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Debra A. Howland
Executive Director
New Hampshire Public Utilities Commission
21 South Fruit Street, Suite 10
Concord , NH 03301-2429

Subject: New Hampshire Class III renewable energy source eligibility application for Ryegate Associates

Dear Executive Director,

Attached please find the electronic version of the completed application for a renewable energy source (Ryegate Associates) with attachments. We are also sending an original and two(2) paper copies of these documents as required by New Hampshire guidelines.

The Ryegate Associates renewable source is a biomass facility located in East Ryegate, VT and is seeking eligibility for New Hampshire Class III Renewable Energy Credits. Contact information for this application is as follows:

Eric A. DeBarba
Director, New England Origination
GDF SUEZ Energy North America, Inc.
200 Glastonbury Boulevard, Suite 303
Glastonbury, CT 06033
Phone: 860-430-2114
Cell: 860-614-0227
FAX: 860-430-2120
eric.debarba@gdfsuezna.com

Please advise if you have any questions or comments.

Sincerely,

Eric DeBarba

Attachments

STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION

SAMPLE APPLICATION FORM

FOR RENEWABLE ENERGY SOURCE ELIGIBILITY

Pursuant to New Hampshire Admin. Code Puc 2500 Rules

NOTE: When completing this application electronically, using the "tab" key after completing each answer will move the cursor to the next blank to be filled in. If a question is not applicable to your facility, then check the box next to N/A.

Pursuant to Puc 202, the signed application shall be filed with the Executive Director and Secretary of the New Hampshire Public Utilities Commission (Commission). To ensure that your submitted application is complete, please read RSA 362-F and N.H. Code Admin. Rules Puc 2500 before filling out this application. It is the burden of the applicant to provide timely, accurate and complete information as part of the application process. Any failure by the applicant to provide information in a timely manner may result in the Commission dismissing this application without prejudice.

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1. **ELIGIBILITY CLASS APPLIED FOR:** ☐ I ☐ II ☒ III ☐ IV

2. Applicant's legal name: Ryegate Associates

3. Address: (1) 200 Glastonbury Boulevard

   (2) Suite 303

   (3)

   Glastonbury (City) CT (State) 06033 (Zip code)

4. Telephone number: (860) 430-2114

5. Facsimile number: (860) 430-2120

6. Email address: eric.debarba@gdfsuezna.com

7. Facility name: Ryegate Power Station

8. Facility location: (1) 247 Weesner Drive

(2) _____

East Ryegate (City) VT (State) O5042 (Zip code)

9. Latitude: N44.194 degrees Longitude: W72.072 degrees

10. The name and telephone number of the facility's operator, if different from the owner: Same ☐

Mark Driscoll (Name) (802)-633-3500 x104 (Telephone number)

11. The ISO-New England asset identification number, if applicable: 2,433 or N/A: ☐

12. The GIS facility code, if applicable: MSS2433 or N/A: ☐

13. A description of the facility, including fuel type, gross nameplate generation capacity, the initial commercial operation date, and the date it began operation, if different.

14. If Class I certification is sought for a generation facility that uses biomass, the applicant shall submit:
    (a) quarterly average NOx emission rates over the past rolling year,
    (b) the most recent average particulate matter emission rates as required by the New Hampshire Department of Environmental Services (NHDES),
    (c) a description of the pollution control equipment or proposed practices for compliance with such requirements,
    (d) proof that a copy of the completed application has been filed with the NHDES, and
    (e) conduct a stack test to verify compliance with the emission standard for particulate matter no later than 12 months prior to the end of the subject calendar quarter except as provided for in RSA 362-F:12, II.
    (f) [x] N/A: Class I certification is NOT being sought for a generation facility that uses biomass.

15. If Class I certification is sought for the incremental new production of electricity by a generation facility that uses biomass, methane or hydroelectric technologies to produce energy, the applicant shall:
    (a) demonstrate that it has made capital investments after January 1, 2006 with the successful purpose of improving the efficiency or increasing the output of renewable energy from the facility, and
    (b) supply the historical generation baseline as defined in RSA 362-F:2, X.
    (c) [x] N/A: Class I certification is NOT being sought for the incremental new production of electricty by a generation facility that uses biomass, methane or hydroelectric technologies.

16. If Class I certification is sought for repowered Class III or Class IV sources, the applicant shall:
    (a) demonstrate that it has made new capital investments for the purpose of restoring unusable generation capacity or adding to the existing capacity, in light of the NHDES environmental permitting requirements or otherwise, and

(b) provide documentation that eighty percent of its tax basis in the resulting plant and equipment of the eligible generation capacity, including the NHDES permitting requirements for new plants, but exclusive of any tax basis in real property and intangible assets, is derived from the new capital investments.

(c) [x] N/A: Class I certification is NOT being sought for repowered Class III or Class IV sources.

17. If Class I certification is sought for formerly nonrenewable energy electric generation facilities, the applicant shall:

(a) demonstrate that it has made new capital investments for the purpose of repowering with eligible biomass technologies or methane gas and complies with the certification requirements of Puc 2505.04, if using biomass fuels, and

(b) provide documentation that eighty percent of its tax basis in the resulting generation unit, including NHDES permitting requirements for new plants, but exclusive of any tax basis in real property and intangible assets, is derived from the new capital investments.

(c) [x] N/A: Class I certification is NOT being sought for formerly nonrenewable energy electric generation facilities.

18. If Class IV certification is sought for an existing small hydroelectric facility, the applicant shall submit proof that:

(a) it has installed upstream and downstream diadromous fish passages that have been required and approved under the terms of its license or exemption from the Federal Energy Regulatory Commission, and

(b) when required, has documented applicable state water quality certification pursuant to section 401 of the Clean Water Act for hydroelectric projects.

(c) [x] N/A: Class IV certification is NOT being sought for existing small hydroelectric facilities.

19. If the source is located in a control area adjacent to the New England control area, the applicant shall submit proof that the energy is delivered within the New England control area and such delivery is verified using the documentation required in Puc 2504.01(a)(2) a. to e.

20. All other necessary regulatory approvals, including any reviews, approvals or permits required by the NHDES or the environmental protection agency in the facility's state.

21. Proof that the applicant either has an approved interconnection study on file with the commission, is a party to a currently effective interconnection agreement, or is otherwise not required to undertake an interconnection study.

22. A description of how the generation facility is connected to the regional power pool of the local electric distribution utility.

23. F A statement as to whether the facility has been certified under another non-federal jurisdiction's renewable portfolio standard and proof thereof.

A statement as to whether the facility's output has been verified by ISO-New England.

25. A description of how the facility's output is reported to the GIS if not verified by ISO-New England.

26. An affidavit by the owner attesting to the accuracy of the contents of the application.

27. Such other information as the applicant wishes to provide to assist in classification of the generating facility.

28. This application and all future correspondence should be sent to:

Ms. Debra A. Howland
Executive Director and Secretary
State of New Hampshire
Public Utilities Commission
21 S. Fruit St, Suite 10
Concord, NH 03301-2429

29. Preparer's information:

Name: Eric A. DeBarba

Title: Director-New England Origination

Address: (1) 200 Glastonbury Boulevard

(2) Suite 303

(3)

Glastonbury	CT	06033
(City)	(State)	(Zip code)

30. Preparer's signature: Eric A. DeBarba

13. A description of the facility, including fuel type, gross nameplate generation capacity, the initial commercial operation date, and the date it began operation, if different.

Ryegate Power Station located in East Ryegate, Vermont along the Connecticut River, is a 20 megawatt biomass wood chip fired steam electrical generating facility. Electrostatic precipitator and SNCR NOx reduction equipment keeps emissions within state standards and since wood contains little sulfur, this emits virtually no sulfur dioxide. The facility began commercial operation in October 1992. The project burns "Bio Mass Wood" consuming approximately 266,000 tons per year. The Ryegate Power Station wood procurement process, developed in cooperation with state forestry officials, promotes sound forest management principles. Ryegate proposes to install an SCR system, the purpose of which is to further reduce NO_x emissions from .15 lbs/mmBTU to emissions no greater than 0.075 lbs/mmBTU. The SNCR provides an initial and partial reduction of NO_x emissions in the boiler. While the existing SNCR system will continue to be utilized, the proposed SCR unit, which would be downstream of the boiler, would reduce the emissions to the final level of 0.075 lbs/mmBTU or less. Installing an SCR unit at the Facility would have the immediate effect of converting much of the Facility's NO_x emissions into nitrogen and water. The new SCR unit will utilize an ammonia based reagent (urea) injected in the ductwork upstream of a catalyst which, when the flue gas passes through it, converts the NO_x into nitrogen and water. The system design is based upon the current 335 °F flue gas temperature to achieve a contractor guaranteed NO_x emission rate of no more than 0.075 lbs/mmBTU (as compared with the current baseline of 0.15 lbs/mmBTU). This will be accomplished by utilizing a small air heater by-pass duct and damper with an air to air heat exchanger to heat a slip stream of flue gas from the discharge of the Electrostatic Precipitator ("ESP"), where 50% urea will be injected. The urea will be converted to ammonia and supplied to an ammonia injection grid. Ryegate Associates currently anticipates initial operation of the new SCR in Q3 2014 and will have NOx test results shortly thereafter. The unit currently has a continuous emissions monitoring system that meets VT requirements as described in the Title V document. Additionally, the unit has conducted stack tests for particulate matter emissions and has most recently achieved an emissions rate of .0012lb/MMBtu (attached).

20. All other necessary regulatory approvals, including any reviews, approvals or permits required by the NHDES or the environmental protection agency in the facility's state.

NPDES_Permit_2010.pdf | Chip Plan.rtf | Title V.pdf | MSGPAuthorization2011.pdf | compliance report 2013.pdf

21. Proof that the applicant either has an approved interconnection study on file with the commission, is a party to a currently effective interconnection agreement, or is otherwise not required to undertake an interconnection study.

Ryegate Interconnect Agreem | 1423_001.pdf

22. A description of how the generation facility is connected to the regional power pool of the local electric distribution utility.

Ryegate operates in parallel with Green Mountain Power's system and is interconnected to GMP's 34.5 kV transmission system on line 3324, sourced from the New England Electric Systems McIndoos Falls Substation.

23. A statement as to whether the facility has been certified under another non-federal jurisdiction's renewable portfolio standard and proof thereof.

Ryegate Power Station is certified under CT Class II renewable portfolio standards. The attached GIS report for Ryegate Power Station shows certification for Class II CT renewable standards.

Ryegate GIS Qualification.pdf

24. A statement as to whether the facility's output has been verified by ISO-New England.

Ryegate Power Station is a registered asset with ISO-NE and GIS (ID # MSS2433). Vermont Electric Power Company (VELCO) serves as the Lead Market Participant. VELCO reports revenue meter data to Vermont Electric Power Producers Inc.(VEPPI) and to ISO-NE from the Ryegate Power Station facility daily thereby providing verification of energy generation.

25. A description of how the facility's output is reported to the GIS if not verified by ISO-New England

Ryegate Power Station's output is verified by ISO-NE using meter data provided independently by VELCO, the Local Distribution Company serving the Ryegate area in which the generation facility is located and VEPP Inc. , a Vermont entity that purchases electric power from renewable resources and distributes to all 17 Vermont utilities on a pro-rata basis.

26. An affidavit by the owner attesting to the accuracy of the contents of the application.

RyegateAffidavit.pdf

27. Such other information as the applicant wishes to provide to assist in classification of the generating facility.Ryegate Power Station is a sister unit to Pinetree Power- Tamworth, Inc.(Tamworth, NH) and Pinetree Power, Inc. (Bethlehem, NH)as well as Pinetree Power-Fitchburg, Inc. all of which have been classified as NH Class III Renewable Energy Sources.

30. Preparer's signature: RyegateAppSignature.pdf

AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WASTEWATER MANAGEMENT DIVISION
103 SOUTH MAIN STREET, - THE SEWING BUILDING
WATERBURY, VERMONT 05671-0405

RECEIVED
MAR 2 6 2010
BY:

Permit No.: 3-1324
File No.: 03-10
PIN: SJ95-0114
NPDES No.:VT0020893

DISCHARGE PERMIT

In compliance with the provisions of the Vermont Water Pollution Control Act, as amended, (10 V.S.A. Chapter 47 §1251 et. seq), and the Federal Clean Water Act, as amended (33 U.S.C. § 1251 et. seq),

Ryegate Associates
247 Weesner Drive
East Ryegate, VT 05042

(hereinafter referred to as the "permittee") is authorized, by the Secretary, Agency of Natural Resources, to discharge from a facility located at:

Weesner Drive
East Ryegate, Vermont

to the Connecticut River, Class B at the point of discharge in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III hereof.

This permit shall become effective on July 1, 2010.

This permit and the authorization to discharge shall expire on June 30, 2015.

Signed this 24th day of MARCH, 2010.

Justin G. Johnson, Commissioner
Department of Environmental Conservation

By _____
John J. Aklelaszek, Acting Director
Wastewater Management Division

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. From July 1, 2010 through June 30, 2015, the permittee is authorized to discharge from outfall serial number **S/N 001**: Process wastewater (cooling tower blowdown, reverse osmosis regeneration, demineralization regenerant, filter backwash, miscellanueous cooling waters, and floor drains). Such discharges shall be limited and monitored by the permittee as specified below:

	Discharge Limitations		Monitoring Requirements	
Effluent Characteristic	**Monthly Average**	**Daily Maximum**	**Measurement Frequency**	**Sample Type**
Flow		65,000 gpd	Continuous	Daily total
Total Suspended Solids (1)	30 mg/l (2,3)	100 mg/l	1 x month	24 hour composite
Oil & Grease	15 mg/l	20 mg/l	1 x month	Grab
Turbidity (1)		Monitor only (NTU)	1 x month	24 hour composite
Temperature (May through Sept)		90° F	1 x week	Grab
Temperature (Oct through April)		90° F	1 x month	Grab
Total Metals (4)		Monitor only (mg/l)	Annually	24 hour composite
pH		6.5 to 8.5 SU	daily	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken prior to combining with Discharge S/N 002.

(1) Samples of Total Suspended Solids and Turbidity shall be collected during normal R.O. regenerant operations or during filter backwashing if the filters are backwashed during that month.

(2) At the permittee's choice this effluent limitation may be a "Net Limitation". The net limitation value shall be determined by subtracting the intake water sample concentration from the effluent water sample concentration. The difference cannot be greater than 30 mg/l, monthly average.

Intake (source water) Total Suspended Solids sampling shall be conducted to account for the detention time in the system based on the current effluent flows. If the permittee fails to collect and analyze a valid Total Suspended Solids sample of the source water, then the "Net Limitation" cannot be evoked.

If the permittee chooses to report net effluent limitations, the intake water sample results shall also be submitted on the Discharge Monitoring Report (DMR) and the sampling indicated on the DMR.

(3) If the "Net" Total Suspended Solids is result is greater than 30 mg/l, then at a minimum, the permittee shall collect and analyze additional samples for "Net" Total Suspended Solids.

(4) The Total Metals sample shall be collected in September and analyzed for Total Cadmium, Total Copper, Total Iron, Total Lead, Total Nickel, and Total Zinc. Each metal concentration shall be reported separately.

1.[cont] From the period of July 1, 2010 and lasting through June 30, 2015, the permittee is authorized to discharge from outfall serial number **S/N 001**: Process wastewater (cooling tower blowdown, reverse osmosis regenerant, demineralization regenerant, filter backwash, misscellaneous cooling water and floor drains) from a biomass (wood) fired electical power plant. Such discharges shall be limited and monitored by the permittee as specified below:

For a Discharge of not more than 2 hours in a day

	Discharge Limitations		Monitoring Requirements	
Effluent Characteristic	**2 Hour Average**	**Instantaneous Maximum**	**Measurement Frequency**	**Sample Type**
Free Available Chlorine (1)	0.2 mg/l	0.5 mg/l	daily	grab
Total Residual Chlorine (1)		1.0 mg/	daily	grab
Free Available Oxidants (1)	0.1 mg/	0.25 mg/l	daily	grab
Total Residual Oxidants (1)		0.5 mg/l	daily	grab

Samples taken in compliance with the monitoring requirements specified above shall be taken prior to combining with Discharge S/N 002. For this requirement, the discharge valve is not opened for more than 2 hours per day.

(1) Samples for Free Available Chlorine, Free Available Oxidants (Bromine), Total Residual Chlorine, and Total Residual Oxidants (Bromine) shall be collected only during periods when the discharge of chlorinated or brominated cooling water is occurring.

For Continuous Discharges (more than 2 hours in a day)

	Discharge Limitations		Monitoring Requirements	
Effluent Characteristic	**Monthly Average**	**Instantaneous Maximum**	**Measurement Frequency**	**Sample Type**
Free Available Chlorine (1)		0.0 mg/l	daily	grab
Total Residual Chlorine (1)		0.0 mg/	daily	grab
Free Available Oxidants (1)		0.0 mg/l	daily	grab
Total Residual Oxidants (1)		0.0 mg/l	daily	grab

Samples taken in compliance with the monitoring requirements specified above shall be taken prior to combining with Discharge S/N 002. For this requirement, the discharge valve is opened for more than 2 hours per day.

(1) Samples for Free Available Chlorine, Free Available Oxidants (Bromine), Total Residual Chlorine, and Total Residual Oxidants (Bromine) shall be collected only during periods when the discharge of chlorinated or brominated cooling water is occurring.

(2) Neither Free Available Chlorine, Free Available Oxidants (Bromine), Total Residual Chlorine, and Total Residual Oxidants (Bromine) shall be discharged for more than 2 hours in a day unless the permittee can demonstrate to the Agency that the unit in question cannot operate at or below this level of chlorination or bromination. **If these residuals are removed by dechlorination or debromination, then a continuous discharge is allowed.**

2. From the period of July 1, 2010 and lasting through June 30, 2015, the permittee is authorized to discharge from outfall serial number **S/N 002**: Stormwater runoff from the wood chip storage area. Such discharges shall be limited and monitored by the permittee as specified below:

	Discharge Limitations		**Monitoring Requirements**	
Effluent Characteristic	**Monthly Average**	**Daily Maximum**	**Measurement Frequency**	**Sample Type**
Flow		as naturally occurs	none	none
Biochemical Oxygen Demand		monitor only (mg/l)	1 x month (seasonal) (1)	grab (1)
Total Suspended Solids		monitor only (mg/l)	1 x month (seasonal) (1)	grab (1)
Turbidity		monitor only (NTU)	1 x month (seasonal) (1)	grab (1)
pH		monitor only (SU)	1 x month (seasonal) (1)	grab (1)

Samples taken in compliance with the monitoring requirements specified above shall be taken prior to combining with Discharge S/N 001.

(1) A grab sample shall be collected each month during the period of **May 1st through October 31st**. The sample shall be collected during the first 30 minutes of discharge after a rainstorm has started. If a stormwater discharge does not occur during a month (reporting period), then the monthly discharge monitoring report shall indicate "no discharge" for that month.

3. Special Conditions:

a. The permittee is limited to using the chemicals that are similar in composition, concentration, and toxicity to those identified in the permit application (received December 23, 2009). An increase in the dosage rate or a substantial change in the chemicals used shall be reviewed by the Agency (Wastewater Management Division) to assure that there is no adverse impact to the receiving water.

A change in chemical vendors shall require that the permittee, at a minimum, submit the appropriate MSDS sheets to the Agency (Wastewater Management Division)

A substantial change in chemical usage may require the permittee to conduct a priority pollutant analysis of the discharge for some or all of the pollutants listed in Appendix A of 40 CFR Part 423 or conduct Whole Effluent Toxicity (WET) Testing on the discharge.

A substantial change in chemical usage shall be defined as chemicals that are not similar in composition, concentration, or toxicity to those identified in the application.

b. The permittee shall maintain a current spill prevention and contingency plan for the facility (current version date February 2006). The plan shall be reviewed periodically and updated as necessary to reflect changes in the facility's design or operations. If the plan is updated, the revised plan shall be submitted to the Agency (Wastewater

Management Division). The plan shall define management, operations, and procedures to properly contain and dispose of any unuseable hazardous materials that may be generated by this facility's processes or as a result of a spill. The plan shall minimize the potential for spills and prevent the discharge of these materials to floor drains, the cooling tower, or waters of the State.

c. The facility shall maintain and utilize a Chip Management Plan. At a minimum the Chip Management Plan shall include the following:

1. The chip pile shall be built on sloped asphalt or concrete.

2. The chip pile shall be rotated at least every 120 days or as necessary in order to prevent significant decomposition, acid formation, or spontaneous combustion.

3. The storage area shall be kept free of oil or other chemical residues, litter and other miscellaneous refuse.

The Chip Management Plan shall be updated as necessary and the updated version shall be submitted to the Wastewater Management Division..

d. There shall be no discharge of scum, foam, or floating solids other than in trace amounts

e. This discharge shall not cause or contribute to violations of Water Quality Standards in the receiving water.

f. This discharge shall not cause a visible discoloration of the receiving waters.

g. The discharge of polychlorinated biphenyl compounds is prohibited.

h. Chlorine and bromine based compounds may be used as biocides. No other chemically based biocides or slimicides may be used without review and approval of the Agency.

B. REAPPLICATION

If the permittee desires to continue to discharge after the expiration date of this permit, he shall apply on the application forms then in use at least 180 days before the permit expires.

Reapply for a Discharge permit by December 31, 2014.

C. OPERATING FEES

This discharge is subject to operating fees. The permittees shall submit the operating fees in accord with the procedures provided by the Secretary.

D. TOXICITY TESTING

The permittee shall conduct and submit the results of one, two-species (Pimephales promelas) and (Ceriodaphnia dubia), 48 hour acute Whole Effluent Toxicity (WET) test to the Agency as specified below.

1. In **August or September 2014**, the Permittee shall conducted a WET test on S/N 001 and the results shall be submitted to the Agency by **November 15, 2014**.

2. Based upon the results of these tests or any other toxicity tests conducted on this discharge, this permit may be amended to require additional Whole Effluent Toxicity testing or a Toxicity Reduction Evaluation be conducted.

3. The whole effluent toxicity tests shall be conducted according to the procedures and guidelines specified in: *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (most recent edition),* USEPA document.

E. MONITORING AND REPORTING

1. Sampling and Analysis

The sampling, preservation, handling, and analytical methods used shall conform to regulations published pursuant to Section 304(g) of the Clean Water Act, under which such procedures may be required. Guidelines establishing these test procedures have been published in the Code of Federal Regulations, Title 40, Part 136 (Federal Register, Vol. 56, No. 195, July 1, 1999 or as amended).

If applicable, *Escherichia coli* shall be tested using one of the following methods:

a. "Most Probable Number" (MPN) method 9223B found in Standard Methods for the Examination of Water and Wastewater, 18th or subsequent approved edition(s). Premade formulations are available as Colilert and Colilert 18 from IDEXX Labs Inc., Westbrook, ME;

b. EPA "membrane filtration" (MF) method 1603 using modified mTEC; or

c. A single step membrane filtration (MF) method using mColiBlue 24 available from Hach Company, Loveland, CO.

Samples shall be representative of the volume and quality of effluent discharged over the sampling and reporting period. All samples are to be taken during normal operating hours. The permittee shall identify the effluent sampling location used for each discharge.

2. Reporting

The Permittee is required to submit monitoring results as specified on a Discharge Monitoring Report (Form WR-43). Reports are due on the 15th day of each month, beginning with the month following the effective date of this permit.

If, in any reporting period, there has been no discharge, the permittee must submit that information by the report due date.

Signed copies of these, and all other reports required herein, shall be submitted to the Secretary at the following address:

Agency of Natural Resources
Department of Environmental Conservation
Wastewater Management Division
103 South Main Street, The Sewing Building
Waterbury, Vermont 05671-0405

All reports shall be signed:

a. In the case of corporations, by a principal executive officer of at least the level of vice president, or his/her duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the permit form originates;

b. In the case of a partnership, by a general partner;

c. In the case of a sole proprietorship, by the proprietor;

d. In the case of a municipal, State, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

3. Recording of Results

The permittee shall maintain records of all information resulting from any monitoring activities required including:

a. The exact place, date, and time of sampling;
b. The dates and times the analyses were performed;
c. The person(s) who performed the analyses;
d. The analytical techniques and methods used including sample collection handling and preservation techniques;
e. The results of all required analyses.
f. The records of monitoring activities and results, including all instrumentation and calibration and maintenance records;
g. The original calculation and data bench sheets of the operator who performed analysis of the influent or effluent pursuant to requirements of Section I.(A) of this permit.

The results of monitoring requirements shall be reported (in the units specified) on the Vermont reporting form WR-43 or other forms approved by the Secretary.

4. Additional Monitoring

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form WR-43. Such increased frequency shall also be indicated.

PART II

A. MANAGEMENT REQUIREMENTS

1. Facility Modification / Change in Discharge:

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil and/or criminal penalties as provided for in Section 1274 and 1275 of the Vermont Water Pollution Control Act. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new permit application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Noncompliance Notification

In the event the permittee is unable to comply with any of the conditions of this permit due, among other reasons, to:

a. breakdown or maintenance of waste treatment equipment (biological and physical-chemical systems including, but not limited to, all pipes, transfer pumps, compressors, collection ponds or tanks for the segregation of treated or untreated wastes, ion exchange columns, or carbon absorption units),

b. accidents caused by human error or negligence, or

c. other causes such as acts of nature,

the permittee shall notify the Secretary within 24 hours of becoming aware of such condition or by the next business day and shall provide the Secretary with the following information, in writing, within five (5) days:

i. cause of non-compliance

ii. a description of the non-complying discharge including its impact upon the receiving water;

iii. anticipated time the condition of non-compliance is expected to continue or, if such condition has been corrected, the duration of the period of non-compliance;

iv. steps taken by the permittee to reduce and eliminate the non-complying discharge; and

v. steps to be taken by the permittee to prevent recurrence of the condition of non-compliance.

3. Operation and Maintenance

All waste collection, control, treatment, and disposal facilities shall be operated in a manner consistent with the following:

a. The permittee shall, at all times, maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

b. The permittee shall provide an adequate operating staff which is duly qualified to carry out the operation, maintenance, and testing functions required to insure compliance with the conditions of this permit; and

4. Quality Control

The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at regular intervals to ensure accuracy of measurements, or shall ensure that both activities will be conducted.

The permittee shall keep records of these activities and shall provide such records upon request of the Secretary.

The permittee shall demonstrate the accuracy of the flow measurement device monthly and report the results on the monthly report forms. The acceptable limit of error is ± 10%.

The permittee shall analyze any additional samples as may be required by the Agency of Natural Resources to ensure analytical quality control.

5. Bypass

The diversion or bypass of facilities, necessary to maintain compliance with the terms and conditions of this permit, is prohibited, except where authorized under terms and conditions of an emergency pollution permit issued pursuant to 10 V.S.A. Section 1268.

6. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any adverse impact to waters of the State resulting from non-compliance with any condition specified in this permit, including accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed, calibration and maintenance of instrumentation, and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, and shall be submitted to Department representatives upon request. This period shall be extended during the course of unresolved litigation regarding the discharge of pollutants or when requested by the Secretary.

8. Solids Management

Collected screenings, sludges, and other solids removed in the course of treatment and control of wastewaters shall be stored, treated and disposed of in accord with 10 V.S.A., Chapter 159 and with the terms and conditions of any certification, interim or final, transitional operation authorization or order issued pursuant to 10 V.S.A., Chapter 159 that is in effect on the effective date of this permit or is issued during the term of this permit.

9. Emergency Pollution Permits

Maintenance activities, or emergencies resulting from equipment failure or malfunction, including power outages, which result in an effluent which exceeds the effluent limitations specified herein, shall be considered a violation of the conditions of this permit, unless the permittee immediately applies for, and obtains, an emergency pollution permit under the provisions of 10 V.S.A., Chapter 47, Section 1268. The permittee shall notify the Department of the emergency situation by the next working day.

10 V.S.A., Chapter 47, Section 1268 reads as follows:

"When a discharge permit holder finds that pollution abatement facilities require repairs, replacement or other corrective action in order for them to continue to meet standards specified in the permit, he may apply in the manner specified by the secretary for an emergency pollution permit for a term sufficient to effect repairs, replacements or other corrective action. The permit may be issued without prior public notice if the nature of the emergency will not provide sufficient time to give notice; provided that the secretary shall give public notice as soon as possible but in any event no later than five days after the effective date of the emergency pollution permit. No emergency pollution permit shall be issued unless the applicant certifies and the secretary finds that:

(1) there is no present, reasonable alternative means of disposing of the waste other than by discharging it into the waters of the state during the limited period of time of the emergency;

(2) the denial of an emergency pollution permit would work an extreme hardship upon the applicant;

(3) the granting of an emergency pollution permit will result in some public benefit;

(4) the discharge will not be unreasonably harmful to the quality of the receiving waters;

(5) the cause or reason for the emergency is not due to wilful or intended acts or omissions of the applicant."

Application shall be made to the Secretary of the Agency of Natural Resources, Department of Environmental Conservation, 103 South Main Street, Waterbury, Vermont 05671-0405.

10. Power Failure

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. Provide an alternative power source sufficient to operate the wastewater control facilities, or if such alternative power source is not in existence,

b. Halt, reduce, or otherwise control production and/or all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Secretary or authorized representative, upon the presentation of proper credentials:

a. to enter upon the permittee's premises in which an effluent source or any records required to be kept under terms and conditions of the permit are located;

b. to have access to and copy any records required to be kept under the terms and conditions of the permit;

c. to inspect any monitoring equipment or method required in the permit; or

d. to sample any discharge of pollutants.

2. Transfer of Ownership or Control

This permit is not transferable without prior written approval of the Secretary. All application and operating fees must be paid in full prior to transfer of this permit. In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall provide a copy of this permit to the succeeding owner or controller and shall send written notification of the change in ownership or control to the Secretary. The permittee shall also inform the prospective owner or operator of their responsibility to make an application for transfer of this permit.

This request for transfer application must include as a minimum:

a. A properly completed application form provided by the Secretary and the applicable processing fee.

b. A written statement from the prospective owner or operator certifying:

   i.. The conditions of the operation that contribute to, or affect, the discharge will not be materially different under the new ownership.

   ii. The prospective owner or operator has read and is familiar with the terms of the permit and agrees to comply with all terms and conditions of the permit.

   iii. The prospective owner or operator has adequate funding to operate and maintain the treatment system and remain in compliance with the terms and conditions of the permit.

c. The date of the sale or transfer.

The Secretary may require additional information dependent upon the current status of the facility operation, maintenance, and permit compliance.

3. Confidentiality

Pursuant to 10 V.S.A. 1259(b):

"Any records, reports or information obtained under this permit program shall be available to the public for inspection and copying. However, upon a showing satisfactory to the secretary that any records, reports or information or part thereof, other than effluent data, would, if made public, divulge methods or processes entitled to protection as trade secrets, the secretary shall treat and protect those records, reports or information as confidential. Any records, reports or information accorded confidential treatment will be disclosed to authorized representatives of the state and the United States when relevant to any proceedings under this chapter."

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. violation of any terms or conditions of this permit;

b. obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. a change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

5. Toxic Effluent Standards

That if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under section 307(a) of the Federal Act for a toxic pollutant which is present in the permittee's discharge and such standard or prohibition is more stringent than any limitation upon such pollutant in the permit, the secretary shall revise or modify the permit in accordance with the toxic effluent standard or prohibition and so notify the permittee.

6. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under 10 V.S.A. §1281.

7. Civil and Criminal Liability

Except as provided in, "Bypass" (Part II, paragraph A.5.), "Power Failure" (Part II, paragraph A.10.), and "Emergency Pollution Permits" (Part II, paragraph A.9.), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Civil penalties, as authorized under 10 V.S.A. §1274 and 10 V.S.A. §8010, shall not exceed $10,000 a day for each day of violation. Criminal penalties, as authorized under 10 V.S.A. §1275, shall not exceed $25,000 for each day of violation, imprisonment for up to six months, or both.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

9. Property Rights

Issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

11. Authority

This permit is issued under authority of 10 V.S.A. §1259 which states that: "No person shall discharge any waste, substance, or material into waters of the State, nor shall any person discharge any waste, substance, or material into an injection well or discharge into a publicly owned treatment works any waste which interferes with, passes through without treatment, or is otherwise incompatible with those works or would have a substantial adverse effect on those works or on water quality, without first obtaining a permit for that discharge from the Secretary", and under the authority of Section 402 of the Clean Water Act, as amended.

PART III

A. OTHER REQUIREMENTS

This permit shall be modified, suspended or revoked to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b) (2) (C), and (D), 304(b) (2), and 307 (a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. Controls any pollutant not limited in the permit.

The permit as modified under this paragraph shall also contain any other requirements of the Vermont Water Pollution Control Act then applicable.

B. DEFINITIONS

For purposes of this permit, the following definitions shall apply:

The Act - The Vermont Water Pollution Control Act, 10 V.S.A. Chapter 47

Annual Average - The highest allowable average of daily discharges calculated as the sum of all daily discharges (mg/l, lbs or gallons) measured during a calendar year divided by the number of daily discharges measured during that year.

Average - The arithmetic means of values taken at the frequency required for each parameter over the specified period.

The Clean Water Act - The federal Clean Water Act, as amended.

Composite Sample - A sample consisting of a minimum of one grab sample per hour collected during a 24-hour period (or lesser period as specified in the section on Monitoring and Reporting) and combined proportionally to flow over that same time period.

Daily Discharge - The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling.

For pollutants with limitation expressed in pounds the daily discharge is calculated as the total pounds of pollutants discharged over the day.

For pollutants with limitations expressed in mg/l the daily discharge is calculated as the average measurement of the pollutant over the day.

Grab Sample - An individual sample collected in a period of less than 15 minutes.

Incompatible Substance (Pollutant) - Any waste being discharged into the treatment works which interferes with, passes through without treatment, or is otherwise incompatible with said works or would have a substantial adverse effect on these works or on water quality. This includes all pollutants required to be regulated under the Federal Clean Water Act.

Instantaneous Maximum - A value not to be exceeded in any grab sample.

Major Contributing Industry - One that: (1) has a flow of 50,000 gallons or more per average work day; (2) has a flow greater than five percent of the flow carried by the municipal system receiving the waste; (3) has in its wastes a toxic pollutant in toxic amounts as defined in standards issued under Section 307(a) of the Act; or (4) has a significant impact, either singly or in combination with other contributing industries, on a publicly owned treatment works or on the quality of effluent from that treatment works.

Maximum Day (maximum daily discharge limitation) - The highest allowable "daily discharge" (mg/l, lbs or gallons).

Mean - The mean value is the arithmetic mean.

Monthly Average - (Average monthly discharge limitation) - The highest allowable average of daily discharges (mg/l, lbs or gallons) over a calendar month, calculated as the sum of all daily discharges (mg/l, lbs or gallons) measured during a calendar month divided by the number of daily discharges measured during that month.

NPDES - The National Pollutant Discharge Elimination System.

Secretary - The Secretary of the Agency of Natural Resources

State Certifying Agency Agency of Natural Resources
Department of Environmental Conservation
Wastewater Management Division
103 South Main Street
Waterbury, Vermont 05671-0405

Weekly Average - (Average weekly discharge limitation) - The highest allowable average of daily discharges (mg/l, lbs or gallons) over a calendar week, calculated as the sum of all daily discharges (mg/l, lbs or gallons) measured during a calendar week divided by the number of daily discharges measured during that week.

07/2000; u.4/2007

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RESPONSE SUMMARY
DRAFT DISCHARGE PERMIT No. 3-1324
Proposed NPDES Industrial Discharge Permit
for
Ryegate Associates, Inc.

This permitting action was the proposed renewal of an existing discharge permit which authorizes discharge of 65,000 gallons per day, daily maximum, of process wastewater (cooling tower blowdown, reverse osmosis regeneration, demineralization regenerant, filter backwash, miscellanueous cooling waters, and floor drains) to the Connecticut River.

A draft permit for this discharge was placed on public comment from February 16, 2010 through March 18, 2010.

Public comments were received during the notice period from David Deen, River Steward of the Connecticut River Watershed Council, Richard Walling of the Connecticut River Joint Commissions, and Larry Anderson of Ryegate Associcates, Inc. The following is a summary of the relevant comments received on this draft Discharge Permit, and the Agency's responses to those comments.

Comment A: Have the temperature limitations changed from the permit that currently authorizes this discharge.

Response A: No, the temperature limitation is unchanged from the permit that currently authorizes this discharge.

Comment B: An effluent temperature of 90° F seems to be a lot of heat to the river, have baseline aquatic studies been done to assess the impact to aquatic biota ?

Response B: Regarding instream aquatic studies, based on the negligible predicted temperature change in the river due to this discharge, the Agency has not pursued any aquatic studies on the this discharge.

Specifically, while 90° F is a significant thermal enhancement of a discharge, the volume of the discharge is small and due to the flow of the Connecticut River at this location, the discharge is easily assimilated and only could increase the river temperature about 0.01° F.

In detail, the permitted discharge is 65,000 gpd (or ~0.1 cfs) at a temperature of 90° F. According to Agency files, the 7Q10 flow of the river in that area is 375 cfs. If a summer river temperature of 60° F is assumed, the discharge raises the river temperature to about 60.009° F. Therefore the discharge is well within the requirements of the Water Quality Standards for Cold Water Fisheries, which mandates no instream temperature changes greater than 1°F.

Comment C: What is the volume of this discharge relative to the river?

Response C: The 7Q10 flow of the Connecticut River at the Ryegate Associates, Inc outfall is 375 cfs. The permitted flow of the discharge is 65,000 gpd (or ~0.1 cfs). Therefore the instream waste concentration at "design conditions" for this discharge is 0.02%.

Comment D: Do the boiler maintenance activities result in heavy metals which affect the quality of the discharge?

Response D: The sludge resulting from the boiler maintenance activities is not discharged, it is collected for disposal off-site. see Condition II.A.8. Regarding potential heavy metals in the discharge, typically cadmium, lead, nickel, and zinc are below the level of detection. Copper and iron have been found in detectable concentrations. However but due to their low concentrations, the volume of the discharge, and the size of the receiving water, these metals in the discharge are well under the numerical water quality standards and do not pose a risk to Connecticut River.

Comment E: What is the typical floor drain additions to the wastestream ?

Response E: Floor drains are located in various locations in the facility. These drains can collect a number of minor wastewaters. For example, floor washing, pump condensation, spillage water of the submerged ash conveyor will be collected in floor drains. The water collected from all the floor drains is conveyed through an oil skimmer for treatment and then to the wastewater collection tank for neutralization and sodium bisulfate addition. The contents of that tank are piped to the circulating water building discharge pit, mixed with the other wastestreams and discharged to the river.

Comment F: Could a multiplier for the TSS concentration in the river water be used in calculating the Net TSS limitation based on number of backwash cycles?

Response F: No, 40 CFR 122.45(g) only allows for concentration of the actual source water to be used when calculating net effluent limitations.

Comment G: Since the TSS in the river can changed based on stormevents or excessive runoff, could the sampling requirements for the source water (river water) TSS sampling be clarified to address the detention time in the wastewater treatment system when calculating the Net TSS limitations?

Response G: Yes, Condition I.A.1, Footnote (2) has been modified to address source water and effluent TSS sampling. The footnote has been modified to read as follows:

> "Intake (source water) Total Suspended Solids sampling shall be conducted to account for the detention time in the system based on the current effluent flows."

It will be the responsibility of the permittee to properly determine the detention time in system based on the actual effluent flows and collect a representative intake (source water) sample. Specifically with the tank size of 180,000 gallons and a permitted discharge of 65,000 gpd, there is 3 days detention time in the system at the maximum permitted flow. Currently the facility typically discharges between 20,000 to 30,000 gpd, consequently there is typically between 9 and 6 days detention time in the system. Therefore the intake (source water) sample will need to be collected between 6 and 9 days before the effluent sample is collected to ensure that the "net" total suspended solids is properly calculated.

RYEGATE 'POWER STATION CHIP MANAGEMENT PLAN OS/26/92 Rev. 005

A. Purpose:

Ryegate Associates, RA, is building and proposes to operate a 20 MW wood fired power plant in East Ryegate, Vermont. The facility will be fueled with whole tree wood chips as the primary fuel. The chips will be stored in both covered storage silos and an uncovered outside storage pile. Roundwood logs will also be stored at the facility for long term storage.

The purpose of this plan is to provide assurance to the State that the outside storage of wood chips will be done in such a way to minimize potential adverse environmental effects.

B. Background:

The proposed facility will be fired with wood fuel delivered in standard chip vans. The fuel will be mixed hardwood and softwood whole tree chips with a high heating value of 8.5 million Btu's per green ton, and an average moisture content of 50% (wet basis). Demolition waste, railroad ties, and other wastes will not be stored or burned at the facility.

Depending on the species, the chemical characteristics of the wood fuel will vary slightly. The design basis fuel analysis is as follows:

Hydrogen	3.0%
Carbon	25.0%
Oxygen	20.0%
Water	50.0%
Nitrogen	0.0% (0.15% maximum)
Sulfur"	0.0% (0.07% maximum)
Ash	2.0%

The fuel chips will be stored in both covered storage silos and an uncovered outside storage pile before being mechanically conveyed to the boiler. Primary storage will be the fuel silos. The outside chip piles and the roundwood piles provide for secondary storage. The storage silos provide for 72 hours of covered storage at maximum plant operating capacity. The main purpose of the outside piles will be to allow continuous plant operation in spite of supply interruptions. Typical interruptions include such things as a labor strike or foul weather, which are expected to cause a reduction in wood fuel availability. Also, use of outside piles will allow the operators to take advantage of short term or seasonal excess availability of fuel wood supplies.

The pile will be built on sloped asphalt. Runoff from the pile will be discharged *in* accordance with an approved discharge permit to the Connecticut River through piping sized for a 10 year 24 hour storm. The pile will be rotated at a maximum interval of 60 days in order to prevent significant decomposition, acid formation, odors, or spontaneous combustion.

Roundwood logs will also be stored at the facility for periods up to 180 days. This fuel will be used to carry the plant through periods of long term shortages of fuel. The roundwood storage pile *will* not be subject to decomposition, odor generation, or spontaneous combustion. The current plan is for a contractor to provide services for roundwood chipping. However, RA may install and operate a permanent roundwood chipper on site if proven to be more economical and provide better operating flexibility.

The wood will be burned at a rate of approximately 35 tons/hr. This converts to approximately 12,000 tons for two weeks of fuel storage. The uncovered chip storage pile will occupy a ground area of approximately 2.0 acres.

The project has a base load power contract and therefore will operate continuously consuming steady quantities of wood. There will not be startups and shutdowns dictated by fuel costs and NEPOOL requirements. This will allow procurement of fuel deliveries to be carefully planned in order to avoid large stockpiles of chips on site. This was a major cause of early problems at Burlington Electric Department's (BED) wood fired power plant. At BED plant operating hours were significantly reduced while wood fuel deliveries continued. This resulted in extremely large storage piles with heights of 60' to 80' and storage times greater than 12 months. That is when the spontaneous combustion and offensive odors caused by natural fermentation occurred. BED has since rectified the problems.

C. **Potential Chip Storage Problems**:

The potential problems that can result from outside chip storage include the following:

1. spontaneous combustion

2. offensive odors

3. fermentation

4. Contaminated leachate production

5. Increased wood fuel moisture content

6. Loss of heating value

This chip pile management plan is developed to decrease the potential for these problems to occur.

D. **Chip pile Management Plan:**

The following plan is proposed for Ryegate Power station:

1. The plant will be base loaded with a steady power contract. Fuel deliveries will be carefully planned in order to avoid large stockpiles of chips on site. A weekly inventory and age determination will be recorded utilizing weekly fuel delivery scale tickets and plant fuel consumption. The total pile inventory will not exceed 25,000 tons, which is the quantity of fuel that can be consumed in 30 days of operation when all deliveries are halted.

2. The outside chip pile serves as the secondary fuel source.

3. Whole tree logs will be stored onsite for long term storage. These logs will be chipped on site as necessary, but it is likely that the roundwood will turn over every 3-4 months. Problems discussed above are not associated with the storage of roundwood logs.

4. A two-pile system will be used. Wood chips in the storage pile will be used based on the first-in first-out method. Wood chip piles will not exceed a height of 35' -40' tall.

5. 5. Whole tree chips will not be stored on the site for more than 60 days at a time.

6. Chip piles greater than 30 days old will be monitored for excessive temperatures at several locations weekly for tracking purposes. In the event any temperature reaches 180 degrees (F) the pile will be monitored daily. Piles reaching a temperature of 200 degrees (F) or greater will be consumed immediately before internal heat causes spontaneous combustion.

Piles will be constructed with minimal horizontal surface area exposed. This will encourage shedding of rainwater and help prevent moisture pick-up from rainfall.

8. Chips will be stored on a sloped paved surface with storm water runoff leading directly to the Connecticut River as approved by discharge permit. This will help prevent moisture build-up and a favorable environment for rapid fermentation in the chip pile. It will also prevent an environment for the generation of significant leachate from the chip pile. Annual storm water runoff from the chip pile is expected to be less than 823,000 gallons.

9. The storage area will be kept free from oil, chemical residues, litter, cigarette butts, tramp metal or any other miscellaneous refuse that can act as a external heat sink potentially leading to fires.

1O. As research and experimentation on the mechanisms of chip storage are developed, the chip pile management plan can be modified to address the results that are encountered.

11. In the event the Ryegate facility is unable to consume *in* a timely manner a pile which is beginning to produce offensive odors, the Air Pollution Control Division and Ryegate town selectmen will be informed immediately. If necessary to consume the pile in a timely manner, the pile will be transported to another facility controlled by the operator of Ryegate Power Station for immediate consumption.

E. **Summary:**

The outside storage piles will be primarily used to insure a continuous fuel supply for the base-loaded electric power plant.

The storage piles will be managed based on the first-in first-out basis and will be continuously rotated. Chips will remain in storage for no longer than 60 days. Piles will be limited to a height of 35 to 40 feet and good housekeeping will prevent external heat sources from causing fires.

The pile will be built on an asphalt sloped surface to allow storm water to drain from the storage area.

Factors that are conducive to spontaneous combustion, offensive odors, fermentation, and leachate production will not occur at the Ryegate facility. Short rotation periods, small piles, good housekeeping, and adequate drainage will assure that the environment will not be adversely affected by the outside chip storage pile. Also, the plan will be flexible to incorporate the findings of future research and experimentation.

There is an additional incentive for RA to properly manage the chip pile. During prolonged outside storage there is a loss in the wood chip's available energy, i.e. Btu heating value. Proper pile management by Ryegate Associates and minimal outside storage time will help optimize the fuel's heating value and thereby save overall annual fuel costs.

#AOP-01-037
DEC# SJ95-0114
Operating Permit Expiration Date: May 16, 2016

State of Vermont
Agency of Natural Resources
Department of Environmental Conservation

Air Pollution Control Division
Waterbury, Vermont

TITLE V
AIR POLLUTION CONTROL PERMIT TO CONSTRUCT AND OPERATE

Date Permit Issued: May 16, 2011

Owner/Operator:	Ryegate Associates, Incorporated 247 Weesner Drive East Ryegate, Vermont 05042
Source:	Ryegate Associates, Incorporated Wood-fired Electric Generating Station 247 Weesner Drive East Ryegate, Vermont

FINDINGS OF FACT

(A) FACILITY DESCRIPTION

Ryegate Associates, Incorporated (hereinafter "Ryegate Associates" and also referred to herein as "Permittee") owns and operates a twenty (20) megawatt (net) wood-fired power plant located at 247 Weesner Drive in East Ryegate, Vermont (hereinafter "Ryegate Power Station" and also referred to herein as "Facility"). Ryegate Power Station is operated as a base load plant at or close to 100% capacity at all times, excluding plant outages. The electricity generated at the Ryegate Power Station is sold to the Vermont Electric Power Producers Inc. (VEPPI). Operations performed at the Facility are classified within the Standard Industrial Classification Code - 4911 (Electrical Services).

The Facility is fired with whole tree wood 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 silos and outside storage pile(s) before being mechanically conveyed to the boiler. Wood fuel is fed into a single, high-pressure, boiler designed to burn green fuel (hereinafter "Main Boiler"). 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 open loop circulating water system to a cooling tower structure.

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. The Facility also has a 430 horsepower propane-fired engine generator set for use during electric power outages (hereinafter "Emergency Generator"), and an auxiliary propane-fired boiler (hereinafter "Auxiliary Boiler") that supplies hot water for space heating purposes during plant outages.

Air contaminant emissions produced by the wood-fired boiler are controlled as follows: electrostatic precipitator, flue gas reinjection, selective non-catalytic reduction system (urea injection), and combustion air control with oxygen trim and underfire/overfire air ratio.

Below is a summary of specifications for equipment the Facility will consist of upon issuance of this Permit:

Equipment Specifications			
Equipment	Size[1,2]	Fuel Type[3]	Date of Installation
Main Boiler Manufacturer: Riley Stoker Corp.	300 MMBtu/hr	Wood	1992
Main Boiler Auxiliary Burner Manufacturer: Coen Model: 230/DAZ-22	50 MMBtu/hr	LPG	

Equipment Specifications			
Equipment	Size[1,2]	Fuel Type[3]	Date of Installation
Auxiliary Boiler Manufacturer: Weil-McLain Boiler Model: 1688R-W Burner Model: WCR3-G-25B	5 MMBtu/hr		
Emergency Generator Manufacturer: Cummins Model: GTA-19	430 bhp (300kW)		
Insignificant Fuel Combustion Equipment			
Equipment	Size[1]	Fuel Type	Date of Installation
Diesel Fire Pump	< 3 MMBtu/hr	No. 2 Fuel Oil	1992
Fuel Yard Maintenance Building Heater			
Main Maintenance Building Heater		LPG	
Propane System Vaporizer			2009

[1] MMBtu/hr - Million British Thermal Units per hour maximum rated heat input.
[2] bhp – brake horsepower rated output as specified by the manufacturer. kW – kilowatt electrical output.
[3] LPG –Liquefied Petroleum Gas

(B) FACILITY CLASSIFICATION

The Facility is classified as a source of air contaminants pursuant to Title 10 of the *Vermont Statutes Annotated* ("10 *VSA*") §555 and §5-401 (3), [Electrical power generating facilities], of the *Vermont Air Pollution Control Regulations* (hereinafter "*Regulations*"). In addition, §5-101 of the *Regulations* defines a *stationary source* as any structure(s), equipment, installation(s), or operation(s), or combination thereof, which emit or may emit any air contaminant, which is located on one or more contiguous or adjacent properties and which is owned or operated by the same person or persons under common control. Based on this definition, all of the equipment, operations, and structures at the Facility are grouped together by the Agency of Natural Resources, Department of Environmental Conservation, Air Pollution Control Division (hereinafter "Agency") as one stationary air contaminant source for purposes of review under the *Regulations*.

(C) PRIOR AGENCY ACTIONS/APPROVALS

The Facility has been issued the following "Permit to Construct" approvals pursuant to 10 *VSA* §556 and §§5-501 and/or 5-502 of the *Regulations* and the following "Permit to Operate" approvals pursuant to 10 *VSA* §556a and Subchapter X of the *Regulations*.

Prior Agency Approvals and Actions		
Permit Number	Date Approval Issued	Description of Agency Approval/Action
N/A	January 11, 1988	Original Agency approval to construct the Facility.
AP-90-029a	July 11, 1990	Amendment issued to extend the deadline of construction of the Facility and added requirement for SNCR for NOx.
AP-90-029b2	August 15, 1991	Amendment issued to address design changes in the Facility (e.g., switch auxiliary fuel from No. 2 oil to LPG, increase in stack height, etc.).
AP-90-029b	October 30, 1991	Amendment issued requiring compliance with a revised NO_x MSER limit 0.15 lb/MMBtu at start-up instead of three years following start-up.
AP-90-029c	January 24, 1992	Amendment issued approving the use of urea and/or ammonia for the selective non-catalytic control device.
AP-90-029d	April 29, 1992	Amendment issued in order to make clerical revisions to the conditions of the approval.
AP-90-029e	June 18, 1992	Amendment issued in order to revise the language of various reporting requirements.
AP-90-029f	February 23, 1993	Amendment issued in order to extend the deadline for emission testing.
AP-90-029g	February 25, 1997	Amendment issued eliminating the requirement to continuously monitor VOC emissions and the prohibition on simultaneous operation of the Main Boiler and Auxiliary Boiler.
AOP-95-031	September 15, 1997	Agency approval for initial Title V Permit to Operate.

(D) FACILITY PERMIT APPLICABILITY

As noted above, the Facility is classified as a source of air contaminants under §5-401 of the *Regulations*. Pursuant to 10 *VSA* §556a and Subchapter X of the *Regulations* a Permit to Operate is required for any air contaminant source with allowable emissions of all air contaminants combined of ten (10) tons per year ("tpy") or more or that is subject to a standard, limitation or other requirement under §111 and/or §112 of the Clean Air Act.

Therefore, pursuant to §§5-1002, 5-1003, and 5-1005 of the *Regulations* the Facility is classified as a "Title V Subject Source" and must obtain a 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 Facility currently operates under a Permit to Operate issued on September 15, 1997 (Permit #AOP-95-031). The allowable emissions from the Facility are estimated to be greater than ten (10) tpy combined and emissions of nitrogen oxides (NO_x) and carbon monoxide (CO) are estimated to be in excess of the one-hundred (100) tpy threshold for applicability to Title V of the federal Clean Air Act. Therefore, pursuant to §§5-1002, 5-1003, and 5-1005 of the *Regulations* the Facility is classified as a "Title V Subject Source". In accordance with §5-1009 of the *Regulations*, the Agency is issuing the Permit to Operate herein as a renewal of the previous Permit to Operate for the Facility and the Permit herein supercedes all prior Permits for the Facility.

In accordance with 10 *VSA* §556(e) the Agency has combined the Permit to Construct and the Permit to Operate for this Facility into one combined Permit to Construct and Operate. The allowable emissions for the Facility are summarized below:

Future Allowable Air Contaminant Emissions (tons/year)[1]						
PM/PM_{10}	**SO_2**	**NO_x**	**CO**	**VOCs**	**Total Criteria**	**HAPs[2]**
22	25	197	394	39	>10	<10/25

[1] PM/PM_{10} - particulate matter and particulate matter of 10 micrometers in size or smaller; SO_2 - sulfur dioxide; NO_x - oxides of nitrogen measured as NO_2 equivalent; CO - carbon monoxide; VOCs - volatile organic compounds; HAPs - hazardous air pollutants as defined in §112 of the federal Clean Air Act.
[2] Emissions of individual HAPs each < 10 tpy and emissions of total HAPs combined <25 tpy.

(E) REVIEW FOR THE PERMIT TO CONSTRUCT

(a) New Source Review Designation

The Permittee has not proposed any modifications to the Facility in conjunction with the review for this Permit to Operate and therefore is not subject to review under the New Source Review requirements in §5-501 or §5-502 of the *Regulations* at this time.

(b) Most Stringent Emission Rate

Pursuant to §5-502 of the *Regulations*, the owner/operator of each new major stationary source or major modification must apply control technology adequate to achieve the Most Stringent Emission Rate ("MSER") with respect to those air contaminants for which there would be a major or significant actual emissions increase, respectively, but only for those currently proposed physical or operational changes which would contribute to the increased emissions.

The Facility was previously reviewed under §5-502 of the *Regulations* for the following modifications to the Facility. The following MSER determinations have been made at this Facility:

Most Stringent Emission Rate Determinations		
Determination Date & Permit #	Pollutant	Description/Emission limit[1]
Original Permit to Construct No Permit Number Issued: January 11, 1988	PM	Main Boiler: Installation and operation of mechanical collectors in series with a 670 SCA, five field electrostatic precipitator. Emission Limit: 0.00070 gr/dscf at 12% CO_2.
	SO_2	Main Boiler: Combustion of #2 fuel oil with a maximum sulfur content of 0.5 percent by weight, as the auxiliary fuel and the maximum combustion limit of 357,000 gallons/yr.
	NO_x	Main Boiler: Modern combustion design devised to minimize nitrogen oxides emissions and the low flame temperature resulting from the utilization of wood as the primary fuel. Emission Limit: 0.250 lb/MMBtu.
	CO	Main Boiler: Modern combustion design devised to assure complete combustion of fuels. Emission Limit: 0.30 lb/MMBtu.
July 11, 1990 AP-90-029a	NO_x	Main Boiler: Installation and operation of a non-catalytic reduction system wherein ammonia is injected into the boiler combined with modern combustion design of the boiler and the low flame temperature resulting from utilization of wood as the primary fuel. Emission Limits: 0.25 lb/MMBtu (first year of operation) 0.20 lb/MMBtu (second year of operation) 0.15 lb/MMBtu (third year of operation)
August 15, 1991 AP-90-029b	PM	Auxiliary Boiler: Use of propane fuel. Emission Limit: 0.005 lb/MMBtu Emergency Generator: Use of propane fuel. Emission Limit: 0.001 g/bhp-hr
	NO_x	Auxiliary Boiler: Modern combustion design and use of propane fuel. Emission Limit: 0.14 lb/MMBtu Emergency Generator: Modern combustion design and the use of propane fuel. Emission Limit: 8.5 g/bhp-hr
	CO	Auxiliary Boiler: Modern combustion design. Emission Limit: 0.035 lb/MMBtu Emergency Generator: Modern combustion design. Emission Limit: 28 g/bhp-hr
October 30, 1991 AP-90-029c	NO_x	Main Boiler: Installation and operation of a non-catalytic reduction system wherein ammonia is injected into the boiler combined with modern combustion design of the boiler and the low flame temperature resulting from utilization of wood as the primary fuel. Emission Limit: 0.15 lb/MMBtu (8 hour rolling average) to be met upon start-up of boiler.

[1] gr/dscf – grains per dry standard cubic feet, lb/hr – pounds per hour, lb/MMBtu – pounds per million British thermal unit at maximum rated heat input, g/bhp-hr – grams per break horsepower hour rated output as specified by the manufacturer.

(c) Ambient Air Quality Impact Evaluation

An ambient air quality impact evaluation is performed to demonstrate whether or not a proposed project will cause or contribute to violations of the ambient air quality standards and/or significantly deteriorate existing air quality. The Agency's implementation procedures concerning the need for an ambient air quality impact evaluation under §5-406(1) of the *Regulations*, specifies that such analyses may be required when a project results in an allowable emissions increase of ten (10) tons per year or more of any air contaminant, excluding VOCs. Additionally, the Agency may require an air quality impact evaluation where the short-term allowable emission rates will significantly increase as a result of a project.

The Permittee has not proposed any modifications to the Facility in conjunction with the review for this Permit to Operate and therefore is not subject to an air quality impact analysis under §5-501 of the *Regulations* at this time.

Ambient air quality impact analyses were performed in 1987 as part of the original review for the Facility and again as part of the review for AP-90-029A2 issued August 15, 1991. The pollutants PM, SO_2, CO and NO_x were modeled and it was determined that the proposed impacts would not cause a violation of any National Ambient Air Quality Standard (NAAQS), exceed any PSD increment or significantly contribute to an existing violation of an NAAQS.

(F) REVIEW FOR THE PERMIT TO OPERATE

(a) Applicable Requirements

The operations at the Facility are subject to the following state and federal laws and regulations, the requirements of which are embodied in the conditions of this Permit.

(i) *Vermont Air Pollution Control Regulations*:

Applicable Requirements from the Vermont Air Pollution Control Regulations
Section 5-201 – Prohibition of Open Burning.
Section 5-211(2) and (3) - Prohibition of Visible Air Contaminants, Installations Constructed Subsequent to April 30, 1970. Exceptions – Wood Fuel Burning Equipment.
Section 5-221(1) - Prohibition of Potentially Polluting Materials in Fuel, Sulfur Limitation in Fuel.
Section 5-231(3) - Prohibition of Particulate Matter; Combustion Contaminants.
Section 5-231(4) - Prohibition of Particulate Matter; Fugitive Particulate Matter.
Section 5-241 – Prohibition of Nuisance and Odor.

Applicable Requirements from the Vermont Air Pollution Control Regulations
Section 5-402 – Written Reports When Requested.
Section 5-403 – Circumvention.
Section 5-502(3) – Most Stringent Emission Rate.
Subchapter VIII – Registration of Air Contaminant Sources.
Subchapter X – Operating Permits.

(ii) Reasonably Available Control Technology - §5-1010 of the *Regulations*

Pursuant to 10 *VSA* §556a(d) and §5-1010 of the *Regulations* the Agency may establish and include within any Permit to Operate emission control requirements based on Reasonably Available Control Technology ("RACT"). Based on the Facility's existing levels of emissions and emission controls, the Agency has not imposed any further requirements on this Facility under this authority at this time.

(iii) Existing Air Pollution Control Permit to Construct and/or Operate

The Facility currently operates under the confines of a combined Permit to Construct and Operate issued on September 15, 1997 (Permit #AOP-95-031). The conditions within that existing permit are considered applicable requirements pursuant to §5-1002(d) of the *Regulations*. The requirements of that permit which are not being modified herein are incorporated into this new combined Permit to Construct and Operate (Permit #AOP-01-037).

Consistent with Condition (16) of Permit #AOP-95-031, the Facility has updated and made changes to its O&M including boiler cleaning techniques.

(iv) Federal Requirements:

Applicable Requirements from Federal Regulations and the Clean Air Act
40 *CFR* Part 60, New Source Performance Standards, Subpart A - General Provisions.
40 *CFR* Part 60, Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units: §60.42b Standards for sulfur dioxide; §60.43b Standards for particulate matter; §60.44b Standards for nitrogen oxides; §60.49b Reporting and recordkeeping requirements. Applicable to all units of 100 MMBtu per hour or greater constructed after June 19, 1984.

Applicable Requirements from Federal Regulations and the Clean Air Act
Clean Air Act §§114(a)(3), 502(b), and 504(a)-(c); 40 *CFR* Part 70 §§70.6(a)(3)(i)(B) and 70.6(c)(1); and 40 *CFR* Part 64 - Compliance Assurance Monitoring. Upon renewal of a Title V Permit to Operate, a facility must comply with enhanced monitoring and compliance assurance monitoring requirements for any emission controlled unit subject to an emission standard with uncontrolled emissions from the unit in excess of the Title V major source thresholds.
40 CFR Parts 72, 73, 75, 76, 77, 78, Acid Rain Program *Acid Rain Program does not apply since Ryegate had power contracts prior to effective date and does not burn oil:* *They are an Independent Power Production facility (IPP) that had power purchase commitments prior to 11/15/90 (entered into a purchase power agreement on March 13, 1989 Docket # 5177) even though they did not commence commercial operation until after 11/15/90. Once they amend their power purchase contracts on October 31, 2012 they will lose this exemption but can apply for new unit exemption as a low sulfur unit less than 25 MW.*
40 *CFR* Part 63, Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial and Institutional Boilers. This regulation will apply to new and existing fuel oil and solid fuel fired boilers located at area sources (major sources are subject to Subpart DDDDD). It does not apply to natural gas or propane fired boilers. The final rule is effective 3/21/2011. Boilers that commenced construction on or before June 4, 2010 are considered an existing source. *The Main Boiler is subject to this regulation.* *The propane fired auxiliary boiler is not subject to this regulation.*

(b) Non-Applicable Requirements

Pursuant to §5-1015(a)(14) of the *Regulations*, an owner or operator of a Facility may request a permit shield from specific state or federally enforceable regulations and standards which are not applicable to the source. The applicant has not requested such a permit shield in accordance with the requirements of §5-1015(a)(14) of the *Regulations*.

(c) Enforceability

This section delineates which permit conditions are federally enforceable and which conditions are state only enforceable. All federal enforceable conditions are subject to federal citizen suit provisions. Condition (14) of this Permit regarding odor control and the emission limits for ammonia in Condition (22) of this Permit derive solely from state law and are only state enforceable, and therefore, are not federally enforceable. All other conditions of this Permit are enforceable by both state and federal authorities.

(d) Compliance Certification

The Permittee is required by this Permit to certify compliance as part of its annual registration with the Agency pursuant to the requirements of Subchapter X of the *Regulations*. Additionally, this Permit requires the submission of quarterly reports of monitoring records used to demonstrate compliance with the limitations contained in this Permit.

(G) HAZARDOUS MOST STRINGENT EMISSION RATE

Pursuant to §5-261 of the *Regulations*, any stationary source whose current or proposed actual emission rate of a hazardous air contaminant ("HAC") is equal to or greater than the respective Action Level (found in Appendix C of the *Regulations*) shall achieve the Hazardous Most Stringent Emission Rate ("HMSER") for the respective HAC.

Pursuant to §5-261(1)(b)(ii) of the *Regulations*, all fuel burning equipment which combusts virgin liquid or gaseous fuel and wood boilers constructed before January 1, 1993 are exempt from this section. Therefore, the Main Boiler, Auxiliary Boiler and the engine/generator are not subject to §5-261 of the *Regulations* at this time.

The emission of HACs from the cooling tower drift is also subject to §5-261, but no Action Levels are estimated to be exceeded.

The ammonia emissions from the SNCR system is subject to §5-261, and the HMSER continues to be an ammonia emission rate of 40 ppmv.

Hazardous Most Stringent Emission Rate Determinations		
Date of Determination/ Permit #	Pollutant	Description/Emission limit
July 11, 1990 #AP-90-029a Re-established May 16, 2011 #AOP-01-037	Ammonia	40 ppmv (parts per million on a volume basis corrected to 12% CO2)(one-hour average) when wood is contributing more than thirty (30) % of the BTU input to the Main Boiler.

(H) EQUIVALENCY DETERMINATIONS

Applicable Visible Emission Standards, Main Boiler		
Most Stringent	Regulatory Authority	Standard or Limit
	40 *CFR* Part 60 Subpart Db §60.43b(f)	20% or less opacity except for one 6 minute period in any hour where emissions may not exceed 27% opacity. Does not apply to startup, shutdown and malfunction.
X	§5-211(2) and (3) of the *Regulations*	20% opacity for periods aggregating to more than 6 minutes in any hour. Exception for wood burning start up and soot blowing, but never to exceed 80% opacity.

Applicable Particulate Matter Emission Standards, Main Boiler		
Most Stringent	Regulatory Authority	Standard or Limit
	40 *CFR* Part 60 Subpart Db §60.43b(c)(1)	0.10 lb/MMBtu
	§5-231(3)(b)(iii) of the *Regulations*	0.10 gr/dscf
X	MSER: Original Permit to Construct – Issued January 11, 1988	0.0007 gr/dscf corrected to 12% CO_2 equivalent to 0.002 lb/MMBtu

Based on the Agency's review of the Facility's application and the above Findings of Fact, the Agency concludes that the Facility, subject to the following Permit conditions, complies with all applicable state and federal air pollution control laws and regulations or is subject to an acceptable schedule of compliance. Therefore, pursuant to 10 *VSA* §§556 and 556a, as amended, the Agency hereby issues a Permit approving the Facility, as described in the above Findings of Fact, subject to the following:

PERMIT CONDITIONS

- Construction and Equipment Specifications -

(1) The Permittee shall construct and operate the Facility in accordance with the plans and specifications submitted to the Agency and in accordance with the conditions set forth herein, including the equipment specifications as listed in Findings of Fact (A). [10 *V.S.A.* §§556(c) and 556a(d)] [§5-501(1) of the *Regulations*]

(2) The Main Boiler's propane auxiliary burner shall not exceed fifty (50) million British Thermal Units per hour ("MMBTU/hr"). [10 *V.S.A.* §556(c)][AP-90-029b issued 8/15/1991]

(3) Air Pollution Control Equipment

(a) The Main Boiler shall be equipped with a particulate matter control system consisting of mechanical collectors in series with a five (5) field electrostatic precipitator ("ESP"), each of the make and specifications indicated by the Permittee in its application entitled "Air Pollution Control Operating Permit Application" and dated 15 September 2001. At all times, including periods of startup, shutdown, and malfunction, the Permittee shall, to the extent practicable, maintain and operate the mechanical collectors and ESP in a manner consistent with good air pollution control practice for minimizing emissions. Further, the mechanical collectors and ESP shall be operated whenever the Main Boiler is running after initial start-up. [10 *V.S.A.* §556(c)] [Original Agency Approval to Construction: 1/11/1988][40 *CFR* §60.11d]

(b) The Main Boiler shall be equipped with a non-catalytic nitrogen oxides reduction system consisting of either ammonia or urea injection into the boiler flue gas at appropriate points within the furnace. The Permittee shall maintain temperatures within the injection zones in a range between 1600 degrees Fahrenheit ("°F") and 1900°F. All elements of the non-catalytic reduction system shall be maintained in good working order and shall be operating whenever the Main Boiler is running after initial start-up. [10 *V.S.A.* §556(c)] [AP-90-029a]

(4) Auxiliary Boiler

(a) The Permittee shall operate the Auxiliary Boiler in accordance with the plans and specifications submitted to the Agency and the terms and conditions of this Permit.

(b) The Auxiliary Boiler shall have a maximum rated heat input of five (5) MMBTU/hr or less and shall operate on propane fuel.

[10 *V.S.A.* §556(c)] [AP-90-029b issued 8/15/1991]

(5) Emergency Generator

(a) The Permittee shall operate the Emergency Generator in accordance with good operating practices.
(b) The Emergency Generator shall have a maximum rating of 300 kilowatts and 430 brake horsepower and shall operate on propane fuel.
(c) The Emergency Generator shall be equipped with a non-resettable elapsed time meter designed to measure and record its total hours of operation.

[10 *V.S.A.* §556(c)] [AP-90-029b issued 8/15/1991]

(6) The exhaust gases from the Main Boiler shall be released vertically through a stack which extends a minimum of 212 feet above the stack base grade elevation. The stack shall not be equipped with any device that may obstruct the upward discharge of the exhaust gases such as a fixed raincap. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-406 of the *Regulations*]

(7) The exhaust gases from the Auxiliary Boiler shall be released vertically through a stack which extends a minimum of 47 feet above the stack base grade elevation. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-406 of the *Regulations*]

- Operational Limitations -

(8) The Permittee shall utilize as solid fuel for the Main Boiler only wood fuel uncontaminated by glues, preservatives, oils, or similar foreign substances. Furthermore, The Permittee shall notify the Agency of all proposed sources of wood fuel other than whole tree wood chips, and of the nature of said fuels, prior to the securing of any purchase/utilization agreements for said fuels. Whole tree wood chips means chips made from virgin wood and include stumps, branches, bark, and sawdust incidental to chipping operations. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-101, 5-231(2) and 5-1015(a)(1) of the *Regulations*]

(9) Propane

(a) The annual propane fuel consumption by the Main Boiler shall not exceed 20.0 million cubic feet, based upon any rolling twelve (12) consecutive calendar month period.
(b) The sulfur content of propane combusted by the Facility shall at no time exceed 10 grains per 100/cubic foot.

[10 *V.S.A.* §§556(c) and 556a(d)] [AP-90-029b issued 8/15/1991]

(10) The Auxiliary Boiler shall not operate more than 720 hours during any rolling twelve (12) consecutive calendar month period. [10 *V.S.A.* §§556(c) and 556a(d)] [AP-90-029b issued 8/15/1991]

(11) The Permittee shall not install or operate a stationary reciprocating internal combustion engine, as defined in the *Regulations*, that is 450 bhp or greater unless the engine complies with §5-271 of the *Regulations*, as applicable. Installation of any size stationary reciprocating internal combustion engine, even those below 450 bhp, may still require approval from the Agency in the form of an amended Permit prior to installation. Stationary reciprocating internal combustion engines include those used to power generator sets or to provide shaft power for equipment but does not include engines used to power motor vehicles. [§§5-501 and 5-271 of the *Regulations*]

(12) The Emergency Generator shall not operate more than 720 hours during any rolling twelve (12) consecutive calendar month period and shall not operate simultaneously with the Main Boiler, except for periods of regularly scheduled Emergency Generator operation necessary for maintenance and performance testing of the emergency system when requested by the Independent Systems Operator for New England (ISO New England) for an OP 4 event or OP 7 event. [10 *V.S.A.* §§556(c)][AP-90-029b issued 8/15/1991]

(13) Fugitive Particulate Matter Control

The Permittee shall take reasonable precautions at all times to prevent emissions of fugitive particulate matter, including, but not limited to, the following measures:

(a) Techniques such as, but not limited to, enclosing or spraying with water or surfactants shall be employed by the Permittee to prevent particulate matter from becoming airborne from the handling and transportation of ash.

(b) The Permittee shall include in its contract(s) with those receiving ash from the Facility the following clause:
The ash recipient shall take reasonable precautions at all times to prevent fugitive particulate matter from becoming airborne from the handling and disposing of ash.

(c) All roads, traffic areas, and storage piles on the premises shall be maintained and treated as necessary to control fugitive dust, and all trucks and railroad cars which may be sources of fugitive dust shall be covered or treated as necessary.

(d) Reasonable measures shall be taken to control fugitive dust resulting from any wood chipping operations conducted at the Facility.

[10 V.S.A. §556(c) and §5-231(4) of the *Regulations*] [Original Agency Approval to Construction: 1/11/1988]

(14) Nuisance and Odor Control

(a) The Permittee shall operate the Facility in accordance with its Chip Management Plan, initially approved by the Agency on 5/28/1992. Future amendments to the plan do not require approval by the Agency, but a copy of the amended plan shall be sent to the Agency. Said plan shall detail the outdoor woodchip storage and handling methods to be utilized by the Permittee to prevent the decomposition of the woodchips and the emissions of objectionable odors beyond the property line of the premises. [Original Agency Approval to Construction: 1/11/1988]

(b) The Permittee shall not discharge, cause, suffer, allow, or permit from any source whatsoever such quantities of air contaminants or other material which will cause injury, detriment, nuisance or annoyance to any considerable number of people or to the public or which endangers the comfort, repose, health or safety of any such persons or the public or which causes or has a natural tendency to cause injury or damage to business or property. [§5-241(1) and (2) of the *Regulations*]

(15) Operation and Maintenance Plan: The Permittee shall develop and update as necessary an Operation and Maintenance Plan for the Main Boiler and its associated air pollution control equipment.

(a) Said plan shall detail the inspection and maintenance procedures to be followed to ensure proper operation of the Facility and continuing compliance with the emission standards specified in this Permit.
(b) Said plan shall also detail the practices and procedures to be followed during periods of startup, shutdown and upset conditions in order to prevent emissions in excess of the standards specified in this permit.
(c) Said plan shall include, but not be limited to, consideration of preventive maintenance schedules, spare parts inventories, procedures and protocols for unscheduled outages, and provisions for equipment replacement and measures to be taken to protect air pollution control equipment in the event of any control equipment failure or shutdown.
(d) All operators of the Facility shall be trained in the operation and maintenance of both the Main Boiler and its associated air pollution control equipment by qualified personnel.

[10 *V.S.A.* §§556(c)][Original Agency Approval to Construction: 1/11/1988]

(16) In accordance with 40 *CFR* Part 63 Subpart JJJJJJ (National Emission Standards for Hazardous Air Pollutants: Industrial, Commercial and Institutional Boilers at area sources), the Permittee shall comply with the following applicable requirements for coal, oil and wood fired boilers as well as all other applicable requirements of this regulation:

(a) Biennial tune-ups of the boiler(s) as required by 40 *CFR* §63.11223. For boilers installed prior to June 4, 2010 the first tune-up is required by March 21, 2012. Subsequent tune-ups must be completed no later than 25 months after the prior tune-up.
(b) A one-time energy assessment of the boilers as well as the rest of the Facility as required by 40 *CFR* §63.11201(b). This provision only applies to existing facilities with one or more boilers of 10 MMBtu/hr heat input or greater that were installed prior to June 4, 2010. The energy assessment must be completed by March 21, 2014.
(c) Notification, reporting and recordkeeping requirements as specified in §63.11225. This includes:
    (i) §63.11225(a)(2): Initial Notification:
        a. For boilers installed prior to June 4, 2010 the initial notification must be sent to the EPA no later than September 17, 2011.

(ii) §63.11225(a)(4): Notification of Compliance Status:

a. Notification of the initial tune-up of the boiler must be submitted no later than July 19, 2012 for boilers installed prior to June 4, 2010.

b. Notification of the completion of the energy assessment must be submitted no later than July 19, 2014

(iii) §63.11225(b): By March 1 of each year, prepare and submit an annual compliance certification report. For boilers only subject to a requirement to conduct biennial tune-up and not subject to emission limits or operating limits, the Permittee may prepare only a biennial compliance report. This should be included in the Annual Compliance Certification required by Condition (34) of this permit.

(iv) All records, reports and notifications that are required by this regulation shall be submitted to the Agency as well as the U.S. Environmental Protection Agency.

[40 *CFR* Part 63 Subpart JJJJJJ] [40 *CFR* Part 63]

- Emission Limitations -

(17) Particulate Matter:

(a) In the event that emission testing demonstrates that particulate matter emissions exceed 0.00070 grains per dry standard cubic foot corrected to twelve percent carbon dioxide ("gr/DSCF corrected to 12% CO_2") or 0.50 pounds per hour ("lbs/hour") when wood fuel is contributing more than thirty (30) percent ("%") of the British Thermal Unit ("BTU") input to the Main Boiler, but are less than 0.0070 gr/DSCF corrected to 12% CO_2 and 5.0 lbs/hour, the Permittee shall take all reasonable measures to reduce and maintain its emissions of particulate matter to the greatest extent practicable below 0.0070 gr/DSCF corrected to 12% CO_2 and 5.0 lbs/hour. The Permittee shall report to the Secretary those measures implemented and the degree of improvement derived from them. [10 *V.S.A.* §556(c) and §5-502(3)(a)(i) of the *Regulations*] [Original Agency Approval to Construction: 1/11/1988]

(b) In the event that emission testing demonstrates that particulate matter emissions exceed 0.0070 gr/DSCF corrected to 12% CO2 or 5.0 lbs/hour, when wood fuel is contributing more than thirty (30) % of the BTU input to the Main Boiler, the Main Boiler shall cease operation. Operation shall be discontinued within thirty (30) days after the Permittee or the Agency receives the results of said testing. The Main Boiler will be permitted to restart only after the Permittee has demonstrated to the satisfaction of the Secretary that all necessary corrective actions have been taken to ensure that the Main Boiler will operate in compliance with this Permit. Within sixty (60) days after restarting operation under these circumstances, compliance with the above particulate matter emission limit shall be demonstrated by emission testing to the satisfaction of the Secretary. [10 *V.S.A.* §556(c)] [Original Agency Approval to Construction: 1/11/1988]

(c) Any emission testing conducted to demonstrate compliance with the above particulate matter emission limit shall be performed in accordance with 40 *CFR* Part 60, Appendix A, Reference Method 5 or an equivalent method approved in writing by the Agency. The sampling time for each test run shall be at least 120

minutes and the minimum sampling volume shall be sixty (60) dry standard cubic feet. [10 *V.S.A.* §556(c) and 40 *CFR* Part 60 Subpart Db §60.46b] [Original Agency Approval to Construction: 1/11/1988]

(18) Visible Emissions:

(a) Emissions of visible air contaminants from the stacks at the Facility, except where otherwise noted in this Permit shall not exceed twenty (20) percent opacity for more than a period or periods aggregating six (6) minutes in any hour and at no time shall visible emissions exceed sixty (60) percent opacity. For wood fuel burning equipment, the exceptions as provided in paragraphs (b) and (c) of this condition shall apply.

(b) During normal start-up operations of the wood fuel burning equipment, emissions of visible air contaminants in excess of the limits specified above may be allowed for a period not to exceed one (1) hour; however, at no time shall such emissions exceed eighty (80) percent opacity.

(c) During normal soot blowing operations of the wood fuel burning equipment, emissions of visible air contaminants in excess of the limits specified above may be allowed for a period not to exceed thirty (30) minutes during any twenty-four (24) hour period; however, at not time shall such emissions exceed eighty (80) percent opacity.

(d) Compliance with the above visible emission limits for the Main Boiler shall be determined by means of continuous emission monitoring. At the Secretary's discretion, compliance shall, in the alternative, be determined by observations by a trained observer in accordance with 40 *CFR* Part 51, Appendix M, Methods 203B and 203C, respectively. For all other installations and operations at the Facility, any emission testing conducted to demonstrate compliance with the above emission limits shall be performed in accordance with the above Federal Reference Method. [§§5-211(2), 5-211(3) and 5-404 of the *Regulations*] [Original Agency Approval to Construction: 1/11/1988]

(19) Nitrogen Oxides: Nitrogen oxides ("NO_x") emissions from the Main Boiler shall not exceed 0.15 pounds per million BTU ("lb/MMBtu") of heat input and 45 lbs/hour (eight-hour rolling average) when wood is contributing more than thirty (30) % of the BTU input to the Main Boiler. [10 *V.S.A.* §556(c) and §§5-502(3)(a)(i) and 5-1010(a) of the *Regulations*] [AP-90-029a]

(20) Carbon Monoxide: Carbon Monoxide ("CO") emissions from the Main Boiler shall not exceed 0.30 pounds per million BTU ("lb/MMBtu") of heat input and 90 lbs/hour (eight-hour rolling average) when wood is contributing more than thirty (30) % of the BTU input to the Main Boiler. [10 *V.S.A.* §556(c) and §§5-502(3)(a)(i) and 5-261(3) of the *Regulations*] [Original Agency Approval to Construction: 1/11/1988]

(21) Volatile Organic Compounds: Volatile Organic Compounds ("VOC") emissions from the Main Boiler shall not exceed 0.03 pounds per million BTU ("lb/MMBtu") of heat input and 9.0 lbs/hour (1 hour average) when wood is contributing more than thirty (30) % of the BTU input to the Main Boiler.

Compliance with the above VOC emission limit shall be determined by means of using the following Federal Reference Method 25 or Method 25a combined with Method 18 (40

CFR Part 60, Appendix A). [10 *V.S.A.* §556(c) and §§5-502(3)(a)(i) and 5-261(3) of the *Regulations*] [Original Agency Approval to Construction: 1/11/1988]

(22) Ammonia: Ammonia ("NH_3") emissions from the Main Boiler shall not exceed 40 ppmv (parts per million on a volume basis corrected to 12% CO_2)(one-hour average) when wood is contributing more than thirty (30) % of the BTU input to the Main Boiler. [10 *V.S.A.* §556(c) and §§5-502(3)(a)(i) and 5-261(3) of the *Regulations*] [AP-90-029a]

(23) Hazardous Air Pollutants: Emission of federally regulated hazardous air pollutants (HAPs) from the Facility shall not equal or exceed ten (10) tons per year of any single HAP or twenty-five (25) tons per year of all HAPs combined per calendar year per year based on any rolling twelve (12) consecutive calendar month period. [40 *CFR* Part 63]

(24) Hazardous Air Contaminants: Emissions of state hazardous air contaminants (HACs) from the applicable operations at the Facility shall not equal or exceed their respective Action Level (found in Appendix C of the *Regulations*) unless the Agency has reviewed and approved such HAC emission under §5-261 of the *Regulations*. [§5-261 of the *Regulations*]

- Compliance Testing and Monitoring –

(25) Compliance Testing and Monitoring

(a) Continuing compliance with the particulate matter emission standards specified in condition (17) of this Permit and the VOC emission standard specified in condition (21) of this Permit shall be determined by biennial emissions testing, to be conducted beginning in 1995 and every other year thereafter. The Permittee shall conduct such testing and furnish the Agency with a written report of the results of such testing within ninety (90) days after June 1st for those years when re-testing is required. At least thirty (30) days prior to the re-testing, the Permittee shall submit a pre-test report prepared in accordance with the Agency's "Source Emission Testing Guidelines".

(b) Continuing compliance with the visible air contaminant emission standards specified in condition (18) of this Permit shall be determined by means of continuous emission monitoring, as required in condition (28) of this Permit. At the Secretary's discretion, compliance shall, in the alternative, be determined by observations by a trained observer in accordance with 40 *CFR* Part 51, Appendix M, Methods 203B and 203C, respectively, or equivalent methods approved in writing by the Agency.

(c) Continuing compliance with the nitrogen oxides and carbon monoxide emission standards specified in conditions (19) and (20) of this Permit shall be determined by means of continuous emission monitoring, as required in condition (28) of this Permit.

(d) Continuing compliance with the ammonia emission standard specified in condition (22) of this Permit shall be determined by continuous emission monitoring, as required in condition (28) of this Permit. [10 *V.S.A.* §556(c)]

- Continuous Assurance Monitoring -

(26) Compliance Assurance Monitoring (CAM) – NO_X:

(a) The Permittee shall use the continuous emission monitoring system for oxides of nitrogen, required in this permit, to fulfill their CAM obligation.

Table for Condition (26) Compliance Assurance Monitoring (CAM) – NOx	
Indicator	Measured NOx
Approach	Use of NOx CEM
Indicator Range	Alarm for NOx concentration >= 77 ppm (approximately equivalent to 0.14 lb/MMBTU)
Measurement location	Exhaust stack after all control systems.
QA/QC	This is covered in Condition (27) of this permit
Frequency	Continuous

[40 CFR Part 64]

(27) Compliance Assurance Monitoring (CAM) – Particulate Matter:

Table for Condition (27) Compliance Assurance Monitoring (CAM) – Particulate Matter			
Indicator	Secondary Voltage	ESP Amperage	Inspection & Maintenance
Approach	The transformer-rectifier secondary voltage for each of the 5 fields is transmitted to the process control computer. The Unit Supervisor will monitor the readings and record the 24 hour sheet."	The ESP field milliamps value for each of the 5 fields is transmitted to the process control computer. The Unit Supervisor will monitor the readings and record on the "round sheet."	A. Inspection and Maintenance generated by work order and round sheets. B. Record TR voltage and milliamp readings. C. DCS alarm acknowledgement. D. Inspections of screws, conveyors, and rotary seal valves. E. Inspect and test rappers, vibrators, and insulator blowers. F. Test hopper high level alarms. G. Internal inspection of precipitator.
Indicator Range	Field T-R kilovolt range: TR-1: 30-50 TR-2: 30-50 TR-3: 20-25 TR-4: 20-25 TR-5: 20-25 Excursions trigger an inspection, corrective action and a reporting requirement.	Field milliamp range: TR-1: 100-400 TR-2: 300-500 TR-3: 50-100 TR-4: 50-100 TR-5: 50-100 Excursions trigger an inspection, corrective action and a reporting requirement.	Computer generated work orders.
Measurement location	Transformer-rectifier	Transformer-rectifier	Inspections are performed at the ESP, in the control room, and ancillary equipment.
QA/QC	Annual calibration of voltage meter	Annual calibration of milliamp meter	Inspections shall be performed by qualified personnel.
Frequency	Record readings during every shift.	Record readings during every shift.	A. Per work order. B. Per shift. C. Per shift. D. Daily. E. Weekly. F. Monthly. G. Annually.

[40 CFR Part 64]

- Continuous Emissions Monitoring -

(28) Continuous Emission Monitoring ("CEM") The Permittee shall install a continuous emission monitoring system (CEMS) and continuous opacity monitoring system (COMS) approved by the Agency, to measure and permanently record, CO ppm, lb/MMBtu, lb/hr, NO_x ppm, lb/MMBtu, lb/hr, NH_3 ppm emissions, CO_2 content, stack gas volumetric flow rate and visible emissions discharged to the atmosphere from the Main Boiler exhaust. The Permittee shall operate and maintain such system in good working order, within manufacturer's specifications and as specified below:

(a) Except for NH_3, the CEMS and COMS shall be designed, installed, calibrated, maintained and operated in such a manner as to meet the requirements of *40 CFR* Part 60, Standards of Performance for New Stationary Sources, Subparts A, and Appendix B, Performance Specification 1, 2, 3, 4 and 6, *40 CFR* Part 60, Appendix F-Quality Assurance Procedures, and latest revision of the Agency's Continuous Emission Monitoring Requirements ("CEM Requirements").

(b) The NH_3 CEMS shall be designed, installed, calibrated, maintained, operated and audited in such a manner as to meet the requirements of 40 *CFR* Part 60, Appendix F-Procedure 1. *Quality Assurance Requirements for Gas Continuous Emission Monitoring Systems Used For Compliance Determination* and the latest revision of the Agency's CEM Requirements.

(c) The CEMS and COMS shall be operated, calibrated and maintained continuously, independent of the Main Boiler's operation. The Permittee must measure and record valid continuous emission data for the parameters listed in this condition during all periods of the Main Boiler's operation including periods of boiler startup, shutdown, malfunction or emergency conditions, except for periods of CEMS and COMS quality assurance/quality control ("QA/QC") identified in the approved Quality Assurance Plan, routine maintenance, or uncontrolled malfunction. Nevertheless, the Permittee must obtain valid data for all CEMS parameters listed in this condition and COMS for a minimum of 90% of the Main Boiler's operating hours, based on the calendar quarter.

(d) The Permittee shall develop a Quality Assurance Plan ("QA Plan") for the above CEMS and COMS that is acceptable to the Agency. Said QA Plan shall satisfactorily document instrumentation, monitoring procedures, calibration procedures, QA/QC procedures, data acquisition, validation and reporting procedures as required to demonstrate compliance with this Permit. The Permittee shall formally review the QA Plan annually. The Permittee shall revise and update the QA Plan as necessary, based on the results of this review, or at the request of the Agency or at any other appropriate time to accurately document CEMS and COMS operations. The Permittee shall notify the Agency in writing of the results of the annual QA Plan review. QA Plan modifications are subject to Agency review and shall not be implemented until approval has been received from the Agency.

(e) The Permittee shall submit a summary report for each calendar quarter, within thirty (30) days after the close of the quarter, in a format acceptable to the Agency and in accordance with the Agency's CEM Requirements and the Permittee's approved QA Plan. The report shall include at a minimum, all valid CO lb/MMBtu, CO lb/hr, NO_x lb/MMBtu, NO_x lb/hr, NH_3 ppm (corrected to 12% CO_2) and visible emissions data in excess of the emissions standards specified

in this Permit, as well as a frequency distribution summary of all valid CO lb/MMBtu, CO lb/hr, NO_x lb/MMBtu, NO_x lb/hr, NH_3 ppm (corrected to 12% CO_2) data collected, a summary of valid CEMS and COMS data capture, periods of CEMS and COMS downtime, CEMS and COMS invalid data, CEMS and COMS calibration and QA/QC results.

(f) Continuing compliance with the CO lb/MMBtu, CO lb/hr, NO_x lb/MMBtu, NO_x lb/hr, NH_3 ppm (corrected to 12% CO_2) and visible emission standards specified in this Permit shall be determined by means of a CEMS and COMS as required by this Condition.

(g) The CEMS CO and NO_x data shall be recorded and reported in units of lb/MMBtu (of heat input) and lb/hour (NO_x as NO_2 and both CO and NO_x in terms of 8-hour rolling averages, calculated on an hourly basis). NH_3 data shall be recorded and reported in units of ppm (corrected to 12% CO_2) in terms of 1 hour averages, calculated on an hourly basis. Valid CEMS 8-hour rolling averages during source operation must be calculated from valid CEMS 1-hour sub-average data representing at least 75% of the particular averaging period.

(h) The COMS shall measure and record visible emissions at least every 10-seconds. COMS data shall be reported in whole numbers in units of % Opacity in terms of 1-minute averages. Valid COMS 1-minute averages during source operation must be calculated from at least 6 valid 10-second measurements. One (1)-minute averages shall be used for determining compliance with the twenty (20) % opacity aggregated six (6) minute standard and two (2) minute rolling averages (calculated using 1-minute averages) shall be used for determining compliance with the sixty (60) % opacity and eighty (80) % opacity standards.

(i) The Permittee shall maintain a file of all information reported in the quarterly summaries and all other supporting information and data collected by the monitoring system for at least five (5) years from the date of collection of such data or submission of such summaries.

[§§5-405, 5-1015(a)(3)-(5) of the *Regulations*][40 *CFR* Part 60 Subpart Db 60.49b(f)]

- Record Keeping and Reporting -

(29) Record keeping: In addition to the record keeping and reporting requirements specified in conditions (25) and (28) of this Permit, the Permittee shall maintain records of the following data:

(a) The quantity of wood fuel fired during each day and calendar month;

(b) The quantity of wood fuel other than whole tree chips, such as sawdust, mill chips and bark received during each calendar month;

(c) The quantity of propane fired during each day and calendar month in each of the following:

(i) Main Boiler;

(ii) Auxiliary Boiler;

(iii) Auxiliary Generator;

(d) The total hours of operation during each calendar month of the Auxiliary Generator;
(e) The quantity of ammonia or urea injected into the Main Boiler during each calendar month;
(f) Electricity supplied and used by each field of the electrostatic precipitator pursuant to the inspection and maintenance plan referenced by Condition (15) of this Permit.

A report, signed by a responsible official of the Facility and containing summaries of such records shall be submitted to the Agency for each calendar quarter within thirty (30) days after the close of each quarter. [10 *V.S.A.* §556(c) and 40 *CFR* Part 60 Subpart Db §§ 60.49b(d)(1) and 60.49b(w) and 40 *CFR* Part 70 §70.6(a)(3)(iii)(A)]

(30) Records of all required compliance testing shall include the following:

(a) The date, place, and time of sampling or measurements;
(b) The date analyses were performed;
(c) The company or entity that performed the analyses;
(d) The analytical techniques or methods used;
(e) The results of all such analyses; and
(f) The operating conditions existing at the time of sampling or measurement.

[§§5-402(1), 5-405(1) and 5-1015(5) of the *Regulations*][40 *CFR* 70.6(a)(3)(ii)(A)]

(31) All records shall be retained for a minimum period of five (5) years from the date of record and shall be made available to the Agency upon request. [§§5-402(1), 5-405(1) and 5-1015(a)(7) of the *Regulations*]

(32) The Permittee shall notify the Agency in writing within ten (10) days of any violation, of which it is aware, of any requirements of this Permit. This notification shall include, at a minimum, the cause for the violation and corrective action or preventative maintenance taken to correct the violation. [§§5-402(1) and 5-1015(a)(6) of the *Regulations*]

(33) The Permittee 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 regardless of any concurrent emission reductions that may be achieved. 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. [10 *V.S.A.* §556(c)] [§§5-402(1) and 5-501 of the *Regulations*]

(34) Annual Compliance Certification: By February 1st of each year, the Permittee shall submit to the Agency an annual certification of compliance for the previous calendar year which ascertains and identifies the compliance status of the Facility with respect to all terms and conditions of this Permit, including but not limited to 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; and
(d) The methods used for determining the compliance status of the Facility over the reporting period.
(e) For any periods of deviation, report the cause of the deviation and the corrective action taken.

A copy of the compliance certification shall also be sent to the U.S. Environmental Protection Agency at the following address:

Air Compliance Clerk
U.S. EPA-New England
5 Post Office Sq. Suite 100 (OES04-2)
Boston, MA 02109-3912)

[§§5-402(1) and 5-1015(a)(11) of the *Regulations*] [§114(a)(3) of the CAA] [40 *CFR* 70.6(c)(1)]

(35) Annual Registration: The Permittee shall calculate the quantity of emissions of air contaminants from the Facility annually. If the Facility emits more than five (5) tons of any and all air contaminants per year, the Permittee shall register the source with the Secretary of the Agency (hereinafter "Secretary"), and shall renew such registration annually. Each day of operating a source which is subject to registration without a valid, current registration shall constitute a separate violation and subject the Permittee to civil penalties. The registration process shall follow the procedures set forth in Subchapter VIII of the *Regulations*, including the payment of the annual registration fee on or before May 15 of each year. Annual registration forms submitted to the Agency shall contain a compliance certification statement in accordance with Condition (34) of this Permit. [Subchapter VIII §§5-802, 5-803, 5-807, 5-808 of the *Regulations*]

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

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

[§5-402(1) of the *Regulations*]

- Standard Permit Conditions -

(37) These Permit conditions may be suspended, terminated, modified, or revoked for cause and reissued upon the filing of a written request with the Secretary of the Agency (hereinafter "Secretary") or upon the Secretary's own motion. Any modification shall be granted only with the written approval of the Secretary. If the Secretary finds that modification is appropriate, only the conditions subject to modification shall be re-opened. The filing of a request for modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated non-compliance does not stay any terms or conditions of this Permit. The Secretary may provide opportunity for public comment on any proposed modification of these conditions. If public comments are solicited, the Secretary shall follow the procedures set forth in 10 *V.S.A.* §556 and §556a, as amended. [10 *V.S.A.* §§556(d) and 556a(g)] [§§5-1008(a) and 5-1008(e) of the *Regulations*]

(38) Cause for reopening, modification, termination and revocation of this Permit includes, but is not limited to:

(a) Inclusion of additional applicable requirements pursuant to state or federal law;
(b) A determination that the permit contains a material mistake or that inaccurate information was used to establish emissions standards or other terms or conditions of the operating permit;
(c) A determination that the operating permit must be modified or revoked to ensure compliance with applicable requirements;
(d) A determination that the subject source has failed to comply with a permit condition;
(e) For Title V subject sources, a determination by U.S. EPA that cause exists to terminate, modify, revoke or reissue an operating permit;
(f) Those causes which are stated as grounds for refusal to issue, renew or modify an operating permit under §5-1008(a) of the *Regulations*; or
(g) If more than three (3) years remain in the permit term and the source becomes subject to a new applicable requirement.

[§5-1008(e)(4) of the *Regulations*]

(39) The Permittee shall furnish to the Agency, within a reasonable time, any information that the Agency may request in writing to determine whether cause exists to modify, revoke, reissue, or terminate the Permit or to determine compliance with this Permit. Upon request, the Permittee shall also furnish to the Agency copies of records required to be kept by this Permit. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-402(1) of the *Regulations*] [40 *CFR* Part 70 §70.6(a)(6)(v)]

(40) By acceptance of this Permit, the Permittee agrees to allow representatives of the State of Vermont access to the properties covered by the Permit, at reasonable times, to ascertain compliance with Vermont environmental and health statutes and regulations and with this Permit. The Permittee also agrees to give the Agency access to review and copy any records required to be maintained by this Permit, and to sample or monitor at reasonable times to ascertain compliance with this Permit. [10 *V.S.A.* §§556(c), 556a(d) and 557] [§§5-402(1), 5-404, and 5-1015(a)(10) of the *Regulations*]

(41) All data, plans, specifications, analyses and other information submitted or caused to be submitted to the Agency as part of the application for this Permit or an amendment to this Permit shall be complete and truthful and, for Title V permit applications, certified by a responsible official whose designation has been approved by the Secretary. Any such submission which is false or misleading shall be sufficient grounds for denial or revocation of this Permit, and may result in a fine and/or imprisonment under the authority of Vermont statutes. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-505 and 5-1006(f) of the *Regulations*]

(42) For the purpose of establishing whether or not a person has violated or is in violation of any condition of this Permit, nothing in this Permit shall preclude the use, including the exclusive use, of any credible evidence or information relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed. [10 *V.S.A.* §§556(c) and 556a(d)]

(43) Any permit noncompliance could constitute a violation of the federal Clean Air Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-1008(a) and 5-1008(e) of the *Regulations*]

(44) It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this Permit. [10 *V.S.A.* §§556(c) and 556a(d)]

(45) No person shall build, erect, install or use any article, machine, equipment or other contrivances, the use of which, without resulting in a reduction in the total release of air contaminants to the atmosphere, reduces or conceals an emission which otherwise would constitute a violation of these *Regulations*. [§5-403 of the *Regulations*]

(46) The provisions of this Permit are severable. If any provision of this Permit, or its application to any person or circumstances is held invalid, illegal, or unenforceable by a court of competent jurisdiction, the invalidity shall not apply to any other portion of this Permit which can be given effect without the invalid provision or application thereof. [10 *V.S.A.* §§556(c) and 556a(d)]

(47) This Permit does not convey any property rights of any sort or any exclusive privilege, nor does it authorize any injury to private property or any invasion of personal rights. [10 *V.S.A.* §§556(c) and 556a(d)]

(48) All subsequent owners and/or operators of this Facility must request an amendment and transfer of this Permit prior to commencing any operations covered by this Permit. All subsequent owners and/or operators shall submit to the Agency as part of the request for amendment all such information the Agency deems necessary to establish legal ownership and/or interest in the property and all such information the Agency deems necessary to ensure the new owners and/or operators will construct and operate the Facility in compliance with the *Regulations* and this Permit. The terms and conditions of this Permit shall remain in full force and effect after submittal of the request for amendment and until the issuance of an amended Permit or denial. Should the

Secretary deny the request, the new owner and/or operator must take whatever action is necessary to comply with the denial. [10 *V.S.A.* §§556 and 556a] [§§5-501, 5-1004, and 5-1013(a) of the *Regulations*]

(49) Conditions (1) – (10), (12), (16) and (18) – (20) are derived from the new source review requirements of Subchapter V of the *Regulations*. With the exception of the cited new source review conditions, this Operating Permit shall expire as indicated on cover page to this Permit. The Permittee shall submit to the Agency a complete application for renewal of the Operating Permit at least twelve (12) months before the expiration of the Operating Permit. If a timely and administratively complete application for an operating permit renewal is submitted to the Secretary, but the Secretary has failed to issue or deny such renewal before the end of the term of this Operating Permit, then the Permittee may continue to operate the subject source and all terms and conditions of this Operating Permit shall remain in effect until the Secretary has issued or denied the operating permit renewal. However, this Operating Permit shall automatically expire if, subsequent to the renewal application being determined or deemed administratively complete pursuant to §5-1006 of the *Regulations*, the Permittee fails to submit any additional information required by the Secretary as well as information pertaining to changes to the Facility within thirty (30) days or such other period as specified in writing by the Secretary. [§§5-1011 and 5-1012(a) of the *Regulations*] [§§5-1005(c) and 5-1012 of the *Regulations*]

(50) The conditions of this Permit as set forth above supersede all conditions contained in all prior Permits issued by the Agency to the Permittee for this Facility. [10 *V.S.A.* §§556(c) and 556a(d)]

The Agency's issuance of this Air Pollution Control Permit relies upon the data, judgment, and other information supplied by the Permittee. The Agency makes no assurances that the air contaminant source approved herein will meet performance objectives or vendor guarantees supplied to the source Permittee. It is the sole responsibility of the Permittee to operate the source in accordance with the conditions herein and with all applicable state and federal standards and regulations.

Dated this 16th day of May, 2011, in the town of Waterbury, county of Washington, state of Vermont.

Agency of Natural Resources

David K. Mears, Commissioner
Department of Environmental Conservation

By: Richard A. Valentinetti
Richard A. Valentinetti, Director
Air Pollution Control Division

sks
A2 –File: Ryegate Associates Power Station

VERMONT

COPY

Vermont Department of Environmental Conservation
Watershed Management Division
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-241-3777
[fax] 802-338-4890

RECEIVED
AUG 24 2012
BY: dl

July 30, 2012

Mark Driscoll, Plant Manager
Ryegate Associates
247 Weesner Drive
East Ryegate, VT 05042

Re: Authorization to Discharge Permit No. 4557-9003.R

Dear Mr. Driscoll,

The Department of Environmental Conservation has received the Notice of Intent (NOI) to seek coverage under Multi-Sector General Permit 3-9003 (NPDES# VTR050001) for stormwater discharges from industrial activities. A ten-day comment period was provided after the NOI submittal. No public comments were received.

Enclosed is your copy of an Authorization to Discharge pursuant to General Permit 3-9003, which has been signed by the Stormwater Program Manager on behalf of the Commissioner of the Department of Environmental Conservation.

This authorizes the discharge of stormwater associated with industrial activities from the Ryegate Power Plant located on 247 Weesner Drive in East Ryegate, Vermont to the upper Connecticut River.

Please read this Authorization to Discharge carefully and note the terms, conditions and eligibility provisions of General Permit 3-9003.

If you have any questions, please call me at (802) 338-4827 or email me at Thomas.benoit@state.vt.us.

Sincerely,

Thomas A. Benoit Sr
Environmental Analyst
Stormwater Program

Permit No. 4557-9003.R

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

RECEIVED
AUG 24 2012
BY:

AUTHORIZATION TO DISCHARGE STORMWATER
UNDER MULTI-SECTOR GENERAL PERMIT 3-9003
NPDES VTR 050001

A determination has been made that the applicant (here in after "permittee"):

Ryegate Associates
247 Weesner Drive
East Ryegate, VT 05042

meets the criteria necessary for inclusion under General Permit 3- 9003. Subject to the conditions and eligibility provisions of General Permit No. 3-9003, the permittee is authorized to discharge stormwater from Ryegate Power Plant located on 247 Weesner Drive in East Ryegate, Vermont to the Upper Connecticut River.

1. Effective Date and Expiration Date of this Authorization: This authorization to discharge shall become effective on July 30, 2012 and shall continue until August 4, 2016. The permittee shall reapply for coverage at least one hundred and eighty (180) days prior to August 4, 2016.

2. Compliance with General Permit 3-9003 and this Authorization: The permittee shall comply with this authorization and all the terms, conditions and eligibility provisions of General Permit 3-9003. General Permit 3-9003 contains a number of detailed requirements which are applicable to your facility and your discharge-related activities. These include, but are not limited to, the inspection, monitoring and reporting requirements listed below. Please read and follow the permit carefully to ensure that you remain in compliance with all permit conditions.

3. Inspection Requirement: The permittee shall conduct monthly facility inspections and an annual comprehensive site inspection in accordance with Part 4 of the General Permit. The permittee shall also conduct quarterly visual assessments of stormwater discharges from the facility.

4. Monitoring Requirement:

   The permittee must conduct quarterly benchmark monitoring at stormwater outfalls for the following parameters, in accordance with Part 6 of the General Permit. Monitoring data must be submitted to the Secretary on a Discharge Monitoring Report (DMR) form no later than 30 days after receipt of laboratory results.

Subsector	SIC Code	Parameter	Monitoring Concentration
Subsector O1. Steam Electric Generating Facilities	SE	Total Iron	1.0 mg/L

5. Annual Reporting: The permittee must prepare an annual report that includes the findings from the annual comprehensive site inspection and any corrective action documentation. The report must be submitted to the Secretary within 45 days of conducting the annual compliance inspection. In no case shall the report be submitted later than October 15 every year.

6. Operating Fees: This discharge is subject to operating fees under 3 V.S.A. §2822. The permittee shall submit payment of annual operating fees to the Department. The first year's statement is enclosed and a billing statement for such fees will be sent to the permittee each year. Any permit non-compliance, including a failure to pay the annual operating fee, constitutes a violation of 10 V.S.A. Chapter 47 and may be grounds for an enforcement action or revocation of this authorization to discharge.

7. Rights to Appeal to the Environmental Court: Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel.# 802-828-1660).

8. Dated this 30th day of July, 2012.

David K. Mears, Commissioner
Department of Environmental Conservation

By Padraic Monks

Padraic Monks, Program Manager
Stormwater Management Program

Anderson, Lawrence

From: Witters, Christy [Christy.Witters@state.vt.us]
Sent: Thursday, August 23, 2012 11:51 AM
To: mark@bannonengineering.com
Cc: Benoit, Thomas; Anderson, Lawrence
Subject: RE: SWPPP - Ryegate Power Station

Hi Mark,

I've responded to your questions, below. I'll get back to you on the impaired waters monitoring requirements. Please let me know if you have any additional questions. I'll be out of the office until Monday, but I can get back to you then.

Thanks, Christy

Christy Witters, AICP
VTDEC - Stormwater Program
103 S. Main Street, Bldg 10 North
Waterbury, VT 05671
802.338.4842
christy.witters@state.vt.us

From: Mark Bannon [mailto:mark@bannonengineering.com]
Sent: Thursday, August 23, 2012 7:47 AM
To: Witters, Christy
Cc: Benoit, Thomas; lawrence.anderson@gdfsuezna.com
Subject: SWPPP - Ryegate Power Station

Hi Christy –

I updated Ryegate Power Station's SWPPP recently and have two questions:

1. Ryegate completed benchmark monitoring under the previous GP. Please advise if a new round of benchmark monitoring is required for the new GP. Yes, benchmark monitoring must be conducted again under the new permit.

2. Ryegate is a Sector O Steam Generator facility with Wood Storage located in reach VT16-06 CT River.

   Sector O requires benchmark monitoring for Total Iron. Yes, 1 mg/L for discharges from the steam powered electric plant.
   Sector O discharges from coal ~~fired plants~~ storage piles require benchmark monitoring for TSS < 50 mg/L. and pH 6-7. If you have coal storage piles, then this benchmark limit applies to the discharge points from the coal storage piles.
   Sector A ~~timber Industry~~ log storage requires benchmark monitoring for TSS <100 mg/L. Yes, the benchmark limit for the discharge point from your log storage area for TSS is 100mg/L.
   My SWPPP requires benchmark monitoring for Ryegate with a TSS < 100mg/L. Could you comment on these limits.

I will look up the current impaired waters monitoring requirements and get back you on whether or not mercury must be monitored for annually in this permit term.

Thanks! -Christy

CEMSERVICES
360 Old Colony Road
Norton, MA 02766

RYEGATE POWER STATION
EMISSION COMPLIANCE TEST PROGRAM
EAST RYEGATE, VT

JUNE 18, 2013

Source Designation:
Ryegate Power Station
247 Weesner Drive
East Ryegate, Vermont 05042

Concerning:
Compliance Test for Particulate and Volatile Organic Compounds
Wood Fired Boiler

Prepared for:
Ryegate Associates
247 Weesner Drive
East Ryegate, Vermont 05042

Prepared by:
CEMServices Inc.
360 Old Colony Road, Suite 1
Norton, MA 02766

The information contained in this report is true and accurate to the best of my knowledge.

Sean M. MacKay
Technical Director, QSTI

July 16, 2013
Date

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1. INTRODUCTION

CEMServices of Norton, Massachusetts was retained by Ryegate Associates to conduct compliance testing on the wood fired boiler at the Ryegate Power Station located in East Ryegate, Vermont. The compliance test program was performed on June 18, 2013 and consisted of four two-hour particulate tests and three one-hour VOC tests. Three particulate runs were performed during a normal operating procedures and one run during a soot blow cycle.

The objective of the particulate/VOC program was to demonstrate the compliance status of the exhaust emissions as it relates to the facility's Air Pollution Control Permit and in accordance with 40 CFR 60, New Source Performance Standards, specifically Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.

Table 1-1 indicates the air contaminants tested and the test methodologies used during the emissions test program. Table 1-2 indicates the emission limits for the facility.

TABLE 1-1
POLLUTANTS AND TEST METHODOLOGIES

CONSTITUENTS	TEST METHODS
Volumetric Flow	EPA Test Methods 1-2
Oxygen (O2), Carbon Dioxide (CO2)	EPA Test Method 3A
Moisture	EPA Test Method 4
Particulate Matter (PM)	EPA Test Method 5
Volatile Organic Compounds	EPA Test Method 25A

TABLE 1-2
EMISSION STANDARDS

Constituent	Emissions Standard
VOC (non-methane)	0.03 #/MM/Btu, 9.0 #/hr
PM	0.007 gr/dscf @ 12% CO2, 5.0 #/hr (federally enforced) 0.0007 gr/dscf @ 12% CO2, 5.0 #/hr (VTANR enforced)

As seen in Table 2-1, the VOC limit is expressed as a non-methane limit. Typically this would require using Method 25A (total VOC's using FID) in conjunction with Method 18 (specific VOC's using gas chromatography) and the difference between the two would be the non-methane portion of VOC's. Because Ryegate emits such low levels of VOC's (typically the total VOC's is 1% of the non-methane emission standard), CEMServices used Method 25A only and reported the emissions as total VOC's (including methane if any). The average of the three runs are compared to the non-methane emission limit, therefore Ryegate must pass the non-methane emission limit with the addition of any methane that may be present.

All Reference Method LB/MMBtu emission rates were calculated using the facility's fuel factor (Fc) of 1830.

1. INTRODUCTION (continued)

Sean MacKay was the Project Director for this test Program. He was assisted by Charles Santoro and Mike Dadmun also of CEMServices. Mr. Dave Manning of the Vermont Agency of Natural Resources (VTANR) observed the field testing and process operations. Mr. Patrick Fournier of Ryegate Power was responsible for process operations and collected the facility CEM and operating data. Mr. Fournier is the plant contact and can be reached at:

Mr. Patrick Fournier
Ryegate Power Station
247 Weesner Drive
East Ryegate, VT 05042

(802) 633-3500 x115
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2. SUMMARY OF RESULTS

TABLE 2-1
COMPLIANCE PARTICULATE EMISSIONS RESULTS

RUN #	START	STOP	% CO2	GR/DSCF @ 12% CO2	LB/MMBTU	LB/HR
1	0645	0853	**14.84**	**0.00037**	**0.0008**	**0.27**
2 - SB	0935	1149	**14.77**	**0.00040**	**0.0009**	**0.29**
3	1220	1429	**14.85**	**0.00068**	**0.0015**	**0.46**
4	1500	1710	**14.93**	**0.00059**	**0.0013**	**0.44**
3 RUN AVERAGE W/O SOOT BLOW				**0.00055**	**0.0012**	**0.39**
PRORATED AVERAGE W/SOOT BLOW				**0.00052**	**0.0011**	**0.37**
LIMIT				0.007 (FEDERAL) 0.0007 (STATE)		5.0
RESULT				PASS		PASS

Note - SB is soot blow run

TABLE 2-2
COMPLIANCE VOC EMISSIONS RESULTS

RUN #	START	STOP	% CO2	LB/MMBTU	LB/HR
1	0655	0755	**14.65**	**0.004**	**1.17**
2	0806	0906	**15.03**	**0.003**	**1.05**
3	0935	1035	**14.53**	**0.004**	**1.17**
AVERAGE				**0.004**	**1.13**
LIMIT (VOC as non-methane)				0.03	9.0
RESULT				PASS	PASS

Discussion of Results

The results indicate Ryegate to be in compliance with both federal and state regulations concerning particulate and VOC's. The VOC emissions reported are total VOC's as methane (including methane). The limit is expressed as a VOC's as non-methane. Therefore Ryegate has passed the VOC emission limit with the inclusion of methane (if any).

The soot blow was performed during run 2 and spanned about 20 minutes. The prorated averages in the Table 2-1 are not the average of the four runs but an average calculated using emissions while soot blowing and emissions while not soot blowing over time. These calculations are in the Appendices.

3. FACILITY DESCRIPTION

A. General

The Ryegate Power Station, located in East Ryegate, Vermont, consists of a stoker type boiler with a maximum design capacity of 300 MMBTU/hour, which uses wood chips (urban waste wood and whole trees) as its primary fuel. The boiler drives a steam turbine generator with a nominal output of approximately 20 megawatts. Emissions from the boiler are controlled by a mechanical dust collector, an electrostatic precipitator, and an ammonia injection system for NOx control. Emissions are vented to atmosphere through a 209.8 foot steel stack.

B. Test Location

The stack that services the wood-fired boiler at Ryegate Power Station has an internal diameter of 6.5 feet at the port height (116.5 feet). There are two sampling ports, 4 inches in diameter and ninety degrees apart. The port sleeve length is seven inches. The distance from the nearest downstream disturbance (reduction in stack diameter) to the sampling ports is 6.5 feet. The distance from the ports to the nearest upstream disturbance (stack exit) is 93.3 feet. Figure 3-1 provides a schematic of the sampling port locations.

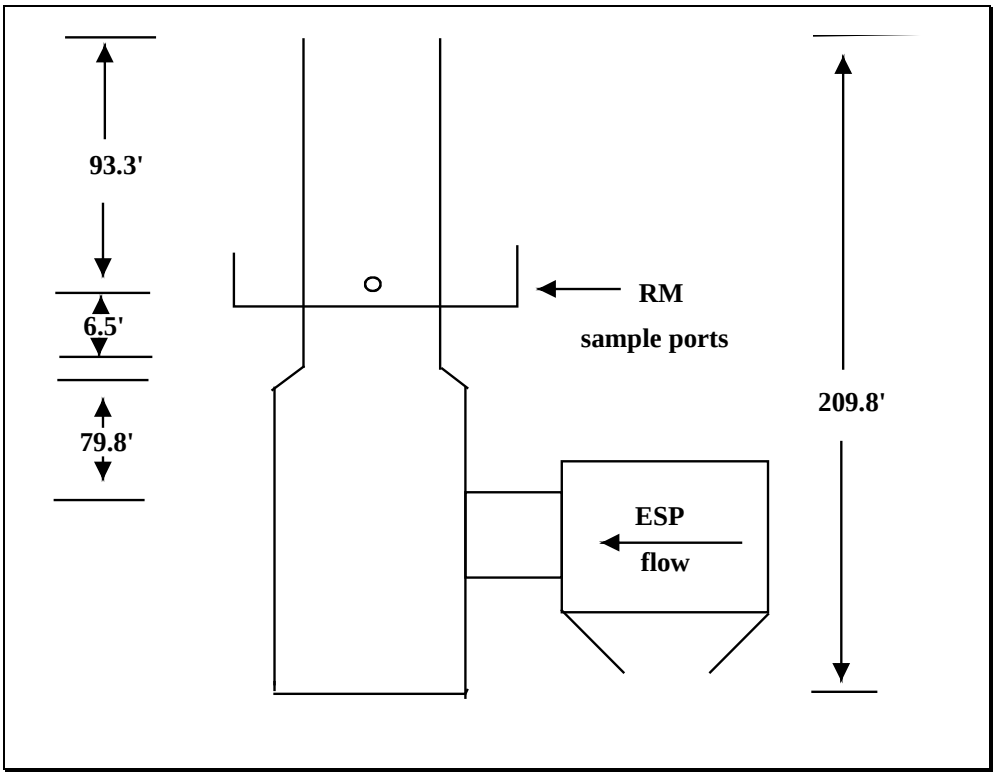


Figure not drawn to scale

FIGURE 3-1
TEST LOCATION

3. FACILITY DESCRIPTION (continued)

C. Plant Entry and Safety Policies

Ryegate Power requires all visitors to check in with the control room before walking about the plant. Most areas of the plant require a hard hat, safety glasses, ear plugs, steel toe boots and long sleeve shirts.

4. REFERENCE METHOD TEST PROCEDURES

A. Velocity Traverse - EPA Test Method 1

Method 1 procedures delineate velocity traverses for stationary sources. As described in Section 3, the stack internal diameter at the port location is 6.5 feet. The ports are 6.5 feet or 1.0 diameter from the nearest downstream disturbance, and 93.3 feet or 14.4 diameters from the nearest upstream disturbance.

Based upon EPA Method 1 criteria, this location does not meet the minimum requirement of 2.0 diameters from the downstream disturbance to the sample port location. Because the downstream distance does not comply with the requirements of Method 1, Section 2.2.2 for velocity traverses, Method 1, Section 2.5 - **Alternative Measurement Site Selection Procedure** is recommended. This method specifies that a total of forty (40) traverse points (twenty for each port) should be used for a velocity traverse. The probe was marked according to the measurements in Table 4-1.

TABLE 4-1
40 POINT VELOCITY TRAVERSE POINT LOCATIONS (20 PER PORT)

Traverse Point	Distance (% Diameter)	Distance from Wall (inches)
1	1.3	1.0
2	3.9	3.0
3	6.7	5.2
4	9.7	7.6
5	12.9	10.1
6	16.5	12.9
7	20.4	15.9
8	25.0	19.5
9	30.6	23.9
10	38.8	30.3
11	61.2	47.7
12	69.4	54.1
13	75.0	58.5
14	79.6	62.1
15	83.5	65.1
16	87.1	67.9
17	90.3	70.4
18	93.3	72.8
19	96.1	75.0
20	98.7	77.0

The pitots were connected to a manometer using 1/8 inch ID Tygon tubing. They were checked for leaks before and after each run.

B. Volumetric Flow Rate - EPA Test Method 2

Method 2 was used for the determination of stack gas velocity and volumetric flow rate. Before the velocity traverse was started, a leak check was conducted on the pitots, and the manometer was leveled. The velocity head and stack gas temperature was recorded for each of the required sampling points. Simultaneous gas density (Method 3A) and stack gas moisture content (Method 4) testing was conducted during every test run. Each test run was one hundred and twenty (120) minutes in length.

4. REFERENCE METHOD TEST PROCEDURES (continued)

C. Moisture Content - EPA Test Method 4

Method 4 is used for the determination of moisture content in stack gas. This method consists of extracting a known volume of gas sample and quantifying the removed moisture portion of this sample.

Before each test run the impingers used to remove condensate from the gas were prepared. A total of four impingers were loaded according to the method. The sampling train was then assembled and the sampling probe heated. The train was then checked for leaks by plugging the sample inlet and challenging the train with a vacuum of 15 inches of Hg. All leak rates were below 0.02 CFM. The initial meter volume was recorded and the probe was positioned at the first traverse point. Sampling was conducted isokinetically for the 120 minute run. At the completion of each test run the final meter volume was recorded and another leak check was conducted. The impingers were recovered and their final volumes recorded.

D. Particulate Matter - EPA Test Method 5

This method is used for the determination of particulate emissions from stationary sources. It is used in conjunction with Methods 1,2, and 4. Particulate matter is drawn isokinetically from the source and collected onto a glass fiber filter.

Before each test run the impingers used to remove condensate from the gas were prepared. A total of four impingers were loaded according to the method. The remainder of the sample train is assembled by inserting a desiccated tared filter into the glass filter holder. The filter holder is then placed into the hot box and the sample probe and nozzle are attached. The hot box and sample probe were heated to approximately 320 °F. Prior the start of each run a leak check was performed from the end of the nozzle at a vacuum of 15 inches of mercury.

The run was then initiated and isokinetic sampling took place. The entire stack was traversed according to the sample points specified in Method 1. Three (3) minute readings were taken during the two-hour test run. At the conclusion of the test a post leak check was conducted at the highest vacuum obtained during the run and the sample train was moved to the cleanup site where it was recovered in strict accordance with Method 5 Sample Recovery Procedures as follows:

Container #1. The filter was carefully removed from the filter holder and placed in its identified petri dish container. Any filter that may have stuck to the frit was scraped off the frit with a spatula and rinsed into container #2 with acetone.

Container #2. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, particulate matter from the nozzle, probe liner and front half of the filter holder was quantitatively recovered by washing these components with acetone into a Nalgene container. The inside of each component was brushed and rinsed until the acetone rinse shows no visible particles, after which a final rinse of the inside surface was performed.

4. REFERENCE METHOD TEST PROCEDURES (continued)

E. CEM Calibration Procedures - EPA Test Method 7E

Method 7E is used for the determination of Nitrogen Oxide emissions from stationary sources using instrumental analyzer procedures. Although NOx was not tested in this program, all calibration procedures and requirements for the instrumentation methods used are specified in this method.

Before any testing was conducted, the calibration span of all test analyzers was set up so that expected source emissions were at least twenty (20) percent of this span and did not exceed this span. Once this span was determined, calibration gases were chosen within this span. Only gases prepared according to EPA Protocol G1/G2 were used. Analyzer calibration error checks were then conducted by challenging each analyzer with a zero, mid, and high gas. The actual value of the high gas used was the calibration span of each analyzer. Analyzer responses to these gases were within two (2) percent of the instrument's span or within 0.5 PPM of the gas value. Before and after each test run a sampling system bias check was conducted on each monitor. This check consisted of introducing the calibration gases at the sampling probe thus allowing the gases to travel through the entire sampling system including any filters. The analyzer responses to this check were then recorded by the data acquisition system. All system bias check responses were within five (5) percent of the instruments span or within 0.5 PPM, when compared to the analyzer calibration error check conducted initially. The sampling system bias check conducted prior to each test run was compared to the sampling system bias check conducted at the completion of that same run.

Differences between the two bias checks constitute the upscale and zero calibration drifts. All calculated calibration drifts were below three (3) percent of the span of the analyzer or within 0.5 PPM.

Once the initial system bias check was conducted the system was put into the sample mode and data acquisition was initiated. The probe was positioned at the first traverse point. The probe was 5/8" stainless steel tube that was traversed at 16.7%, 50.0%, and 83.3% of the stack diameter (6.5 ft). Table 4-2 shows the CEM traverse point locations.

TABLE 4-2
CEM TRAVERSE POINT LOCATIONS

Traverse Point	Distance (% Diameter)	Distance from Wall
1	16.7	13.0 "
2	50.0	39.0 "
3	83.3	65.0 "

A STRATA data shuttle documented voltage output from each monitor. This instrument sends all signals via a RS-232 cable to a computer for data archiving. Data points were logged every two (2) seconds during each test run. At the test run completion, data was transferred to a spreadsheet for determination of the raw run average.

Results from the initial and final system bias checks were used to adjust the raw run average to correct it for any deviations due to the system bias.

4. REFERENCE METHOD TEST PROCEDURES (continued)

F. Oxygen and Carbon Dioxide - EPA Test Method 3A

Method 3A is used for the determination of Oxygen and Carbon Dioxide emissions from stationary sources using instrumental analyzer procedures. All calibration procedures and requirements for this instrumentation method are identical to those found in EPA Test Method 7E.

O2 content in the effluent was determined by a California Analytical monitor which utilizes a micro-fuel cell that consumes O2 from the atmosphere surrounding the measurement probe. The consumption of O2 generates a proportional electrical current. This current is then amplified and provides a signal output of 0-1 V DC, which corresponds to a full scale, rang of 0-25 % O2.

A California Analytical non-dispersive infrared analyzer is used to continuously measure the CO2 concentration in the effluent. The theory of operation for this analyzer is based on the principle that CO2 has a unique absorption line spectrum in the infrared region. The instrument consists of an infrared light source, a chopper, a measurement cell, and a detector. The infrared light beam emitted by the source passes through the measuring cell, which is filled with a continuously flowing gas sample. The light beam is partially absorbed or attenuated by the gas species of interest in this cell before reaching the front chamber of the detector.

Both the front and rear chambers of the sealed detector are filled with a reference gas. The difference in the amount of light absorbed between the front and rear chambers are dependent of the concentration of the gas species of interest within the sample measurement cell. A pressure differential is thus created between the two chambers. This pressure difference is then observed as gas flow by the micro-flow sensor located in a channel connecting the two chambers. The resulting AC signal from the micro-flow sensor is rectified, amplified, and linearized into a DC voltage signal for output. An interference response check was conducted on the O2 and CO2 analyzers prior to testing.

G. Volatile Organic Compounds - EPA Test Method 25A

Method 25A is used for the measurement of total gaseous organic concentrations using flame ionization detection (FID). A Vig Industries Model 20 FID is the analyzer that was used for compliance determinations of VOC's. For this method a gas sample was continuously extracted from the source through a heated (approx. 250° F) Teflon sample line to the FID.

CH molecules in the sample are introduced in the burner socket through the burner tip and into a hydrogen flame. The thermal energy (caused by combustion of hydrogen) cracks the CH molecules into C and H atoms. In the hot zone the C atoms loose a certain number of electrons and now become C ions with a positive charge. The negative electrical field created by a negative charge imposed on the collector (which supplies an excess of negative electrons) influence the positive charged C ions which are drifting towards the collector and absorb a number of electrons thus neutralizing the positive C ions. This neutralization causes a change in the current between the electrodes and is directed through a high impedance amplifier, which is connected to meter type readout. The neutralized C atoms combine with the O2 (from the combustion source) to form CO2. The hydrogen introduced to form the flame combusts into water vapor.

4. REFERENCE METHOD TEST PROCEDURES (continued)

Prior to testing the sample train was assembled by connecting one end of the probe to the sample line and the other to the FID. The train was then leak checked. The FID was calibrated and the responses to a zero and three other methane calibration gases within the range of the instrument were recorded onto a data sheet. Once sampling was initiated, the signal from the FID was sent to the data logger and computer. Data was archived at 2-second intervals during each test run.

5. REFERENCE METHOD TEST EQUIPMENT

A. Particulate, Flow and Moisture Sampling Train

All Method 1, 2, and 4 and 5 testing, described in Section 4 was conducted using a particulate, flow and moisture sampling train. The train, manufactured by Nutech, consists of the following components:

Meter Box - The meter box used in this program was the Nutech Model 2010 - Isokinetic Stack Sampler. This box consists of a leak-free sample pump, a dry gas meter, a vacuum gauge, and a temperature readout. Thermocouples are mounted on the inlet and outlet of the dry gas meter to provide meter temperatures during testing.

Umbilical - The umbilical used in this program consisted of a sample line, pitot lines, and thermocouple lines. These lines transported sample from the impingers to the meter box, indicated pressure difference at the pitots to the meter box, and carried temperature signals from the stack to the temperature readout in the meter box.

Condenser System - This system consisted of four glass impingers placed in series and in an ice bath. The second impinger was of the Greenburg - Smith design, and the first, third, and fourth impinger was standard. When prepared for a test run, the first three impingers were loaded with water and the fourth was loaded with a 500 g of silica gel.

Hot Box - This hot box connects the filter holder to the probe and maintains the filter temperature at the required setting (approx. 320 °F).

Filter Holder - The holder is made of borosilicate glass with a glass frit filter support with a silicone gasket.

Probe - The probe assembly consisted of a set of "S" type pitots, a stack thermocouple, and a stainless steel sheath with a heated quartz glass liner.

Nozzle - The nozzles are a stainless steel buttonhook design available in a range of sizes for isokinetic sampling.

B. Mobile CEM Laboratory

All reference test methods described in Section 4 was conducted using the CEMServices mobile CEM laboratory. This laboratory consists of all analyzers and support equipment used to conduct the CEM sampling during this test program. The following is a description of each item that makes up the entire system:

Sample Probe - A seven-foot stainless steel probe was used for this test program. The probe has a filter at the end of it to remove particulate matter. The other end contains a heated three-way valve to switch from sample and system calibration.

Particulate Filter - This in-stack filter is a Labyrinth Systems 5 micron sintered stainless steel design.

Calibration Valve Assembly - This assembly consists of a Hoke three-way stainless steel valve mounted inside a heated, water resistant box. This box was heated to 250 degrees F, with a self-regulating Omega heat bar. The assembly was attached to the base of the sample probe and is capable of blocking sample flow and introducing calibration gas into the system.

5. REFERENCE METHOD TEST EQUIPMENT (continued)

Heated Sample Transport Line - The heated sample line is approximately one hundred and fifty (150) feet in length and was used to transport the sample from the VOC probe to the CEM trailer. The heater in this line can be controlled by a resistor box that allows you to set the temperature. This line was set to 250 degrees F.

Moisture Removal System - This system continuously removes moisture from the sample gas while maintaining minimal contact between the condensate and the sample gas. CEMServices uses an ice bath condenser consisting of three (3) stainless steel heat exchangers which are continuously drained of condensate by two (2) peristaltic pumps. The inlet to the system is connected to the heated sample line and the outlet was connected to the sample transport line.

Sample Pump - A dual headed diaphragm pump was used to transport the gas sample through the system to the sample gas manifold. This pump is manufactured by Air Dimension and all parts coming into contact with the gas stream are either Teflon or stainless steel.

Sample Gas Manifold - This manifold consists of a series of valves and adjustable rotameters capable of setting and maintaining the desired
backpressure and flow rate to the analyzers during both sampling and calibration.

Sample Gas Analyzers - CEMServices used the following analyzers to complete this test program:

TABLE 5-1
REFERENCE METHOD ANALYZERS

Gas	Manufacturer	Model	Serial #	Range
O_2	Servomex	100	04902C1-2668	0-22.8 %
CO_2	Servomex	100	04902C1-2668	0-19.85 %
VOC	Vig Industries	20	1060702	0-100 PPM

Data Recorder - All voltage outputs from the analyzers were sent to a Strawberry Tree Data Shuttle. This shuttle logged data at two-second intervals. Data from the shuttle was sent to a computer where the Strawberry Tree data acquisition program listed instantaneous concentration values for each parameter. At the conclusion of each run, one-minute averages were printed out and a calibration was initiated through the program. The calibration data was used to correct the raw averages for system bias and drift. This data is presented in the appendices.

5. REFERENCE METHOD TEST EQUIPMENT (continued)

C. Calibration Gases

All calibration gases used in this test program were prepared according to EPA Protocol G1/G2. As per EPA Test Method 7E for all O2 and CO2 testing, the high level calibration gas was the span of the analyzer. All mid calibration gas values were between 40-60 % of the span of the analyzer (or value of the high level gas), and all low calibration gas values were between 0-20 % of the span of the analyzer (or value of the high level gas). As per Method 25A for VOC testing all low range methane gases were between 25-35% of span, all mid range methane gases were between 45-55% of span, and all high range methane gases were between 80-90% of span. The zero calibrations for all analyzers were conducted using pre-purified grade Nitrogen. Purified hydrogen and air was used to fuel the FID.

TABLE 5-2
REFERENCE METHOD CALIBRATION GASES

Gas/Range	Allowable Values	Cal Point	Actual Value	Cylinder #	Expiration
O2 0-22.8%	0.0-4.6 9.1-13.7 22.8	Low Mid High	0.0 11.45 22.8	CC106896 CC110145 CC84988	- 05/29/2021 09/19/2020
CO2 0-19.85 %	0.0-4.0 8.0-11.9 19.85	Low Mid High	0.0 9.91 19.85	CC106896 CC110145 CC84988	- 05/29/2021 09/19/2020
VOC 0-100 PPM	25-35 45-55 80-90	Low Mid High	29.6 55.2 91.3	CC134734 SG9153990 CC20164	05/31/15 09/28/14 10/27/13

6. QUALITY CONTROL PROCEDURES

A. General

Throughout all phases of this test program strict attention was given to all testing to provide the highest quality of results possible.

All of CEMServices test equipment is of the highest quality available and undergoes routine maintenance to ensure top operating condition. This includes meter boxes, thermocouples, barometers, pitot tubes and sampling nozzles.

Meter boxes are calibrated over a full range of flow rates against certified orifices every six months. After each field use the meter box is given a calibration check against an orifice at the average flow rates and highest vacuums experienced in the field. Thermocouples are calibrated as specified in the EPA Handbook against a NBS traceable mercury in glass thermometer. Pitot tubes are visually inspected for conformance to the dimensional specified in EPA Method 2

Sampling was conducted by trained personnel with extensive experience in source sampling. All sampling and analysis was conducted in strict accordance with EPA test procedures (where available). The quality control procedures found in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems were adhered to as well.

Analyzer calibrations were performed at the beginning of each test day. System calibrations were performed before and after each test run through the entire sampling system.

All calculations were conducted in strict accordance with the equations found in the individual Methods. Calculations were conducted on a computer and the input data was checked by a person other than the original calculator to ensure that it is correct.

The entire staff of CEMServices is thoroughly familiar with all test methods used in this program and has extensive experience in source emission monitoring.

Appendix A

DEFINITION OF ABBREVIATIONS

ACFM	Flowrate reported in actual cubic feet per minute.
An	Area of the nozzle, cross-sectional, in square feet.
As	Area of the stack in square feet.
BWO	Water vapor in gas stream, proportional by volume.
CC	Percent error confidence coefficient (one tailed).
Cd	Conversion calibration for concentration (PPMdv to lbs/SCF)
Cgas	Final emissions data reported by CEMS, adjusted for calibration drift. Reported as ppm dry, proportional by volume.
Cm	Average CEM response to initial and final span gas system calibration.
Cma	Concentration of the calibration gases.
Co	Average CEM response to initial and final zero gas system calibration.
Craw	Raw emissions data reported by the CEMS, uncorrected for calibration drift.
Cwet	Final emissions data reported by CEMS, adjusted for calibration drift and water vapor. Reported as ppm wet, proportional by volume.
% CO	Percent of carbon monoxide in the flue gas.
% CO_2	Percent of carbon dioxide in the flue gas.
Cp	Pitot tube coefficient.
Cs	The concentration in the stack in pounds per standard cubic foot.
Cs'	The concentration in the stack in grains per standard cubic foot.
Cs' @ 12%	The concentration in the stack in grains per dry standard cubic feet corrected to 12% CO_2.
DELTA H	The pressure differential across orifice meter, reported in inches of H_2O.
DELTA H(ABS)	The pressure differential across orifice meter, absolute conditions in inches of mercury.
Dn (IN)	Diameter of the nozzle in inches.
DGM IN	Temperature of the dry gas meter inlet, reported in degrees Fahrenheit.
DGM OUT	Temperature of the dry gas meter outlet, reported in degrees Fahrenheit.
Ds (FT)	Diameter of the stack in feet.
DSCFH	Dry standard cubic feet per hour.
DSCFM	Dry standard cubic feet per minute.
DSCMH	Dry standard cubic meters per hour.
E	Emission rate in pounds per million Btu using F Factor of fuel burned.
END METER	The dry gas meter reading at the end of the test.
F FACTOR	The theoretical amount of air in dry standard cubic feet (DSCF) needed to combust a million Btu's worth of fuel.
GR/BHP-HR	Grams per brake horsepower hour.
IMP(FIN)	Final volume of absorbing solution in impinger.
IMP(INT)	Initial volume of absorbing solution in impinger.
INT METER	The dry gas meter reading at the beginning of the test.
% ISO	Variation of sampling from isokinetic conditions.
LB/HR	Pounds per hour.
LB/MMBTU	Pounds per million British Thermal Unit.
LB/SCF	Pounds per standard cubic foot.
Md (DRY)	The dry molecular weight of the flue gas in pounds per pound mole.
Ml	Volume in milliliters.
Mg/M3	Milligrams per cubic meter.
Mn	Total particulate found in sample minus the acetone residue (blank). Reported in milligrams.
Ms (WET)	Wet or actual molecular weight of the flue gas in pounds per pound mole.
MW	Molecular weight
% N2	The percent of nitrogen in the flue gas.
NO. PTS	Number of traverse points.
% O2	% oxygen in the flue gas.
P BAR	Barometric pressure at test location.
PIT COEFF	Pitot tube coefficient (S Type=.84, standard=.99).
PPM	Parts per million.

DEFINITION OF ABBREVIATIONS

PPMdv	Parts per million - dry volume.
PPMwv	Parts per million - wet volume.
P STK	Static pressure of the stack in inches of water.
PMR	The pollutant mass rate in pounds per hour.
PS (ABS)	Absolute stack pressure in inches of mercury.
Pstd	Standard absolute pressure, (29.92 in. Hg).
Qs	The volumetric flow rate of the flue gas in dry standard cubic feet per hour.
RA	Relative accuracy.
RATA	Relative accuracy test audit.
RM	Reference Method.
Sd	Emission standard (allowable emission rate).
SQ ROOT	The square root of each velocity head measurement (Delta P).
SQRT DELTA P	The average of the square roots of the measured pressure drops.
Stack Temp	The temperature of the stack in degrees (°F) Fahrenheit.
TM (°F)	Average temperature of the dry gas meter in degrees Fahrenheit.
TM (°R)	Average temperature of the dry gas meter in degrees Rankine.
TS (°R)	The temperature of the stack in degrees Rankine.
VEL HEAD	The pressure drop measured across the pitot tubes.
VI (TOT)	The amount of water collected in the impingers in milliliters.
VM (CF)	The volume sampled through the dry gas meter in cubic feet.
VM STD	Volume sampled through the dry gas meter corrected to standard conditions.
VOC	Volatile organic compounds
VS	Velocity of the stack gas in feet per second.
VW STD	The amount of moisture collected, corrected to standard conditions.
Y	Dry gas meter calibration factor.

Appendix B

VELOCITY TRAVERSE DATA AND PARTICULATE EMISSION CALCULATIONS

FACILITY: RYEGATE POWER STATION
UNIT : WOOD FIRED BOILER
DATE : 06/18/2013

RUN ID# : 1
START TIME: 06:45
END TIME: 08:53

Ds (FT)	6.50
As (SQFT)	33.18
Y =	1.0171
PIT COEFF	0.84
Dn (IN)	0.250
An (SQFT)	0.00034
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	324
IMP-2 (FIN)	350
IMP-3 (FIN)	46
IMP-4 (FIN)	576.6
% CO2 (OUT)	14.84
% O2 (OUT)	5.35
% CO (OUT)	0.00
% N2 (OUT)	79.81
P BAR	29.42
PSTK	-0.75
FINAL METER	900.816
INT METER	808.034
MID CHECK	0.000
VM (CF)	92.782
RUN TIME	120
F-FACTOR	1830

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
A1	0.98	0.99	1.96	75	75	332
2	0.98	0.99	1.96	80	75	333
3	0.96	0.98	1.92	82	76	333
4	0.96	0.98	1.92	85	77	334
5	1.00	1.00	2.00	86	77	334
6	0.96	0.98	1.92	88	78	334
7	0.96	0.98	1.92	89	79	336
8	0.94	0.97	1.88	89	79	337
9	0.94	0.97	1.88	90	80	337
10	0.96	0.98	1.92	92	81	336
11	0.96	0.98	1.92	93	81	337
12	0.96	0.98	1.92	94	82	337
13	0.98	0.99	1.96	96	84	337
14	0.94	0.97	1.88	96	84	338
15	0.92	0.96	1.84	97	85	340
16	0.92	0.96	1.84	97	85	339
17	0.89	0.94	1.78	97	86	340
18	0.80	0.89	1.60	96	86	340
19	0.80	0.89	1.60	95	87	340
20	0.80	0.89	1.60	95	87	339
B1	0.82	0.91	1.64	86	84	338
2	0.77	0.88	1.54	87	84	338
3	0.77	0.88	1.54	87	83	337
4	0.88	0.94	1.76	87	82	337
5	0.88	0.94	1.76	88	82	338
6	0.88	0.94	1.76	88	82	331
7	0.95	0.97	1.90	89	82	338
8	0.95	0.97	1.90	89	82	337
9	0.98	0.99	1.96	90	82	337
10	1.00	1.00	2.00	91	82	339
11	0.98	0.99	1.96	91	82	339
12	0.98	0.99	1.96	91	83	338
13	0.94	0.97	1.88	92	83	339
14	0.94	0.97	1.88	92	83	340
15	0.91	0.95	1.82	92	83	339
16	0.93	0.96	1.86	92	83	339
17	0.94	0.97	1.88	91	83	338
18	0.86	0.93	1.72	91	83	337
19	0.82	0.91	1.64	91	83	335
20	0.82	0.91	1.64	91	83	330
AVG:	0.92	0.96	1.83	90.20	81.95	336.93

TS ('R)=	796.9	DELTA H (ABS) =	29.55
TM ('F)=	86.1	PS (ABS) =	29.36
TM ('R)=	546.1	VI (TOT) =	546.6

SAMPLE NUMBER	FILTER 3578	BEAKER 14	SAMPLE NUMBER	FILTER 3588	BEAKER 18
FINAL WT.	0.3385	81.1692	FINAL WT.	0.3447	71.8801
TARE WT.	0.3385	81.1661	TARE WT.	0.3447	71.8797
NET WT.	0.0000	0.0031	NET WT.	0.0000	0.0004

SAMPLE BEAKER VOLUME 110 ml
BLANK BEAKER VOLUME 100 ml
TOTAL SAMPLE GAIN 3.10 mg
ACETONE RESIDUE 0.44 mg
TOTAL SAMPLE GAIN LESS ACETONE RESIDUE (Mn) = 2.66 mg

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	= 90.09	DSCF
VW STD	=	.04707 (VI TOT)	= 25.73	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	= 0.222	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	= 30.59	LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	= 27.79	LBS/MOLE
G	=	SQRT (TS / PS / MS)	= 0.99	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 67.84	FPS
H	=	0.002669 (VI TOT)	= 1.46	
J	=	(DELTA H ABS) (VM) (Y) / (TM)	= 5.11	
K	=	(H) + (J)	= 6.57	
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	= 107.0	%
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	= 4097645	DSCFH
CS	=	(2.205x10-6) (MN) / (VM STD)	= 6.51E-08	LBS/SCF
CS'	=	.0154 (MN) / (VM STD)	= 0.00045	GRAINS/SCF
CS'@7%O2	=	CS' * (20.9-7) / (20.9 - O2)	= 0.00041	GRAINS/SCF
CS'@12%CO2	=	CS' * (12 / % CO2)	= 0.00037	GRAINS/SCF
PMR	=	CS X Qs	= 0.27	LBS/HR
E	=	CS x FUEL FACTOR X(100 / %CO2))	= 0.0008	LBS/MMBTU

VELOCITY TRAVERSE DATA AND PARTICULATE EMISSION CALCULATIONS

FACILITY: RYEGATE POWER STATION
UNIT : WOOD FIRED BOILER
DATE : 06/18/2013

RUN ID# : 2SB
START TIME: 09:35
END TIME: 11:49

Ds (FT)	6.5
As (SQFT)	33.18
Y =	1.0171
PIT COEFF	0.84
Dn (IN)	0.250
An (SQFT)	0.00034
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	350
IMP-2 (FIN)	354
IMP-3 (FIN)	22
IMP-4 (FIN)	569.6
% CO2 (OUT)	14.77
% O2 (OUT)	5.43
% CO (OUT)	0.00
% N2 (OUT)	79.80
P BAR	29.44
PSTK	-0.82
FINAL METER	992.805
INT METER	900.897
MID CHECK	0.000
VM (CF)	91.908
RUN TIME	120
F-FACTOR	1830

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
B1	0.78	0.88	1.56	80	79	317
2	0.81	0.90	1.62	83	79	319
3	0.74	0.86	1.48	88	80	318
4	0.76	0.87	1.52	89	81	318
5	0.84	0.92	1.68	91	81	316
6	0.90	0.95	1.80	94	83	336
7	0.84	0.92	1.68	96	84	337
8	0.86	0.93	1.72	97	85	338
9	0.84	0.92	1.68	100	87	339
10	0.84	0.92	1.68	101	88	339
11	0.84	0.92	1.68	102	89	338
12	0.88	0.94	1.76	103	91	340
13	0.80	0.89	1.60	104	92	339
14	0.82	0.91	1.64	105	94	340
15	0.96	0.98	1.92	106	95	338
16	0.96	0.98	1.92	106	95	339
17	0.98	0.99	1.96	106	97	339
18	1.00	1.00	2.00	108	97	337
19	0.86	0.93	1.72	108	98	336
20	0.84	0.92	1.68	109	99	331
A1	0.90	0.95	1.80	108	104	328
2	0.92	0.96	1.84	110	104	330
3	0.92	0.96	1.84	111	105	329
4	0.98	0.99	1.96	112	105	329
5	0.95	0.97	1.90	112	105	339
6	0.90	0.95	1.80	112	105	330
7	0.96	0.98	1.92	112	104	338
8	0.96	0.98	1.92	111	104	339
9	0.94	0.97	1.88	110	104	338
10	0.85	0.92	1.70	109	103	339
11	0.88	0.94	1.76	108	103	340
12	0.81	0.90	1.62	105	101	340
13	0.89	0.94	1.78	104	101	339
14	0.91	0.95	1.82	102	99	339
15	0.92	0.96	1.84	100	97	338
16	0.92	0.96	1.84	99	96	338
17	0.98	0.99	1.96	99	96	340
18	0.92	0.96	1.84	99	95	337
19	0.85	0.92	1.70	99	94	337
20	0.85	0.92	1.70	99	94	333
AVG:	0.88	0.94	1.77	102.43	94.83	334.35

TS ('R)= 794.4 DELTA H (ABS) = 29.57
TM ('F)= 98.6 PS (ABS) = 29.38
TM ('R)= 558.6 VI (TOT) = 545.6

SAMPLE NUMBER	FILTER 3579	BEAKER 15	SAMPLE NUMBER	FILTER 3588	BEAKER 18
FINAL WT.	0.3416	67.3580	FINAL WT.	0.3447	71.8801
TARE WT.	0.3416	67.3546	TARE WT.	0.3447	71.8797
NET WT.	0.0000	0.0034	NET WT.	0.0000	0.0004

SAMPLE BEAKER VOLUME 130 ml BLANK BEAKER VOLUME 100 ml
TOTAL SAMPLE GAIN 3.40 mg ACETONE RESIDUE 0.52 mg
TOTAL SAMPLE GAIN LESS ACETONE RESIDUE (Mn) = 2.88 mg

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	= 87.29	DSCF
VW STD	=	.04707 (VI TOT)	= 25.68	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	= 0.227	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	= 30.58	LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	= 27.72	LBS/MOLE
G	=	SQRT (TS / PS / MS)	= 0.99	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 66.64	FPS
H	=	0.002669 (VI TOT)	= 1.46	
J	=	(DELTA H ABS) (VM) (Y) / (TM)	= 4.95	
K	=	(H) + (J)	= 6.40	
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	= 105.9	%
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	= 4012903	DSCFH
CS	=	(2.205x10-6) (MN) / (VM STD)	= 7.275E-08	LBS/SCF
CS'	=	.0154 (MN) / (VM STD)	= 0.00051	GRAINS/SCF
CS'@7%O2	=	CS' * (20.9-7) / (20.9 - O2)	= 0.00045	GRAINS/SCF
CS'@12%CO2	=	CS' * (12 / % CO2)	= 0.00040	GRAINS/SCF
PMR	=	CS X Qs	= 0.29	LBS/HR
E	=	CS x FUEL FACTOR X(100 / %CO2))	= 0.0009	LBS/MMBTU

VELOCITY TRAVERSE DATA AND PARTICULATE EMISSION CALCULATIONS

FACILITY: RYEGATE POWER STATION
UNIT : WOOD FIRED BOILER
DATE : 06/18/2013

RUN ID# : 3
START TIME: 12:20
END TIME: 14:29

Ds (FT)	6.5
As (SQFT)	33.18
Y =	1.0171
PIT COEFF	0.84
Dn (IN)	0.250
An (SQFT)	0.00034
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	324
IMP-2 (FIN)	350
IMP-3 (FIN)	38
IMP-4 (FIN)	569.2
% CO2 (OUT)	14.85
% O2 (OUT)	5.31
% CO (OUT)	0.00
% N2 (OUT)	79.84
P BAR	29.44
PSTK	-0.71
FINAL METER	1085.222
INT METER	992.880
MID CHECK	0.000
VM (CF)	92.342
RUN TIME	120
F-FACTOR	1830

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
A1	0.92	0.96	1.84	95	92	324
2	0.93	0.96	1.86	97	93	328
3	0.88	0.94	1.76	99	93	327
4	0.88	0.94	1.76	102	94	327
5	0.81	0.90	1.62	105	95	326
6	0.79	0.89	1.58	107	96	328
7	0.81	0.90	1.62	108	98	335
8	0.81	0.90	1.62	111	100	337
9	0.89	0.94	1.78	112	101	337
10	0.88	0.94	1.76	114	102	338
11	0.88	0.94	1.76	116	104	338
12	0.93	0.96	1.86	116	105	338
13	0.96	0.98	1.92	118	106	338
14	0.86	0.93	1.72	118	107	337
15	0.98	0.99	1.96	118	108	336
16	0.95	0.97	1.90	118	109	337
17	0.96	0.98	1.92	119	110	336
18	0.93	0.96	1.86	120	111	337
19	0.90	0.95	1.80	121	112	335
20	0.84	0.92	1.68	121	113	334
B1	0.73	0.85	1.46	119	116	339
2	0.98	0.99	1.96	120	116	336
3	1.05	1.02	2.10	121	117	336
4	0.93	0.96	1.86	121	117	336
5	0.93	0.96	1.86	121	118	337
6	0.93	0.96	1.86	121	116	337
7	0.89	0.94	1.78	120	116	336
8	0.88	0.94	1.76	119	116	339
9	0.88	0.94	1.76	119	115	340
10	0.88	0.94	1.76	118	115	340
11	0.80	0.89	1.60	117	115	340
12	0.80	0.89	1.60	116	113	339
13	0.73	0.85	1.46	114	111	339
14	0.73	0.85	1.46	112	110	340
15	0.81	0.90	1.62	112	109	339
16	0.84	0.92	1.68	111	109	338
17	0.87	0.93	1.74	111	108	338
18	0.86	0.93	1.72	110	108	335
19	0.89	0.94	1.78	110	108	339
20	0.82	0.91	1.64	111	107	336
AVG:	0.88	0.93	1.75	113.95	107.73	335.80

TS ('R)=	795.8	DELTA H (ABS) =	29.57
TM ('F)=	110.8	PS (ABS) =	29.39
TM ('R)=	570.8	VI (TOT) =	531.2

SAMPLE NUMBER	FILTER 3586	BEAKER 16
FINAL WT.	0.3469	67.1142
TARE WT.	0.3469	67.1092
NET WT.	0.0000	0.0050

SAMPLE NUMBER	FILTER 3588	BEAKER 18
FINAL WT.	0.3447	71.8801
TARE WT.	0.3447	71.8797
NET WT.	0.0000	0.0004

SAMPLE BEAKER VOLUME 120 ml
BLANK BEAKER VOLUME 100 ml
TOTAL SAMPLE GAIN 5.00 mg
ACETONE RESIDUE 0.48 mg
TOTAL SAMPLE GAIN LESS ACETONE RESIDUE (Mn) = 4.52 mg

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	= 85.82	DSCF
VW STD	=	.04707 (VI TOT)	= 25.00	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	= 0.226	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	= 30.59	LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	= 27.75	LBS/MOLE
G	=	SQRT (TS / PS / MS)	= 0.99	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 66.32	FPS
H	=	0.002669 (VI TOT)	= 1.42	
J	=	(DELTA H ABS) (VM) (Y) / (TM)	= 4.87	
K	=	(H) + (J)	= 6.28	
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	= 104.5	%
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	= 3996714	DSCFH
CS	=	(2.205x10-6) (MN) / (VM STD)	= 1.16E-07	LBS/SCF
CS'	=	.0154 (MN) / (VM STD)	= 0.00081	GRAINS/SCF
CS'@7%O2	=	CS' * (20.9-7) / (20.9 - O2)	= 0.00077	GRAINS/SCF
CS'@12%CO2	=	CS' * (12 / % CO2)	= 0.00068	GRAINS/SCF
PMR	=	CS X Qs	= 0.46	LBS/HR
E	=	CS x FUEL FACTOR X(100 / %CO2))	= 0.0015	LBS/MMBTU

VELOCITY TRAVERSE DATA AND PARTICULATE EMISSION CALCULATIONS

FACILITY: RYEGATE POWER STATION
UNIT : WOOD FIRED BOILER
DATE : 06/18/2013

RUN ID# : 4
START TIME: 15:00
END TIME: 17:10

Ds (FT)	6.5
As (SQFT)	33.18
Y =	1.0171
PIT COEFF	0.84
Dn (IN)	0.250
An (SQFT)	0.00034
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	336
IMP-2 (FIN)	346
IMP-3 (FIN)	32
IMP-4 (FIN)	566.1
% CO2 (OUT)	14.93
% O2 (OUT)	5.33
% CO (OUT)	0.00
% N2 (OUT)	79.74
P BAR	29.44
PSTK	-0.64
FINAL METER	177.471
INT METER	85.298
MID CHECK	0.000
VM (CF)	92.173
RUN TIME	120
F-FACTOR	1830

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
B1	0.77	0.88	1.54	108	110	319
2	0.72	0.85	1.44	111	110	337
3	0.76	0.87	1.52	112	110	336
4	0.89	0.94	1.78	111	109	340
5	0.92	0.96	1.84	111	109	341
6	0.90	0.95	1.80	111	109	341
7	1.05	1.02	2.10	111	108	340
8	1.00	1.00	2.00	110	107	340
9	0.94	0.97	1.88	111	106	341
10	0.94	0.97	1.88	111	106	342
11	0.91	0.95	1.82	112	106	342
12	0.90	0.95	1.80	113	106	341
13	0.90	0.95	1.80	113	107	343
14	0.95	0.97	1.90	113	107	343
15	0.88	0.94	1.76	113	107	342
16	0.88	0.94	1.76	113	107	343
17	0.84	0.92	1.68	112	107	340
18	0.85	0.92	1.70	112	107	342
19	0.86	0.93	1.72	112	107	343
20	0.75	0.87	1.50	111	107	338
A1	0.85	0.92	1.70	104	104	330
2	0.77	0.88	1.54	106	104	336
3	0.87	0.93	1.74	107	104	336
4	0.92	0.96	1.84	108	103	339
5	0.92	0.96	1.84	108	103	339
6	1.00	1.00	2.00	109	103	338
7	0.97	0.98	1.94	109	104	337
8	0.97	0.98	1.94	111	104	336
9	0.89	0.94	1.78	112	104	336
10	0.89	0.94	1.78	112	105	336
11	0.78	0.88	1.56	113	106	340
12	0.77	0.88	1.54	114	106	340
13	0.84	0.92	1.68	114	107	340
14	0.84	0.92	1.68	113	107	341
15	0.93	0.96	1.86	112	107	341
16	1.05	1.02	2.10	112	106	341
17	0.96	0.98	1.92	112	106	338
18	0.96	0.98	1.92	112	106	340
19	0.77	0.88	1.54	112	105	339
20	0.77	0.88	1.54	112	105	337
AVG:	0.88	0.94	1.77	111.08	106.28	338.85

TS ('R)= 798.9 DELTA H (ABS) = 29.57
TM ('F)= 108.7 PS (ABS) = 29.39
TM ('R)= 568.7 VI (TOT) = 530.1

SAMPLE NUMBER	FILTER 3587	BEAKER 17	SAMPLE NUMBER	FILTER 3588	BEAKER 18
FINAL WT.	0.3425	65.8857	FINAL WT.	0.3447	71.8801
TARE WT.	0.3425	65.8810	TARE WT.	0.3447	71.8797
NET WT.	0.0000	0.0047	NET WT.	0.0000	0.0004

SAMPLE BEAKER VOLUME 110 ml BLANK BEAKER VOLUME 100 ml
TOTAL SAMPLE GAIN 4.70 mg ACETONE RESIDUE 0.44 mg
TOTAL SAMPLE GAIN LESS ACETONE RESIDUE (Mn) = 4.26 mg

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	= 85.99	DSCF
VW STD	=	.04707 (VI TOT)	= 24.95	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	= 0.225	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	= 30.60	LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	= 27.77	LBS/MOLE
G	=	SQRT (TS / PS / MS)	= 0.99	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 66.70	FPS
H	=	0.002669 (VI TOT)	= 1.41	
J	=	(DELTA H ABS) (VM) (Y) / (TM)	= 4.87	
K	=	(H) + (J)	= 6.29	
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	= 104.4	%
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	= 4008198	DSCFH
CS	=	(2.205x10-6) (MN) / (VM STD)	= 1.092E-07	LBS/SCF
CS'	=	.0154 (MN) / (VM STD)	= 0.00076	GRAINS/SCF
CS'@7%O2	=	CS' * (20.9-7) / (20.9 - O2)	= 0.00067	GRAINS/SCF
CS'@12%CO2	=	CS' * (12 / % CO2)	= 0.00059	GRAINS/SCF
PMR	=	CS X Qs	= 0.44	LBS/HR
E	=	CS x FUEL FACTOR X(100 / %CO2))	= 0.0013	LBS/MMBTU

Appendix C

RYEGATE POWER STATION
PRORATED SOOT BLOW PARTICULATE RESULTS
GR/DSCF @ 12% CO2

SOOTBLOW CALCULATION:

E = (E(SB) X ((A+B)XS) / AXR)) + (E(NOSB) X ((R-S/R) - (BXS/AXR)))

E = GR/DSCF of particulate	
E(SB) = average E of sample(s) containing blowing	0.0004
E(NOSB) = average E of sample(s)with no sootblowing	0.00055
A = hours sootblowing during sample(s) containing sootblowing	0.33
B = hours not sootblowing during sample(s) containing sootblowing	1.67
R = average hours of operation per 24 hours	24
S = average hours of soot blowing per 24 hours	0.67
E = (overall sootblow prorated average for all runs)	**0.00052**

RYEGATE POWER STATION
PRORATED SOOT BLOW PARTICULATE RESULTS
LB/MMBTU

SOOTBLOW CALCULATION:

E = (E(SB) X ((A+B)XS) / AXR)) + (E(NOSB) X ((R-S/R) - (BXS/AXR)))

E = LB/MMBtu of particulate	
E(SB) = average E of sample(s) containing blowing	0.0009
E(NOSB) = average E of sample(s)with no sootblowing	0.0012
A = hours sootblowing during sample(s) containing sootblowing	0.33
B = hours not sootblowing during sample(s) containing sootblowing	1.67
R = average hours of operation per 24 hours	24
S = average hours of soot blowing per 24 hours	0.67
E = (overall sootblow prorated average for all runs)	**0.0011**

RYEGATE POWER STATION
PRORATED SOOT BLOW PARTICULATE RESULTS
LB/HR

SOOTBLOW CALCULATION:

E = (E(SB) X ((A+B)XS) / AXR)) + (E(NOSB) X ((R-S/R) - (BXS/AXR)))

E = LB/HR of particulate	
E(SB) = average E of sample(s) containing blowing	0.29
E(NOSB) = average E of sample(s)with no sootblowing	0.39
A = hours sootblowing during sample(s) containing sootblowing	0.33
B = hours not sootblowing during sample(s) containing sootblowing	1.67
R = average hours of operation per 24 hours	24
S = average hours of soot blowing per 24 hours	0.67
E = (overall sootblow prorated average for all runs)	**0.37**

Appendix D

THC EMISSION RATE CALCULATION

FACILTY:	RYEGATE POWER STATION	RUN ID#:	1
UNIT:	WOOD FIRED BOILER	START:	06:55
DATE:	06/18/2013	END:	07:55

Cgas PPMwv	=	5.35	Cgas % CO2	=	14.65
Cgas PPMdv	=	6.88	Cgas % O2	=	5.43
M.W. CH4	=	16.04	FUEL FACTOR(Fc)	=	1830
BWO %	=	22.2	Qs DSCFH Flow from PM-1 (06:45-0853)	=	4097645

Cd = Cgas X (M.W. / 385.6) / 1000000	=	2.86E-07	LBS/SCF
E = Cd X FUEL FACTOR X(100/ %CO2)	=	0.004	LBS/MMBTU
PMR = CD X QS DSCFH	=	1.17	LBS/HR

THC EMISSION RATE CALCULATION

FACILTY:	RYEGATE POWER STATION	RUN ID#:	2
UNIT:	WOOD FIRED BOILER	START:	08:06
DATE:	06/18/2013	END:	09:06

Cgas PPMwv	=	4.75	Cgas % CO2	=	15.03
Cgas PPMdv	=	6.15	Cgas % O2	=	5.27
M.W. CH4	=	16.04	FUEL FACTOR(Fc)	=	1830
BWO %	=	22.7	Qs DSCFH Flow from PM-1 (06:45-0853)	=	4097645

Cd = Cgas X (M.W. / 385.6) / 1000000	=	2.56E-07	LBS/SCF
E = Cd X FUEL FACTOR X(100/ %CO2)	=	0.003	LBS/MMBTU
PMR = CD X QS DSCFH	=	1.05	LBS/HR

THC EMISSION RATE CALCULATION

FACILTY:	RYEGATE POWER STATION	RUN ID#:	3
UNIT:	WOOD FIRED BOILER	START:	09:35
DATE:	06/18/2013	END:	10:35

Cgas PPMwv	=	5.44	Cgas % CO2	=	14.53
Cgas PPMdv	=	7.02	Cgas % O2	=	5.62
M.W. CH4	=	16.04	FUEL FACTOR(Fc)	=	1830
BWO %	=	22.6	Qs DSCFH Flow from PM-2 (0935-1149)	=	4012903

Cd = Cgas X (M.W. / 385.6) / 1000000	=	2.92E-07	LBS/SCF
E = Cd X FUEL FACTOR X(100/ %CO2)	=	0.004	LBS/MMBTU
PMR = CD X QS DSCFH	=	1.17	LBS/HR

Appendix E

Calibration Error Test, Run 1 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2				
CO2				
CO H				
NOx				
CO Z				
THC				

Date/Time 06-18-2013 06:17:10 PASSED

Analyte	O2	CO2	CO H	NOx	CO Z	THC
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.00	0.00	0.00	0.00
Zero Avg	0.036	0.154	-0.99	0.07	-0.96	0.16
Zero Error%	0.2%	0.8%	0.1%	0.0%	0.1%	0.2%
Low Ref Cyl			235.00		235.00	29.60
Low Avg			232.31		231.18	29.79
Low Error%			0.3%		0.4%	0.2%
Mid Ref Cyl	11.450	9.910	476.00	94.40	476.00	55.20
Mid Avg	11.495	9.950	482.55	94.27	476.75	55.27
Mid Error%	0.2%	0.2%	0.7%	0.1%	0.1%	0.1%
High Ref Cyl	22.800	19.850	947.00	192.30	947.00	91.30
High Avg	22.977	19.606	965.38	192.42	960.85	91.45
High Error%	0.8%	1.2%	1.9%	0.1%	1.5%	0.1%

Calibration Error Test End

Initial System Bias Check, Run 1 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO H		
NOx		
CO Z		
THC		

Date/Time 06-18-2013 06:27:57 PASSED

Analyte	O2	CO2	CO H	NOx	CO Z	THC
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.00	0.00	0.00	0.00
Zero Cal	0.036	0.154	-0.99	0.07	-0.96	0.16
Zero Avg	0.069	0.156	0.61	0.07	-0.96	0.34
Zero Bias%	0.1%	0.0%	0.2%	0.0%	0.0%	0.2%
Zero Drift%						
Span Ref Cyl	11.450	9.910	476.00	192.30	476.00	29.60
Span Cal	11.495	9.950	482.55	192.42	476.75	29.79
Span Avg	11.478	9.933	477.27	192.41	467.80	30.30
Span Bias%	0.1%	0.1%	0.6%	0.0%	0.9%	0.5%
Span Drift%						

System Bias Check End

Test Run 1 STRATA Version 3.2

VOC- 1

	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
Begin calculating run averages						
06-18-2013 06:56:02	5.800	14.133	203.07	92.17	194.72	3.57
06-18-2013 06:57:02	5.876	13.971	195.75	91.40	198.55	3.58
06-18-2013 06:58:02	5.974	13.871	196.13	88.08	189.32	4.06
06-18-2013 06:59:01	5.703	14.159	196.81	86.19	202.03	4.06
06-18-2013 07:00:01	5.419	14.526	195.46	91.67	214.30	5.20
06-18-2013 07:01:01	5.323	14.750	241.15	93.68	225.90	5.20
06-18-2013 07:02:01	5.633	14.308	195.41	91.15	217.13	4.56
06-18-2013 07:03:01	5.368	14.637	244.18	90.43	251.40	6.29
06-18-2013 07:04:01	4.849	15.273	389.48	94.22	415.00	12.87
06-18-2013 07:05:01	4.886	15.305	363.64	94.30	347.04	10.88
06-18-2013 07:06:01	4.995	15.161	441.03	89.51	414.93	13.41
06-18-2013 07:07:01	5.269	14.831	276.54	87.52	259.46	6.98
06-18-2013 07:08:01	5.254	14.840	284.57	87.41	291.29	8.50
06-18-2013 07:09:02	5.498	14.521	254.39	86.53	246.51	6.41
06-18-2013 07:10:02	5.906	14.075	230.00	81.53	205.72	3.88
06-18-2013 07:11:02	5.942	13.881	198.73	81.53	205.63	3.88
06-18-2013 07:12:02	5.853	14.092	211.73	82.03	208.82	4.68
06-18-2013 07:13:02	5.564	14.414	281.58	79.62	291.63	7.90
06-18-2013 07:14:02	5.420	14.632	245.30	84.11	249.61	6.08
06-18-2013 07:15:02	5.124	15.012	349.83	88.48	357.29	10.16
06-18-2013 07:16:02	5.311	14.808	284.89	89.00	294.66	8.07
06-18-2013 07:17:02	5.304	14.789	282.01	89.04	248.99	6.61
06-18-2013 07:18:02	5.210	14.892	302.62	90.34	328.76	8.76
06-18-2013 07:19:02	5.339	14.805	276.92	89.47	229.97	5.42
06-18-2013 07:20:02	5.564	14.504	251.21	85.47	255.89	6.02
06-18-2013 07:21:02	5.803	14.151	195.14	82.08	176.86	3.60
06-18-2013 07:22:02	5.238	14.841	206.14	88.00	222.48	5.28
06-18-2013 07:23:02	4.948	15.243	256.88	92.17	291.72	7.84
06-18-2013 07:24:02	5.113	15.074	287.28	91.90	236.41	5.58
06-18-2013 07:25:02	5.288	14.816	200.27	91.91	226.21	5.39
06-18-2013 07:26:02	5.320	14.815	223.94	90.18	191.51	4.26
06-18-2013 07:27:02	5.201	14.925	199.94	88.63	204.85	5.00
06-18-2013 07:28:02	5.447	14.680	187.03	86.45	180.04	4.51
06-18-2013 07:29:02	5.330	14.766	231.96	88.23	253.78	6.02
06-18-2013 07:30:02	5.677	14.374	201.18	86.84	175.45	3.45
06-18-2013 07:31:02	5.693	14.251	178.00	84.98	180.57	3.25
06-18-2013 07:32:01	5.512	14.478	191.15	86.26	269.78	6.68
06-18-2013 07:33:01	4.948	15.235	340.07	89.70	289.31	7.95
06-18-2013 07:34:01	4.899	15.293	248.64	88.45	241.51	6.18
06-18-2013 07:35:01	4.968	15.270	249.66	89.27	249.60	6.39
06-18-2013 07:36:01	5.157	15.020	291.50	90.76	293.85	7.34
06-18-2013 07:37:01	5.380	14.761	234.00	87.89	208.64	5.13
06-18-2013 07:38:01	5.351	14.760	192.39	88.27	190.87	3.82
06-18-2013 07:39:01	5.588	14.488	192.24	87.20	200.90	4.37
06-18-2013 07:40:02	5.595	14.457	223.03	85.95	218.68	4.29
06-18-2013 07:41:02	5.832	14.135	192.11	82.47	192.14	3.53
06-18-2013 07:42:02	5.878	14.135	205.28	80.75	199.23	3.15
06-18-2013 07:43:02	5.890	14.034	192.28	83.84	203.42	3.20
06-18-2013 07:44:02	6.127	13.810	204.30	83.91	192.68	2.89
06-18-2013 07:45:02	6.073	13.795	191.50	84.30	191.32	2.89
06-18-2013 07:46:02	5.925	14.015	174.41	86.97	182.65	3.06
06-18-2013 07:47:02	5.542	14.499	217.33	88.50	207.11	3.97
06-18-2013 07:48:02	5.776	14.213	174.15	85.27	178.03	3.03
06-18-2013 07:49:02	5.806	14.228	187.41	85.77	179.44	2.83
Pause						
End Pause						
06-18-2013 07:53:02	5.614	13.771	140.56	90.34	153.78	3.12
06-18-2013 07:54:02	5.409	14.707	180.98	91.80	181.95	3.85
06-18-2013 07:55:02	5.682	14.364	146.58	88.02	149.65	2.81
06-18-2013 07:56:02	5.749	14.305	163.04	83.01	157.12	2.80
06-18-2013 07:57:02	5.603	14.402	145.01	86.42	162.36	3.25
06-18-2013 07:58:02	5.175	15.061	171.96	88.33	162.52	3.46
Run Averages	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
06-18-2013 07:58:06	5.483	14.567	230.37	87.68	228.73	5.35

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

VOC-1

Reference Cylinder Numbers
Zero Span
O2
CO2
CO H
NOx
CO Z
THC

Date/Time	06-18-2013		08:04:28		PASSED	
Analyte	O2	CO2	CO H	NOx	CO Z	THC
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.00	0.00	0.00	0.00
Zero Cal	0.036	0.154	-0.99	0.07	-0.96	0.16
Zero Avg	0.083	0.360	0.71	0.30	-1.60	1.01
Zero Bias%	0.2%	1.0%	0.2%	0.1%	0.1%	0.8%
Zero Drift%	0.1%	1.0%	0.0%	0.1%	-0.1%	0.7%
Span Ref Cyl	11.450	9.910	476.00	192.30	476.00	29.60
Span Cal	11.495	9.950	482.55	192.42	476.75	29.79
Span Avg	11.487	9.944	475.46	191.63	463.96	29.31
Span Bias%	0.0%	0.0%	0.7%	0.4%	1.4%	0.5%
Span Drift%	0.0%	0.1%	-0.2%	-0.4%	-0.4%	-1.0%
Ini Zero Avg	0.069	0.156	0.61	0.07	-0.96	0.34
Ini Span Avg	11.478	9.933	477.27	192.41	467.80	30.30
Run Avg	5.483	14.567	230.37	87.68	228.73	5.35
Co	0.076	0.258	0.66	0.18	-1.28	0.67
Cm	11.482	9.939	476.37	192.02	465.88	29.80
Correct Avg	5.427	14.648	229.85	87.71	234.36	4.75

System Bias Check End

Test Run 2 STRATA Version 3.2

VOC-2

	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
Begin calculating run averages						
06-18-2013 08:07:11	5.713	14.324	177.07	86.02	166.73	3.10
06-18-2013 08:08:11	5.446	14.649	208.35	85.80	214.45	4.26
06-18-2013 08:09:11	5.397	14.727	186.01	85.75	199.09	4.04
06-18-2013 08:10:11	5.194	15.023	200.36	85.13	181.53	3.67
06-18-2013 08:11:11	5.341	14.793	168.92	88.55	183.54	3.28
06-18-2013 08:12:10	5.248	14.974	187.78	89.10	172.04	3.13
06-18-2013 08:13:10	5.093	15.144	188.86	91.55	202.26	3.81
06-18-2013 08:14:10	5.430	14.772	179.94	91.58	161.86	2.66
06-18-2013 08:15:10	5.280	14.886	207.32	90.46	219.59	4.07
06-18-2013 08:16:10	5.237	14.994	165.63	90.97	157.02	2.91
06-18-2013 08:17:10	5.355	14.853	172.44	87.98	170.52	2.95
06-18-2013 08:18:10	5.374	14.762	168.77	90.76	223.69	5.28
06-18-2013 08:19:10	5.010	15.299	248.17	91.46	199.18	4.41
06-18-2013 08:20:10	4.913	15.371	212.92	93.43	224.88	4.63
06-18-2013 08:21:10	4.871	15.486	198.51	94.79	178.55	3.75
06-18-2013 08:22:10	4.984	15.345	197.69	94.62	201.05	3.83
06-18-2013 08:23:10	5.522	14.716	152.24	90.89	142.11	2.20
06-18-2013 08:24:10	5.539	14.604	164.11	86.42	168.68	2.75
06-18-2013 08:25:10	5.723	14.371	149.72	86.06	189.22	3.38
06-18-2013 08:26:10	5.335	14.909	236.18	88.92	200.74	3.89
06-18-2013 08:27:10	5.378	14.835	165.80	91.03	164.65	2.63
06-18-2013 08:28:10	5.523	14.705	170.15	89.33	168.37	2.83
06-18-2013 08:29:10	5.350	14.892	213.60	87.89	226.53	4.41
06-18-2013 08:30:10	5.405	14.870	215.74	87.73	211.81	5.42
06-18-2013 08:31:10	5.196	15.114	240.49	87.28	251.57	6.68
06-18-2013 08:32:10	5.177	15.137	292.42	86.18	330.15	9.25
06-18-2013 08:33:10	5.146	15.200	416.14	87.42	377.10	12.32
06-18-2013 08:34:10	5.413	14.824	291.67	86.56	278.01	7.43
06-18-2013 08:35:10	5.563	14.706	251.90	85.32	229.91	4.92
06-18-2013 08:36:10	5.751	14.387	242.82	84.85	243.51	5.27
06-18-2013 08:37:11	5.917	14.213	212.27	84.02	196.16	3.61
06-18-2013 08:38:11	5.859	14.252	216.50	83.38	224.58	4.11
06-18-2013 08:39:10	5.713	14.421	211.95	82.32	200.43	3.99
06-18-2013 08:40:10	5.305	14.971	220.59	87.61	214.78	4.42
06-18-2013 08:41:10	5.294	14.968	200.42	91.43	214.10	4.95
06-18-2013 08:42:10	5.372	14.954	214.70	89.73	194.42	3.73
06-18-2013 08:43:10	5.515	14.693	196.04	89.72	201.83	4.00
06-18-2013 08:44:10	5.525	14.737	202.64	90.75	202.75	4.23
06-18-2013 08:45:10	5.607	14.609	204.07	90.51	192.37	3.47
06-18-2013 08:46:10	5.859	14.227	173.09	85.66	175.98	3.21
06-18-2013 08:47:10	5.238	15.014	242.01	89.34	247.97	5.82
06-18-2013 08:48:10	5.357	14.896	222.09	93.11	241.07	5.75
06-18-2013 08:49:10	5.389	14.880	256.52	92.17	223.58	5.04
06-18-2013 08:50:10	5.445	14.768	196.95	93.10	203.46	4.16
06-18-2013 08:51:10	5.626	14.585	219.38	91.50	216.69	4.22
06-18-2013 08:52:10	5.518	14.650	231.29	90.51	228.45	4.88
06-18-2013 08:53:10	5.364	14.875	230.89	85.86	248.47	5.72
06-18-2013 08:54:10	4.845	15.486	404.62	89.54	397.96	11.92
06-18-2013 08:55:10	4.995	15.343	257.35	92.60	272.91	6.51
06-18-2013 08:56:10	4.696	15.684	354.78	92.53	324.64	9.96
06-18-2013 08:57:10	4.690	15.694	282.77	94.44	300.45	8.06
06-18-2013 08:58:10	4.982	15.434	242.17	91.73	176.28	3.96
06-18-2013 08:59:10	5.064	15.259	201.69	90.66	225.46	5.90
06-18-2013 09:00:10	5.210	15.094	209.20	85.88	204.22	4.56
06-18-2013 09:01:10	4.982	15.338	230.08	88.65	232.77	5.74
06-18-2013 09:02:10	4.999	15.336	205.38	90.33	193.82	4.45
06-18-2013 09:03:10	5.089	15.227	221.87	84.94	205.81	5.10
06-18-2013 09:04:10	5.278	14.938	147.00	85.77	148.48	2.68
06-18-2013 09:05:10	5.226	15.052	154.19	85.61	149.10	2.44
06-18-2013 09:06:10	5.039	15.205	197.17	83.66	225.84	5.31
Run Averages	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
06-18-2013 09:06:10	5.315	14.925	217.19	88.85	215.39	4.75

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack
Test Run 2 End

Final System Bias Check, Run 2 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

VOC-2

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO H		
NOx		
CO Z		
THC		

Date/Time 06-18-2013 09:13:25 PASSED

Analyte	O2	CO2	CO H	NOx	CO Z	THC
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.00	0.00	0.00	0.00
Zero Cal	0.036	0.154	-0.99	0.07	-0.96	0.16
Zero Avg	0.036	0.305	0.76	0.30	-2.88	0.23
Zero Bias%	0.0%	0.8%	0.2%	0.1%	0.2%	0.1%
Zero Drift%	-0.2%	-0.3%	0.0%	0.0%	-0.1%	-0.8%
Span Ref Cyl	11.450	9.910	476.00	192.30	476.00	29.60
Span Cal	11.495	9.950	482.55	192.42	476.75	29.79
Span Avg	11.455	9.961	477.30	191.83	464.96	29.33
Span Bias%	0.2%	0.1%	0.6%	0.3%	1.2%	0.5%
Span Drift%	-0.1%	0.1%	0.2%	0.1%	0.1%	0.0%
Ini Zero Avg	0.083	0.360	0.71	0.30	-1.60	1.01
Ini Span Avg	11.487	9.944	475.46	191.63	463.96	29.31
Run Avg	5.315	14.925	217.19	88.85	215.39	4.75
Co	0.060	0.333	0.74	0.30	-2.24	0.62
Cm	11.471	9.952	476.38	191.73	464.46	29.32
Correct Avg	5.273	15.032	216.61	88.95	221.96	4.26

System Bias Check End

Test Run 3 STRATA Version 3.2

VOC-3

	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
Begin calculating run averages						
06-18-2013 09:35:52	5.656	14.396	178.94	86.50	188.02	3.67
06-18-2013 09:36:52	5.461	14.652	241.29	84.86	237.70	4.87
06-18-2013 09:37:52	5.726	14.286	180.81	82.51	177.65	3.40
06-18-2013 09:38:52	5.552	14.536	206.72	84.53	215.67	4.72
06-18-2013 09:39:52	5.050	15.092	244.04	88.00	260.39	6.59
06-18-2013 09:40:52	4.923	15.352	287.63	89.33	294.84	8.25
06-18-2013 09:41:52	4.909	15.372	327.47	91.18	303.17	8.62
06-18-2013 09:42:52	5.389	14.822	254.73	88.96	227.00	5.36
06-18-2013 09:43:52	5.765	14.277	176.34	82.89	173.28	2.88
06-18-2013 09:44:52	5.580	14.444	175.10	80.23	198.74	4.22
06-18-2013 09:45:52	5.242	14.930	234.36	83.32	225.02	4.89
06-18-2013 09:46:52	5.094	15.073	213.57	88.15	215.95	4.64
06-18-2013 09:47:53	5.162	15.081	197.25	88.35	171.02	3.44
06-18-2013 09:48:53	5.282	14.896	166.04	88.53	170.33	3.13
06-18-2013 09:49:53	5.499	14.620	154.57	87.98	146.39	2.54
06-18-2013 09:50:53	5.459	14.671	156.87	87.71	162.98	2.56
06-18-2013 09:51:53	5.736	14.321	149.47	81.82	144.80	2.03
06-18-2013 09:52:53	5.587	14.493	155.18	83.81	154.46	2.26
06-18-2013 09:53:53	5.067	15.053	275.36	84.60	388.06	12.04
06-18-2013 09:54:53	4.565	15.821	362.26	79.17	262.66	6.68
06-18-2013 09:55:53	5.176	15.148	197.77	76.03	188.27	3.91
06-18-2013 09:56:53	6.321	13.752	161.26	67.68	140.52	2.39
06-18-2013 09:57:53	6.792	13.291	129.39	62.93	133.98	1.77
06-18-2013 09:58:53	6.958	13.160	131.87	58.19	140.98	2.21
06-18-2013 09:59:53	6.568	13.398	164.68	67.74	158.20	2.25
06-18-2013 10:00:53	6.437	13.483	126.66	74.70	124.11	1.60
06-18-2013 10:01:53	6.385	13.544	134.28	74.95	132.17	1.84
06-18-2013 10:02:53	6.187	13.709	186.90	73.33	224.98	5.08
06-18-2013 10:03:53	5.875	14.164	215.79	73.89	194.77	4.12
06-18-2013 10:04:53	5.810	14.263	238.90	73.71	267.31	5.05
06-18-2013 10:05:53	6.131	13.874	263.59	72.03	225.14	4.69
06-18-2013 10:06:53	6.258	13.667	200.79	80.32	219.69	4.79
06-18-2013 10:07:53	6.095	13.895	226.64	81.03	233.46	5.47
06-18-2013 10:08:53	5.803	14.243	331.76	80.87	340.02	8.02
06-18-2013 10:09:53	5.863	14.211	287.13	77.38	250.64	5.66
06-18-2013 10:10:53	5.915	14.143	238.45	75.44	246.10	4.87
06-18-2013 10:11:53	5.887	14.119	232.69	73.70	245.42	5.24
06-18-2013 10:12:53	5.575	14.608	278.82	78.95	281.69	6.35
06-18-2013 10:13:52	6.121	13.916	357.65	79.32	365.11	9.00
06-18-2013 10:14:52	6.382	13.541	269.28	77.62	216.87	4.74
06-18-2013 10:15:52	6.109	13.847	243.49	80.13	263.01	7.01
06-18-2013 10:16:52	6.057	13.956	228.23	82.91	192.10	4.82
06-18-2013 10:17:52	5.902	14.146	210.14	81.13	236.20	5.97
06-18-2013 10:18:52	5.929	14.103	240.19	82.82	243.18	7.10
06-18-2013 10:19:52	5.729	14.369	238.36	87.23	213.89	6.11
06-18-2013 10:20:53	5.755	14.318	194.81	87.42	228.11	6.08
06-18-2013 10:21:53	5.742	14.373	246.70	87.90	238.10	5.72
06-18-2013 10:22:53	5.443	14.687	305.55	89.43	303.98	9.19
06-18-2013 10:23:53	5.280	14.960	270.38	90.49	264.17	7.46
06-18-2013 10:24:53	5.023	15.266	426.37	90.98	456.24	15.51
06-18-2013 10:25:53	5.007	15.309	406.64	94.24	402.00	12.04
06-18-2013 10:26:53	5.086	15.226	366.25	94.85	302.69	9.00
06-18-2013 10:27:53	5.519	14.661	198.15	93.22	199.11	4.52
06-18-2013 10:28:53	5.370	14.859	211.44	92.78	208.00	4.79
06-18-2013 10:29:53	5.176	15.077	242.76	91.89	257.46	7.18
06-18-2013 10:30:53	5.227	15.061	241.36	91.83	217.60	5.50
06-18-2013 10:31:53	5.189	15.092	223.76	94.00	219.33	5.66
06-18-2013 10:32:53	5.121	15.179	206.32	94.94	210.35	5.59
06-18-2013 10:33:53	5.085	15.252	267.05	93.46	267.01	7.86
06-18-2013 10:34:53	5.460	14.784	180.87	91.12	173.07	3.64
Run Averages	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
06-18-2013 10:34:53	5.641	14.481	230.98	83.09	229.01	5.44

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack
Test Run 3 End

Final System Bias Check, Run 3 STRATA Version 3.2

VOC-3

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO H		
NOx		
CO Z		
THC		

Date/Time 06-18-2013 10:41:35 PASSED

Analyte	O2	CO2	CO H	NOx	CO Z	THC
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.00	0.00	0.00	0.00
Zero Cal	0.036	0.154	-0.99	0.07	-0.96	0.16
Zero Avg	0.048	0.347	0.59	0.30	-1.60	0.62
Zero Bias%	0.1%	1.0%	0.2%	0.1%	0.1%	0.5%
Zero Drift%	0.1%	0.2%	0.0%	0.0%	0.1%	0.4%
Span Ref Cyl	11.450	9.910	476.00	192.30	476.00	29.60
Span Cal	11.495	9.950	482.55	192.42	476.75	29.79
Span Avg	11.455	9.999	479.18	190.84	463.96	29.13
Span Bias%	0.2%	0.2%	0.4%	0.8%	1.4%	0.7%
Span Drift%	0.0%	0.2%	0.2%	-0.5%	-0.1%	-0.2%
Ini Zero Avg	0.036	0.305	0.76	0.30	-2.88	0.23
Ini Span Avg	11.455	9.961	477.30	191.83	464.96	29.33
Run Avg	5.641	14.481	230.98	83.09	229.01	5.44
Co	0.042	0.326	0.68	0.30	-2.24	0.42
Cm	11.455	9.980	478.24	191.34	464.46	29.23
Correct Avg	5.617	14.531	229.55	83.33	235.86	5.16

System Bias Check End

Test Run 4 STRATA Version 3.2

O_2 / CO_2

	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
Begin calculating run averages						
06-18-2013 10:45:43	5.117	15.048	277.06	89.66	349.68	11.41
06-18-2013 10:46:44	4.941	15.396	336.02	91.57	264.63	8.17
06-18-2013 10:47:43	5.196	15.039	212.37	93.48	204.70	4.67
06-18-2013 10:48:43	5.393	14.830	184.90	91.39	169.51	3.75
06-18-2013 10:49:43	5.611	14.509	185.63	88.39	192.82	4.38
06-18-2013 10:50:43	5.557	14.564	171.51	86.63	188.66	4.35
06-18-2013 10:51:43	5.308	14.896	215.19	89.98	197.58	5.14
06-18-2013 10:52:43	5.303	14.895	180.20	91.27	200.65	5.28
06-18-2013 10:53:43	5.440	14.760	206.89	89.83	191.84	4.18
06-18-2013 10:54:43	5.525	14.634	183.25	90.10	176.32	3.44
06-18-2013 10:55:43	5.748	14.343	163.57	88.57	155.64	2.73
06-18-2013 10:56:43	5.536	14.584	187.89	88.18	198.00	4.31
06-18-2013 10:57:43	5.633	14.501	151.04	86.49	146.74	2.75
06-18-2013 10:58:43	5.455	14.709	171.35	88.17	174.83	3.13
06-18-2013 10:59:43	5.481	14.663	154.66	89.59	158.46	2.78
06-18-2013 11:00:43	5.562	14.616	171.72	89.23	168.34	3.06
06-18-2013 11:01:44	5.398	14.784	185.66	90.56	203.04	4.38
06-18-2013 11:02:43	5.241	15.029	196.61	91.34	183.30	4.10
06-18-2013 11:03:43	5.228	15.032	178.53	91.22	173.67	3.33
06-18-2013 11:04:43	5.713	14.458	150.62	86.29	148.54	2.34
06-18-2013 11:05:43	5.803	14.274	176.54	85.46	178.30	2.76
06-18-2013 11:06:43	5.771	14.320	154.03	88.83	156.81	2.69
06-18-2013 11:07:43	5.644	14.528	162.02	90.10	157.07	2.60
06-18-2013 11:08:43	5.643	14.476	153.52	90.16	167.03	2.85
06-18-2013 11:09:43	5.177	15.082	174.51	91.45	164.33	3.19
06-18-2013 11:10:43	4.813	15.527	228.57	93.68	246.82	6.20
06-18-2013 11:11:43	4.935	15.449	214.48	90.85	205.40	5.46
06-18-2013 11:12:43	5.050	15.296	258.37	89.94	260.18	6.70
06-18-2013 11:13:43	5.214	15.070	203.19	90.53	241.28	5.53
06-18-2013 11:14:43	5.007	15.336	299.33	89.58	276.48	6.98
06-18-2013 11:15:43	4.886	15.470	317.89	90.55	351.23	9.05
06-18-2013 11:16:43	5.128	15.251	366.56	89.19	312.57	8.98
06-18-2013 11:17:43	5.594	14.641	241.10	86.01	228.19	5.50
06-18-2013 11:18:43	5.597	14.607	249.57	81.59	257.10	7.32
06-18-2013 11:19:43	5.131	15.130	333.12	83.48	357.84	11.44
06-18-2013 11:20:43	5.053	15.307	345.95	87.80	317.61	9.70
06-18-2013 11:21:43	5.413	14.903	275.17	85.08	246.95	6.09
06-18-2013 11:22:43	5.299	14.913	361.27	85.39	480.27	14.47
06-18-2013 11:23:43	4.748	15.659	534.19	90.50	479.87	15.90
06-18-2013 11:24:43	4.587	15.868	537.89	93.89	551.47	17.57
06-18-2013 11:25:43	4.630	15.856	548.34	91.54	502.61	16.84
06-18-2013 11:26:43	5.043	15.373	408.49	90.77	358.69	10.88
06-18-2013 11:27:43	5.282	15.063	274.09	91.48	238.00	6.35
06-18-2013 11:28:43	5.231	15.110	262.14	90.52	263.38	7.05
06-18-2013 11:29:43	5.320	14.979	273.41	88.70	308.79	9.05
06-18-2013 11:30:43	5.073	15.308	376.47	89.14	350.57	10.62
06-18-2013 11:31:43	5.182	15.183	339.00	88.91	342.39	10.41
06-18-2013 11:32:43	5.477	14.807	376.34	83.43	417.34	12.67
06-18-2013 11:33:43	5.358	14.917	478.49	85.18	413.46	13.48
06-18-2013 11:34:43	5.389	14.918	288.78	88.77	252.90	7.09
06-18-2013 11:35:44	5.131	15.214	286.06	89.22	326.39	8.29
06-18-2013 11:36:43	5.184	15.171	399.28	89.96	404.33	12.58
06-18-2013 11:37:43	5.203	15.164	386.62	89.30	342.10	9.48
06-18-2013 11:38:43	4.931	15.446	411.00	92.16	456.01	15.72
06-18-2013 11:39:43	4.790	15.688	466.27	91.37	420.62	13.75
06-18-2013 11:40:43	4.796	15.654	482.05	91.70	489.20	16.59
06-18-2013 11:41:43	5.012	15.435	397.71	92.48	340.93	11.15
06-18-2013 11:42:43	5.209	15.175	296.08	90.74	276.44	7.66
06-18-2013 11:43:43	5.476	14.838	273.43	88.69	293.38	7.32
06-18-2013 11:44:43	5.352	14.971	307.34	88.80	261.90	6.30
Run Averages	O2 %	CO2 %	CO H ppm	NOx ppm	CO Z ppm	THC ppm
06-18-2013 11:44:43	5.266	15.011	279.73	89.31	275.75	7.53

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack
Test Run 4 End

O2/CO2
VOC-B

Final System Bias Check, Run 4 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO H		
NOx		
CO Z		
THC		

Date/Time	06-18-2013		11:52:36		PASSED	
Analyte	O2	CO2	CO H	NOx	CO Z	THC
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.00	0.00	0.00	0.00
Zero Cal	0.036	0.154	-0.99	0.07	-0.96	0.16
Zero Avg	0.060	0.299	-0.13	0.29	-1.51	0.24
Zero Bias%	0.1%	0.7%	0.1%	0.1%	0.1%	0.1%
Zero Drift%	0.0%	-0.2%	-0.1%	0.0%	0.0%	-0.4%
Span Ref Cyl	11.450	9.910	476.00	192.30	476.00	29.60
Span Cal	11.495	9.950	482.55	192.42	476.75	29.79
Span Avg	11.471	10.047	475.80	193.44	462.04	29.37
Span Bias%	0.1%	0.5%	0.7%	0.5%	1.6%	0.4%
Span Drift%	0.1%	0.2%	-0.4%	1.3%	-0.2%	0.2%
Ini Zero Avg	0.048	0.347	0.59	0.30	-1.60	0.62
Ini Span Avg	11.455	9.999	479.18	190.84	463.96	29.13
Run Avg	5.266	15.011	279.73	89.31	275.75	7.53
Co	0.054	0.323	0.23	0.29	-1.55	0.43
Cm	11.463	10.023	477.49	192.14	463.00	29.25
Correct Avg	5.231	15.006	278.76	89.23	284.14	7.30

System Bias Check End

Test Run 5 STRATA Version 3.2

PM-3

	O2 %	CO2 %
Begin calculating run averages		
06-18-2013 12:22:07	5.547	14.680
06-18-2013 12:23:07	5.295	14.975
06-18-2013 12:24:07	5.126	15.229
06-18-2013 12:25:07	4.922	15.472
06-18-2013 12:26:08	5.085	15.310
06-18-2013 12:27:08	5.343	14.988
06-18-2013 12:28:08	5.502	14.719
06-18-2013 12:29:08	5.423	14.850
06-18-2013 12:30:08	5.206	15.077
06-18-2013 12:31:08	5.359	14.934
06-18-2013 12:32:08	5.538	14.686
06-18-2013 12:33:08	5.760	14.370
06-18-2013 12:34:08	5.389	14.803
06-18-2013 12:35:08	5.586	14.608
06-18-2013 12:36:08	5.842	14.286
06-18-2013 12:37:08	5.848	14.227
06-18-2013 12:38:08	5.698	14.416
06-18-2013 12:39:08	5.382	14.809
06-18-2013 12:40:08	5.254	14.989
06-18-2013 12:41:08	4.896	15.462
06-18-2013 12:42:08	5.372	14.883
06-18-2013 12:43:08	5.746	14.447
06-18-2013 12:44:08	5.749	14.332
06-18-2013 12:45:08	5.672	14.525
06-18-2013 12:46:08	5.576	14.600
06-18-2013 12:47:08	5.582	14.637
06-18-2013 12:48:08	5.566	14.671
06-18-2013 12:49:08	5.911	14.197
06-18-2013 12:50:08	5.557	14.616
06-18-2013 12:51:08	5.151	15.150
06-18-2013 12:52:08	5.282	15.059
06-18-2013 12:53:08	5.352	14.927
06-18-2013 12:54:08	5.671	14.543
06-18-2013 12:55:08	5.310	14.905
06-18-2013 12:56:08	4.991	15.362
06-18-2013 12:57:08	4.757	15.654
06-18-2013 12:58:08	5.031	15.351
06-18-2013 12:59:08	5.371	14.934
06-18-2013 13:00:08	5.590	14.614
06-18-2013 13:01:08	5.880	14.229
06-18-2013 13:02:08	5.469	14.724
06-18-2013 13:03:07	5.270	14.976
06-18-2013 13:04:07	4.729	15.647
06-18-2013 13:05:07	4.682	15.722
06-18-2013 13:06:07	4.862	15.555
06-18-2013 13:07:07	5.256	15.028
06-18-2013 13:08:07	5.531	14.685
06-18-2013 13:09:07	5.393	14.805
06-18-2013 13:10:07	5.427	14.803
06-18-2013 13:11:07	5.568	14.614
06-18-2013 13:12:07	5.627	14.502
06-18-2013 13:13:07	5.229	15.023
06-18-2013 13:14:07	5.313	14.921
06-18-2013 13:15:08	5.501	14.721
06-18-2013 13:16:08	5.400	14.801
06-18-2013 13:17:08	5.489	14.722
06-18-2013 13:18:08	5.230	15.009
06-18-2013 13:19:08	5.076	15.202
06-18-2013 13:20:08	4.740	15.625
06-18-2013 13:21:08	5.013	15.295
06-18-2013 13:22:08	5.000	15.339
06-18-2013 13:23:08	4.933	15.386
06-18-2013 13:24:08	4.928	15.432
06-18-2013 13:25:08	4.933	15.409
06-18-2013 13:26:08	5.189	15.109
06-18-2013 13:27:08	5.199	15.077
06-18-2013 13:28:08	5.480	14.718
06-18-2013 13:29:08	5.477	14.690
06-18-2013 13:30:07	5.174	15.073
06-18-2013 13:31:07	5.183	15.131
06-18-2013 13:32:07	5.158	15.135
06-18-2013 13:33:07	5.272	14.989
06-18-2013 13:34:07	4.995	15.295
06-18-2013 13:35:07	4.999	15.327
06-18-2013 13:36:07	5.170	15.124
06-18-2013 13:37:07	5.350	14.848
06-18-2013 13:38:07	5.282	14.989
06-18-2013 13:39:07	5.164	15.115
06-18-2013 13:40:07	5.234	15.028
06-18-2013 13:41:08	4.931	15.381
06-18-2013 13:42:08	4.908	15.421
06-18-2013 13:43:08	4.881	15.449
06-18-2013 13:44:08	5.025	15.276
06-18-2013 13:45:08	5.179	15.135

06-18-2013	13:46:08	5.520	14.660
06-18-2013	13:47:08	5.626	14.518
06-18-2013	13:48:08	5.343	14.851
06-18-2013	13:49:08	5.296	14.928
06-18-2013	13:50:08	5.186	15.084
06-18-2013	13:51:08	5.003	15.271
06-18-2013	13:52:08	4.838	15.516
06-18-2013	13:53:08	4.939	15.369
06-18-2013	13:54:08	5.127	15.202
06-18-2013	13:55:08	5.200	15.048
06-18-2013	13:56:08	5.447	14.805
06-18-2013	13:57:08	5.707	14.414
06-18-2013	13:58:08	5.726	14.352
06-18-2013	13:59:07	5.342	14.847
06-18-2013	14:00:07	5.092	15.167
06-18-2013	14:01:07	5.252	15.076
06-18-2013	14:02:07	5.373	14.845
06-18-2013	14:03:07	5.671	14.521
06-18-2013	14:04:07	6.180	13.856
06-18-2013	14:05:07	6.216	13.690
06-18-2013	14:06:07	5.626	14.460
06-18-2013	14:07:07	5.457	14.705
06-18-2013	14:08:07	5.660	14.535
06-18-2013	14:09:07	5.498	14.670
06-18-2013	14:10:07	4.881	15.438
06-18-2013	14:11:08	4.599	15.853
06-18-2013	14:12:08	5.456	14.872
06-18-2013	14:13:08	5.981	14.111
06-18-2013	14:14:08	5.864	14.149
06-18-2013	14:15:08	5.333	14.927
06-18-2013	14:16:08	5.044	15.243
06-18-2013	14:17:08	5.119	15.286
06-18-2013	14:18:08	5.566	14.709
06-18-2013	14:19:08	5.952	14.168

PM-3

Test Run 5 STRATA Version 3.2

	O2	CO2
	%	%
06-18-2013 14:20:08	5.591	14.595
06-18-2013 14:21:08	5.761	14.377

Run Averages

	O2	CO2
	%	%
06-18-2013 14:21:08	5.337	14.907

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack
Test Run 5 End

PM-3

Final System Bias Check, Run 5 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		

Run-3

Date/Time 06-18-2013 14:25:35 PASSED

Analyte	O2	CO2
Units	%	%
Zero Ref Cyl	0.000	0.000
Zero Cal	0.036	0.154
Zero Avg	0.048	0.421
Zero Bias%	0.1%	1.3%
Zero Drift%	0.0%	0.6%
Span Ref Cyl	11.450	9.910
Span Cal	11.495	9.950
Span Avg	11.423	10.083
Span Bias%	0.3%	0.7%
Span Drift%	-0.2%	0.2%
Ini Zero Avg	0.060	0.299
Ini Span Avg	11.471	10.047
Run Avg	5.337	14.907
Co	0.054	0.360
Cm	11.447	10.065
Correct Avg	5.309	14.854

System Bias Check End

Test Run 6 STRATA Version 3.2

PM-4

Begin calculating run averages

	O2 %	CO2 %
06-18-2013 15:01:10	5.384	14.931
06-18-2013 15:02:10	5.061	15.263
06-18-2013 15:03:10	4.810	15.639
06-18-2013 15:04:10	4.836	15.628
06-18-2013 15:05:10	5.096	15.303
06-18-2013 15:06:10	5.014	15.389
06-18-2013 15:07:10	4.961	15.442
06-18-2013 15:08:10	5.025	15.411
06-18-2013 15:09:10	5.075	15.288
06-18-2013 15:10:10	5.114	15.311
06-18-2013 15:11:10	5.182	15.185
06-18-2013 15:12:10	5.328	15.028
06-18-2013 15:13:10	5.412	14.901
06-18-2013 15:14:10	5.551	14.708
06-18-2013 15:15:10	5.362	14.967
06-18-2013 15:16:10	5.293	15.016
06-18-2013 15:17:10	5.058	15.340
06-18-2013 15:18:10	4.883	15.525
06-18-2013 15:19:10	4.899	15.555
06-18-2013 15:20:10	4.670	15.809
06-18-2013 15:21:10	5.060	15.410
06-18-2013 15:22:10	5.200	15.188
06-18-2013 15:23:10	5.289	15.048
06-18-2013 15:24:10	5.333	15.044
06-18-2013 15:25:10	5.362	14.957
06-18-2013 15:26:10	5.333	15.043
06-18-2013 15:27:10	5.188	15.182
06-18-2013 15:28:10	5.357	15.029
06-18-2013 15:29:10	5.398	14.924
06-18-2013 15:30:10	5.313	15.034
06-18-2013 15:31:10	5.291	15.104
06-18-2013 15:32:10	5.330	15.002
06-18-2013 15:33:10	5.111	15.312
06-18-2013 15:34:10	5.060	15.391
06-18-2013 15:35:10	5.303	15.088
06-18-2013 15:36:10	4.956	15.471
06-18-2013 15:37:10	4.920	15.545
06-18-2013 15:38:10	5.028	15.465
06-18-2013 15:39:10	5.308	15.074
06-18-2013 15:40:10	5.365	15.041
06-18-2013 15:41:10	5.237	15.163
06-18-2013 15:42:10	5.532	14.824
06-18-2013 15:43:09	5.659	14.620
06-18-2013 15:44:09	5.879	14.342
06-18-2013 15:45:10	5.651	14.591
06-18-2013 15:46:10	5.778	14.445
06-18-2013 15:47:10	5.854	14.377
06-18-2013 15:48:10	5.383	14.914
06-18-2013 15:49:10	5.318	15.078
06-18-2013 15:50:10	5.447	14.888
06-18-2013 15:51:10	5.566	14.741
06-18-2013 15:52:10	5.241	15.136
06-18-2013 15:53:10	5.405	14.923
06-18-2013 15:54:10	5.498	14.853
06-18-2013 15:55:10	5.427	14.891
06-18-2013 15:56:10	5.632	14.711
06-18-2013 15:57:10	5.753	14.492
06-18-2013 15:58:10	5.638	14.638
06-18-2013 15:59:10	5.457	14.881
06-18-2013 16:00:10	5.461	14.863
06-18-2013 16:01:10	5.352	15.024
06-18-2013 16:02:10	5.295	15.089
06-18-2013 16:03:10	5.468	14.948
06-18-2013 16:04:10	5.646	14.648
06-18-2013 16:05:10	5.674	14.619
06-18-2013 16:06:10	5.433	14.944
06-18-2013 16:07:10	5.703	14.601
06-18-2013 16:08:10	5.433	14.872
06-18-2013 16:09:10	4.893	15.549
06-18-2013 16:10:10	4.855	15.712
06-18-2013 16:11:10	5.378	15.080
06-18-2013 16:12:10	5.773	14.534
06-18-2013 16:13:10	5.737	14.549
06-18-2013 16:14:10	5.811	14.488
06-18-2013 16:15:10	5.828	14.422
06-18-2013 16:16:10	5.771	14.483
06-18-2013 16:17:10	5.354	15.053
06-18-2013 16:18:10	5.361	15.045
06-18-2013 16:19:10	5.681	14.687
06-18-2013 16:20:10	5.786	14.505
06-18-2013 16:21:10	5.788	14.513
06-18-2013 16:22:10	5.518	14.837
06-18-2013 16:23:10	5.601	14.754
06-18-2013 16:24:10	5.689	14.673

PM-4

06-18-2013 16:25:10	6.065	14.130
06-18-2013 16:26:10	5.925	14.335
06-18-2013 16:27:10	5.580	14.744
06-18-2013 16:28:10	5.378	15.054
06-18-2013 16:29:09	5.130	15.365
06-18-2013 16:30:10	5.213	15.265
06-18-2013 16:31:10	5.218	15.307
06-18-2013 16:32:10	5.778	14.556
06-18-2013 16:33:10	6.008	14.274
06-18-2013 16:34:10	5.649	14.662
06-18-2013 16:35:10	5.639	14.765
06-18-2013 16:36:10	5.573	14.822
06-18-2013 16:37:10	5.640	14.750
06-18-2013 16:38:10	5.363	15.045
06-18-2013 16:39:10	4.811	15.710
06-18-2013 16:40:10	4.608	16.090
06-18-2013 16:41:10	5.094	15.510
06-18-2013 16:42:10	5.582	14.872
06-18-2013 16:43:10	5.601	14.808
06-18-2013 16:44:10	5.580	14.809
06-18-2013 16:45:10	5.106	15.419
06-18-2013 16:46:10	5.012	15.537
06-18-2013 16:47:10	4.930	15.685
06-18-2013 16:48:09	5.040	15.523
06-18-2013 16:49:10	5.310	15.243
06-18-2013 16:50:10	5.538	14.934
06-18-2013 16:51:10	5.701	14.676
06-18-2013 16:52:10	5.235	15.220
06-18-2013 16:53:10	4.953	15.601
06-18-2013 16:54:10	4.420	16.253
06-18-2013 16:55:10	4.650	16.027
06-18-2013 16:56:10	5.177	15.447
06-18-2013 16:57:10	5.590	14.864
06-18-2013 16:58:10	5.994	14.331

Test Run 6 STRATA Version 3.2

	O2	CO2
	%	%
06-18-2013 16:59:10	5.619	14.764
06-18-2013 17:00:10	5.532	14.918

Run Averages

	O2	CO2
	%	%
06-18-2013 17:00:10	5.362	15.028

Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack
Test Run 6 End

PM-4

Final System Bias Check, Run 6 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: Ryegate
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		

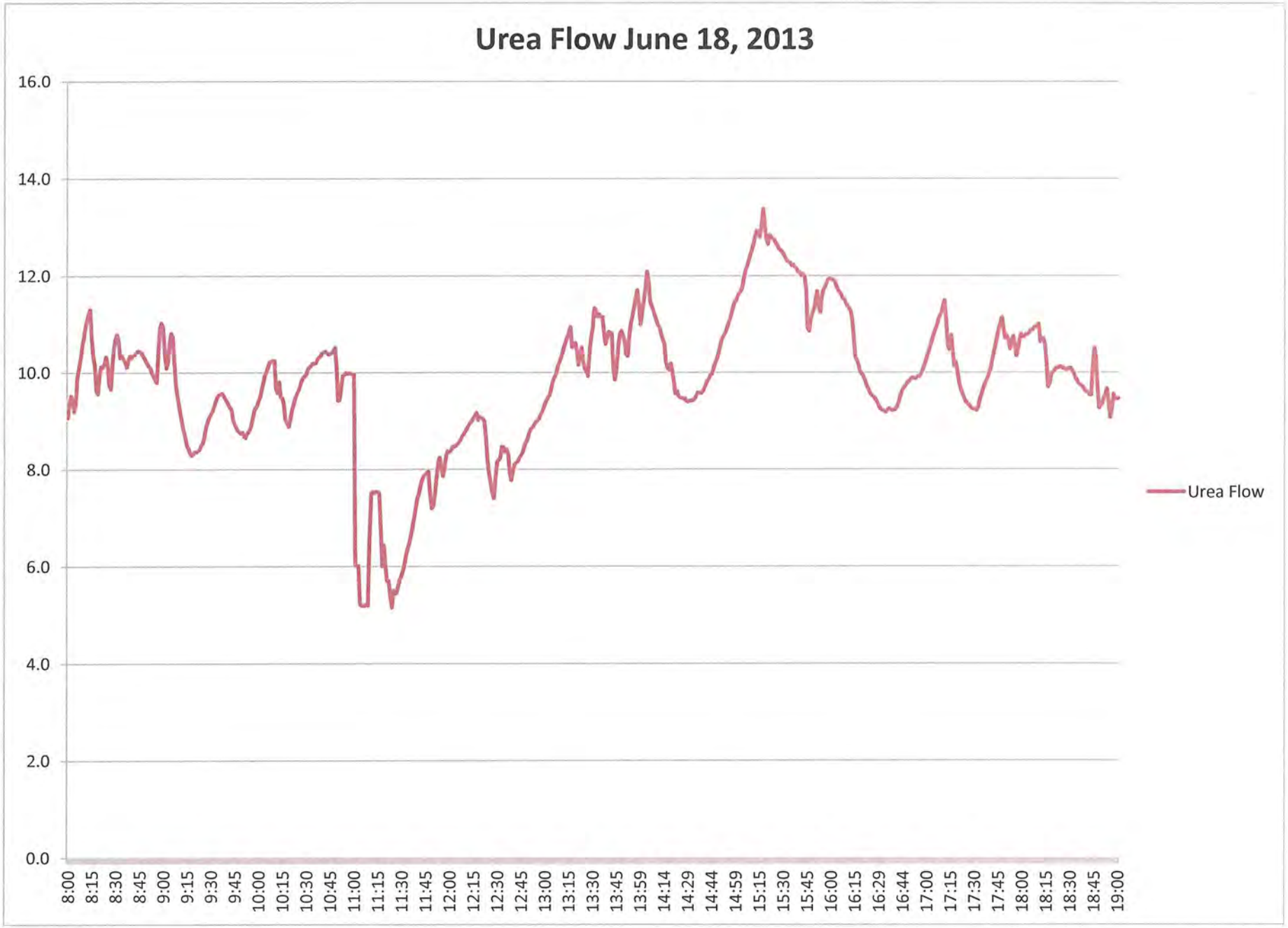
PM-4

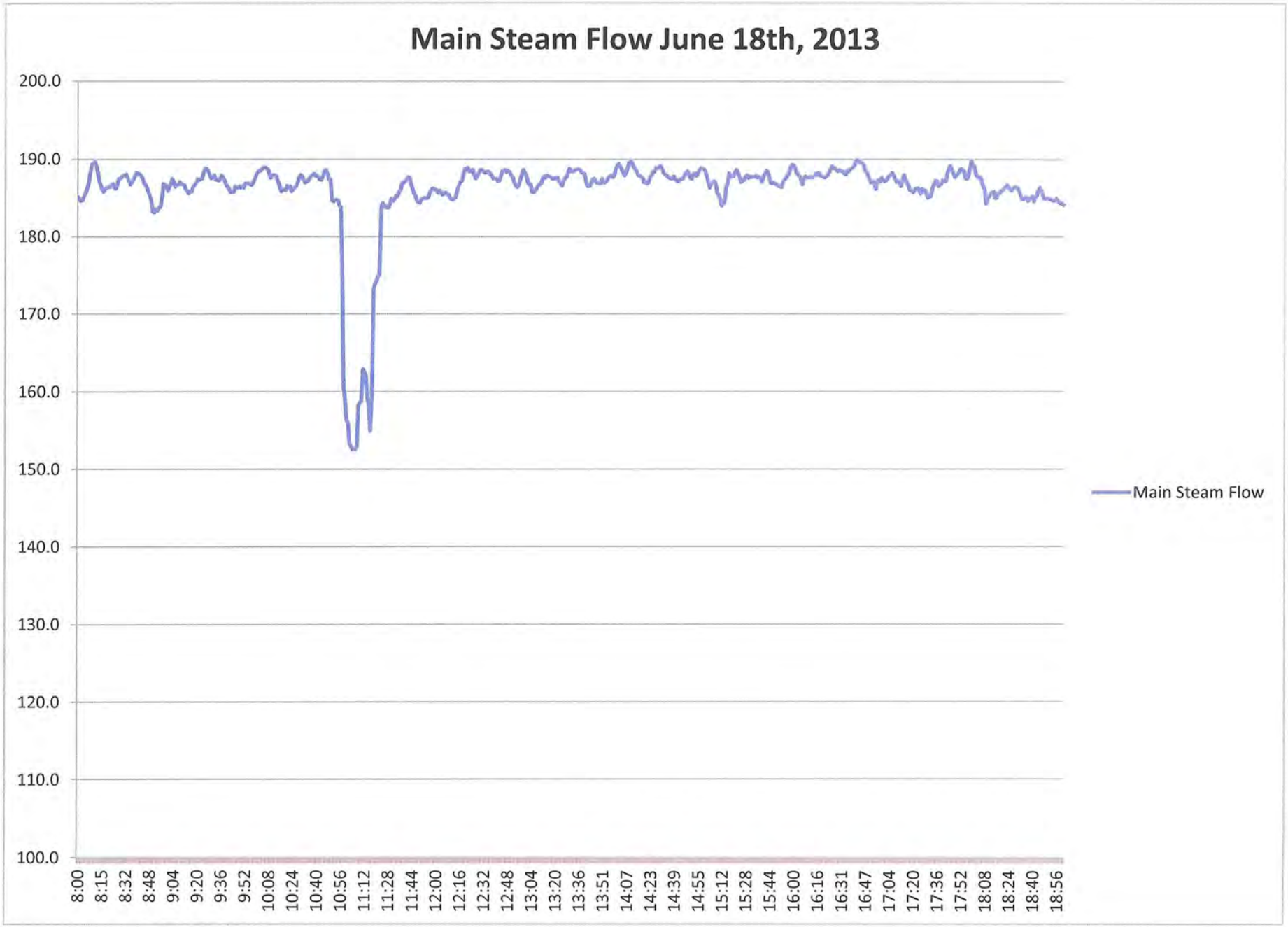
Date/Time 06-18-2013 17:06:10 PASSED

Analyte	O2	CO2
Units	%	%
Zero Ref Cyl	0.000	0.000
Zero Cal	0.036	0.154
Zero Avg	0.081	0.437
Zero Bias%	0.2%	1.4%
Zero Drift%	0.1%	0.1%
Span Ref Cyl	11.450	9.910
Span Cal	11.495	9.950
Span Avg	11.455	10.158
Span Bias%	0.2%	1.0%
Span Drift%	0.1%	0.4%
Ini Zero Avg	0.048	0.421
Ini Span Avg	11.423	10.083
Run Avg	5.362	15.028
Co	0.065	0.429
Cm	11.439	10.121
Correct Avg	5.332	14.927

System Bias Check End

Appendix F


Urea Flow June 18, 2013
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
8:00
8:15
8:30
8:45
9:00
9:15
9:30
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
13:59
14:14
14:29
14:44
14:59
15:15
15:30
15:45
16:00
16:15
16:29
16:44
17:00
17:15
17:30
17:45
18:00
18:15
18:30
18:45
19:00
Urea Flow


Main Steam Flow June 18th, 2013
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
8:00
8:15
8:32
8:48
9:04
9:20
9:36
9:52
10:08
10:24
10:40
10:56
11:12
11:28
11:44
12:00
12:16
12:32
12:48
13:04
13:20
13:36
13:51
14:07
14:23
14:39
14:55
15:12
15:28
15:44
16:00
16:16
16:31
16:47
17:04
17:20
17:36
17:52
18:08
18:24
18:40
18:56
Main Steam Flow

Report Generated: 6/19/2013 6:26

RTS = Range Test Status (if any)
|R-A| = Reference - Actual
|R-A|/S = Reference - Actual / Span

Calibration Results - Colors
Yellow: Warning/Pass
Red: Fail

Ryegate Power

From: 6/18/13 0:00 Through: 6/18/13 23:59

Unit #1 Calibration Results

Subject To:		Calibration Time	Span	Reference	Actual	RTS	Deviation	|A-R|	|A-R|/S
		6/18/2013 5:13:00AM							
Part 60	**U1_OPAC_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
Zero	High	06/18/13 05:06	100.0	0.0	-0.2		0.2	0.2	0.2
High	High	06/18/13 05:12	100.0	58.2	58.6		0.4	0.4	0.4
		6/18/2013 5:27:00AM							
Part 60	**U1_DP_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
Zero	High	06/18/13 05:17	2.5	0.0	0.0		0.0	0.0	0.0
High	High	06/18/13 05:19	2.5	1.6	1.6		0.0	0.0	0.0
Part 60	**U1_TEMP_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
Zero	High	06/18/13 05:17	500.0	50.0	48.6		1.4	1.4	0.3
High	High	06/18/13 05:19	500.0	450.0	449.6		0.4	0.4	0.1
		6/18/2013 5:46:00AM							
Part 60	**U1_CO_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
High	High	06/18/13 05:10	2,500.0	1,265.0	1,275.9		0.4	10.9	0.4
Zero	High	06/18/13 05:30	2,500.0	0.0	0.8		0.0	0.8	0.0
Part 60	**U1_CO2_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
High	High	06/18/13 05:10	25.0	13.6	13.7		0.1	0.1	0.4
Zero	High	06/18/13 05:30	25.0	0.0	0.0		0.0	0.0	0.0
Part 60	**U1_NH3_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
Zero	High	06/18/13 05:30	250.0	0.0	0.0		0.0	0.0	0.0
High	High	06/18/13 05:45	250.0	125.0	126.3		0.5	1.3	0.5

Report Generated: 6/19/2013 6:26

RTS = Range Test Status (if any)
|R-A| = Reference - Actual
|R-A|/S = Reference - Actual / Span

Calibration Results - Colors
Yellow: Warning/Pass
Red: Fail

Ryegate Power

From: 6/18/13 0:00 Through: 6/18/13 23:59

Unit #1 Calibration Results

Subject To:		Calibration Time	Span	Reference	Actual	RTS	Deviation	|A-R|	|A-R|/S
Part 60	**U1_NOX_P_Instrument, Used For Quality Assurance.**						**Calibration Result: Pass**		
High	High	06/18/13 05:20	250.0	122.0	122.3		0.1	0.3	0.1
Zero	High	06/18/13 05:30	250.0	0.0	0.0		0.0	0.0	0.0

Ryegate Power
PO box 5, East Ryegate, VT 05042
Unit #1

Daily Emission Summary

From: 2013/06/18 00:00:00 to 2013/06/18 23:59:00

SI = Invalid Data,	OD = OOC_Daily,
EV = Edited Value,	OM = OOC_Manual,
ES = Edited Status,	QA = Not Quality Assured,
M = Missing,	FF = Fatal Fault,
C = InCalibration,	OS = Out of Service
* = Excess Emission	

Hour	U1_CO_LbPerHr_1H	U1_CO_LbPerMBtu_1H	U1_NOx_LbPerHr_1H	U1_NOx_LbPerMBtu_1H	U1_StackTemp_DegF_1H
06/18/2013					
00	69.8	0.204	43.6	0.128	332.0
01	61.8	0.180	43.7	0.127	331.4
02	62.8	0.183	43.2	0.126	332.9
03	72.2	0.209	43.4	0.126	332.6
04	66.4	0.193	43.6	0.126	333.4
05	0.0SIC	0.000SIC	0.0SIC	0.000SIC	332.2
06	61.8	0.183	43.0	0.128	332.7
07	63.8	0.188	42.9	0.126	334.7
08	59.9	0.174	43.1	0.125	335.7
09	51.8	0.151	42.5	0.123	335.2
10	61.3	0.182	42.1	0.125	336.9
11	88.6	0.259	43.1	0.126	335.8
12	66.0	0.191	43.9	0.127	336.6
13	61.3	0.177	43.7	0.126	336.5
14	65.6	0.191	43.3	0.126	336.7
15	77.4	0.225	43.0	0.125	339.1
16	62.2	0.181	43.4	0.126	338.2
17	53.6	0.154	44.0	0.126	318.6
18	50.6	0.149	43.4	0.128	337.2
19	57.1	0.168	43.9	0.129	335.9
20	60.4	0.176	43.1	0.125	334.5
21	65.2	0.189	43.2	0.125	333.6
22	59.9	0.174	43.8	0.127	333.3
23	60.1	0.174	43.6	0.126	332.0
Daily Statistics:					
Avg. =	63.5	0.190	43.3	0.130	334.1
Max. =	88.6	0.260	44.0	0.130	339.1
Min. =	50.6	0.150	42.1	0.120	318.6
% SI =	4.17	4.17	4.17	4.17	0.00
% M =	0.00	0.00	0.00	0.00	0.00
% C =	4.17	4.17	4.17	4.17	0.00
% NQA =	4.17	4.17	4.17	4.17	0.00
% Valid =	95.83	95.83	95.83	95.83	100.00

Ryegate Power
PO box 5, East Ryegate, VT 05042
Unit #1

Daily Emission Summary

From: 2013/06/18 00:00:00 to 2013/06/18 23:59:00

SI = Invalid Data,	OD = OOC_Daily,
EV = Edited Value,	OM = OOC_Manual,
ES = Edited Status,	QA = Not Quality Assured,
M = Missing,	FF = Fatal Fault,
C = InCalibration,	OS = Out of Service
* = Excess Emission	

Hour	U1_CO_Ppm_1H	U1_NOx_Ppm_1H	U1_NH3_Ppmvdc_1H	U1_CO2_Pct_1H	U1_StackFlow_scfm_1H	U1_StackTemp_DegF_1H
06/18/2013						
00	180.7	68.7	13	11.75	88,670.4	332.0
01	161.0	69.3	13	11.88	88,081.2	331.4
02	163.8	68.5	14	11.88	87,997.8	332.9
03	188.1	68.8	14	11.95	88,014.5	332.6
04	172.9	69.0	13	11.92	88,114.0	333.4
05	0.0SIC	0.0SIC	0SIC	0.00SIC	88,228.7	332.2
06	162.8	69.0	14	11.81	87,091.4	332.7
07	168.0	68.7	12	11.90	87,127.1	334.7
08	155.3	68.0	12	11.90	88,416.4	335.7
09	134.1	66.9	13	11.84	88,634.6	335.2
10	161.1	67.3	11	11.77	87,296.2	336.9
11	232.6	68.9	12	11.96	87,356.6	335.8
12	170.9	69.2	13	11.87	88,556.7	336.6
13	158.7	68.9	14	11.91	88,609.7	336.5
14	170.7	68.5	15	11.90	88,217.9	336.7
15	202.1	68.3	13	11.93	87,847.0	339.1
16	161.4	68.5	14	11.87	88,372.9	338.2
17	136.4	68.2	12	11.79	90,149.3	318.6
18	131.7	68.8	12	11.75	88,142.6	337.2
19	148.3	69.5	13	11.76	88,262.3	335.9
20	157.2	68.2	14	11.88	88,148.8	334.5
21	169.7	68.4	14	11.91	88,150.8	333.6
22	155.2	69.0	12	11.88	88,550.0	333.3
23	155.4	68.5	12	11.87	88,765.8	332.0
Daily Statistics:						
Avg. =	165.1	68.6	13	11.86	88,200.1	334.1
Max. =	232.6	69.5	15	11.96	90,149.3	339.1
Min. =	131.7	66.9	11	11.75	87,091.4	318.6
% SI =	4.17	4.17	4.17	4.17	0.00	0.00
% M =	0.00	0.00	0.00	0.00	0.00	0.00
% C =	4.17	4.17	4.17	4.17	0.00	0.00
% NQA =	4.17	4.17	4.17	4.17	0.00	0.00
% Valid =	95.83	95.83	95.83	95.83	100.00	100.00

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)

06-18-13 10:51 (9:51 DAS TIME)

PPC - Electrical Readings - Instantaneous

T/R	Type	VAC	AAC	KVDC	KVpk	mADC	SPM/APM	Duty	KW
TR1	GVC DSP	175	30	31	n/a	128	46/0	67%	4.0
TR2	GVC DSP	281	86	43	n/a	411	48/0	106%	17.7
TR3	GVC DSP	376	111	53	n/a	609	0/0	135%	32.3
TR4	GVC DSP	381	111	54	n/a	615	0/0	141%	33.2
TR5	GVC DSP	380	111	53	n/a	607	0/0	140%	32.2

INSTANTANEOUS

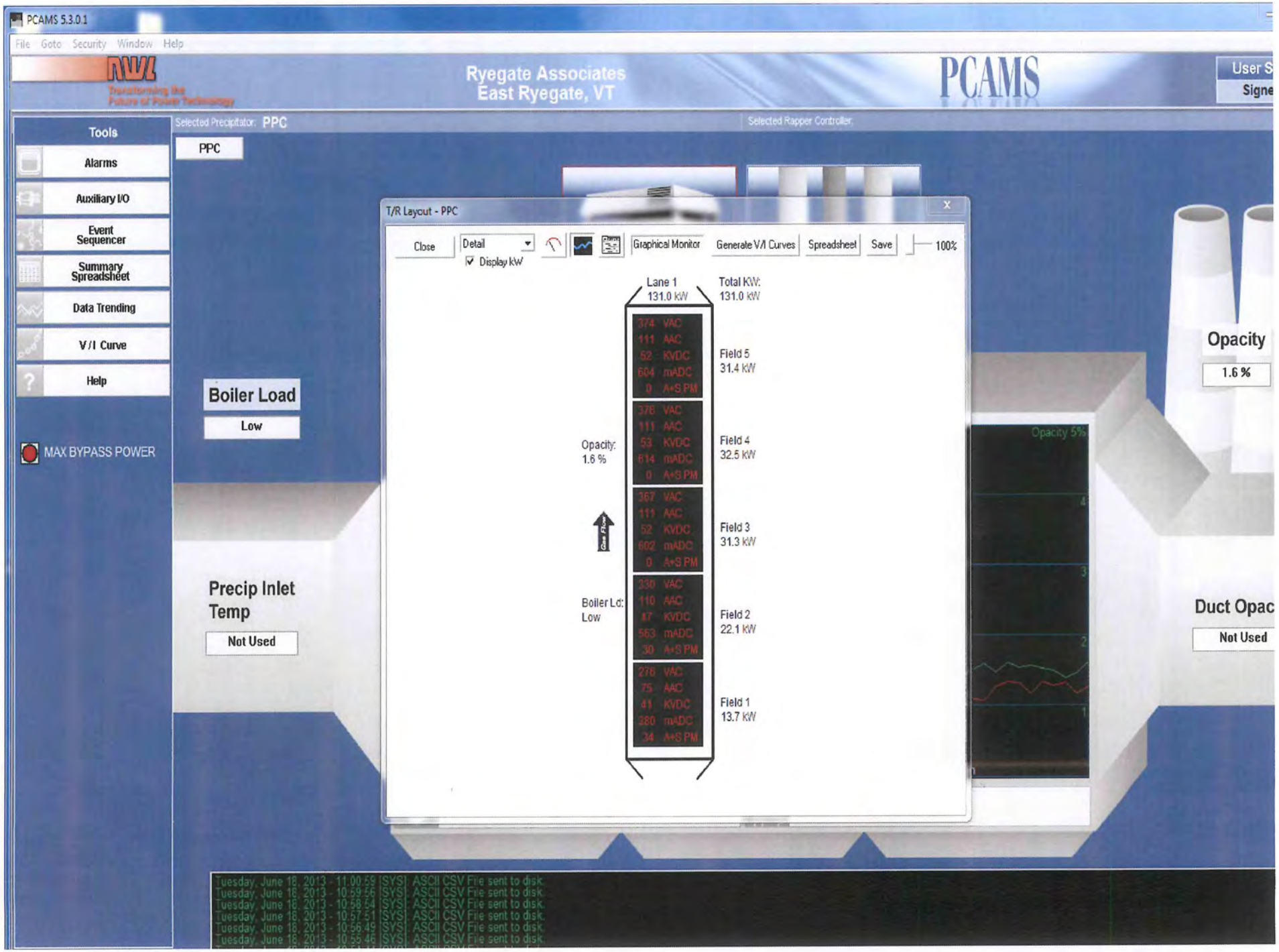
PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 10:52 (9:52 DAS TIME)

PPC - Electrical Readings - Instantaneous

T/R	Type	VAC	AAC	KVDC	KVpk	mADC	SPM/APM	Duty	KW
TR1	GVC DSP	281	74	42	n/a	376	44/1	105%	15.8
TR2	GVC DSP	327	105	47	n/a	528	27/0	122%	24.8
TR3	GVC DSP	373	111	52	n/a	606	0/0	134%	31.5
TR4	GVC DSP	378	112	53	n/a	615	0/0	140%	32.6
TR5	GVC DSP	377	112	53	n/a	612	0/0	135%	32.4

SOOT BLOW INSTANTANEOUS [illegible] AM
DAS TIME



SOOT BLOW INSTANTANEOUS 10:08 AM
DAS TIME

PCAMS 5.3.0.1

File Goto Security Window Help

Ryegate Associates
East Ryegate, VT

PCAMS

User Sig
Signed

Tools
- Alarms
- Auxiliary I/O
- Event Sequencer
- Summary Spreadsheet
- Data Trending
- V / I Curve
- Help

MAX BYPASS POWER

Selected Precipitator: PPC

Selected Rapper Controller

PPC

Boiler Load
0.0 MW

Precip Inlet Temp
Not Used

Opacity
1.6 %

Duct Opacit
Not Used

Opacity 5%

T/R Layout - PPC

Close | Detail | Display kW | Graphical Monitor | Generate V/I Curves | Spreadsheet | Save | 100%

Lane 1
135.0 kW

Total KW:
135.0 kW

Opacity:
1.6 %

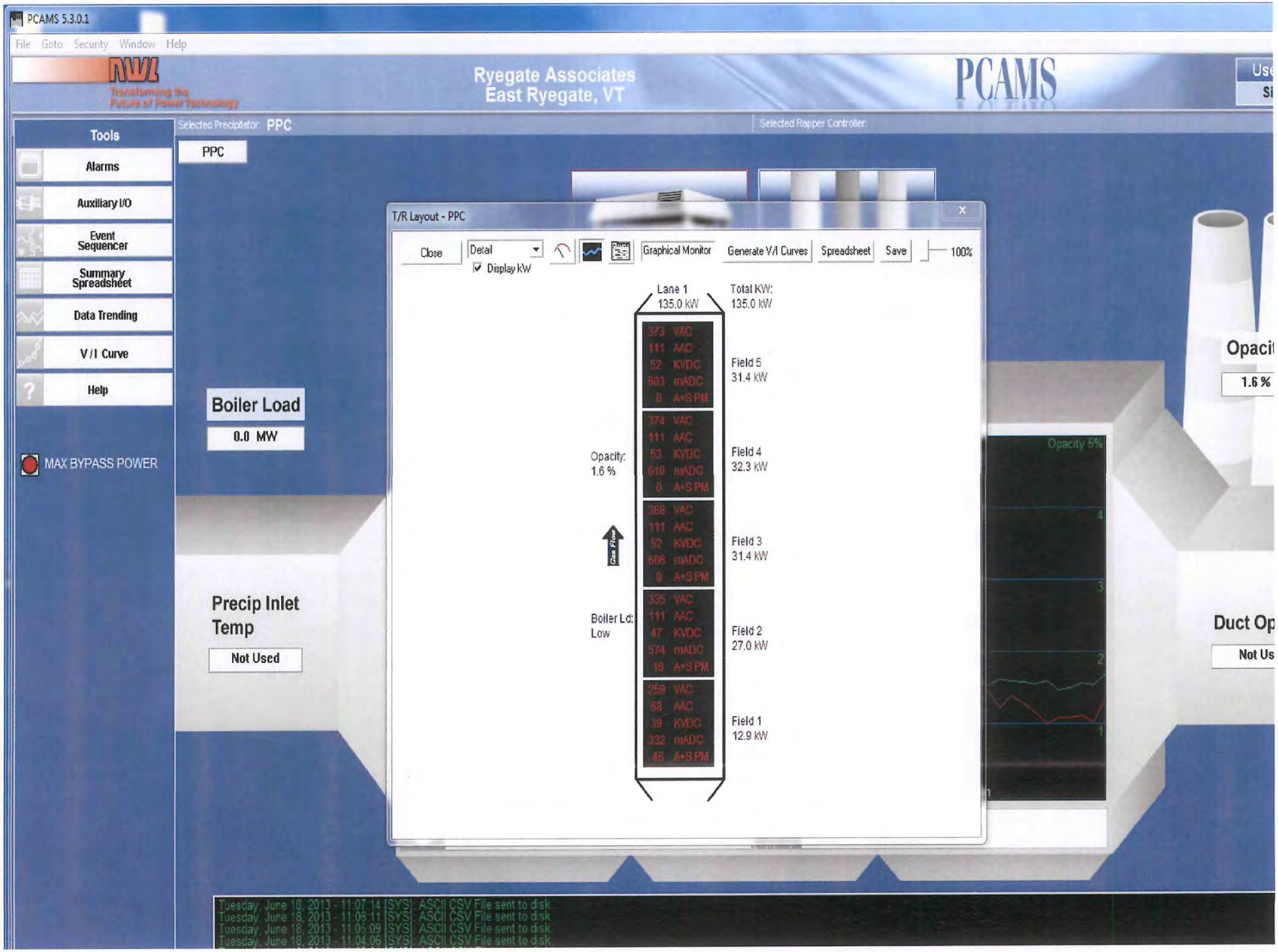
Boiler Ld:
Low

373	VAC	111	AAC	52	KVDC
503	mADC	0	A+S PM		
Field 5	31.4 kW				
374	VAC	111	AAC	53	KVDC
510	mADC	0	A+S PM		
Field 4	32.3 kW				
368	VAC	111	AAC	52	KVDC
506	mADC	0	A+S PM		
Field 3	31.4 kW				
335	VAC	111	AAC	47	KVDC
574	mADC	18	A+S PM		
Field 2	27.0 kW				
259	VAC	68	AAC	39	KVDC
332	mADC	46	A+S PM		
Field 1	12.9 kW				

Tuesday, June 18, 2013 - 11:07:14 [SYS]: ASCII CSV File sent to disk.
Tuesday, June 18, 2013 - 11:06:11 [SYS]: ASCII CSV File sent to disk.
Tuesday, June 18, 2013 - 11:05:09 [SYS]: ASCII CSV File sent to disk.
Tuesday, June 18, 2013 - 11:04:06 [SYS]: ASCII CSV File sent to disk.
Tuesday, June 18, 2013 - 11:03:04 [SYS]: ASCII CSV File sent to disk.
Tuesday, June 18, 2013 - 11:02:01 [SYS]: ASCII CSV File sent to disk.
Tuesday, June 18, 2013 - 11:00:59 [SYS]: ASCII CSV File sent to disk.

T/R Spreadsheet - PPC

INSTANTANEOUS NO SOOT BLOW
10:27 AM DAS TIME



PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 09:14

PPC - Electrical Readings - Instantaneous

T/R	Type	VAC	AAC	KVDC	KVpk	mADC	SPM/APM	Duty	KW
TR1	GVC DSP	221	48	36	n/a	218	18/0	81%	7.3
TR2	GVC DSP	215	53	36	n/a	228	14/0	80%	8.2
TR3	GVC DSP	103	12	23	n/a	49	0/0	43%	1.1
TR4	GVC DSP	99	11	23	n/a	45	0/0	46%	1.0
TR5	GVC DSP	99	12	22	n/a	48	0/0	45%	1.1

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 09:15

PPC - Electrical Readings - Instantaneous

T/R	Type	VAC	AAC	KVDC	KVpk	mADC	SPM/APM	Duty	KW
TR1	GVC DSP	251	63	39	n/a	305	24/0	93%	11.9
TR2	GVC DSP	262	78	41	n/a	361	13/0	96%	14.8
TR3	GVC DSP	102	11	23	n/a	49	0/0	45%	1.1
TR4	GVC DSP	101	11	23	n/a	48	0/0	47%	1.1
TR5	GVC DSP	99	11	22	n/a	47	0/0	45%	1.0

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 11:59 (10:59 DAS Time)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	248	60	38	300	44	187232280		92	12.1
TR2	GVC DSP	290	88	43	440	22	187232280		108	19.9
TR3	GVC DSP	368	111	51	604	0	187232280		131	31.4
TR4	GVC DSP	374	111	52	611	0	187232280		137	32.4
TR5	GVC DSP	372	111	51	603	0	187232280		134	31.4

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 13:00 (12:00 DAS TIME)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	234	53	37	256	23	187232280		85	9.9
TR2	GVC DSP	247	69	39	317	9	187232280		89	12.8
TR3	GVC DSP	102	11	23	48	0	187232280		44	1.1
TR4	GVC DSP	100	11	22	46	0	187232280		46	1.1
TR5	GVC DSP	98	11	22	47	0	187232280		44	1.1

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 14:00 (13:00 DAS TIME)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	235	52	37	249	22	187232280		84	9.7
TR2	GVC DSP	255	71	40	330	8	187232280		92	13.5
TR3	GVC DSP	101	11	22	48	0	187232280		43	1.1
TR4	GVC DSP	99	11	22	46	0	187232280		46	1.1
TR5	GVC DSP	98	11	22	47	0	187232280		43	1.1

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 15:01 (14:01 DAS TIME)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	214	44	35	203	22	187232280		77	7.5
TR2	GVC DSP	258	73	40	337	7	187232280		92	13.9
TR3	GVC DSP	102	11	23	48	0	187232280		43	1.1
TR4	GVC DSP	99	11	22	46	0	187232280		46	1.1
TR5	GVC DSP	98	11	22	47	0	187232280		43	1.0

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 16:02 (15:02 DAS TIME)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	211	43	35	201	23	187232280		76	7.3
TR2	GVC DSP	257	72	40	334	10	187232280		92	13.7
TR3	GVC DSP	102	11	23	48	0	187232280		43	1.1
TR4	GVC DSP	99	11	22	46	0	187232280		45	1.1
TR5	GVC DSP	98	11	22	48	0	187232280		43	1.1

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 17:03 (16:03 DAS TIME)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	208	42	35	191	24	187232280		74	7.0
TR2	GVC DSP	248	68	39	314	10	187232280		89	12.7
TR3	GVC DSP	102	11	23	47	0	187232280		43	1.1
TR4	GVC DSP	99	11	22	46	0	187232280		45	1.1
TR5	GVC DSP	97	11	22	47	0	187232280		42	1.0

PCAMSPRINT

(c) NWL Transformers PCAMS for Windows(r)
06-18-13 18:04 (17:04 DAS TIME)

PPC - Electrical Readings - Average (60 minute interval)

T/R	Type	VAC	AAC	KVDC	mADC	SPM	APM	Cond.	KW	
TR1	GVC DSP	221	47	36	216	23	187232280		79	8.1
TR2	GVC DSP	247	67	39	310	8	187232280		88	12.6
TR3	GVC DSP	101	11	23	47	0	187232280		43	1.1
TR4	GVC DSP	99	11	22	46	0	187232280		45	1.1
TR5	GVC DSP	97	11	22	47	0	187232280		43	1.1

Appendix G

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 0645 - 0857

Run : M5-1

Filter No. : 8578

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.0518 "Hg
Pitots: 0.053 "H_2O

Final Rate:
Probe: 0.00812 "Hg
Pitots: 0.053 "H_2O

Initial Meter Reading: 808.034

Final Meter Reading: 855.084

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	1	.98	1.96	808.5	75	75	50	332	327	7
	6	2	.98	1.96	812.8	80	75	53	333	320	7
	9	3	.96	1.92	815.1	82	76	56	333	318	7
	12	4	.96	1.92	817.7	85	77	60	334	321	7
	15	5	1.00	2.00	819.8	86	77	62	334	320	7
	18	6	.96	1.92	822.2	88	78	62	334	319	7
	21	7	.96	1.92	825.0	89	79	64	336	319	7
	24	8	.94	1.88	826.9	89	79	64	337	321	7
	27	9	.94	1.88	829.3	90	80	63	337	321	7
	30	10	.96	1.92	831.8	92	81	63	336	320	7
	33	11	.96	1.92	834.0	93	81	63	337	320	7
	36	12	.96	1.92	836.5	94	82	64	337	319	7
	39	13	.98	1.96	838.8	96	84	64	337	320	7
	42	14	.94	1.88	841.2	96	84	64	338	319	7
	45	15	.92	1.84	843.0	97	85	64	340	319	7
	48	16	.92	1.84	845.8	97	85	64	339	318	7
	51	17	.89	1.78	848.2	97	86	64	339	321	7
	54	18	.80	1.60	850.9	96	86	64	340	320	6
	57	19	.80	1.60	852.8	95	87	65	340	321	6
	60	20	.80	1.60	855.0	95	87	65	339	321	6

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: MD
CEMS: SMac

Conditions:
Pbar : 29.42
Static P : -0.75

O_2 5.35
CO_2 14.84

Moisture Data:

Gross	Tare	Net
324	100	224 ml
350	100	250 ml
46	0	46 ml
576	550	26.6 g

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 0645 - 0853

Run : M5-1

Filter No. : 3574

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.00618 "Hg
Pitots: 0.053 "H_2O

Final Rate:
Probe: 0.00612 "Hg
Pitots: 0.053 "H_2O

Initial Meter Reading: 855.040

Final Meter Reading: 900.816

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	1	.82	1.64	857.5	86	84	58	338	319	6
	6	2	.77	1.54	859.3	87	84	55	338	321	6
	9	3	0.77	1.54	861.5	87	83	55	337	320	6
	12	4	0.88	1.76	863.7	87	82	55	337	320	7
	15	5	0.88	1.76	866.0	88	82	55	338	321	7
	18	6	0.88	1.76	868.7	88	82	56	331	320	7
	21	7	.95	1.90	870.9	89	82	56	338	320	7
	24	8	.95	1.90	872.8	89	82	57	337	320	7
	27	9	.98	1.96	875.6	90	82	58	337	320	7
	30	10	1.00	2.00	878.0	91	82	59	339	321	7
	33	11	.98	1.96	880.5	91	82	59	339	318	7
	36	12	.98	1.96	882.4	91	83	60	338	319	7
	39	13	.94	1.88	884.9	92	83	61	339	319	7
	42	14	.94	1.88	887.1	92	83	61	340	321	7
	45	15	.91	1.82	889.4	92	83	62	339	321	7
	48	16	.93	1.86	891.7	92	83	62	339	319	7
	51	17	.94	1.88	894.1	91	83	62	338	321	7
	54	18	.86	1.72	896.4	91	83	64	337	320	7
	57	19	.82	1.64	898.8	91	83	65	338	321	6
	60	20	.82	1.64		91	83	66	330	320	6

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: MD
CEMS: SMac

Conditions:
Pbar : 29.42
Static P : -0.75

Moisture Data:

Gross	Tare	Net
324	100	224 ml
350	100	250 ml
46	0	46 ml
576.6	550	26.6 g

O_2 5.35
CO_2 14.84

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 0935-1149

Run : M5-2

Filter No. : 3579

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.00514 "Hg
Pitots: 0.083 "H_2O

Final Rate:
Probe: 0.00512 "Hg
Pitots: 0.087 "H_2O

Initial Meter Reading: 900.897

Final Meter Reading: 946.140

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	B 1	.78	1.56	903.0	80	79	58	317	315	5
	6	2	.81	1.62	905.3	83	79	57	319	319	6
	9	3	.74	1.48	907.5	88	80	59	318	321	5
	12	4	.76	1.52	909.5	89	81	60	318	322	5
	15	5	.84	1.68	911.8	91	81	60	316	319	6
	18	6	.90	1.80	913.9	94	83	61	336	325	6
	21	7	.84	1.68	916.1	96	84	62	337	320	6
	24	8	.86	1.72	918.4	97	85	62	338	319	6
	27	9	.84	1.68	920.6	100	87	61	339	321	6
	30	10	.84	1.68	923.0	101	88	62	339	320	6
	33	11	.84	1.68	925.4	102	89	62	338	320	6
	36	12	.88	1.76	927.9	103	91	62	340	321	6
	39	13	.80	1.60	930.3	104	92	63	339	320	6
	42	14	.82	1.64	931.8	105	94	63	340	320	6
	45	15	.96	1.92	934.8	106	95	63	338	320	7
	48	16	.96	1.92	938.9	106	95	62	339	319	7
	51	17	.98	1.96	939.1	106	97	59	339	320	7
	54	18	1.00	2.00	941.5	108	97	59	337	320	7
	57	19	.86	1.72	943.8	108	98	59	336	319	6
	60	20	.84	1.68	946.1	109	99	59	331	321	6

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: MD
CEMS: SMac

Conditions:
Pbar 29.44
Static P : -0.62

Moisture Data:

Gross	Tare	Net
350	100	250 ml
354	100	254 ml
22	0	22 ml
569.6	550	19.6 g

O_2 5.43
CO_2 14.77

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 0935 - 1149

Run : M5-2

Filter No. : 3579

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.00614 "Hg
Pitots: 0.053 "H_2O

Final Rate:
Probe: 0.00612 "Hg
Pitots: 0.053 "H_2O

Initial Meter Reading: 946.140

Final Meter Reading: 992.805

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	A 1	.90	1.80	948.5	108	104	57	328	319	7
	6	2	.92	1.84	950.7	110	104	55	330	320	7
	9	3	.92	1.84	953.0	111	105	56	329	319	7
	12	4	.98	1.96	955.0	112	105	57	329	320	7
	15	5	.95	1.90	957.8	112	105	58	329	320	7
	18	6	.90	1.80	959.3	112	105	59	330	320	7
	21	7	.96	1.92	962.6	112	104	61	338	320	7
	24	8	.96	1.92	965.0	111	104	62	339	321	7
	27	9	.94	1.88	967.7	110	104	64	338	320	7
	30	10	.85	1.70	969.7	109	103	65	339	320	6
	33	11	.88	1.76	972.2	108	103	65	340	321	6
	36	12	.81	1.62	974.4	105	101	66	340	321	6
	39	13	.89	1.78	976.6	104	101	65	339	320	6
	42	14	.91	1.82	978.9	102	99	63	339	319	7
	45	15	.92	1.84	981.7	100	97	62	338	319	7
	48	16	.92	1.84	983.5	99	96	62	338	320	7
	51	17	.98	1.96	986.1	99	96	62	340	320	7
	54	18	.92	1.84	988.6	99	95	64	337	320	7
	57	19	.85	1.70	990.4	99	94	64	337	320	6
	60	20	.85	1.70	992.8	99	94	65	333	319	6

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: STD
CEMS: SMac

Conditions:
Pbar : 29.44
Static P : -0.62

Moisture Data:

Gross	Tare	Net
350	100	250 ml
354	100	254 ml
22	0	22 ml
569.6	550	19.6 g

O_2 5.43

O_2 19.77

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 1220 – 1429

Run : M5-3

Filter No. : 3586

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.00615 "Hg
Pitots: 0.053 "H_2O

Final Rate:
Probe: 0.08613 "Hg
Pitots: 0.053 "H_2O

Initial Meter Reading: 1039.289

Final Meter Reading: 1085.222

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	1								[illegible]	6
	6	2								[illegible]	7
	9	3									[illegible]
	12	4									
	15	5									
	18	6									
	21	7									
	24	8									
	27	9									
	30	10									
	33	11									
	36	12									
	39	13									
	42	14									
	45	15									
	48	16	.84	1.68	075.2	111	[illegible]				
	51	17	.87	1.74	078.3	111	109				
	54	18	.86	1.72	080.6	110	108				
	57	19	.89	1.78	082.9	110	108			319	7
	60	20	.82	1.64	085.2	111	107	58	336	320	7
											[illegible]

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: MD
CEMS: SMac

Conditions:
Pbar : 29.49
Static P : -0.71

Moisture Data:

Gross	Tare	Net
324	100	224 ml
350	100	250 ml
38	0	38 ml
569.2	550	19.2 g

O_2 5.31
CO_2 14.85

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 1220 - 1429

Run : M5-3

Filter No. : 3586

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.00615 "Hg
Pitots: 0.053 "H_2O

Final Rate:
Probe: 0.00613 "Hg
Pitots: 0.053 "H_2O

Initial Meter Reading: 992.880

Final Meter Reading: [illegible]284

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Filter Temp	Pump Vac
	3	1								[illegible]	6
	6	2									6
	9	3									
	12	4									
	15	5									
	18	6									
	21	7									
	24	8									
	27	9									
	30	10									
	33	11									
	36	12									
	39	13									
	42	14									
	45	15	.98	1.96	027.4	118					
	48	16	.95	1.90	029.9	118					
	51	17	.96	1.92	032.2	119					
	54	18	.93	1.86	034.6	120	114				
	57	19	.90	1.80	037.0	121	112		[illegible]	319	7
	60	20	.84	1.68	039.2	121	113	66	334	321	6

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : GS
Probe: MD
CEMS: SMac

Conditions:
Pbar : 29.44
Static P : -0.71

Moisture Data:

Gross	Tare	Net
324	100	224 ml
350	100	250 ml
38	0	38 ml
569.2	550	19.2 g

O_2 5.31

CO_2 14.85

CEM Services 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 1500 - 1710

Run : M5-4

Filter No. : 3587

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.02515 "Hg
Pitots: 0.063 "H_2O

Final Rate:
Probe: 0.02515 "Hg
Pitots: 0.063 "H_2O

Initial Meter Reading: 085.298

Final Meter Reading: 131.404

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	B 1	.77	1.54	087.8	108	110	66	319	312	6
	6	2	.72	1.48	090.2	111	110	66	337	323	6
	9	3	.76	1.52	092.6	112	110	65	336	318	6
	12	4	.89	1.78	094.9	111	109	64	340	320	7
	15	5	.92	1.84	096.3	111	109	64	341	320	7
	18	6	.90	1.80	098.5	111	109	63	341	319	7
	21	7	1.05	2.10	100.9	111	108	62	340	320	8
	24	8	1.00	2.00	103.4	110	107	61	340	320	7
	27	9	.94	1.88	105.8	111	106	61	341	322	7
	30	10	.94	1.88	108.4	111	106	61	342	319	7
	33	11	.91	1.82	110.9	112	106	60	342	319	7
	36	12	.90	1.80	112.8	113	106	61	341	321	7
	39	13	.90	1.80	115.1	113	107	61	343	318	7
	42	14	.95	1.90	117.6	113	107	61	343	320	7
	45	15	.88	1.76	120.0	113	107	62	342	321	7
	48	16	.88	1.76	122.4	113	107	62	343	321	7
	51	17	.84	1.68	124.5	112	107	63	340	320	7
	54	18	.85	1.70	127.0	112	107	64	342	320	7
	57	19	.86	1.72	129.3	112	107	65	343	320	7
	60	20	.75	1.50	131.4	111	107	62	338	321	6

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: MD
CEMS: SMac

Conditions:
Pbar : 29.44
Static P : -0.64

Moisture Data:

Gross	Tare	Net
336	100	236 ml
346	100	246 ml
32	0	32 ml
566.1	550	16.1 g

O_2 5.33
CO_2 14.93

METHOD 5 SAMPLING DATA SHEET

Facility: Ryegate Power

Unit : Wood Fired Boiler

Date : 6/18/2013

Run Time : 1500 – 1711

Run : M5-4

Filter No. : 3587

Nozzle No.: .250

Leak Test Data

Initial Rate:
Probe: 0.02615 "Hg
Pitots: 0.083 "H_2O

Final Rate:
Probe: 0.02615 "Hg
Pitots: 0.083 "H_2O

Initial Meter Reading: 131.404

Final Meter Reading: 177.471

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	DGM IN	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3	A 1	.85	1.70	132.5	104	104	61	330	322	7
	6	2	.77	1.54	135.7	106	104	56	336	319	6
	9	3	.87	1.74	138.0	107	104	57	336	321	7
	12	4	.92	1.84	140.2	108	103	58	339	320	7
	15	5	.92	1.84	142.6	108	103	58	339	318	7
	18	6	1.00	2.00	144.9	109	103	59	338	321	8
	21	7	.97	1.94	147.2	109	104	60	337	320	7
	24	8	.97	1.94	149.6	111	104	61	336	320	7
	27	9	.89	1.78	151.9	112	104	62	336	319	7
	30	10	.89	1.78	154.2	112	105	63	336	320	7
	33	11	.78	1.56	156.8	113	106	64	340	320	7
	36	12	.77	1.54	159.1	114	106	64	340	320	7
	39	13	.84	1.68	160.9	114	107	61	340	321	7
	42	14	.84	1.68	163.1	114	107	59	341	319	7
	45	15	.93	1.86	165.7	113	107	58	341	321	7
	48	16	1.05	2.10	168.0	112	106	57	341	320	8
	51	17	.96	1.92	170.3	112	106	57	338	324	8
	54	18	0.96	1.92	172.7	112	106	57	340	321	8
	57	19	.77	1.54	175.1	112	105	57	339	320	7
	60	20	.77	1.54	177.4	112	105	58	337	321	7

General:
Box No: 2
Delta H@: 1.66
Gamma Y: 1.0171

Operators:
Box : CS
Probe: MD
CEMS: SMac

Conditions:
Pbar : 29.44
Static P : -0.64

Moisture Data:

Gross	Tare	Net
336	100	236 ml
346	100	246 ml
32	0	32 ml
566.1	550	16.1 g

O_2 5.33
CO_2 14.93

Appendix H

METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	MB-2
Console Serial Number	MB-2
DGM Model Number	DGM-175
DGM Serial Number	MB-2-175

Calibration Conditions		
Date / Time	16-Jul-13	15:30
Barometric Pressure	29.7	in Hg
Theoretical Critical Vacuum	14.0	in Hg
Calibration Technician	C.B.	

Factors/Constants		
Std Temp	528	°R
Std Press	29.92	in Hg
K[1]	17.647	cfM/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[1]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 \cdot °R^{1/2})/(in.Hg \cdot min)$.

Calibration Data

Run Time Elapsed	DGM Orifice ΔH	Metering Console Volume Initial	Metering Console Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Critical Orifice Coefficient	Critical Orifice Amb Temp Initial	Critical Orifice Amb Temp Final	Critical Orifice Actual Vacuum
min	in H2O	cubic feet	cubic feet	°F	°F		cu ft/min/in Hg	°F	°F	in Hg
10.0	1.7	22.250	29.355	82	84	3	0.5502	80	80	12
10.0	1.7	29.500	36.650	84	86	3	0.5502	81	81	12
10.0	1.7	36.700	43.850	86	87	3	0.5502	81	82	12

Results

Standardized Data: Dry Gas Meter ($V_{m(std)}$)	Standardized Data: Dry Gas Meter ($Q_{m(std)}$)	Standardized Data: Critical Orifice ($V_{cr(std)}$)	Standardized Data: Critical Orifice ($Q_{cr(std)}$)	Dry Gas Meter: Calibration Factor Value (Y)	Dry Gas Meter: Calibration Factor Variation (Δ)	Dry Gas Meter: Flowrate Std & Corr ($Q_{m(std)(corr)}$)	Dry Gas Meter: ΔH @ 0.75 SCFM (ΔH@)	Dry Gas Meter: ΔH @ Variation (ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
6.905	0.691	7.020	0.702	1.0166	-0.001	0.702	1.887	0.003
6.893	0.689	7.014	0.701	1.0174	-0.001	0.701	1.884	0.000
6.874	0.687	7.010	0.701	1.0198	0.002	0.701	1.880	-0.003
				1.0180	Y Average		1.884	ΔH@ Average

Y Comparison	
Y Previous	1.0171
Y Average	1.0180
% Diff. Allowed	5

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
6-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	MB-2
Console Serial Number	MB-2
DGM Model Number	175
DGM Serial Number	MB2-175

Calibration Conditions		
Date Time	13-Jun-13	11:20
Barometric Pressure	29.45	in Hg
Theoretical Critical Vacuum[1]	13.90	in Hg
Calibration Technician	GP	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 \cdot {}^\circ R^{1/2})/(in.Hg \cdot min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	$(H_{@})$	(V_{m_i})	(V_{m_f})	(t_{m_i})	(t_{m_f})		K'	(t_{amb_i})	(t_{amb_f})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	0.33	748.500	751.803	67	68	1	0.2598	65	65	19
10.0	0.82	758.500	763.774	69	71	2	0.4114	65	66	18
10.0	1.50	764.700	771.783	71	72	3	0.5502	66	65	17
10.0	2.20	772.700	781.299	73	74	4	0.6660	65	66	16
10.0	3.40	782.500	793.222	74	75	5	0.8288	65	64	14
10.0	3.85	795.000	806.410	75	75	6	0.8809	65	66	14

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
(V_{std})	(Q_{std})	(Vcr_{std})	$(Q_{cr_{std}})$	(Y)	(ΔY)	$(Q_{std_{corr}})$	(ΔH@)	ΔΔH@
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
3.257	0.326	3.339	0.334	1.0253	0.008	0.334	1.644	-0.013
5.182	0.518	5.285	0.529	1.0199	0.003	0.529	1.627	-0.030
6.952	0.695	7.068	0.707	1.0168	0.000	0.707	1.665	0.008
8.423	0.842	8.556	0.856	1.0158	-0.001	0.856	1.666	0.009
10.514	1.051	10.658	1.066	1.0137	-0.003	1.066	1.666	0.009
11.190	1.119	11.317	1.132	1.0113	-0.006	1.132	1.676	0.018
				1.0171	Y Average		1.657	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02

I certify that the above Dry Gas Meter was calibrated in accordance with U.S.EPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11A65 which in turn was calibrated using the American Bell Prover # 1765, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.)

Signature _____ Date _____

NOZZLE CALIBRATION DATA

FACILITY: Ryegate DATE: 6/17/13

NOZZLE ID: 1/4-1

DIAMETER #	INSIDE DIAMETER (INCHES)
1	.251
2	.250
3	.250
AVERAGE	.250

NOZZLE ID:

DIAMETER #	INSIDE DIAMETER (INCHES)
1	
2	
3	
AVERAGE	

NOTE: The difference between inside diameters shall not exceed 0.004 inches

Thermocouple Calibration Sheet

DATE: 4/4/2013
TECHNICIAN CS

ALL READINGS IN DEGREES FARENHEIGHT

Ser. #	T.C. ID	ICE WATER	ACTUAL RESPONSE	BOILING WATER	ACTUAL RESPONSE	% DIFF LOW	% DIFF HIGH	RESULT
501	IS-1	32.0	32.2	212	212	0.62	0.00	PASS
		32.0	32.2	212	211	0.62	0.47	PASS
2206	IS-2	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.0	212	212	0.00	0.00	PASS
	OFFSET-1	32.0	32.3	212	212	0.93	0.00	PASS
		32.0	32.3	212	213	0.93	0.47	PASS
708	OFFSET-2	32.0	32.2	212	211	0.62	0.47	PASS
		32.0	32.2	212	211	0.62	0.47	PASS
	OFFSET-3	32.0	32.2	212	211	0.62	0.47	PASS
		32.0	32.3	212	211	0.93	0.47	PASS
183	OFFSET-4	32.0	31.9	212	210	0.31	0.94	PASS
		32.0	32.0	212	212	0.00	0.00	PASS
454	OFFSET-5	32.0	32.4	212	212	1.23	0.00	PASS
		32.0	32.4	212	213	1.23	0.47	PASS
459	OFFSET-6	32.0	32.1	212	210	0.31	0.94	PASS
		32.0	32.2	212	210	0.62	0.94	PASS
709	OFFSET-7	32.0	32.0	212	214	0.00	0.94	PASS
		32.0	31.9	212	213	0.31	0.47	PASS
	OFFSET-8	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	31.9	212	211	0.31	0.47	PASS
	FH-1	32.0	32.1	212	211	0.31	0.47	PASS
		32.0	32.1	212	212	0.31	0.00	PASS
	FH-2	32.0	32.3	212	213	0.93	0.47	PASS
		32.0	32.3	212	213	0.93	0.47	PASS
	FH-3	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.1	212	210	0.31	0.94	PASS
	GLASS-1	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.0	212	211	0.00	0.47	PASS
	GLASS-2	32.0	32.3	212	212	0.93	0.00	PASS
		32.0	32.3	212	213	0.93	0.47	PASS
	GLASS-3	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.0	212	213	0.00	0.47	PASS
	GLASS-4	32.0	32.1	212	214	0.31	0.94	PASS
		32.0	32.2	212	214	0.62	0.94	PASS
	VOST 1	32.0	31.9	212	213	0.31	0.47	PASS
		32.0	31.9	212	212	0.31	0.00	PASS
	VOST-2	32.0	31.9	212	210	0.31	0.94	PASS
		32.0	32.1	212	210	0.31	0.94	PASS
5122	OFFSET-9-	32.0	32.0	212	210	0.00	0.94	PASS
	SHORT	32.0	32.1	212	210	0.31	0.94	PASS
5049	OFFSET-10-	32.0	32.1	212	212	0.31	0.00	PASS
	SHORT	32.0	32.2	212	212	0.62	0.00	PASS

GLASS-5-	32.0	32.1	212	212	0.31	0.00	PASS
SHORT	32.0	32.1	212	212	0.31	0.00	PASS
GLASS-6-	32.0	32.0	212	212	0.00	0.00	PASS
SHORT	32.0	31.8	212	212	0.63	0.00	PASS

360 Old Colony Road, Suite 1, Norton, MA 02766

CEMSERVICES

Thermocouple Calibration Sheet

DATE: 4/4/2013
TECHNICIAN CS

ALL READINGS IN DEGREES FARENHEIGHT

T.C. ID	ASSET NUMBER	ICE WATER	ACTUAL RESPONSE	BOILING WATER	ACTUAL RESPONSE	% DIFF LOW	% DIFF HIGH	RESULT
FIA-1	0052	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.1	212	212	0.31	0.00	PASS
FIA-2	0053	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.2	212	212	0.62	0.00	PASS
FIA-3	0054	32.0	32.2	212	211	0.62	0.47	PASS
		32.0	32.0	212	211	0.00	0.47	PASS
FIA-4	0055	32.0	32.0	212	213	0.00	0.47	PASS
		32.0	32.2	212	212	0.62	0.00	PASS
FIA-5	0056	32.0	32.1	212	213	0.31	0.47	PASS
		32.0	32.0	212	213	0.00	0.47	PASS
FIA-6	0057	32.0	32.3	212	211	0.93	0.47	PASS
		32.0	32.4	212	211	1.23	0.47	PASS
MB-1	0001	32.0	32.1	212	213	0.31	0.47	PASS
DGM IN		32.0	32.2	212	212	0.62	0.00	PASS
MB-1		32.0	32.2	212	213	0.62	0.47	PASS
DGM OUT		32.0	32.2	212	213	0.62	0.47	PASS
MB-2	0002	32.0	32.1	212	212	0.31	0.00	PASS
DGM IN		32.0	32.2	212	211	0.62	0.47	PASS
MB-2		32.0	32.0	212	211	0.00	0.47	PASS
DGM OUT		32.0	31.9	212	211	0.31	0.47	PASS
MB-3	0003	32.0	32.0	212	212	0.00	0.00	PASS
DGM IN		32.0	32.1	212	212	0.31	0.00	PASS
MB-3		32.0	32.0	212	212	0.00	0.00	PASS
DGM OUT		32.0	31.9	212	210	0.31	0.94	PASS
MB-4	0004	32.0	32.1	212	210	0.31	0.94	PASS
DGM OUT		32.0	31.9	212	210	0.31	0.94	PASS
AUX		32.0	32.3	212	213	0.93	0.47	PASS
		32.0	32.2	212	213	0.62	0.47	PASS

OEMSERVICES
360 Old Colony Road, Suite 1, Norton, MA 02766

Thermocouple Calibration Sheet

DATE: 4/4/2013
TECHNICIAN: CS

ALL READINGS IN DEGREES FARENHEIGHT

T.C. ID	ASSET NUMBER	ICE WATER	ACTUAL RESPONSE	BOILING WATER	ACTUAL RESPONSE	% DIFF LOW	% DIFF HIGH	RESULT
M5-3-1	0115	32.2	32.2	212.0	213.0	0.00	0.47	PASS
M5-3-2	0116	32.1	32.0	212.0	212.0	0.31	0.00	PASS
M5-3-3	0117	32.1	32.1	212.0	211.0	0.00	0.47	PASS
M5-3-4	0118	32.1	32.1	212.0	212.0	0.00	0.00	PASS
M5-5-1	0114	32.1	32.2	212.0	213.0	0.31	0.47	PASS
M5-5-2	0122	32.1	32.3	212.0	213.0	0.62	0.47	PASS
M5-6-1	0112	32.2	32.2	212.0	210.0	0.00	0.94	PASS
M5-7-2	0113	32.2	32.2	212.0	211.0	0.00	0.47	PASS
M5-7-3	0110	32.2	32.0	212.0	212.0	0.63	0.00	PASS
M5-7-4	0111	32.2	32.2	212.0	212.0	0.00	0.00	PASS
M5-7-HH	0134	32.1	32.3	212.0	212.0	0.62	0.00	PASS
M5INC-7-1	0123	32.0	32.2	212.0	212.0	0.62	0.00	PASS
M5INC-7-2	0124	32.1	32.3	212.0	211.0	0.62	0.47	PASS
M5-8-1	0108	32.1	32.1	212.0	212.0	0.00	0.00	PASS
M5-8-2	0109	32.1	32.1	212.0	212.0	0.00	0.00	PASS
M5-9-1	0107	32.1	32.0	212.0	212.0	0.31	0.00	PASS
M5-10-1	0106	32.1	32.4	212.0	213.0	0.93	0.47	PASS
M5-12-1	0130							
M5-13-1	0105							
M5-16-1	0131							
M5-16-2	0132	32.2	32.1	212.0	212.0	0.31	0.00	PASS
M5-16-3	0133	32.2	32.4	212.0	212.0	0.62	0.00	PASS
TF-7	0125	32.1	32.2	212.0	212.0	0.31	0.00	PASS
TF-TELE	0126							
TF-9	-							
TF-10	-	32.1	32.2	212.0	213.0	0.31	0.47	PASS
TF-11-1	0135	32.2	32.1	212.0	211.0	0.31	0.47	PASS

S - TYPE PITOT GEOMETRIC CALIBRATION

PROBE IDENTIFICATION: M5INC-2
PITOT IDENTIFICATION: 18
TECHNICAL SPECIALIST: CS
CALIBRATION DATE: 5/2/2013

PART 1 - PROBE CONFIGURATION

			RESULT
A.	Dt=	0.355	PASS
	Dn =	0.500	PASS
	a =	1.015	PASS
B.	Pa=	0.454	SEE PART-2
	Pb =	0.450	SEE PART-2
	b =	0.555	PASS
C.	c =	NA	NA
	d =	NA	NA
	e =	NA	NA
D.	c =	3.168	PASS
	f =	2.075	PASS

PART 2 - PITOT ALIGNMENT

			RESULT
A.	a=	0.927	
	b=	0.364	
	c=	0.977	
	d=	0.352	
	e=	0.989	
	=	86.83	PASS
	'=	89.55	PASS
B.	a=	0.950	
	b=	0.571	
	c=	1.099	
	d=	0.584	
	e=	1.090	
	›=	88.90	PASS
	›'=	87.14	PASS
C.	f=	0.030	PASS
D.	g=	0.00	PASS

SPECIFICATIONS (EPA Method #2)

Dt = 3/16" to 3/8"
Dn = 1/2"
* Pa = Pb
a,e >= 3/4"
b >= 0
c,d >= 3"
f >= 2"

SPECIFICATIONS (EPA Method #2)

80ø<'/'< 100ø
85ø<›/›'< 95ø
f < 1/8"
g < 1/32"

* Slight misalignments of the openings are permissible. If PART 2 - PITOT ALIGNMENT specifications are met, then these will not effect the baseline value of Cp(s).

S - TYPE PITOT GEOMETRIC CALIBRATION

PROBE IDENTIFICATION: M5-7-3
PITOT IDENTIFICATION: 20
TECHNICAL SPECIALIST: CS
CALIBRATION DATE: 1/2/2013

PART 1 - PROBE CONFIGURATION

			RESULT
A.	Dt=	0.336	PASS
	Dn =	1.205	PASS
	a =	1.380	PASS
B.	Pa=	0.462	SEE PART-2
	Pb =	0.459	SEE PART-2
	b =	0.720	PASS
C.	c =	8.390	PASS
	d =	14.47	PASS
	e =	4.08	PASS
D.	c =	NA	NA
	f =	NA	NA

PART 2 - PITOT ALIGNMENT

			RESULT
A.	a=	0.884	
	b=	0.355	
	c=	0.942	
	d=	0.336	
	e=	0.961	
	=	88.16	PASS
	'=	92.81	PASS
B.	a=	0.891	
	b=	0.593	
	c=	1.079	
	d=	0.591	
	e=	1.053	
	›=	91.01	PASS
	›'=	88.13	PASS
C.	f=	0.030	PASS
D.	g=	0.00	PASS

SPECIFICATIONS (EPA Method #2)

Dt = 3/16" to 3/8" b >= 0
Dn = 1/2" c,d >= 3"
* Pa = Pb f >= 2"
a,e >= 3/4"

SPECIFICATIONS (EPA Method #2)

80ø<'< 100ø
85ø<›/›'< 95ø
f < 1/8"
g < 1/32"

* Slight misalignments of the openings are permissible. If PART 2 - PITOT ALIGNMENT specifications are met, then these will not effect the baseline value of Cp(s).

S - TYPE PITOT GEOMETRIC CALIBRATION

PROBE IDENTIFICATION: M5-8-2
PITOT IDENTIFICATION: 23
TECHNICAL SPECIALIST: CS
CALIBRATION DATE: 5/2/2013

PART 1 - PROBE CONFIGURATION

			RESULT
A.	Dt=	0.361	PASS
	Dn =	0.500	PASS
	a =	1.522	PASS
B.	Pa=	0.509	SEE PART-2
	Pb =	0.512	SEE PART-2
	b =	0.623	PASS
C.	c =	3.135	PASS
	d =	6.75	PASS
	e =	2.10	PASS
D.	c =	NA	NA
	f =	NA	NA

PART 2 - PITOT ALIGNMENT

			RESULT
A.	a=	0.993	
	b=	0.368	
	c=	1.046	
	d=	0.361	
	e=	1.05	
	=	87.85	PASS
	'=	88.89	PASS
B.	a=	0.993	
	b=	0.579	
	c=	1.129	
	d=	0.574	
	e=	1.140	
	›=	87.67	PASS
	›'=	89.20	PASS
C.	f=	0.030	PASS
D.	g=	0.00	PASS

SPECIFICATIONS (EPA Method #2)

Dt = 3/16" to 3/8"
Dn = 1/2"
* Pa = Pb
a,e >= 3/4"
b >= 0
c,d >= 3"
f >= 2"

SPECIFICATIONS (EPA Method #2)

80ø<'/'< 100ø
85ø<›/›'< 95ø
f < 1/8"
g < 1/32"

* Slight misalignments of the openings are permissible. If PART 2 - PITOT ALIGNMENT specifications are met, then these will not effect the baseline value of Cp(s).

Interference Response Test

Auditor: CP **Vehicle:** T4
Date: 10/5/2012 **Asset #:** 69

	191.5 CO / 192.5 NOx / 196.7 SO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
04902C1-2668	**O2**	0.08	0.03	0.2%	25
04902C1-2668	**CO2**	0.00	-0.04	0.2%	20

Servomex O2/CO2 Monitor

Interference must be less than 2% of Span

Interference Response Test

Auditor: CP **Vehicle:** T2
Date: 9/13/2012 **Asset #:** 0025

	22.7 O2 / 19.77 CO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
48-40156-262	**CO**	0.09	-0.315	0.2%	200

	44.0 NOx / 109.9 SO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
48-40156-262	**CO**	0.09	0.09	0.0%	200

TECO 48H CO Monitor

Interference must be less than 2% of Span

Interference Response Test

Auditor: CP
Date: 6/15/2013

Vehicle: T5
Asset #: 0072

10.01% O2 / 10.96% CO2 / 1140 CO / 221 SO2					
S/N	Type	Zero	Response	% Diff	Range
42H-38654-258	NOx	0.01	0.22	0.1%	200

	22.8% O2 / 19.82% CO2				
S/N	Type	Zero	Response	% Diff	Range
42H-38654-258	NOx	0.01	0.01	0.0%	200

TECO 42H NOx Rack 1 Trailer 5

Interference must be less than 2% of Span

Interference Response Test

Auditor: CP **Vehicle:** T4
Date: 3/31/2011 **Asset #:** 0030

	590 CO / 445 NOx / 463 SO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
7300100	**THC**	0.150	0.080	0.1%	100

	20.5 O2 / 18.06 CO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
7300100	**THC**	0.150	0.240	0.1%	100

VIG Industries Model 20 THC

Interference must be less than 2% of Span

Interference Response Test

Auditor: CP **Vehicle:** T5
Date: 6/15/2013 **Asset #:** 0073

	22.8% O2 / 19.82% CO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
N4J3890T	**CO**	-1.11	-0.67	0.0%	2000

	44.5 NOx / 111.4 SO2				
S/N	**Type**	**Zero**	**Response**	**% Diff**	**Range**
N4J3890T	**CO**	-1.110	-1.45	0.0%	2000

California Analytical ZRH CO Rack 1 Trailer 5

Interference must be less than 2% of Span

Appendix I

Linde SPECTRA Environmental Gases, 80 Industrial Drive, Alpha, NJ 08865

THE LINDE GROUP

Linde

SHIPPED TO: CEM Services
360 Old Colony Rd Ste 1
Norton, MA 02766

CERTIFICATE OF ANALYSIS

Sales#:	109928458	**Cylinder Size:**	2A (8" X 47.5")
Production#:	1244150	**Cylinder # :**	CC-106896
Certification Date:	Jan-31-2013	**Cylinder Pressure:**	2000 psig
P.O.# :	010813KM	**Cylinder Valve:**	CGA 580 / Brass
Blend Type:	ZERO NITROGEN	**Cylinder Volume:**	29.5 Liter
Material#:	24086370	**Cylinder Material:**	Aluminum
		Gas Volume:	4000 Liter

Do NOT use under: 150 psig

COMPONENT	REQUESTED GAS GRADE
NITROGEN	99.998 %

THC < 0.2 ppm

ANALYST: Justin Kutz

DATE: Jan-31-2013

THE LINDE GROUP

Linde

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12013	GAS CODE:	OC2
CUSTOMER:	Cem Services	CYLINDER # :	CC-110145
SALES#:	110374941	CYLINDER PRES:	2000 PSIG
PROD#:	1257673	CYLINDER VALVE:	CGA 590
P.O.# :	050813KM	CYLINDER SIZE:	2A
MATERIAL#:	24086339	CYLINDER MATERIAL:	Aluminum
CERTIFICATION DATE:	28-May-2013	GAS VOLUME:	4000 Liter
EXPIRATION DATE:	29-May-2021	BLEND TOLERANCE:	5% Relative
(Using the May 2012 Revision of the EPA Protocol)		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Carbon Dioxide	28-May-2013	9.91 %	9.91 %	+/- 1%
Oxygen	28-May-2013	11.45 %	11.45 %	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Carbon Dioxide	NTRM-82745x	SG-9609736	19.98 %
Oxygen	NTRM-82659Y	cc-237244	24.52 %

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Carbon Dioxide	CAI-300	S03001	NDIR	10-May-2013
Oxygen	CAI-300	S03001	PM	24-May-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: MATTHEW JACKSON

DATE: 28-May-2013

Linde Gas North America LLC

(908) 329-9700 Main (908) 329-9740 Fax
www.Lindeus.com

THE LINDE GROUP

Linde

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12012	**GAS CODE:**	OC2
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-84988
SALES#:	109475072	**CYLINDER PRES:**	2000 PSIG
PROD#:	1231604	**CYLINDER VALVE:**	CGA 590
P.O.# :	090612KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086339	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	18-Sep-2012	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	19-Sep-2020	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Carbon Dioxide	18-Sep-2012	19.85 %	19.85 %	+/- 1%
Oxygen	18-Sep-2012	22.8 %	22.8 %	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Carbon Dioxide	NTRM-82745x	SG-9609736	19.98 %
Oxygen	NTRM-82659Y	cc-237244	24.52 %

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Carbon Dioxide	CAI-300	S03001	NDIR	31-Aug-2012
Oxygen	CAI-300	S03001	PM	31-Aug-2012

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ **DATE:** 18-Sep-2012

MATTHEW JACKSON

Linde Gas North America LLC

(908) 329-9700 Main (908) 329-9740 Fax
www.Lindeus.com

THE LINDE GROUP

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12012	**GAS CODE:**	APPVD
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-134734
SALES#:	109018301	**CYLINDER PRES:**	2000 PSIG
PROD#:	1218405	**CYLINDER VALVE:**	CGA 590
P.O.# :	050912KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086346	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	31-May-2012	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	31-May-2015	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Methane	31-May-2012	29.6 ppm	29.6 ppm	+/- 1%

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Methane	GMIS-1	cc-128487	101.1 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Methane	Horiba VIA-510	57141706	NDIR	08-May-2012

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 150 PSIG.

ANALYST: _____ DATE: 31-May-2012

MATTHEW JACKSON

Linde Gas North America LLC

(908) 329-9700 Main (908) 329-9740 Fax
www.Lindeus.com

Linde Environmental Gases, 80 Industrial Drive, Alpha, NJ 08865

THE LINDE GROUP

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12011	**GAS CODE:**	APPVD
CUSTOMER:	CEM Services	**CYLINDER # :**	SG-9153990
SALES#:	108412285	**CYLINDER PRES:**	2000 PSIG
PROD#:	1192620	**CYLINDER VALVE:**	CGA 590
P.O.# :	090811KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086346	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	28-Sep-2011	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	28-Sep-2014	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Methane	28-Sep-2011	55.2 ppm	55.2 ppm	+/- 1%

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Methane	GMIS-1	cc-53279	99.2 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Methane	Horiba VIA- 510	57141706	NDIR	15-Sep-2011

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 150 PSIG.

ANALYST: _____ **DATE:** 28-Sep-2011

MATTHEW JACKSON

Linde Gas North America LLC

(908) 329-9700 Main (908) 329-9740 Fax
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THE LINDE GROUP

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

CUSTOMER: CEM SERVICES
SALES#:
PROD#: 1157043
P.O.# : 100610KM

CYLINDER # : CC-20164
CYLINDER PRES: 2000 PSIG
CGA OUTLET: 590

CERTIFICATION DATE: 10/27/2010
EXPIRATION DATE: 10/27/2013

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Methane	10/27/2010	91.3 ppm	91.3 ppm	+/- 1%

BALANCE Air
PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Methane	GMIS-1	CC-53279	99.2 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Methane	H. Packard 6890	US00001434	GC - FID	10/4/2010

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 150 PSIG.

ANALYST: _____ **DATE:** 10/27/2010
FRED PIKULA

Linde Gas North America LLC

(908) 329-9700 Main (908) 329-9740 Fax
www.Lindeus.com

Linde **SPECTRA** Environmental Gases, 80 Industrial Drive, Alpha, NJ 08865

THE LINDE GROUP

Linde

SHIPPED TO: CEM Services
360 Old Colony Rd Ste 1
Norton, MA 02766

CERTIFICATE OF ANALYSIS

Sales#:	110068834	**Cylinder Size:**	2A (8" X 47.5")
Production#:	1248766	**Cylinder # :**	XC-000295B
Certification Date:	Feb-28-2013	**Cylinder Pressure:**	2000 psig
P.O.# :	VERBAL-LINDEN COGEN	**Cylinder Valve:**	CGA 350 / Brass
Blend Type:	UHP HYDROGEN	**Cylinder Volume:**	29.5 Liter
Material#:	24087959	**Cylinder Material:**	Aluminum
		Gas Volume:	4000 Liter

Do NOT use under: 150 psig

COMPONENT	REQUESTED GAS GRADE
HYDROGEN	99.999 %

Ar	≤ 1.0 ppm
CO_2	≤ 1.0 ppm
CO	≤ 1.0 ppm
N_2	≤ 3.0 ppm
O_2	≤ 2.0 ppm
THC	≤ 1.0 ppm
H_2O	≤ 3.0 ppm

ANALYST: Matthew Jackson

DATE: Feb-28-2013

Linde SPECTRA Environmental Gases, 80 Industrial Drive, Alpha, NJ 08865

THE LINDE GROUP

Linde

SHIPPED TO: CEM Services
360 old Colony Rd Ste1
Norton, MA 02766

CERTIFICATE OF ANALYSIS

Sales#:	110374941	**Cylinder Size:**	2A (8" X 47.5")
Production#:	1257686	**Cylinder # :**	CC-133731
Certification Date:	May-28-2013	**Cylinder Pressure:**	2000 psig
P.O.# :	050813KM	**Cylinder Valve:**	CGA 590 / Brass
Blend Type:	VOC ZERO AIR	**Cylinder Volume:**	29.5 Liter
Material#:	24088830	**Cylinder Material:**	Aluminum
		Gas Volume:	4000 Liter

Do NOT use under: 150 psig

COMPONENT	REQUESTED GAS GRADE
AIR	VOC ZERO

O_2	Between 20 and 21%
CO	≤ 0.05ppm
CO_2	≤ 0.3 ppm
H_2O	≤ 1.0 ppm
THC	≤ 0.05 ppm

ANALYST: Matthew Jackson

DATE: May-28-2013

Appendix J

FIELD ANALYSIS job: Hygate

test date(s): 6-18-13

CALIBRATION

DATE	TIME	TEMP	OHAUS	SCALE
6-24-13	1100	74	1.0000	0.9999
7-1-13	1200	75	1.0000	0.9999
7-1-13	1200	75	50.0000	0.0007
7-2-13	0900	74	1.0000	0.9999
7-2-13	0900	74	50.0000	50.0007
7-2-13	1600	74	50.0000	50.0007

SAMPLE FILTER RESULTS

DATE:	6-24-13	7-1-13	7-2-13				
TIME:	1100	1200	0900				
FILTER#/ RUN#	weight 1	weight 2	weight 3	weight 4	weight 5	final	tare
3578 PM-1	0.3384	0.3385	0.3384			0.3385	0.3385
3579 PM-2-SB	0.3413	0.3413	0.3413			0.3413	0.3416
3586 PM-3	0.3464	0.3464	0.3464			0.3464	0.3469
3587 PM-4	0.3425	0.3425	0.3425			0.3425	0.3425
3588 blank	0.3444	0.3448	0.3446			0.3447	0.3447

SAMPLE BEAKER RESULTS

DATE:	7-1-13	7-2-13	7-2-13					
TIME:	1200	0900	1600					
BEAKER#/ RUN#	weight 1	weight 2	weight 3	weight 4	weight 5	final	tare	vol (ml)
14 PM-1	81.1690	81.1692	81.1692			81.1692	81.1661	110
15 PM-2-SB	67.3582	67.3578	67.3582			67.3580	67.3546	130
16 PM-3	67.1148	67.1142	67.1142			67.1142	67.1092	120
17 PM-4	65.8862	65.8855	65.8859			65.8857	65.8810	110
18 blank	71.8799	71.8802	71.8800			71.8801	71.8797	100

VERMONT POWER EXCHANGE, INC.
AND
RYEGATE WOOD ENERGY COMPANY
POWER PURCHASE AGREEMENT

ATTACHMENT C
INTERCONNECTION AGREEMENT

INTERCONNECTION AGREEMENT BETWEEN GREEN MOUNTAIN POWER CORPORATION AND RYEGATE WOOD ENERGY COMPANY

THIS AGREEMENT is entered into as of the 17th day of December, 1990, between GREEN MOUNTAIN POWER CORPORATION ("GMP"), a Vermont corporation having its principal office at South Burlington, Vermont, and RYEGATE WOOD ENERGY COMPANY ("the Producer"), a Delaware corporation with offices located at 257 East 200 South, Suite 800, Salt Lake City, Utah, 84111.

W I T N E S S E T H:

WHEREAS, the Producer's facility is a qualifying facility as defined in the Public Utility Regulatory Polices Act of 1978 and Vermont Public Service Board Rule 4.100; and

WHEREAS, the Producer wishes to sell its electric generation to the Vermont Power Exchange, Inc. ("VPX") as purchasing agent under the provisions of Vermont Public Service Board ("VPSB") Rule 4.100; and

WHEREAS, the Producer wishes to interconnect with GMP's electric system in Ryegate, Vermont, as shown on Attachment "A", (Attachment A shall be agreed upon and attached hereto at a later date); and

WHEREAS, GMP will permit interconnection with its system in accordance with the terms hereinafter set forth, and in accordance with the regulations of the VPSB and of the Federal Energy

Regulatory Commission, as they may hereafter be interpreted or modified;

NOW THEREFORE, in consideration of the respective representations and mutual promises of the parties, GMP and the Producer agree as follows:

1. <u>Producer's Generation Facilities</u>.

The Producer's generation facilities are located in the Town of Ryegate, Vermont, and consist of one synchronous generator with a maximum export capacity of 19,000 kilowatts.

2. <u>Operation and Interconnection</u>.

(a) After receiving GMP's written approval to do so, which approval shall not be unreasonably withheld and shall be issued within ten (10) working days of GMP's receipt of the inspection report called for in Section 2(d) provided the report is deemed satisfactory and acceptable to GMP, the generation facilities will be operated in parallel with GMP's system and will be interconnected to GMP's 34.5-kV transmission system on line 3324, sourced from the New England Electric System's McIndoes Falls Substation. The Producer's facilities and operating procedures shall meet required VPSB safety standards and shall comply with the National Electric Safety Code in effect at the time construction is started.

(b) To interconnect its generation facilities with GMP's system, the Producer shall install and maintain the following interconnection facilities:

[Technical descriptions of interconnection facilities, including a one-line diagram and operational dispatch shall be included at a later date. Said technical descriptions are subject to GMP approval.]

The Producer is responsible for the design of all of its facilities; GMP has the right to approve or disapprove the design of all Electrical Facilities in accordance with generally-accepted and prudent utility practices. "Electrical Facilities" as used in this paragraph 2 shall be limited to all interconnection facilities including any other of Producer's facilities which in GMP's reasonable judgment, could have a direct or indirect impact upon GMP's facilities or its ability to serve its customers. Electrical Facility requirements are solely for the protection of GMP's facilities; GMP is not responsible for the adequacy of the required interconnection equipment in protecting the Producer's facilities.

(c) The Producer shall be responsible for all costs of the interconnection facilities described in Section 2(b) of this Agreement. If the Producer so elects and advises GMP in writing within twenty (20) days of the date of this Agreement, GMP shall loan to the Producer funds sufficient for the Producer to purchase the equipment, said loan to be repaid over a period of twelve (12) months in equal monthly installments, including interest at a rate of 12.0%.

(d) Prior to the initial closing of the interconnection, a written determination shall be made by a

Professional Engineer, registered in the State of Vermont, and provided to GMP that all facilities meet specifications and are functioning properly. Inspections performed for the purpose of making such determination shall be made on reasonable notice to both the Producer and GMP, so that each may witness the inspections.

(e) The Producer shall be responsible for maintaining all facilities owned by it and for keeping the same in good working order at all times. The Producer's responsibility includes the performance of all tests recommended by the manufacturer of the respective facilities and any other tests consistent with good utility practice. The Producer shall give GMP reasonable prior notice of all scheduled testing of Electrical Facilities, and GMP shall have the right to witness such testing. The Producer shall promptly certify the results of such testing and maintenance to GMP.

(f) After closing of the interconnection, GMP shall have the right to inspect and monitor, at its own expense, and upon reasonable notice to the Producer, all Electrical Facilities (including metering equipment) as necessary to ensure the safety and integrity of the utility system and the safety and continuity of supply to its customers. With the prior consent of the Producer, or in cases of emergency, inspection may include tripping of the interconnection breaker(s). If the Electrical Facilities are found not to be working properly, GMP shall promptly notify the Producer, and the Producer shall promptly

correct any problems at its expense. At no time shall any GMP inspection of the Producer's Electrical Facilities be construed as an endorsement of the design thereof, nor as any warranty of the safety, durability or reliability of said Electrical Facilities. GMP shall not, by reason of any inspection or failure to inspect, be responsible for the strength, safety, design, adequacy or capacity of the Producer's facilities.

(g) GMP may require the Producer to stop generating or to disconnect from its system, or GMP may itself open the interconnection, whenever it reasonably believes that the Producer's generation may result in disruption of service on GMP's system, or in injury to persons or property. Interconnection shall be immediately resumed whenever it is determined that such condition does not exist or the Producer has taken corrective action. Notice of actions under this paragraph shall be provided consistent with the notice requirements of paragraph 2(h) below.

(h) GMP may open, or require the Producer to open, the interconnection whenever reasonably necessary to perform either routine or emergency maintenance or repairs to GMP's or New England Electric Service's facilities. Except for emergencies, GMP shall provide at least 48 hours advance notice, whenever practical, of such maintenance or repairs, and shall attempt to schedule the same in order to accommodate the Producer's operating schedule. If advance notice is not practical, or in the event of an emergency, GMP shall provide Producer notice as soon as practical after disconnection. This notice must be made within 72

hours in all cases but within 24 hours when practical. This notice shall include the reason for disconnection and the corrective steps which need to be taken to cause reconnection.

(i) If GMP shall have disconnected the facilities from its system, or if the Producer shall have done so at GMP's request, for any of the reasons provided in paragraphs (f), (g) or (h) of this Section, then the Producer may request the VPSB to determine whether any negligence, or violation of this Agreement or any applicable rule or regulation on the part of GMP necessitated the disconnection. If it is determined that the disconnection was necessitated by such negligence or violation, then GMP shall be liable for the difference between revenues the Producer would have received for capacity and energy which would have been delivered to GMP's system and costs the Producer would have incurred to produce that generation. In any such proceeding, the burden of proving negligence or violation (including any associated damages) shall be on the Producer. GMP shall render any payments found to be due under this provision to the Producer within ten (10) days of such determination.

(j) The Producer shall be responsible for the costs of any changes to the GMP system or to the Producer's own facilities required for the Producer's initial interconnection at a maximum export level of 19,000 kw.

If, in the future, the Producer increases its export level beyond 19,000 kw, the Producer will be responsible for all costs of any changes to the GMP system or to the

Producer's own facilities which are required for the new generation level together with the cost of studies required to determine such changes.

3. Metering.

The output of the facilities shall be metered by means of the following equipment: A 35-kV class three-phase primary metering package shall be installed on the incoming GMP line on the utility side of the breaker furnished by the Producer. This metering package shall include one meter to measure generation output and another meter to measure the Producer's station service usage. All equipment other than current and potential transformers and their interconnecting wires shall be located in a single cabinet to be mounted in a convenient location. The out-looking meter shall be equipped with a pulse initiator for connection to the VPX LPR equipment and shall also have a dial-type register. The inlooking meter may be of a similar design at GMP's discretion. A terminal board will be provided for connection of the incoming telephone line. All equipment within the cabinet, including terminal boards and interconnecting wiring, will be mounted and installed by GMP.

This installed metering arrangement must be approved by GMP and must comply with applicable metering standards of VPX. The requirements of this paragraph apply to the VPX metering and should not be construed to require a second set of meters.

The Producer shall be responsible for all costs of the metering equipment, provided that, if the Producer so elects and

advises GMP in writing within twenty (20) days of the date of this Agreement, GMP shall loan to the Producer funds sufficient for the Producer to purchase the equipment, said loan to be repaid over a period of twelve (12) months in equal monthly installments, including interest at the rate of 12%.

4. Provision of Electric Service.

The Producer will receive and pay for electricity from GMP's system in accordance with all relevant terms and conditions in GMP's tariffs for electric service, as filed with the VPSB, and as the same shall be amended from time-to-time and approved by the VPSB.

GMP shall not disconnect the Producer because of the Producer's failure to pay charges for electric service provided by GMP except with consent of the VPSB. Such consent will be withheld if, inter alia, it is probable that the Producer will otherwise continue operations, and if the value of the Producer's output to be distributed by the VPX to GMP will, within a reasonable period of time, equal the amount owing by the Producer to GMP. In that event, the Producer consents to the VPSB's authorizing VPX to withhold the amount owing from any bills for power generated by the Producer and to remit said amounts to GMP.

5. Liability; Indemnity; Several Obligations.

(a) Each party to this Agreement shall defend, save harmless and indemnify the other party (including the party's directors, officers, employees and agents) from and and all loss, cost, expense and liability whether for property damage or bodily

injury (including death resulting) by whomsoever sustained and found by a court of competent jurisdiction to have been (i) caused by an act or omission of the culpable party, its agents, employees or invitees, or (ii) sustained on or caused by equipment or facilities, or the operation or use thereof, that the indemnifying party owns or controls. Notwithstanding the foregoing, each party shall be solely responsible for and shall bear all costs of claims by its own employees or contractors growing out of any workers' compensation law; neither party shall indemnify or save the other harmless to the extent that losses are the result of that other party's own negligence or willful misconduct; and each party agrees to waive any claim or right against the other for consequential damages. The indemnitor shall, on the other party's request, defend any suit asserting a claim covered by this indemnity and shall pay all costs, including reasonable attorneys' fees, that are incurred by the other party in enforcing this indemnity. Each party shall maintain and pay for casualty and general liability insurance coverage as will insure the provisions of this Agreement.

(b) No bank or other secured party shall be liable for obligations of the Producer arising out of this Agreement, including liability for indemnification under this Section, which arose prior to such bank or other secured party giving notice to the Producer and GMP of the exercise of its rights pursuant to any security documents between it and the Producer.

(c) Except where specifically stated in this Agreement to be otherwise, the duties, obligations and liabilities of the parties are several and not joint or collective. Nothing contained in this Agreement creates an association, trust, partnership or joint venture or imposes a trust or partnership duty, obligation or liability on or with regard to either party. Each party shall be liable individually and severally for its own obligations under this Agreement.

(d) Nothing in this Agreement shall be construed to create any duty to, any standard of care with reference to or any liability to a person not a party to this Agreement. No undertaking by one party to the other under any provision of this Agreement shall constitute the dedication of that party's system or any portion thereof to the other party or to the public, nor affect the status of GMP as an independent public utility corporation, or the Producer as an independent entity.

(e) Except as otherwise specifically provided by this Agreement, including any attachment or amendment thereto, liability shall be governed by the laws of the State of Vermont.

6. <u>Liability and Workers' Compensation Insurance</u>.

(a) The Producer and GMP shall each maintain in full force and effect policies providing comprehensive general liability insurance which must include the broad form general liability endorsement to pay on their respective behalfs all sums which each is legally obligated to pay as damages for bodily injury and/or property damage. The Producer shall maintain a

policy in the minimum amount of Ten Million Dollars ($10,000,000) for each occurrence, adjusted at least every five years for inflation based on procedures and/or indices approved by VPX. Said policy may include a reasonable deductible in an amount no greater than $50,000. The Producer shall provide certificates of such insurance to GMP (prior to the signing of this Agreement or at such later time as approved by GMP) and shall authorize and direct its insurer to provide sixty (60) days' written notice to GMP before the policy is terminated or materially altered.

(b) The Producer and GMP shall maintain in full force and effect a policy or policies of insurance sufficient to insure their respective workers' compensation law obligations.

(c) Evidence of coverage obtained by the Producer under this Section shall state that the coverage provided is primary and is not excessive to or contributing with any insurance or self-insurance maintained by GMP. GMP shall have the right to inspect or obtain a copy of the applicable policies of insurance.

(d) The Producer's property insurance policy shall cover all real and personal property of the Producer and shall contain a waiver-of-subrogation clause running to GMP. This must be reflected on the certificate of insurance provided by the Producer. The Producer agrees that this policy shall be the primary remedy for any losses covered by the policy.

7. <u>Determination of Disputes</u>.

The VPSB shall have primary jurisdiction to resolve disputes between the parties hereto concerning the construction of

the provisions of this Agreement and any other matters arising under this Agreement within the VPSB's jurisdiction. The Department of Public Service shall be entitled to participate as a party in any such proceeding. An election by either party to seek a remedy before the VPSB will be in lieu of any other remedy if the VPSB addresses the merits of the matter. An election by either party to seek a remedy in another forum will be in lieu of a remedy before the VPSB if the other forum addresses the merits of the matter.

8. **Term of Agreement**.

Subject to any required approval of the VPSB, this Agreement shall become effective upon its execution by the Producer and GMP and shall continue in effect through the expiration of the Purchase Agreement between the Producer and VPX or until its earlier termination in accordance with the provisions of this Agreement.

9. **Assignment/Successors**.

Neither the Producer nor GMP may voluntarily assign its rights or delegate its duties under this Agreement, or any part thereof, without the written consent of the other, except, in the case of the Producer, (a) in connection with the sale or merger of substantially all of the facilities described herein or (b) in connection with any requirement, approved by the Vermont Public Service Board, of any bank or other secured party relating to any development or construction financing or any long-term financing in substitution thereof; or, in the case of GMP, in connection

with the sale or merger of substantially all of its assets within Vermont. Any assignment or delegation without the requisite consent shall be void as against the other party, but such consent shall not be unreasonably withheld. No assignment or delegation shall discharge any party from obligations which shall have accrued under the terms of this Agreement prior to such assignment or delegation, whether such accrual is known or unknown. Except as otherwise provided herein, this Agreement shall bind and inure to the benefit of the successors and assigns of the parties hereto. Nothing contained herein shall limit the power of the VPSB to appoint a Purchasing Agent other than VPX at any time.

10. **Notices**.

Any notices provided for in this Agreement or otherwise shall be sufficient if given in writing and deposited in the United States mail, first-class postage prepaid, addressed as follows:

TO GMP:

Green Mountain Power Corporation
25 Green Mountain Drive
P.O.Box 850
South Burlington, VT 05402-0850
ATTENTION: Vice President
Operations and Engineering

TO THE PRODUCER:

Ryegate Wood Energy Company
257 East 200 South
Suite 800
Salt Lake City, UT 84111
ATTENTION: Corporate Secretary and
Director of Regulatory Affairs

Copies of all notices should be forwarded to VPX, 20 Kimball Avenue, Suite 302, South Burlington, Vermont, 05403. The addresses for notice provided herein may be changed at any time by either party giving written notice of such change. Either party may consent to oral notice provided by the other on a case-by-case basis.

11. Governing Law.

This Agreement shall be interpreted under and governed by the laws applicable to contracts made and to be performed entirely within the State of Vermont.

12. Modifications and Headings.

No modification of this Agreement shall be effective unless it is in writing and signed by both parties hereto. Headings of sections are for the convenience of the parties, but are not a substantive part of the Agreement and each section of this Agreement shall not be limited by the heading.

13. Integration Clause.

This Agreement contains the entire agreement and understanding between the parties, their agents and employees regarding points specifically covered in this Agreement

Dated at South Burlington, Vermont, as of the date first above written.

IN THE PRESENCE OF:

Witness

GREEN MOUNTAIN POWER CORPORATION

By

Witness

STATE OF VERMONT
CHITTENDEN COUNTY, SS.

At South Burlington, this 17th day of December, 1990, before me personally appeared Eugene L. Shlatz, Assistant Vice President of GREEN MOUNTAIN POWER CORPORATION, and he acknowledged the foregoing Agreement, by him subscribed, to be his free act and deed and the free act and deed of GREEN MOUNTAIN POWER CORPORATION.

Notary Public

My Commission Expires

Dated at South Burlington, as of the date first above written.

IN THE PRESENCE OF: RYEGATE WOOD ENERGY COMPANY

Clark M. Mower
Witness

Witness

By: Mark E. Rinehart
Secretary

STATE OF VERMONT
CHITTENDEN COUNTY, SS.

At So Burlington, this 17th day of December, 1990, before me personally appeared Mark E. Rinehart Sig, of Ryegate Wood Energy Company, and he acknowledged the foregoing Agreement, by him subscribed, to be his free act and deed and the free act and deed of Ryegate Wood Energy Company.

Notary Public

HAM:cme/Misc/5344/Ryegate Agr

AMENDMENT NO. 2 TO
INTERCONNECTION AGREEMENT
BETWEEN GREEN MOUNTAIN POWER CORPORATION
AND RYEGATE WOOD ENERGY COMPANY

THIS AMENDMENT NO. 2 to the INTERCONNECTION AGREEMENT dated December 17, 1990 (the "Interconnection Agreement" or "Agreement") is entered into as of this 31st day of October, 2013, between GREEN MOUNTAIN POWER CORPORATION ("GMP"), a Vermont corporation having its principal office at 183 Acorn Lane, Colchester, Vermont and RYEGATE ASSOCIATES, formerly known as RYEGATE WOOD ENERGY COMPANY (the "PRODUCER"), a Utah corporation with its primary offices located at 1990 Post Oak Boulevard, Suite 1900, Houston, Texas 77056.

WITNESSETH:

WHEREAS, Producer is presently a party to that certain Interconnection Agreement which authorizes the interconnection of Producer's wood-fired electric generating facility to the GMP's 34.5 kW transmission system on line 3324 in Ryegate, Vemont; and

WHEREAS, the Interconnection Agreement is scheduled to expire on October 31, 2013 by its original terms and its Amendment No. 1 to Agreement; and

WHEREAS, Ryegate Associates is the successor–in-interest to Ryegate Wood Energy Company with respect to the Interconnection Agreement; and

WHEREAS, Producer represents that it is in good standing under and has abided by the term and conditions of the Interconnection Agreement and Amendment No. 1 to Agreement, and that all interconnection facilities and system protection equipment required pursuant to said Agreement have been installed and are being operated in accordance with the requirements of the Agreement and all applicable rules and regulations of each governmental and regulatory authority of competent jurisdiction; and

WHEREAS, Producer desires to extend the term of the Interconnection Agreement to November 1, 2022 in order to permit continued parallel interconnected operation of its generating facility with GMP transmission system; and

WHEREAS, GMP is willing to permit the continued parallel interconnected operation of Producer's generating facility with GMP transmission system subject to the terms and conditions of the Interconnection Agreement and Amendment No.1 for an additional 9 year period ending November 1, 2022; and

NOW THEREFORE, in consideration of the respective representations and mutual promises of the parties, GMP and the Producer agree as follows:

1. Terms used herein and not defined shall have the meanings set forth in the Interconnection Agreement.

2. All reference to "Vermont Power Exchange, Inc." and "VPX" are replaced with "Vermont Electric Power Producers, Inc." and "VEPPi" respectively.

3. All references to "New England Electric System" and "NEES" are replaced with "National Grid, U.S." and "National Grid" respectively. Section 8 of the Interconnection Agreement is deleted in its entirety, and replaced with the following:

   "Subject to any required governmental approvals the Interconnection Agreement shall become effective upon its execution by the Producer and GMP and shall continue in full force and effect until November 1, 2022 or until its earlier termination in accordance with the provisions of the Agreement."

4. The address for Green Mountain Power Corporation in Section 10 of the Interconnection Agreement is deleted in its entirety and replaced with the following:

   Green Mountain Power Corporation
   Interconnection Engineering
   Attn: Ryan Rainville
   2152 Post Road
   Rutland, VT 05701

5. Pursuant to Section 2(e) of the Agreement, on or before October 31, 2013, Ryegate shall 1) produce a certified relay test report completed in the last sixty (60) months; and 2) verify that the 1991 list of technical descriptions of interconnection facilities, including one-line diagram and operational dispatch, is the most recent and accurate Professional Engineer stamped version. This Amendment shall replace Amendment No. 1 to Interconnection Agreement

6. All other terms and conditions of the Interconnection Agreement shall remain in full force and affect.

7. This Amendment shall become effective upon execution.

8. This Amendment may be executed in any number of counterparts and each executed counterpart shall have the same force and effect as an original instrument.

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties have executed this Amendment by their respective officers hereto duly authorized, as of the date first above written.

DATED at RUTLAND, VERMONT, as of the date first above written.

IN THE PRESENCE OF:

GREEN MOUNTAIN POWER CORPORATION

_____
Witness

By_____
name:
title:

_____
Witness

STATE OF VERMONT
RUTLAND COUNTY, SS

At RUTLAND, Vermont this _____ day of _____, 2013, before me personally appeared _____,_____ of GREEN MOUNTAIN POWER CORPORATION, and s/he acknowledged the foregoing Agreement, by her/him subscribed, to be hers/his free act and deed and the free act and deed of GREEN MOUNTAIN POWER CORPORATION.

By_____
Notary Public
My Commission expires _____

DATED at HOUSTON, TEXAS, as of the date first above written.

IN THE PRESENCE OF:

RYEGATE ASSOCIATES

Witness

By: _____
Name HERMAN A. SCHOPMAN, PRESIDENT OF ATC RYEGATE LLC,
~~Its~~ ITS GENERAL PARTNER

Witness

STATE OF TEXAS
Harris COUNTY, SS.

At Houston, Texas this 28th day of October, 2013, before me personally appeared Herman A. Schopman, President of ATC RYEGATE, LLC, the Managing Partner of RYEGATE ASSOCIATES, and s/he acknowledged the foregoing Agreement, by her/him subscribed, to be hers/his free act and deed and the free act and deed of RYEGATE ASSOCIATES.

ELIZABETH D. ROGERS
Notary Public, State of Texas
My Commission Expires
May 11, 2015

By _____
Notary Public

My Commission expires May 11, 2015

NEPOOL GIS

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GIS Generators

Unit ID	Plant - Unit	Account Holder	State	Vintage	Name Plate Capacity	Fuel Type	GIS Registration Date	CT Class I	CT LREC	CT Class II	CT Class III	CT CEO	CT Date Of Eligibility	MA RPS Class I Renewable Gen	MA Solar Carve-Out Unit	MA RPS Class II Renewable Gen	MA RPS Class II Waste Energy Gen	MA APS Alternative Gen	Eligible MA NOx Allowances	ME Class I	ME Class II	ME Community Based Renewable Energy	ME CO2 Netting	RI New Renewable Resource	RI Existing Renewable Resource	NH Class I	NH Class I Thermal	NH Class II	NH Class III	NH Class IV	Green-E	Low Impact Hydro Institute
MSS2433	BARRE - RYEGATE 1-NEW	Ryegate Associates	VERMONT	10/1992	20.500	Wood	3/26/2003 12:29:48 PM	No	No	Yes	No	No	1/1/2008	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

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AFFIDAVIT

STATE OF CONNECTICUT) ss. Glastonbury

COUNTY OF HARTFORD

Eric A. DeBarba, being duly sworn, deposes and states that:

1. I am over the age of eighteen and understand the obligation of making a statement under oath.

2. I am Director of New England Origination for Ryegate Associates.

3. I am familiar with the information that Ryegate Associates is filing with the State of New Hampshire Public Utilities Commission as its Application for Renewable Energy Source Eligibility for its facility located in East Ryegate, Vermont (the "Application").

4. I hereby attest to the accuracy of the contents of the Application executed by me as preparer on behalf of Ryegate Associates.

IN WITNESS THEREOF, the undersigned has executed and delivered this affidavit as of the date written below.

Date: January 2, 2014

Eric A. DeBarba
Director—New England Origination
Ryegate Associates

Subscribed and sworn to before me
this 2nd day of January, 2014.

Susan B. White
Notary Public
My commission expires: August 31, 2016