TECHNICAL REVIEW DOCUMENT
OPERATING PERMIT 96OPMR153
to be issued to:

Brush Cogeneration Partners
Morgan County
Source ID 0870027

Prepared by Ashley L. Kendall
March 16, 1998
Revised September 20, 1999

I. Purpose:

This document establishes the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA, the Public and other interested parties. Conclusions made in this report are based on information provided by the applicant in the Title V application submitted February 23, 1996, additional information submitted on June 30, 1998 and February 4, 1999, a site visit, and review of Division files. This narrative is intended only as an adjunct for the reviewer and has no legal standing.

On April 16, 1998 the Colorado Air Quality Control Commission directed the Division to implement new procedures regarding the use of short term emission and production/throughput limits on Construction permits. These procedures are being directly implemented in all operating permits that had not started their Public Comment period as of April 16, 1998. All short term emission and production/throughput limits that appeared in the construction permits associated with this facility that are not required by a specific State or Federal standard or by the above referenced Division procedures have been deleted and all annual emission and production/throughput limits converted to a rolling 12 month total. Note that, If applicable, appropriate modeling to demonstrate compliance with the National Ambient Air Quality Standards was conducted as part of the Construction Permit processing procedures. If required by this permit, portable monitoring results and/or EPA reference test method results will be multiplied by 8760 hours for comparison to annual emission limits unless there is a specific condition in the permit restricting hours of operation.

Any revisions made to the underlying construction permits associated with this facility made in conjunction with the processing of this operating permit application have been reviewed in accordance with the requirements of Regulation No. 3, Part B, Construction Permits, and have been found to meet all applicable substantive and procedural requirements. This operating permit incorporates and shall be considered to be a combined construction/operating permit for any such revision, and the permittee shall be allowed to operate under the revised conditions upon issuance of this operating permit without applying for a revision to this permit or for

an additional or revised Construction Permit.

II. Source Description:

This source is primarily classified as a cogeneration facility defined under Standard Industrial Classification 4911. Electricity for sale is produced by a combustion turbine equipped with a diesel starter engine and duct burner. Heat from the combustion turbine and duct burner is used to generate steam to drive a steam turbine for additional electricity. The waste heat from the steam turbine then heats a greenhouse complex. There are also three natural gas fired boilers to provide auxiliary heat to the greenhouses if the turbines don't produce enough heat and a cooling tower to cool water for the steam turbine.

The facility is located on 90 acres just south of Brush in an area designated as attainment for all criteria pollutants. This source is considered to be a major source in an attainment area (Potential to Emit > 100 tons/year, one of the 28 listed sources) and is considered major for purposes of Prevention of Significant Deterioration (PSD) regulations and has a PSD permit. Future modifications to this facility which are in excess of significance levels as defined in Colorado Regulation No. 3, Part A, Section I.B.58, would result in the application of PSD review requirements. This facility is considered to be a single source with Colorado Power Partnership (CPP); a separate operating permit will be issued to CPP. Facility wide emissions (CPP and BCP combined) are as follows:

Pollutant	Potential to Emit (tpy)	Actuals (tpy)
PM	91.5	17.6
PM10	91.5	17.6
SO2	5.4	5.7
NOx	313.3	178.0
VOC	50.9	45.5
CO	228.3	90.2

Potential to Emit is based on permitted limits and worst case emissions for unpermitted units. Actual emissions are based on 1995 data submitted in the Title V application.

Two new turbines are currently being installed at this facility under the name Colorado Energy Management (CEM). A PSD permit was issued on May 25, 1999.

This facility is not within 100 kilometers of a Federal Class I designated area. There are no affected states within a 50 mile radius associated with this facility.

This facility certified within the Title V application they are not subject to 112(r), the Accidental Release Requirements.

III. Emission Sources:

The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

<u>Units S001</u> - General Electric PG6541B-MS6001B Natural Gas Combustion Turbine, Rated at 350 MMBtu/hr, SN: 296003, Equipped with One (1) Duct Burner, Rated at 240 MMBtu/hr. One (1) Cummins BT171OP-635 Diesel Fired Reciprocating Starter Engine, SN: Unknown.

Discussion:

1. Applicable Requirements- The unit above was installed and began operating in 1994. This unit was issued initial construction permit 91MR934-1 in April, 1992. The permit was modified in June 1992 to incorporate the starter diesel engines, and again to address emission testing conducted on May 26, 1994 on NOx limits. Final approval construction permit 91MR934-1 was issued on December 15, 1994 with the following applicable requirements:

Condition 1: Visible emissions shall not exceed twenty percent (20%) opacity.

Condition 3: Emissions of air pollutants from all turbines, duct burners, diesel starter engine, and emergency boilers covered by permits 91MR934-1 and -2 shall not exceed the following limitations:

-Particulate Matter	9.9 tons/yr	6.1 pounds/hr
-PM10	9.9 tons/yr	6.1 pounds/hr
-Sulfur Dioxide	3.2 tons/yr	1.6 pounds/hr
-Nitrogen Oxides	112.4 tons/yr	63.8 pounds/hr
-Volatile Organic Compounds	26.7 tons/yr	19.9 pounds/hr
-Carbon Monoxide	76.6 tons/yr	47.6 pounds/hr

The short term limits have been removed per the policy change stated above. In addition, due to a change in AP-42 emission factors and an increase in throughput for the starter engine and turbine the source has requested the following emission limitations.

-Particulate Matter	45.1 tons/yr
-PM10	45.1 tons/yr
-Sulfur Dioxide	2.0 tons/yr
-Nitrogen Oxides	117.4 tons/yr
-Volatile Organic Compounds	26.7 tons/yr
-Carbon Monoxide	80.8 tons/yr

BACT Requirements:

-NOx ≤ 21 ppmvd at 15% oxygen and ISO standard day conditions.
-CO ≤ 20 ppmvd at 15% oxygen and ISO standard day conditions.
-CO ≤ 250 ppmvd at 15% oxygen and ISO standard day conditions during start-up and shutdown

The source requested to remove the ISO standard day conditions from the emission concentration limits above. The initial approval permit issued on June 2, 1992 indicated a limit of 25 ppmvd for both NOx and CO. However if a lower concentration was determined from the required stack test those concentrations would become the new limitations. The concentrations on the final approval permit issued on December 15, 1994 were based on a stack test conducted on May 26, 1994 and calculated to ISO standard day conditions. Because the ISO standard day conditions are part of the BACT limit they cannot be removed from the permit.

In addition, the source had requested a higher ppmvd limit during extremely cold weather and high humidity. The Division agreed to change the averaging time from 1 hour to 24 hours (or operating hours from 12 midnight to 12 midnight) instead of raising the BACT ppmvd limits.

Start-up and Shutdown, CO: Each hourly average CO concentration, during which startup and/or shut down occurs, shall be compared with the 250 ppmvd limitation; **All other times, CO:** For each 24 hour period (12 midnight to 12 midnight) the hourly average CO ppmvd readings for each hour of operation (not including hours of startup and/or shutdown time) shall be added together and divided by the number of hours included to compare with the 20 ppmvd limitation; **NOx:** For each 24 hour period (12 midnight to 12 midnight) the hourly average NOx ppmvd readings shall be added together and divided by the hours of operation in that 24 hour period to compare with the 21 ppmvd limitation. Startup shall be defined from the insertion of fuel to the turbine to when the gross MW (turbine and duct burner) is equal to or greater than 40 MW. Shutdown shall be defined from when the gross MW is equal to or less than 40 MW to the termination of emissions exiting the stack. The gross MW can be found on the CEM Data output under the column titled “GROSS_2 MW”.

Condition 4: This source is subject to Regulation No. 6 - Standards of Performance for New Stationary Sources, Part A - Federal Register Regulations Adopted by Reference, Subpart GG - Standards of Performance for Stationary Gas Turbines.
-NOx ≤ 190 ppmvd at 15% oxygen. (By meeting BACT above, this standard is satisfied.)
-SO2 ≤ 150 ppmvd at 15% oxygen. Sulfur content of fuel shall not exceed 0.8 percent by weight.

In addition, the requirements of Regulation No. 6, Part A, Subpart A, General Provisions, apply.

Condition 5: This source shall be limited to a maximum consumption rate as

listed below and all other activities, operation rates and numbers of equipment as stated in the application. Records of the actual consumption rate shall be maintained by the permittee and made available to the Division for inspection upon request.
-Consumption of Natural Gas by the turbine shall not exceed 1600 MMscf/yr
-Consumption of Natural Gas by the duct burner shall not exceed 530 MMscf/yr.
-Total consumption of #2 Diesel Fuel by the starter engine shall not exceed 2,258 gallons/yr.

The source has requested to increase the natural gas consumption by the turbine to 2000 MMscf/yr and the diesel consumption by the starter engine to 4000 gallons/yr. Facility wide modeling was performed on maximum design rates and the National Ambient Air Quality standards and increments were not exceeded.

Condition 7: Dry low NOx control technology (DLN) shall be used to comply with NOx and CO emissions in Conditions 3 and 4. This condition has not been incorporated into the operating permit. DLN has already been employed and CEMs are used to demonstrate compliance with both NOx and CO emission limitations.

Condition 8: Turbine DLN combustion chambers shall be upgraded to versions with better NOx control as new versions become available from the manufacturer, and the combustion sections require replacing (according to manufacturer's recommendations).

Condition 11: APEN reporting in accordance with Regulation No. 3, Part A.II.C.

Condition 12: The exhaust stacks of the turbine shall be equipped with a continuous emission monitoring (CEM) system to measure and record the following:
-Concentration of Oxides of Nitrogen.
-Emission rate of Oxides of Nitrogen, pounds/hour, tons per 12-month period.

Quality assured CEM data shall be available for a minimum of 90% of the duration of the operation. For the periods, when such data is not available, the highest reading recorded during the previous 30-day period shall be used for determining the total emissions.

CEM data shall be reported to the Division on a quarterly basis. Such reports shall include all exceedances of the per turbine NOx emission limit, plant 30-day and annual rolling totals of NOx emissions and records of calibration and maintenance. NOx emissions and records of calibration and maintenance should be kept on site and made available upon request. Only the exceedances shall be required to be submitted on a quarterly basis.

The Division may take direct enforcement action based solely on CEM data if the data shows any excursions above the NOx limitations established in Condition 3.

The source has agreed to use CEM data to measure and record CO emission rates and concentrations.

In addition, the turbine and duct burner are subject to both Reg. 1 and Reg. 6 for particulate matter standards and the turbine is subject to the sulfur standards.

2. Emission Factors- Emissions from these turbines are produced during the combustion process, and are dependent upon operating conditions and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NO_X), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulfur Oxides (SO_X), and Particulate Matter (PM and PM_{10}). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted dependent upon the makeup of the fuel and combustion efficiency. The Compliance Emission Factors used to determine emission limits in the Permit for the turbines are from manufacturer's data and are compared to AP-42, Section 3.1, Table 3.1-1 for Stationary Gas Turbines from Electric Generation (10/96). Table 1.4-1 (3/98) for Large Boilers was used to calculate emissions from the duct burners. However, CEMs will be required to determine the emissions of NOx and CO from the turbine and duct burners. AP-42 emission factors will be used for all other emission calculations.

Pollutant	Turbine EF (lb/MMBtu)	AP-42 (lb/MMBtu)
PM	0.0419	0.042
SO2	0.0006	0.94(S)*
VOC	0.024	0.024

* where 'S' is the sulfur content of the fuel.

3. Monitoring Plan- BCP indicated in their application they would demonstrate compliance with the emission limits by multiplying the hours of operation of turbines and the lb per hour limits on the permits. This is not an acceptable compliance determination. Therefore, compliance shall be demonstrated by multiplying fuel usage by the emission factors for PM, PM10, SO2, and VOCs mentioned above. The NOx and CO emissions shall be determined from CEM data. Recordkeeping and reporting of CEM data shall follow the requirements in 40 CFR §60.7. The CEM system shall follow the maintenance and operating requirements in 40 CFR §60.13. The source will be required to record fuel usage and calculate emissions monthly. Operating parameters shall be monitored monthly. Compliance with the Opacity standard of 20% will be ensured by a certification that the turbine has used natural gas exclusively during the reporting period.

4. Compliance Status- Current APENs reporting criteria and HAP emissions are on file with the Division. Due to modification of the permit and review of the sources files these turbines are currently considered to be in compliance with all applicable requirements.

<u>Unit S002-S004</u> - Three (3) Cleaver-Brooks CB-700-600 Natural Gas Fired

Boilers, Each Rated at 20 MMBtu/hr, SN's: L91502, L91503 and L91504. (Emergency Boilers for Heating Greenhouses)

Discussion:

1. Applicable Requirements- These boilers were installed and began operation in 1994. They were originally issued initial approval construction permit 91MR934-2 in 1992. The permit was modified in June 1992 to incorporate the additional emissions from the diesel starter engine added to the turbine. Initial approval permit 91MR934-2 has the following applicable requirements:

Condition 1: Visible emissions shall not exceed twenty percent (20%) opacity.

Condition 5: Emissions of air pollutants from all turbines, duct burners, diesel starter engine, and emergency boilers covered by permits 91MR934-1 and -2 shall not exceed the following limitations:

-Particulate Matter	9.9 tons/yr	6.1 pounds/hr
-PM10	9.9 tons/yr	6.1 pounds/hr
-Sulfur Dioxide	3.2 tons/yr	1.6 pounds/hr
-Nitrogen Oxides	112.4 tons/yr	63.8 pounds/hr
-Volatile Organic Compounds	26.7 tons/yr	19.9 pounds/hr
-Carbon Monoxide	76.6 tons/yr	47.6 pounds/hr

The short term limits have been removed per the policy change stated above. In addition, due to a change in AP-42 emission factors and an increase in throughput the source has requested the following emission limitations.

-Particulate Matter	45.1 tons/yr
-PM10	45.1 tons/yr
-Sulfur Dioxide	2.0 tons/yr
-Nitrogen Oxides	117.4 tons/yr
-Volatile Organic Compounds	26.7 tons/yr
-Carbon Monoxide	80.8 tons/yr

Condition 6: Emissions of air pollutants from each boiler shall not exceed the shall the following limitations:

-Particulate Matter	0.02 tons/yr	0.06 pounds/hr
-PM10	0.02 tons/yr	0.06 pounds/hr
-Sulfur Dioxide	0.01 tons/yr	0.01 pounds/hr
-Nitrogen Oxides	0.84 tons/yr	2.80 pounds/hr
-Volatile Organic Compounds	0.02 tons/yr	0.06 pounds/hr
-Carbon Monoxide	0.21 tons/yr	0.70 pounds/hr

The short term limits have been removed per the policy change stated above. In addition, due to a change in AP-42 emission factors and an increase in throughput the source has requested the following emission limitations.

-Particulate Matter	0.4 tons/yr
-PM10	0.4 tons/yr
-Sulfur Dioxide	0.1 tons/yr
-Nitrogen Oxides	5.0 tons/yr
-Volatile Organic Compounds	0.3 tons/yr
-Carbon Monoxide	4.2 tons/yr

The emission limitations except for NOx and CO would normally be removed because they are APEN deminimis and have corresponding throughput limits. However, in this case they are included in the facility wide emission limitations and need to remain.

Condition 7: The boilers are subject to Regulation No. 6 - Standards of Performance for New Stationary Sources, Part A - Federal Register Regulations Adopted by Reference, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Unit.

In addition, the requirements of Regulation No. 6, Part A, Subpart A, General Provisions, apply.

Condition 8: This source shall be limited to a maximum consumption rate as listed below and all other activities, operational rates and numbers of equipment as stated in the application. Records of the actual consumption rate shall be maintained by the permittee and made available to the Division for inspection upon request.
-Total consumption of Natural Gas by the boilers shall not exceed 12 MMscf/yr.

The source requested an increase of natural gas consumption by the boilers to 100 MMscf/yr.

Condition 9: APEN reporting in accordance with Regulation No. 3, Part A.II.C.

In addition, the boilers are subject to the particulate matter standards in Reg.1 and Reg. 6.

The due date of the first semi-annual monitoring report required by this operating permit will be more than 180 days after the initial approval construction permits were issued and/or the equipment commenced operation. Therefore, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for construction permits 91MR934-2 and the appropriate provisions of the construction permits have been directly incorporated into this operating permit.

2. Emission Factors- Emissions from these boilers are produced during the combustion process, and are dependent upon operating conditions and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NO_X), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulfur Oxides (SO_X), and Particulate Matter (PM and

PM_{10}). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted dependent upon the makeup of the fuel and combustion efficiency. The Compliance Emission Factors used to determine emission limits in the Permit for the boilers are from the EPA Compilation of Air Pollution Emission Factors (AP-42) Section 1.4, Tables 1.4-(1-3), Emission Factors for Small Industrial Natural Gas Boilers (3/98). The lb/hr PM emission limit in the construction permit has been removed, therefore, Colorado Regulation No. 1 which was originally streamlined out has been added to the permit.

3. Monitoring Plan- BCP indicated in their application they would demonstrate compliance with the emission limits by multiplying the hours of operation of the boilers and the lb per hour limits on the permits. This is not an acceptable compliance determination. Therefore, compliance shall be demonstrated by multiplying fuel usage with the emission factors mentioned above. Specific monitoring guidance for Boilers located in attainment areas has been developed by the Division as shown on the attached grid titled, "Compliance/Scenario Summary - Gas Fired Boilers." The source will be required to calculate emissions monthly. Compliance with the Opacity standard of 20% will be ensured by a certification that the boiler has used natural gas exclusively during the reporting period.

This unit is subject to the provisions of NSPS Subpart Dc. The Division's analysis of the applicable requirements for this (gas-fired) unit indicated that there are no emission limits imposed by the Subpart. Therefore the daily fuel records required in 60.48c (h) and (I) do not have any regulatory impact. Subpart Dc will be listed as an applicable requirement in the permit, but there will not be any standards, monitoring, or recordkeeping associated with the units.

4. Compliance Status- Current APENs reporting criteria and HAP emissions are on file with the Division. Due to modification of the permit and review of the sources files these boilers are currently considered to be in compliance with all applicable requirements.

<u>Unit S005</u> - One (1) GEA Cooling Tower, Two Cell Counter Flow, 29,000 gallons/min.

Discussion:

1. Applicable Requirements- The cooling tower was installed and began operation in 1994. The source did not consider the cooling tower as an emission source and did not file an APEN with the Division until 1999. The cooling tower will be incorporated into the operating permit through a CP/OP modification with the following applicable requirements:

Visible emissions shall not exceed twenty (20%) opacity.

Circulating water shall not exceed 8700 MMgal per year (based on a maximum of 29,000 gallons per min and 5000 hr/yr).

Representative samples of makeup water shall be analyzed for total

dissolved solids (TDS) at least once in a period of a calendar month.

This source is subject to the odor requirements of Regulation No. 2. (Cooling towers are not considered units with odor problems therefore, this requirement will not be specifically included for this unit. However, it will remain in the general conditions, Section IV, for all emission units in the state of Colorado).

Emissions of air pollutants shall not exceed the following limitations:

Particulate Matter	3.6 tons/yr
Particulate Matter < 10μm (PM10)	3.6 tons/yr

APEN reporting in accordance with Regulation No. 3, Part A.II.C.

2. Emission Factors- Emissions from cooling towers are produced from the liquid water entrained in the air stream and carried out of the tower as "drift" droplets. The particulate matter contained in the drift droplets is of concern. The emission factor in the permit is calculated by determining the amount of solids in the circulating water and the amount of water being emitted to the air (make-up). This cooling tower has a drift of .02% and a fallout of 31.3%. The emission factor is:

EF = avg. density of water x TDS x drift x fallout
= 8.33 lbs/gal x TDS x 0.0002 x 0.313
= 521.5 lbs/MMgal [TDS]

The TDS of the cooling water is determined by multiplying the TDS of the Make-up water times the cycles of concentration. There are 8 cycles of concentration for this cooling tower.

3. Monitoring Plan- The source shall be required to monitor circulation rate of the cooling tower and calculate emissions on a monthly basis. As well as, analyze samples of makeup water monthly for total dissolved solids (TDS). The cooling tower only runs when the steam turbine runs, therefore, the hours of operation for the cooling tower will be based on the hours of operation metered on the steam turbine.

4. Compliance Status- Current APENs reporting criteria and HAP emissions are on file with the Division. Upon issuance of this operating permit this unit will be considered to be in compliance with all current applicable requirements.

IV. Insignificant Activities

Two (2) small water treatment analysis labs
Ten (10) water treatment chemical storage and dispensing tanks, 125 gallons each
Sulfuric acid storage tank, 3800 gallons
Ten (10) small propane gas tanks
Ten (10) drums of lube oils, 55 gallons

Tank of waste lube oil, 250 gallons
Temporary storage for steam turbine lube oil, 3500 gallons
Diesel storage tank, 300 gallons
Unleaded gasoline storage tank, 300 gallons
Gas unit and duct gas heaters, 5 @ 75 MBtu, 4 @ 100 MBtu, and 5 @ 150 MBtu.
Portable gasoline powered air compressor
Portable welding unit
Portable power generator

V. Alternative Operating Scenarios

No alternative operating scenarios were requested for this facility.

VI. Permit Shield

The listed regulation citations for the Permit Shield requested by Brush Cogeneration Partners in the Title V application are identical to the listed Applicable Requirements for each unit. The 'Specific Conditions' in Section III of the Operating Permit are intended to shield a source from enforcement of non-applicable requirements. Therefore, no specific regulations were included in Section III of the Operating Permit. However, some requirements that have been superceded others have been included in the shield section for this permit.