *Regulations*, and 40 *CFR* Part 60 Section 60.43b(b)(i) are subsumed by MSER as set forth in this subsection.

Visible Air Contaminants

There are two limits which regulate visible air contaminant emissions for the Main Boiler. The state limit is contained in §5-211(2) of the *Regulations* prohibits visible emissions of 20% opacity for a period or period(s) aggregating to six (6) minutes or more in any hour and at no time may visible emissions exceed 60% opacity. There is an exception in §5-211(3) of the *Regulations* which allows visible emissions to exceed the 20% and 60% limits during for periods of start-up and soot blowing for the wood-fired boiler. However, at no time may visible emissions during periods of startup and soot blowing exceed 80% opacity. The federal limit in 40 *CFR* Part 60, Subpart Db, Section 60.43b(e) limits visible emissions to 20% opacity or less, except for one 6-minute period in any hour where emissions may not exceed 27% opacity. The federal opacity limits do not apply during periods of startup, shutdown, or malfunction. Compliance with the state and federal limit are measured differently. The federal standard is based upon the use of Reference Method 9 (40 *CFR* Part 60 Appendix A), while the state limit is assessed using proposed Reference Method F-1 (51 *Federal Register*, page 31076, August 29, 1986).

The Agency considers the state limit as more stringent that it subsumes the federal limit. Therefore, Ryegate Associates will be required to comply with the state opacity limit. This determination is based upon the following: (1) all periods of source operation are covered by the state opacity limits, and (2) the six-minute averaging technique in federal Reference Method 9 results in underenforcement of an opacity regulation (see Page 31076 of the proposed Method F-1).

C. Description of Alternative Operating Scenarios and Related Applicable Requirements Not Previously Identified

Ryegate Associates has not requested any alternative operating scenarios as part of its application for a Permit to Operate.

## V. HAZARDOUS AIR CONTAMINANTS

§5-261 of the *Regulations* addresses the release of HACs into the ambient air. Unless specifically exempted from §5-261, a source must quantify its emissions of HACs regulated by this rule. Any source whose actual emission rate of a HAC exceeds its respective Action Level ("AL") is subject to the rule for that HAC, and the source must then demonstrate that the emissions of the HAC are minimized to the greatest extent practicable. This process is termed the "Hazardous Most Stringent Emission Rate" or HMSER. An air quality impact evaluation may also be required to further assess the ambient impacts that may be attributable to the source. The evaluation of the air quality impacts is performed using the Hazardous Ambient Air Standards ("HAAS") or Stationary Source Hazardous Air Impact Standard ("SSHAIS") contained in the *Regulations*.

### A. Quantification of Hazardous Air Contaminant ("HAC") Emissions

Solid fuel burning equipment (not including incinerators) installed or constructed prior to January 1, 1993, and all fuel burning equipment which combusts virgin liquid or gaseous fuel is exempted from review pursuant to §5-261(1)(b)(ii) of the *Regulations*. Based on this exemption, no fuel burning equipment used at the Facility qualified for review of its HAC emissions.

Nevertheless, the Ryegate Power Station may produce emissions of HACs from the usage of chemicals associated with its cooling tower. These emissions have been quantified and compared to their respective ALs in order to determine if review under §5-261 of the *Regulations* was warranted.

Emissions of these HACs are summarized in Table 5-1 below. Calculations supporting these emission rates may be found in Appendix B of this Technical Analysis.

**Table 5-1: Hazardous Air Contaminant Emissions**

Contaminant	CAS#	Estimated Emission Rate (lbs/8-hrs)	Action Level (lbs/8-hrs)
Chlorine	7782-50-5	0.036	1.3
Dodecylguanidine hydrochloride (DGH)	13590-97-1	0.026	0.025
Ethyl alcohol	64-17-5	0.005	2,330
<i>Ethylene glycol</i>	107-21-1	0.09	53
<i>Hydroquinone</i>	123-31-9	0.01	0.2
Isopropyl alcohol	67-63-0	0.019	4,120
Morpholine	110-91-8	0.006	30
Potassium hydroxide	1310-58-2	0.04	0.84
Sodium hydroxide	1310-73-2	0.024	0.84

Note - EPA HAP identified in italicized font.

Based upon the emissions summarized above, the Ryegate Power Station is not subject to §5-261 of the *Regulations*.

B. Federal Hazardous Air Pollutants

Although exempt from §5-261 of the *Regulations*, the U.S. EPA has identified fuel burning equipment as a potential source that will be regulated by a "Maximum Achievable Control Technology" ("MACT") standard in the future. Emissions of federally regulated HAPs have been estimated for the fuel burning equipment (see Table 1 in the Appendix B of this Technical Analysis). Total HAP emissions from the Ryegate Power Station are estimated to be less than 5 tons per year. Therefore, this Facility does not satisfy the criteria for a major HAP source pursuant to the federal thresholds of 10 tpy (individual HAP) and 25 tpy (total HAPs). A listing of federally regulated HAPs can be found in §112(b) of the federal *Clean Air Act*.

**VI. REASONABLY AVAILABLE CONTROL TECHNOLOGY**

At this time, the Agency has not established a Reasonably Available Control Technology ("RACT") requirement applicable to this Facility. Therefore, the source is currently in compliance with this requirement. The Agency will notify Ryegate Associates if any applicable RACT requirement applies to this Facility in the future. If such RACT should apply to the source in the future, the Agency will ensure that Ryegate Associates complies with such requirement at that time.

**VII. COMPLIANCE PLAN & CERTIFICATION**

A. Description of the Compliance Status for Each Applicable Requirement

See paragraph IV. above.

B. Description of Compliance Certification

Ryegate Associates will certify compliance with applicable requirements on an annual basis. Annual certification will be required as part of the annual registration of the Facility with the Agency pursuant to Subchapter VIII of the *Regulations*. Additionally, quarterly reports will be submitted based upon the requirements of the existing construction permit conditions and QA Plan for the CEMS.

- C. Compliance Schedule For Each Applicable Requirement for Which the Source is Not in Compliance

Not applicable for this Facility.

### VIII. PUBLIC PARTICIPATION

The Ryegate Power Station is classified as a "Title V Subject Source," and consequently any application for a Permit to Operate for this source is subject to the public participation requirements of §5-1007 of the *Regulations*.

The Agency published notice on February 28, 1996, in the *Caledonian Record* that it had received an administratively complete application from Ryegate Associates. The affected state of New Hampshire was also notified in writing of the receipt of this application on February 16, 1996. On May 29, 1997, the Agency published notice in the *Caledonian Record* that it received a technically complete application from Ryegate Associates. This notice also informed the public of the Agency's draft decision to issue a Permit to Operate, and solicited comments and requests for an informational meeting. The affected state of New Hampshire and U.S. EPA were also notified of the draft decision. The public comment period closed at 4:30 p.m. on June 30, 1997. The Agency received no written request for an informational meeting, but written were received from U.S. EPA.

### IX. CONCLUSIONS

- A. Ryegate Associates has demonstrated the Facility is in compliance with all applicable air pollution control requirements.
- B. Recommended Draft Permit Conditions (*Air Pollution Control Division comments italicized.*)

*Consistent with 10 V.S.A. §556(e) and for the purposes of reducing the administrative burden of enforcing two separate permits, the Agency proposes to issue the Air Pollution Control Permit to Operate in conjunction with an administrative amendment of Air Pollution Control Permit to Construct #AP-90-029g. The result will be a combined Air Pollution Control Permit to Construct and Operate ("Combined Permit"). All conditions of the existing Air Pollution Control Permit to Construct #AP-90-029g will carry over into the new Combined Permit. As part of the administrative amendment of the construction permit, the Agency will update some of the conditions to correct errors or insert text that was inadvertently left out of the final document. None of these revisions will significantly alter the requirements of the construction permit. Note the list of standard conditions will be updated to include the most recent list of standard conditions prepared for the operating permit program. Revisions are noted as follows: additional text is noted in underlined and italicized font, while deletions are noted using strikeout font. **NOTE: Some conditions were changed as a result of comments during the public comment period. See the attached response to comments for further detail regarding the changes.***

**CHANGES TO CONSTRUCTION PERMIT CONDITIONS**

() Continuous Emission Monitoring ("CEM")

Visible . . .

All systems, except the NH3 CEMS, shall be installed, calibrated, maintained and operated in such a manner as to meet the requirements of 40 CFR Part 60, Appendix B, Performance Specifications 1, 2, 3, 4 and 6, . . .Section ("TSS"). The NH<sub>3</sub> CEMS shall meet the TSS CEM Requirements. Ryegate Associates shall operate . . .

*Correction to replace inadvertent deletion of reference to PS 4 while processing last amendment of construction permit. Additional reference to CEM requirements for ammonia monitoring system.*

- (a) . . .
- (b) . . .
- (c) . . .shall ~~intended~~ include at a . . .

*Correction of a typographical mistake.*

() Compliance Testing and Monitoring

- (a) Continuing compliance with the particulate matter. . . thereafter. Ryegate Associates shall conduct such testing and furnish the Agency with a written report of the results of such testing within ~~270~~ 90 days after the 7th of September for those years when re-testing is required. At least . . .

*Reduction in the allowable quantity of time for the completion and submittal of bi-ennial compliance test results.*

() Operation, Inspection, and Maintenance Procedures

- (a) All operators of the Facility shall be trained in the operation and maintenance of both the fuel burning and air pollution control equipment by ~~the manufacturers of the equipment~~ qualified personnel.

*Revision of the condition in order to allow the training of personnel using qualified persons at the Facility as well as the manufacturer's of the equipment.*

**NEW OPERATING PERMIT CONDITIONS**

**- Operating Conditions and Limitations -**

- () The Owner/Operator shall operate the Ryegate Power Station in accordance with the plans and specifications submitted to the Agency on November 3, 1995, and January 29, 1996 and in accordance with the conditions set forth herein.

*Requires applicant to operate their facility as described in the operating permit application and the terms and conditions of the Operating Permit.*

**- Record Keeping and Reporting -**

- ( ) The Owner/Operator shall notify the Agency in writing of any proposed physical or operational change at the Facility which may increase the emission rate of any air contaminant to the ambient air. If the Agency determines that a permit amendment is required, a new application and the appropriate application fee shall be submitted. The permit amendment shall be obtained prior to commencing any such change.

*Requirements of Subchapter V of the Regulations.*

- ( ) All records, reports, and notifications that are required to be submitted to the Agency by this Permit shall be submitted to:

Air Pollution Control Division  
Agency of Natural Resources  
Building 3 South  
103 South Main Street  
Waterbury, Vermont 05671-0402.

*Purpose is to identify the appropriate contact for all reports and etc. that must be sent to the Agency for the permit.*

- ( ) The Owner/Operator shall notify the Agency in writing within five (5) days of any violation, of which it is aware, of any condition of this Permit.

*Requires the Owner/Operator to keep the Agency informed if it determines that an emission standard is being violated.*

**- Enhanced Monitoring/Compliance Assurance Monitoring -**

- ( ) Based upon the applicability of regulations promulgated under authority granted to the U.S. Environmental Protection Agency pursuant to Sections 504(b) and/or 114(a)(3) of the federal *Clean Air Act*, the Agency reserves the right to reopen this Permit to include any necessary requirements contained in said regulations.

*Notifies the Owner/Operator that the Agency will take action to amend the requirements of the permit in order to incorporate any applicable enhanced monitoring or compliance assurance monitoring requirements.*

**- Certification of Compliance -**

- ( ) Ryegate Associates shall submit a compliance certification at least annually, or more frequently if specified in the applicable requirement, which states the Ryegate Associates was in compliance with all terms and conditions of the Permit, including emission limitations, standards, and work practices. Such compliance certification shall include the following:
  - (a) Identification of each term or condition of the permit that is the basis of the certification;
  - (b) The compliance status;
  - (c) Whether compliance was continuous or intermittent;
  - (d) The methods used for determining the compliance status of Ryegate

Associates over the reporting period.

[§ 5-1015(a)(8) of the *Regulations*]

## **APPENDICES**

### Appendix A

Figure 1 - Plant Location (USGS Map)

Figure 2 - Schematic of Process Flow

### Appendix B

ALL Support Calculations

### Appendix C

Response to Comments

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## Determination of Allowable Emissions for the Ryegate Power Station

**Allowable emissions** is defined under Section 5-101(11) of the *Regulations* as "...the emission rate calculated using the maximum rated capacity of the source and, if applicable, either:

- (a) The applicable emission standard contained in the regulations, if any, or
- (b) The emission rate or design, operational or equipment standard specified in any order or agreement issued under these regulations that is state and federally enforceable."

**Determination of Existing Allowable Emissions:** Pursuant to Section 5-101(11), allowable emissions must be based upon the limitations contained in Air Pollution Control Permit to Construct #AP-90-029g (issued February 25, 1997 and hereinafter "Permit"). Permit allowable emissions for the fuel burning equipment are defined by the worst case emissions scenario produced when evaluating the combination of fuel, operating load, and equipment being employed. For most combustion air contaminants, the peak emission rate will be produced when the Main Boiler is operating on a continuous operation (i.e., 8,760 hrs/yr) at full load (i.e., 100% of capacity). It is important to note that Condition (11) of existing Permit prohibits the simultaneous operation of the Main Boiler with the Emergency Generator.

### Facility Restrictions and Assumptions

Wood Fuel BTU Content - 4,250 BTU/lb (green wood fuel)  
 Propane BTU Content - 2,507 BTU/cubic foot (90,625 BTU/gal)

	<u>Main Boiler</u>	<u>Auxiliary Boiler</u>	<u>Emergency Generator</u>
Maximum Rated Heat Input:	300 MMBTU/hr 50 MMBTU/hr (Propane)	5 MMBTU/hr	3.7 MMBTU/hr 300 kW; 430 bHP
Fuel:	Wood and/or Propane	Propane	Propane
Fuel Maximum Firing Rate:	35.3 tons/hr wood	33 ft <sup>3</sup> /min.	25 ft <sup>3</sup> /min.
Operational Restrictions:	None on wood fuel propane limited to 20 million ft <sup>3</sup> /yr <sup>(Note 2)</sup>	720 hrs/yr <sup>(Note 1)</sup>	720 hrs/yr <sup>(Note 1)</sup>

Note 1 [per Condition (11) of Permit to Construct]  
 Note 2 [per Condition (3)(b) of Permit to Construct]

### **Main Boiler - Full load and continuous operation**

**Particulate Matter (PM/PM<sub>10</sub>):** Maximum PM Discharge Rate = 0.0070 grains/dscf corrected to 12%CO<sub>2</sub> and 5.0 lbs/hr [per Condition (5)(a) of Permit to Construct]. Applies at all times regardless of fuel(s) being fired in the Main Boiler.

$$PM/PM_{10} = (5.0 \text{ lbs/hr})(8760 \text{ hrs/yr})(\text{ton}/2000 \text{ lbs}) = 22 \text{ tons/yr}$$

**Sulfur Dioxide (SO<sub>2</sub>):** Maximum SO<sub>2</sub> discharge rate based on fuel sulfur content limitations: wood = 0.07% by weight [per Findings of Fact (10)(d) and Condition (2) of APC Permit]; propane = 10 grains/100 ft<sup>3</sup> [per Condition (3)(c) of Permit to Construct]; Worst case allowable emissions produced while Main Boiler is firing propane to its maximum firing rate of 50 MMBTU/hr and 20 million ft<sup>3</sup>/yr, and the remaining heat input (i.e., 250 MMBTU/hr) coming from wood. Usage limits of 50 MMBTU/hr and 20 million ft<sup>3</sup>/yr are equivalent to 1000 hrs/yr operation on propane.

$$SO_2(\text{wood}) = 0.07 \text{ lbs/ton wood}$$

$$SO_2(\text{propane}) = 0.0014 \text{ lbs/ft}^3 \text{ propane}$$

$$SO_2 \text{ Total} = [SO_2(\text{wood}) + SO_2(\text{propane})](1000 \text{ hrs/yr}) + [SO_2(\text{wood})](7,760 \text{ hrs/yr})$$

$$SO_2(\text{wood}) = [(0.07 \text{ lbs/ton})(250 \text{ MMBTU/hr})(\text{lbs}/4250 \text{ BTU})(10^6 \text{ BTU/MMBTU})(\text{ton}/2000 \text{ lbs})(1000 \text{ hrs/yr})] + [(0.07 \text{ lbs/ton})(300 \text{ MMBTU/hr})(\text{lbs}/4250 \text{ BTU})(10^6 \text{ BTU/MMBTU})(\text{ton}/2000 \text{ lbs})(7760 \text{ hrs/yr})]$$

$$= (2100 \text{ lbs/yr} + 19,000 \text{ lbs/yr})(\text{ton}/2000 \text{ lbs})$$

$$= 11 \text{ tons/yr}$$

$$SO_2(\text{propane}) = (0.0014 \text{ lbs/ft}^3)(50 \text{ MMBTU/hr})(\text{ft}^3/2507 \text{ BTU})(10^6 \text{ BTU/MMBTU})(1000 \text{ hrs/yr}) = (27,922 \text{ lbs/yr})(\text{ton}/2000 \text{ lbs})$$

$$= 14 \text{ tons/yr}$$

$$SO_2 \text{ Total} = 11 \text{ tons/yr} + 14 \text{ tons/yr} = 25 \text{ tons/yr}$$

**Oxides of Nitrogen (NOx):** Maximum NOx Discharge Rate = 0.15 lbs/MMBTU and 45.0 lbs/hr [per Condition (7) of Permit to Construct]. Applies whenever wood fuel is contributing more than 30% of the BTU input to the Main Boiler. Worst case emissions assume wood fuel at maximum capacity and at continuous operation.

$$NOx = (45.0 \text{ lbs/hr})(8760 \text{ hrs/yr})(\text{ton}/2000 \text{ lbs}) = 197 \text{ tons/yr}$$

**Carbon Monoxide (CO):** Maximum CO Discharge Rate = 0.30 lbs/MMBTU and 90.0 lbs/hr [per Condition (8)(a) of Permit to Construct]. Applies whenever wood fuel is contributing more than 30% of the BTU input to the Main Boiler. Worst case emissions assume wood fuel at maximum capacity and at continuous operation.

$$CO = (90.0 \text{ lbs/hr})(8760 \text{ hrs/yr})(\text{ton}/2000 \text{ lbs}) = 394 \text{ tons/yr}$$

**Volatile Organic Compounds (VOCs):** Maximum VOC Discharge Rate = 0.03 lbs/MMBTU and 9.0 lbs/hr [per Condition (8)(a) of Permit to Construct]. Applies whenever wood fuel is contributing more than 30% of the BTU input to the Main Boiler. Worst case emissions assume wood fuel at maximum capacity and at continuous operation.

$$\text{VOC} = (9.0 \text{ lbs/hr})(8760 \text{ hrs/yr})(\text{ton}/2000 \text{ lbs}) = 39 \text{ tons/yr}$$

**Auxiliary Boiler Contribution:** Emission Rates based on Table 1.5-1; Section 1.5 of AP-42, *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, 4th Edition* and summarized in Application for Amendment to the Air Pollution Permit for Ryegate Power Station, April 1991.

Emission Factor (lbs/MMBTU)	PM/PM <sub>10</sub>	SO <sub>2</sub>	NOx	CO	VOCs
Emission Rate (lbs/hr)	0.005	0.01	0.15	0.021	0.0055
(tpy)	0.009	0.02	0.27	0.04	0.01
		0.05	0.75	0.11	0.028

Emission Unit		Allowable Emissions (Main Boiler w/ Auxiliary Boiler)				
		Air Contaminant				
		PM/PM <sub>10</sub>	SO <sub>2</sub>	NOx	CO	VOCs
Main Boiler	Emission Rate (tpy)	22	25	197	394	39
	Fuel Combination	Wood	Wood+Propane	Wood	Wood	Wood
Auxiliary Boiler	Emission Rate (tpy)	0.009	0.02	0.27	0.04	0.01
Total Facility	Emission Rate (tpy)	22	25	197	394	39

**Determination of Hazardous Air Pollutant Emission Rates:** No HAP data available for propane fuel. Wood fuel HAP emissions based on AP-42 emission factors published in Table 1.6-4 of Section 1.6 Wood Waste Combustion in Boilers.

Maximum Wood Fuel Firing Rate in Main Boiler - 35.3 tons/hr  
Main Boiler Operation - 100% Load and Continuous

Contaminant	Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (tpy)
Phenol	1.47 E-05	<0.01	0.0023
Polychlorinated dibenzo-p-dioxins	1.2 E-08	<0.01	1.8 E-06
Polychlorinated dibenzo-p-furans	5.3 E-08	<0.01	8.2 E-06
Acrolein	4.0 E-06	<0.01	0.0006
Formaldehyde	8.2 E-03	0.29	1.3
Acetaldehyde	1.92 E-03	0.07	0.3
Benzene	9.95 E-03	0.35	1.5
Naphthlene	3.39 E-03	0.12	0.5
2,3,7,8-Tetrachlorodibenzo-p-dioxin	3.6 E-11	<0.01	5.6 E-09
4-Nitrophenol	2.97 E-06	<0.01	0.0005
Total HAPs from Main Boiler	-----	<1	<4

#### Determination of Emissions From Other Air Contaminant Sources:

1. Release of Chemical Additives From Cooling Towers and Boiler Water Deaerator Vents: The Ryegate Power Station uses a mechanical draft cooling tower. Boiler blowdown water is transferred to the cooling tower/circulating water. Chemical additives are applied to the boiler water and circulating water. Some of these additives may be emitted to the ambient air in the cooling tower drift. These same chemical additives may be released via the boiler deaerator vent. VOC emissions from these points are negligible. See Section E of the application for additional information regarding the derivation of potential HAC/HAP emission rates.
2. Other fuel burning equipment (including: Diesel Fire Pump, Fuel Yard Maintenance Building Heater, Main Maintenance Building Heater, Propane Vaporizer Heater). Each of these units are rated less than 3 MMBTU/hr of heat input, and are consequently classified as insignificant activities. Emissions need not be considered from this equipment for the purposes of determining the classification of the source or modification.
3. Release of VOCs from Chemical and Fuel Storage Tanks: The Ryegate Power Station uses tanks for chemical storage. Each tank is equipped with a static vent. The tanks function in a draw-down capacity to provide make-up to other systems for water treatment. Emissions from this activity are considered negligible.
4. Release of VOCs from Degreasing/Solvent Tanks: As part of its maintenance activities, Ryegate Power Station utilizes two (2) parts cleaning stations of 10 and 15 gallons in capacity, respectively. The solvent used drains to a catch sump and is periodically replaced with a new solution. Emissions from this activity are considered negligible.
5. Release of Fugitive Emissions from Wood Fuel/Ash Handling and Storage, and Haul Roads: Emissions of dust and VOCs from the wood chips are considered unquantifiable. Rather than estimating the emissions, the Agency has focused on the application of reasonable measures to minimize these emissions. These measures are prescribed in the Facility's "Wood Chip Management Plan." Additionally, transfer of wood fuel to the Main Boiler is conducted via enclosed conveyors. Emissions of dust from vehicular traffic on-site are considered negligible, based on the use of wet suppression techniques.

Ash- Two sources of wood ash: bottom and fly ash. The bottom ash from the furnace grates empties directly into a submerged (water trough) bottom ash conveyor and is transported directly to an enclosed ash bunker for storage. The fly ash is conveyed to an ash mixer and conditioner which wets and cools the ash prior to discharging to the ash bunker. Emissions from this activity are considered negligible due to the use of wet suppression and containment of the ash material.