

Statement of Basis

**Title V Air Quality Operating Permit Renewal
Northern Border Pipeline Company – Station #9
Near Ipswich, South Dakota**

1.0	Background	1
1.1	Operational Description	1
2.0	New Source Performance Standards	2
2.1	Standards Applicable to Boilers	2
2.2	40 CFR, Part 60, Subpart GG.....	2
2.3	40 CFR Part 60, Subpart JJJJ.....	4
2.4	40 CFR, Part 60, Subpart KKKK	4
3.0	New Source Review.....	5
4.0	Prevention of Significant Deterioration.....	5
4.1	Potential Emissions	6
4.2	Combustion Turbines	6
4.3	Combustion Turbine.....	7
4.4	Emission Factors for Emergency Generator	8
4.5	Potential Emissions for Emergency Generator	8
4.6	Emission Factors for Boiler.....	9
4.7	Potential Emission for Boiler	9
4.8	Potential Emissions Summary	10
4.9	Federally Enforceable Permit Requirements.....	10
5.0	National Emission Standards for Hazardous Air Pollutants	11
6.0	Maximum Achievable Control Technology Standards.....	11
6.1	Potential HAP Emissions.....	11
6.2	Potential HAP Emissions – Combustion Turbine.....	11
6.3	Potential HAP Emissions – Generator	12
6.4	Potential HAP Emissions – Boiler	12
6.5	Summary of HAP Emissions.....	12
6.6	MACT Standards.....	13
6.7	40 CFR Part 63 Subpart YYYY	13
6.8	40 CFR Part 63 Subpart ZZZZ	13
6.9	Hazardous Air Pollutants for industrial, commercial, and institutional boilers and process heaters	13
6.10	Area Source for Industrial, Commercial, and Institutional Boilers	14
7.0	State Requirements.....	14
7.1	State Emission Limits	14
7.2	Visible Emission Limit.....	14
7.3	Particulate Matter Emission Limits	14
7.4	Sulfur Dioxide Emission Limits.....	15
7.5	Insignificant Activities	16
7.6	Compliance Assurance Monitoring.....	16
7.7	Periodic Monitoring.....	16
7.8	Air Fees	17
7.9	Summary of Applicable Requirements.....	17
8.0	Recommendation	17

1.0 Background

On January 26, 2010, the Department of Environmental and Natural Resources (DENR) reissued Northern Border Pipeline Company's (Northern Border) Title V air quality operating permit (#28.0701-26) for the operation of a natural gas fired compressor station (Compressor Station #9) located near Ipswich, South Dakota. The SIC code for this facility is 4922. During the term of the permit, the permit was revised as follows:

1. On December 1, 2010, Administrative Amendment to change the responsible official.

On May 5, 2014, DENR received a renewal application from Northern Border for Compressor Station #9 located near Ipswich, South Dakota, for its Title V air quality operating permit.

The current Title V air quality operating permit contains federally enforceable operating restrictions that limit nitrogen oxide emissions from the facility to 238 tons per year or less. This restriction prevents Northern Border from having to obtain a Prevention of Significant Deterioration (PSD) permit. Northern Border has requested the renewal permit contain restrictions for the same purpose.

There have been no complaints or violations filed against this facility since the last permit review.

1.1 Operational Description

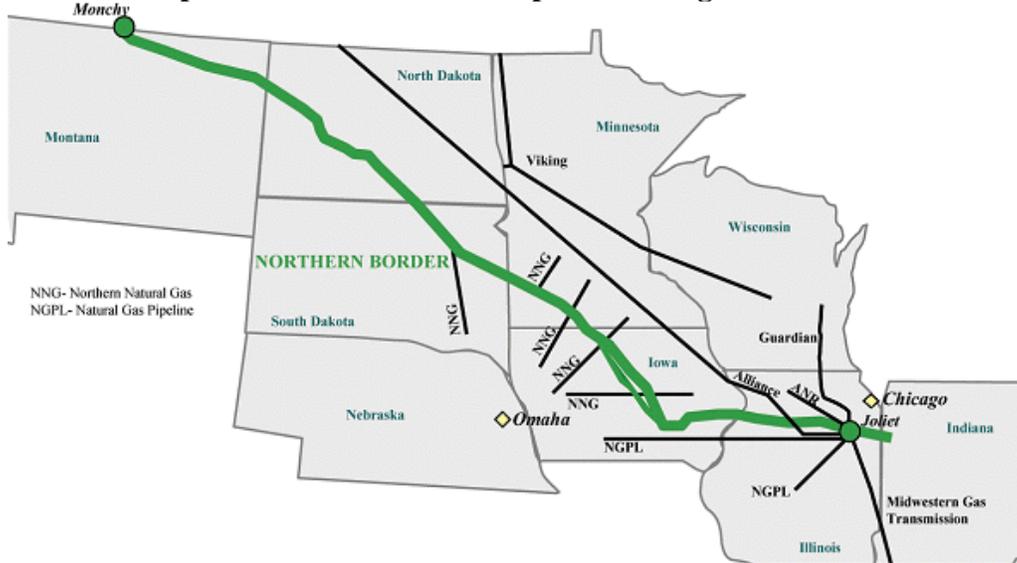
Table 1.1 lists the equipment operated at Northern Border that will be considered during this permit renewal.

Table 1.1 – Operational Description

Operating Units	Equipment	Operating Rate	Control Equipment
#1	1998 Cooper-Rolls, Coberra 6562 DLE, natural gas fired combustion turbine	324 MMBtus per hour heat input	N/A (lean-premix combustion to reduce nitrogen oxide emissions)
#2	1992 Caterpillar G3412SITA emergency generator	350 Kilowatts	N/A
#3	1998 Hydronic natural gas fired boiler	1.34 million Btus per hour	N/A

Northern Border is part of a natural gas pipeline extending from the Montana-Saskatchewan border to interconnecting pipelines in the upper Midwestern United States (see Figure 1).

Figure 1
Map of Northern Border's Pipeline through South Dakota



2.0 New Source Performance Standards

DENR reviewed the New Source Performance Standards (NSPS) in 40 CFR Part 60 and determined that the following require further review to determine whether they are applicable to Northern Border.

2.1 Standards Applicable to Boilers

There are three New Source Performance Standards for fossil fuel-fired steam generators. The three standards are applicable to the following steam generators:

1. **40 CFR Part 60, Subpart D:** applicable to a steam generator with a maximum operating rate of 250 million BTUs per hour or more and commenced construction after August 17, 1971;
2. **40 CFR Part 60, Subpart Db:** applicable to a steam generator with a maximum operating rate of 100 million BTUs per hour or more and commenced construction after June 19, 1984; and
3. **40 CFR Part 60, Subpart Dc:** applicable to a steam generator with a minimum design heat input capacity equal to or greater than 10 million BTUs per hour but less than or equal to 100 million BTUs per hour and commenced construction after June 9, 1989.

Unit #3 was constructed after June 9, 1989 and has a maximum design heat input of 1.4 million Btus per hour heat input. Therefore, this boiler is not applicable to any of these subparts.

2.2 40 CFR, Part 60, Subpart GG

This standard is applicable to all stationary gas turbines that have a heat input at peak load equal to or greater than 10.7 gigajoules per hour (equivalent to 10 million Btus per hour) and were

constructed, modified, or reconstructed after October 3, 1977. The stationary gas turbine at Compressor Station #9 has a heat input greater than 10 million Btus per hour. Therefore, the stationary gas turbine is subject to this new source performance standard. The specific requirements for this subpart are described below.

- In accordance with 40 CFR 60.332(d), the stationary gas turbine is subject to an allowable nitrogen oxide emission limit based on 40 CFR 60.332(a)(2), and defined by Equation 2-1.

Equation 2-1 – Nitrogen oxide limit

$$STD = (0.0150) \frac{14.4}{Y} + F$$

Where:

STD = allowable nitrogen oxide emission limit (percent by volume at 15 % oxygen and on a dry basis);

Y = manufacturer's stated heat rate at manufacturer's rated peak load (kilojoules per watt hour); and

F = nitrogen oxide emission allowance for fuel-bound nitrogen.

Based on a manufacturer's specified heat rate at peak load of 7,038 Btu/hp-hr (9.95 kilojoules per watt hour) and taking no credit for fuel-bound nitrogen in the pipeline gas, the allowable emission rate is 0.0217 percent by volume nitrogen oxide or 217 ppm nitrogen oxide. In accordance with 40 CFR 60.332(k), Northern Border is exempt from the nitrogen oxide emission limit when being fired with an emergency fuel. Northern Border does not have a back-up fuel; therefore, this exemption is not applicable.

Northern Border performed the stack testing required in this new source performance standard on units identical to the stationary gas turbine at Compressor Station #10. DENR accepted the performance test report for demonstrating compliance with the nitrogen oxide emission limit. The resulting nitrogen oxide emission rates were 29.2 ppm when the DLE is operational and 74.9 ppm when the DLE is not operational. This demonstrates that the unit is capable of complying with the nitrogen oxide emission limit during all operations;

- Compressor Station #9's turbine is subject to either a sulfur dioxide emission standard of 0.015 % by volume at 15 % oxygen on a dry basis or a fuel sulfur content of less than 0.8 % by weight for the fuel burned in the turbine. The turbine will burn pipeline quality natural gas that has a sulfur content of less than 0.8 % sulfur; therefore, the turbine will be in compliance with this standard;
- This subpart was amended in July 2004, so that facilities with turbines that burn fuel meeting the definition of natural gas will not be required to monitor the sulfur content of the fuel. It was also amended so that only sources claiming a fuel-bound nitrogen credit are required to monitor the nitrogen content of the fuel being fired in the turbine. Northern Borders burns fuel meeting the definition of natural gas and does not claim a fuel-bound nitrogen credit; therefore, monitoring for the sulfur content and nitrogen content will not be required;

- This subpart was amended in February 2006; facilities that do not use water injection to control NO_x emissions, do not have meet the continuous monitoring requirements on the turbines, because the NO_x emissions of these turbines are, in almost all instances, well below the 40 CFR Part 60 Subpart GG emission limits. Northern Borders does not use water injection to control the NO_x emissions but is required to do performance tests to ensure the turbine is operating below the emission limits; and
- This subpart was amended in February 2014, to add and update some of the testing provisions that contain inaccuracies and outdated procedures, and new alternatives that have been approved. In 40 CFR Part 60 Subpart GG, the definitions of terms for the equation in Section 60.335(b)(1) are revised to allow the reference combustor inlet absolute pressure to be measured in millimeters of mercury (mm Hg). The site barometric pressure is allowed as an alternative to the observed combustor inlet absolute pressure for calculating the mean NO_x emission concentration. This amendment does not affect Northern Borders testing procedures for the turbine.

2.3 40 CFR Part 60, Subpart JJJJ

DENR's review of the NSPS determined the 40 CFR Part 60 Subpart JJJJ may be applicable. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. Subpart JJJJ is applicable to owners and operators of stationary spark ignition (SI) internal combustion engines (ICE) that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

- On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);
- On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;
- On or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or
- On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP); or
- Owners and operators of stationary SI ICE that commence modification or reconstruction after June 12, 2006.

Northern Border operates one natural gas-fired generator rated at 350 kilowatts (470 Hp) that was installed in 1992. Therefore, Northern Border is not applicable to this subpart.

2.4 40 CFR, Part 60, Subpart KKKK

The provisions of 40 CFR, Part 60 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines are applicable to the owner or operator of a stationary combustion turbine with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, and which commenced construction, modification, or reconstruction after February 18, 2005.

The stationary combustion turbine at Northern Border's Ipswich facility was constructed before February 18, 2005. Therefore, Units #1 is not applicable to this subpart.

3.0 New Source Review

The Administrative Rules of South Dakota (ARSD) 74:36:10:01 state that New Source Review (NSR) regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. Northern Border is located near Ipswich, South Dakota, which is in attainment for all the pollutants regulated under the Clean Air Act. Therefore, Northern Border is not subject to NSR review.

4.0 Prevention of Significant Deterioration

A prevention of significant deterioration (PSD) review applies to new major stationary sources and major modifications to existing major stationary sources in areas designated as attainment under Section 107 of the Clean Air Act for any regulated air pollutant. The following is a list of regulated air pollutants under the PSD program:

1. Total suspended particulate (PM);
2. Particulate with a diameter less than or equal to 10 microns (PM10);
3. Particulate with a diameter less than or equal to 2.5 microns (PM2.5);
4. Sulfur dioxide (SO₂);
5. Nitrogen oxides (NO_x);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOC);
8. Lead;
9. Fluorides;
10. Sulfuric acid mist;
11. Hydrogen sulfide;
12. Reduced sulfur compounds;
13. Total reduced sulfur; and
14. Greenhouse gases (carbon dioxide, methane, nitrous oxide, etc.).

If the source is considered one of the 28 named PSD source categories listed in Section 169 of the federal Clean Air Act, the major source threshold is 100 tons per year of any regulated pollutant, except for greenhouse gases. The major source threshold for all other sources is 250 tons per year of any regulated pollutant, except for greenhouse gases.

According to the Clean Air Act, once a pollutant is regulated under any part of the Act, (as was the case with greenhouse gas emissions after the motor vehicle regulations were finalized in March 2010) major new sources or major modifications are subject to the PSD program. Under the Clean Air Act, PSD permits are required for all sources that emit a regulated air pollutant above 100 or 250 tons per year, depending on the source. This threshold, if applied to greenhouse gases, would greatly increase the number of facilities requiring a PSD review. Based on administrative necessity, EPA increased these thresholds through the "Tailoring Rule."

On May 13, 2010, EPA issued the final version of the “Tailoring Rule” for greenhouse gas emissions. The major source threshold for greenhouse gases is listed below:

1. New PSD source because of a criteria air pollutant, the major source threshold for greenhouse gases is 75,000 tons per year of carbon dioxide equivalent or more;
2. New PSD source if greenhouse gas emissions are 100,000 tons per year of carbon dioxide equivalent or more;
3. For an existing PSD source because of a criteria air pollutant, a major modification for greenhouse gases is an increase of 75,000 tons per year of carbon dioxide equivalent or more;
4. For an existing non-PSD source that has the potential to emit 100,000 tons per year of carbon dioxide equivalent emissions or more, a major modification for greenhouse gases is an increase of 75,000 tons per year of carbon dioxide equivalent or more; and
5. In addition to subsection (2) and (4), a specific greenhouse gas, without calculating the carbon dioxide equivalent, also needs to emit greater than 100 or 250 tons per year, whichever is applicable, to be regulated.

On June 23, 2014, the United States Supreme Court vacated provisions of the “Tailoring Rule” for greenhouse gas emissions. In part, the court ruled that a source cannot be required to obtain a Title V or PSD permit solely on the basis of greenhouse gas emissions and that the EPA does not have the authority to increase the major source threshold for PSD from 250 tons per year to 100,000 tons per year carbon dioxide equivalent for greenhouse gases.

4.1 Potential Emissions

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA’s Compilation of Air Pollutant Emission Factors (AP-42) Fifth Edition, 3.1, or other methods to determine potential air emissions. Potential emissions for each applicable pollutant are calculated by assuming the unit operates every day of the year at the maximum design capacity (8,760 hours per year).

4.2 Combustion Turbines

Nitrogen oxide and carbon monoxide are the main pollutants emitted by the combustion turbine. Operating the turbine in lean-premix combustion (DLE) mode reduces the emissions of nitrogen oxide. DENR received a letter in May 2004, notifying DENR that stack tests on identical units have shown nitrogen oxide emissions can exceed the manufacturer data if not operating in DLE mode. The DLE system cannot be engaged during startup and shutdown, at reduced turbine loads that occur due to upstream and downstream upsets, or during mechanical testing. A stack test was performed on Compressor Station #11 on April 8, 2010, to determine the controlled nitrogen oxide emission rate when the DLE system was operational. A stack test was performed on an identical unit at Compressor Station #1 on October 27, 2003, to determine uncontrolled nitrogen oxide emission rates when the DLE was not operational. Both performance test reports are on file with DENR.

EPA's AP-42 document lists controlled and uncontrolled carbon monoxide emission factors as well as emission factors for other criteria pollutants. Table 4.1 summarizes the emission factors for total suspended particulate matter (TSP), particulate matter less than 10 microns (PM10), particulate matter less than 2.5 micron (PM2.5), sulfur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC). There is no emission factor for PM2.5. Therefore, particulate matter emissions for TSP, PM10, and PM2.5 are equal.

Table 4.1 – Turbine emission factors

Pollutant	TSP/PM10/PM2.5^a	SO2^{a,b}	NOx (pounds per hour)	CO^a	VOC^a	HAP^a
Uncontrolled [lb/MMBtu]^e	0.0066	0.0066	59.4 ^c	0.082	0.0021	0.001
Controlled [lb/MMBtu]^e	0.0066	0.0066	23.6 ^d	0.015	0.0021	0.001

^a – EPA AP-42, Fifth Edition, Section 3.1, 4/00;

^b – Based on maximum fuel sulfur content of 2.0 grains per 100 standard cubic feet (0.007% by weight) according to Northern Border gas tariff;

^c – Stack emissions test – Compressor Station #1, October 27, 2003;

^d – Stack emissions test – Compressor Station #11, April 8, 2010;

^e – lb/MMBtu represents pounds per million British thermal units

4.3 Combustion Turbine

Potential emissions from the combustion turbine are the emissions that would occur if the unit operates 8,760 hours per year (24 hours per day for 365 days). Uncontrolled emissions are calculated assuming the turbine operates continuously in non-DLE mode. Controlled emissions are calculated assuming the turbine operates continuously in DLE mode. Potential emissions calculated for each pollutant are as shown in Table 4.2.

Equation 4-1 – Potential Emissions from Combustion Turbines

$$Potential\ Emissions\ \left[\frac{tons}{year} \right] = \left(\frac{Emission\ Factor\ \left[\frac{pounds}{MMBTU} \right] \times 8,760\ \left[\frac{hr}{year} \right] \times HeatInput\ \left[\frac{MMBtu}{hr} \right]}{2000\ \left[\frac{pounds}{tons} \right]} \right)$$

Equation 4-2 – Potential NOx Emission

$$Potential\ Emissions\ \left[\frac{tons}{year} \right] = \left(\frac{Emission\ Factor\ \left[\frac{pounds}{hr} \right] \times 8,760\ \left[\frac{hr}{year} \right]}{2000\ \left[\frac{pounds}{tons} \right]} \right)$$

Table 4.2 – Potential Emissions from Combustion Turbines (tons per year)

	TSP/PM10/PM2.5	SO2	NOx	CO	VOC
Uncontrolled Emissions (Non-DLE)	9.4	9.4	260.2	114.9	2.98
Controlled Emissions (DLE)	9.4	9.4	103.4	114.9	2.98

4.4 Emission Factors for Emergency Generator

The uncontrolled emission factors for the generator fueled with natural gas were derived from AP-42, Chapters 3.2-2, Table 3.2-3; Natural Gas Fired Reciprocating Engines. The emission factors for the generator for total suspended particulate matter (TSP), particulate matter less than 10 microns (PM10), particulate matter less than 2.5 micron (PM2.5), sulfur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC) are summarized in Table 4.3. The generator does not have a control device; therefore potential uncontrolled and controlled emissions are equivalent and will be referred to as potential emissions.

Table 4.3- Generator emission factors

Pollutant	TSP	PM10/PM2.5	SO2 ^a	NOx	CO	VOCs
Emission factor [lb/MMBtu]	0.019	0.0095	0.0059	2.21	3.72	0.0296

^a - Based on maximum fuel sulfur content of 2.0 gr/100scf (0.007% by weight) according to Northern Border gas tariff.

4.5 Potential Emissions for Emergency Generator

Using Equation 4-3 - the maximum designed operating rate in horsepower, an efficiency of 35%, and a conversion factor of 3,413 Btus per kilowatt-hour were used to calculate the maximum designed operating rate based on heat input of the generator in MMBtus per hour.

Equation 4-3 – Heat Input Calculation

$$\text{HeatInput} \left[\frac{\text{MMBtus}}{\text{hr}} \right] = \left(\frac{\text{OperatingRate} [\text{KW}] \times 3,413 \left[\frac{\text{Btu}}{\text{hr} \times \text{KW}} \right]}{10^6 \left[\frac{\text{Btu}}{\text{MMBtu}} \right] \times 35\%} \right)$$

Using Equation 4-3, the emergency generator has a heat input of 3.4 MMBtus/hr.

Based on EPA’s memo from John S. Seitz to the directors of EPA’s regional offices, dated September 6, 1995, the potential emissions from an emergency generator may be based on operating 500 hours per year. Therefore, the potential to emit will be based on 500 hours per year.

The potential to emit (PTE) for the emergency generator was determined using Equation 4-4, emission factors from Table 4.3, an annual operating rate of 500 hours per year, the heat input calculated from Equation 4-3 and a conversion factor of 2,000 pounds per ton.

Equation 4-4 – Potential Emission Calculations

$$\text{Potential Emissions} \left[\frac{\text{tons}}{\text{year}} \right] = \left(\frac{\text{Emission Factor} \left[\frac{\text{pounds}}{\text{MMBTU}} \right] \times \text{Annual Operations} \left[\frac{\text{hr}}{\text{year}} \right] \times \text{HeatInput} \left[\frac{\text{MMBtu}}{\text{hr}} \right]}{2000 \left[\frac{\text{pounds}}{\text{tons}} \right]} \right)$$

In order to avoid a Prevention of Significant Deterioration (PSD) review, Northern Border has requested federally enforceable operating restrictions on the generator limiting its use to 500 hours per year or less.

Table 4.4 - Potential Emissions – Emergency Generator (tons per year)

Description	TSP	PM ₁₀ /PM _{2.5}	SO ₂	NO _x	CO	VOC
#2	0.02	0.008	0.005	1.9	3.2	0.03

4.6 Emission Factors for Boiler

The emission factors for the heating plant boilers are derived from EPA’s Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Tables 1.4-1 and 1.4-2, 7/98. Boilers with a heat input capacity less than 100 million Btus per hour are classified in AP-42 as small boilers. The following are the air emission factors for total suspended particulate matter (TSP), particulate matter less than 10 microns (PM10), particulate matter less than 2.5 microns (PM2.5), sulfur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), and hazardous air pollutants (HAPs) for the combustion of natural gas in small boilers:

Table 4.5 – Emission factors for boilers

Pollutant	TSP/ PM-10/PM2.5 ^a	SO2	NOx	CO	VOC
Emission factor [lb/MMcf] ^b	7.6	0.6	100	84	5.5
Emission factor [lb/MMBtus] ^{b,c}	0.007	0.0006	0.098	0.082	0.005

^a It is noted in AP-42 that particulate emissions from burning natural gas are all less than one micron in diameter. Therefore, the emission factor for particulate matter less than 10 microns in diameter (PM10) is the same as the emission factor for total suspended particulate (TSP).

^b lb/MMcf and lb/MMBtus represent pounds per million standard cubic feet and pounds per million British thermal units, respectively

^c To convert from lb/MMcf to lb/MMBtus, divide lb/MMcf by 1,020, the average natural gas heating value.

4.7 Potential Emission for Boiler

The uncontrolled emission factors for each applicable pollutant for the boiler were derived from the Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume 1 (AP-42). The factors for the boiler fired by natural gas were derived for boilers with less than 100 MMBtus heat input from Table 1.4-1 and 1.4-2 (7/98).

Equation 4-5 was used to calculate the potential emissions from burning natural gas for each air pollutant in tons per year.

Equation 4-5 – Potential Uncontrolled Emission Calculations

$$Potential \left[\frac{\text{tons}}{\text{yr}} \right] = \left(\frac{Emission\ Factor \left[\frac{\text{lbs}}{\text{MMBtu}} \right] \times Annual\ Operations \left[\frac{\text{hr}}{\text{yr}} \right] \times Heat\ Input \left[\frac{\text{MMBtu}}{\text{hr}} \right]}{2000 \left[\frac{\text{lbs}}{\text{tons}} \right]} \right)$$

Table 4.6 – Potential Emissions – Boiler (tons per year)

Description	TSP/PM ₁₀ /PM _{2.5}	SO ₂	NO _x	CO	VOC
Boiler	0.04	0.004	0.6	0.5	0.03

4.8 Potential Emissions Summary

Table 4.7 summarizes the results of the potential uncontrolled emission calculations for the combustion turbine and the auxiliary generator. Shown are the potential emissions of each pollutant from each source as well as the total facility potential to emit for each pollutant.

Table 4.7 – Facility Uncontrolled Emissions Summary (tons/year)

Description	TSP	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO	VOC
#1	9.4	9.4	9.4	9.4	260	116	2.98
#2	0.02	0.008	0.008	0.005	1.9	3.2	0.03
#3	0.04	0.004	0.04	0.004	0.6	0.5	0.03
TOTAL	9	9	9	9	263	120	3

4.9 Federally Enforceable Permit Requirements

Northern Border has requested federally enforceable operating restrictions that limit potential nitrogen oxide emissions below 250 tons per year and allow Compressor Station #9 to remain a minor source under the PSD program. The generator will be restricted to operating 500 hours on a 12-month rolling basis, limiting nitrogen oxide emissions to 1.9 tons per year from this source.

Northern Border has requested that DENR use the non-DLE nitrogen oxide emission rates from a 2006 test performed on a similar unit in Minnesota – non-DLE NOx emissions were 70.95 lb/hr. Northern Border requested that a more conservative non-DLE emission factor of 78.0 lb/hr be utilized. Similarly, Northern Border has requested that the DLE emissions be based upon the turbine manufacturer’s guaranteed emission rate of 52.5 lbs/hr and not the emission rate determined in the 2010 stack test. Northern Border has also requested that the total non-DLE hourly operation of the unit be 380 hours per 12-month rolling average.

Previously, DENR and Northern Border agreed that the permit will require the turbine to be operated in DLE mode except during startup and shutdown, at reduced turbine loads that occur due to upstream and downstream upsets, or during mechanical testing which prohibits DLE operation. This restriction is contained in the current permit. The permit condition states that the turbine can be operated in non-DLE mode not more than 380 hours per 12-month rolling period (4.3% of possible operating time). Northern Border is required to monitor turbine operations and submit periodic reporting of the 12-month rolling totals for non-DLE and generator operation to prove compliance with this condition. Northern Border has requested in the renewal application

the non-DLE mode restriction of 380 hours per 12-month rolling period. Table 4.8 below illustrates the potential nitrogen oxide emissions under these operating restrictions.

Table 4.8 – Limited Nitrogen Oxide Emissions Under Operating Restrictions

Operation	Emission Rate [lbs NO_x / hour]	Operating Time [hours / year]	Resulting Emissions^a [tons NO_x / year]
Controlled (DLE mode)	52.5	8,380	220
Uncontrolled (non DLE mode)	78	380	14.8
Generator	7.6	500	1.9
Boiler	0.13	8760	0.6
TOTAL LIMITED NO_x [tons per year]			237

^a – resulting emissions = emission rate X operating time ÷ 2000 lbs per ton

A PSD review will not be required as long as Northern Border agrees to and complies with the generator and turbine operating restrictions. Since Northern Border does not require a PSD permit, a review of the greenhouse gases will not be required.

5.0 National Emission Standards for Hazardous Air Pollutants

DENR reviewed the National Emission Standards for Hazardous Air Pollutants in 40 CFR Part 61 and determined that there are no standards applicable to Northern Border.

6.0 Maximum Achievable Control Technology Standards

The federal Maximum Achievable Control Technology (MACT) Standards are applicable to both major and area sources of hazardous air pollutants. A major source of hazardous air pollutants is defined as having the potential to emit 10 tons or more per year of a single hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants. An area source is a source that is not a major source of hazardous air pollutants.

6.1 Potential HAP Emissions

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA’s Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant’s application, or other methods to determine potential air emissions.

6.2 Potential HAP Emissions – Combustion Turbine

The combustion turbine is fired with natural gas. The hazardous air pollutant emission factor for firing the combustion turbine burning natural gas is derived from AP-42, Table 3.1-3, 4/00 and is 0.001 pounds per million Btus.

Equation 4-1 and the identified emission factor were used to calculate the potential emissions from the combustion turbine. Equation 4-1, the identified emission factor, and the heat input value were used to calculate the potential emissions from the combustion turbine.

Table 6.1 summarizes the potential emissions from the turbine.

Table 6.1 Potential HAP Emissions (tons/year)

Unit	HAP
#1	1.42

6.3 Potential HAP Emissions – Generator

AP-42, Table 3.2-3, 7/00, list the hazardous air pollutants emission factor as .0324 pounds per MMBtus for natural gas engines. Using Equation 4-4, the hazardous air pollutant emission factor, the heat input, and assuming 500 hours of operation per year per emergency generator, the potential hazardous air pollutant emissions for the emergency generator is calculated and included in Table 6.2.

Table 6.2 – Potential HAP Emissions (tons/year)

Unit	HAP
#2	0.03

6.4 Potential HAP Emissions – Boiler

The boiler is fired with natural gas. The hazardous air pollutant emission factor for firing the boiler with natural gas is derived from AP-42, Table 1.4-3, 7/98 and is .0019 pounds per million Btus.

Equation 4-5, the identified emission factor, and the heat input value of the boiler (1.4 million Btus per hour) were used to calculate the potential HAP emissions. Table 6.3 summarizes the potential emissions from the boiler.

Table 6.3 Potential HAP Emissions (Ton/Year)

Unit	HAP
#3	0.01

6.5 Summary of HAP Emissions

Table 6.4 summarizes the facilities potential HAPs emissions.

Table 6.4 – Summary of HAPs (tons/year)

Unit	HAPs
#1	1.42
#2	0.03
#3	0.01

Total	1.46
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The potential to emit HAPs is less than 10 tons of a single hazardous air pollutant, and has the potential to emit less than 25 tons of any combination of a hazardous air pollutants. Therefore, Northern Border is considered an area source for hazardous air pollutants.

6.6 MACT Standards

DENR reviewed the maximum achievable control technology (MACT) standards in 40 CFR Part 63 and determined that the following may be applicable to Northern Border.

6.7 40 CFR Part 63 Subpart YYYY

The provisions of 40 CFR Part 63 Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines are applicable to the owner or operator of a stationary combustion turbine located at a major source of hazardous air pollutants (HAPs). A major source of HAP emissions is a contiguous site under common control that emits or has the potential to emit any single HAP at a rate of 10 tons or more per year or any combination of HAP at a rate of 25 tons or more per year.

Based on the potential emission calculations, Northern Border is not a major source of hazardous air pollutants. Therefore, Northern Border is not applicable to this subpart.

6.8 40 CFR Part 63 Subpart ZZZZ

The provisions of 40 CFR Part 63 Subpart ZZZZ originally applied to major sources of hazardous air pollutants. Changes to this subpart affecting area sources of HAP are effective March 18, 2008. An affected source is any existing, new, or reconstructed stationary reciprocating internal combustion engines located at a major or area source of HAP emissions.

In accordance with 40 CFR § 63.6590 (1)(ii) – For stationary RICE located at an area source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before June 12, 2006.

The engine was manufactured in 1992 and is an existing 4-stroke, rich burn, 470 horsepower; stationary reciprocating internal combustion engine operated at an area source of HAP emissions. Therefore, Northern Border is applicable to this standard.

6.9 Hazardous Air Pollutants for industrial, commercial, and institutional boilers and process heaters

In accordance with ARSD 74:36:08:41, as referenced in 40 CFR, Part 63, Subpart DDDDD, is applicable to any owner or operator of an industrial, commercial, or institutional boiler, a device having the primary purpose of recovering thermal energy in the form of steam, and is a major source of HAPs.

Northern Border has one boiler which the primary purpose is to provide steam for building heat and fuel gas preheat; however Northern Border is not major source of HAPs. Therefore, Northern Border is not applicable to this subpart.

6.10 Area Source for Industrial, Commercial, and Institutional Boilers

On March 21, 2011, EPA finalized the MACT standard under 40 CFR Part 63 Subpart JJJJJJ. This rule applies to all new or existing industrial, commercial, and institutional boilers located at an area source of hazardous air pollutants. An existing boiler is defined as a boiler where construction or reconstruction occurred prior to June 4, 2010. This subpart does not apply to boilers fired on gaseous fuel.

Northern Border has one boiler manufactured prior to 2010 but the boiler is fired only on natural gas and is not subject to this rule.

7.0 State Requirements

Any source operating in South Dakota that meets the requirements of the Administrative Rules of South Dakota (ARSD) 74:36:05:03 is required to obtain a Title V air quality operating permit. Northern Border's nitrogen oxides (NO_x) and carbon monoxide (CO) emissions are equal to or greater than 100 tons per year, and hazardous air pollutant emissions are less than 10 tons per year for a single hazardous air pollutant and 25 tons per year of a combination of hazardous air pollutant. Based on the emission estimates, Northern Border is considered a major source under the Title V air quality operating permit program. Northern Border is required to obtain a Title V air quality operating permit.

7.1 State Emission Limits

South Dakota has air emission limits for particulate, sulfur dioxide, and opacity. The emission limit for particulate is based on total suspended particulate.

7.2 Visible Emission Limit

In accordance with 74:36:12:01, the owner or operator may not discharge into the ambient air from a single unit of emissions an air pollutant of a density equal to or greater than that designated as 20 percent opacity. Each permitted unit is required to meet the 20 percent opacity limit (six-minute average) measured by EPA Method 9.

7.3 Particulate Matter Emission Limits

In accordance with ARSD 74:36:06:02(1)(b), a fuel burning unit with heat input value greater than or equal to 10 million Btus per hour may not exceed the total suspended particulate matter emission limit calculated using Equation 7-1.

Equation 7-1 – Total Suspended Particulate Matter Emission Limit for Fuel Burning Units

$$E = 0.811 \times H^{-0.131}$$

Where:

- E = emission rate in pounds per million Btu heat input, and
- H = heat input in million Btus per hour.

The maximum heat input values of Unit #1 is 324 million Btus per hour. The particulate matter emission rates for the units are calculated using Equation 7-1 and are summarized in Table 7.1.

In accordance with ARSD 74:36:06:02(1)(a), a fuel burning unit with heat input value less than 10 million Btus per hour may not exceed 0.6 pounds of particulate matter per million Btus of heat input. Unit #2 has a maximum heat input value of 3.4 million Btus per hour. Therefore, Unit #2 is applicable to this standard.

Table 7.1 compares the potential emission rate with the emission limit for the units and demonstrates that the units are capable of meeting the state’s total suspended particulate limit.

Table 7.1 – State Emission Limit Comparison (pounds/MMBtus)

Unit	Particulate Matter ¹	
	Potential Emission Rate	Emission Limit
#1	0.0066	0.4
#2	0.019	0.6

¹ – Potential rate and limit based on heat input.

7.4 Sulfur Dioxide Emission Limits

In accordance with ARSD 74:36:06:01, the sulfur dioxide emission limits in ARSD 74:36:06:02(2) are applicable except as otherwise specified in ARSD 74:36:07, which incorporates the requirements in 40 CFR Part 60. Unit #1 is subject to the sulfur dioxide emission limits in Part 60 Subpart GG. Therefore, the state’s sulfur dioxide emission limit is not applicable.

The sulfur dioxide emission limit is based on ARSD 74:36:02(2) – A fuel burning unit may not emit sulfur dioxide emissions to the ambient air in an amount greater than three pounds of sulfur dioxide per million Btus of heat input to the unit based on a three-hour rolling average, which is the arithmetic average of three contiguous one-hour periods. Therefore, Unit #2 is required to meet the state’s sulfur dioxide emission limit.

The emission factor for Unit #2 was compared to the state emission limits as illustrated in Table 7.2.

Table 7.2 - Potential emission rate versus state emission limit

Unit	Pollutant	Potential Emission Rate [pounds per million Btus]	State Emission Limit [pounds per million Btus]
#2	SO ₂	0.006	3

Based on the comparison and Northern Border's compliance history, Northern Border is capable of operating in compliance with the state air emission limits.

7.5 Insignificant Activities

In the renewal application Northern Border indicated they have Natural Gas blowdowns for the unit and the building and storage tanks for lube oil, pipeline liquids, building drains, and diesel fuel. These activities do not emit nitrogen oxide into the ambient and the emission would be below 2 tons per year. In accordance with ARSD 74:36:05:04.01 (7), a unit that has the potential to emit two tons or less per year of any criteria pollutant before the application of control equipment are exempt from inclusion in a Part 70 operating permit unless the source has requested federally-enforceable permit conditions related to the insignificant activity to avoid needing a PSD preconstruction permit or NSR preconstruction permit. Northern Border has only requested federally enforceable limits on nitrogen oxide. The boiler potential emissions are less than 2 tons per year and has a heat input less than 3.5 million Btus, therefore, the boiler is considered an insignificant activity as is exempt from permitting based on ARSD 74:36:05:04.01(4) and 74:36:05:04.01(7). Therefore, these activities will be considered insignificant activities and not included in this review.

7.6 Compliance Assurance Monitoring

Compliance assurance monitoring is applicable to permit applications received on or after April 20, 1998, from major sources applying for a Title V air quality operating permit. Northern Border's application was received after this date; therefore compliance assurance monitoring would be applicable to any unit that meets the following criteria:

1. The unit is subject to an emission limit or standard for the applicable regulated air pollutant;
2. The unit uses a control device to achieve compliance with any such emission limit or standard; and
3. The unit has potential uncontrolled emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

Compliance assurance monitoring is not applicable to the combustion turbine even though the potential nitrogen oxide emissions are greater than 100 tons per year because the DLE system is not required to meet the nitrogen oxide emission limit.

7.7 Periodic Monitoring

Northern Border is required to meet particulate, sulfur dioxide, nitrogen oxide, and visible emission limits. Monitoring for particulate, sulfur dioxide, and visible emissions is not warranted because Northern Border burns only natural gas in Unit #1.

There are no monitoring requirements in the new source performance standards requirements for

the nitrogen oxide emission limit. Therefore, periodic monitoring for nitrogen oxide will be based on stack tests. The last stack test submitted to DENR to demonstrate compliance with the nitrogen oxide emission limit was conducted at Compressor Station #11 on April 8, 2010. Because Northern Border's three compressor stations in South Dakota operate identical units, DENR will require one of the compressor stations to conduct a performance test for nitrogen oxides.

Northern Border is also required to meet operational limits on the operation of Unit #1. Periodic monitoring for the operational limits will be based on record and reporting requirements.

7.8 Air Fees

Title V sources are subject to an annual air quality fee. The fee consists of an administrative fee and a per ton fee based on the actual tons per year of pollutant emitted. The pollutants that are charged for include particulate matter, sulfur dioxides, nitrogen oxides, volatile organic compounds, and hazardous air pollutants. The air emission fee is \$7.50 per ton of pollutant actually emitted. The actual emissions are calculated by DENR and are based on information provided by the source.

7.9 Summary of Applicable Requirements

Any source operating in South Dakota that meets the requirements of ARSD 74:36:05:03 is required to obtain a Title V air quality permit. A source that is required to comply with federal new source performance standards or national emission standards for hazardous air pollutants must obtain a Title V air quality permit. Therefore, Northern Border is required to operate within the requirements stipulated in the following regulations:

- ARSD 74:36:05 – Operating permits for Part 70 Sources;
- ARSD 74:36:06 – Regulated Air Pollutant Emissions;
- ARSD 74:36:07 – New Source Performance Standards;
- ARSD 74:36:07:23 – Standards of Performance for Stationary Gas Turbines;
- ARSD 74:36:08:40 – National emission standards for Stationary Reciprocating Internal Combustion Engines;
- ARSD 74:36:11 – Performance Testing;
- ARSD 74:36:12 – Control of Visible Emissions;
- ARSD 74:36:16 – Acid Rain Program; and
- ARSD 74:37:01 – Air Emission Fees.

8.0 Recommendation

Based on the information submitted in the air quality permit application, DENR recommends conditional approval of a Title V air quality permit renewal for Northern Border's facility near Ipswich, South Dakota. Questions regarding this permit review should be directed to Earl Berg, Engineer I, Department of Environmental and Natural Resources, Air Quality Program.