



Northern Border Pipeline Company

Operated by TransCanada

April 30, 2016

UPS No. 1Z 40V 7E7 37 1001 561



North Dakota Department of Health
Division of Air Quality
918 East Divide Avenue
Bismarck, North Dakota 58501 – 1947

RE: Northern Border Compressor Station No. 6 – Morton County T5-O93003
Title V Renewal Application

Dear Sir or Madam:

Enclosed please find Attachment 1, a Title V renewal application for Northern Border Pipeline Company's Compressor Station No. 6. Attachment 2 shows the site potential-to emit calculations for both criteria and greenhouse gas pollutants. The only change from the previous submittal is the heat content of the natural gas which has increased from 1007 Btu/Scf to 1061 Btu/Scf. This change only impacts the boiler emissions which are reduced slightly with this change because the emission factors are based on pounds/MMScf rather than pounds/MMBtu. There are no known new applicable requirements for this facility since the last submittal.

No changes are being requested to the existing permit so a copy of the permit is not being submitted with this application.

For all questions, please contact me at (402) 492 – 7465.

Sincerely,

Ruth Jensen
Environmental Specialist

Cc: Compressor Station No. 6 (Section 2)

Air Programs (8P-AR) UPS No. 1Z 40V 7E7 37 1001 562 0
Office of Partnerships & Regulatory Assistance
U.S. EPA, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Attachment 1



**NORTH DAKOTA DEPARTMENT OF HEALTH
TITLE V PERMIT TO OPERATE - RENEWAL APPLICATION**

Division of Air Quality
SFN52824 (5-11)

In accordance with 33-15-14-04.c. of the North Dakota Air Pollution Control Rules, a Title V permit renewal application must be submitted to the Department at least six months, but no more than eighteen months, prior to the expiration date. Permit renewal applications are incomplete unless all information requested herein is supplied. The current Title V permit will be the baseline reference for this renewal. The requirements (40 CFR 70.5(c) & NDAC 33-15-14-06.4.c) to include a citation and description of all applicable requirements and a description of or reference to any applicable test method for determining compliance with each applicable requirement may be met by accomplishing either or both of the following: 1) enclose an annotated (red-lined) copy of the current permit indicating all changes needed to reflect the current facility configuration, applicable requirements and test methods; 2) enclose a narrative that conveys all changes needed to the current permit to reflect the current facility configuration, all applicable requirements and test methods.

FOR ACID RAIN UNITS ONLY – Submit with the Title V permit renewal application all Acid Rain renewal applications (the Acid Rain Permit Application, the Phase II NO_x Compliance Plan, and if applicable, the Phase II NO_x Averaging Plan).

PART 1. GENERAL APPLICATION INFORMATION

Owner's Name <u>Northern Border Pipeline Company</u>	
Facility Name <u>Compressor Station No. 6 (Glen Ullin)</u>	
Name of Person Completing Application <u>Ruth Jensen</u>	Phone <u>402-492-7465</u>
Title <u>Environmental Specialist</u>	Email <u>ruth_jensen@transcanada.com</u>
Current Operating Permit Number <u>T5-O93003</u>	
Expiration Date of Current Operating Permit <u>12</u> / <u>31</u> / <u>2016</u>	

PART 2. COMPLIANCE CERTIFICATION

A. Schedule for Submission of Compliance Certifications During the Term of the Permit

Frequency of Submittal <u>Annual</u>	Date Beginning (month/day/year) <u>2/14/2012</u>
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B. Statement of Compliance with Compliance Assurance Monitoring (CAM) and Compliance Certification Requirements

The facility identified in this application is in compliance with applicable monitoring and compliance certification requirements.

Yes
 No - Describe below which requirements are not being met:
 CAM not applicable

C. Certification of Compliance with all Applicable Requirements

This certification must be signed by a "responsible official" as defined in NDAC 33-15-14-06.1. Forms without a signed certification will be returned as incomplete.

Except for requirements identified in Compliance Schedule and Plan (Section G) of Title V Permit to Operate application forms for which compliance is not achieved, I hereby certify that, based on information and belief formed after reasonable inquiry, the air contaminant source identified in this form is in compliance with all applicable requirements.

Signed 	Date April 30, 2016
Typed Name Rick Duncan	

PART 3. STATUS OF SOURCE

Has there been any change to the source, applicable requirements or test methods since the most recent initial or renewal permit application, minor permit modification, significant modification or administrative permit amendment?

No Yes

If yes, complete and submit appropriate sections of Title V Permit to Operate application forms.

PART 4. CERTIFICATION OF TRUTH, ACCURACY AND COMPLETENESS

Note: This certification must be signed by a "responsible official" as defined in NDAC 33-15-14-06.1. Applications without a signed certification will be returned as incomplete.

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate and complete.

Name (typed) Rick Duncan

(Signed)  Date 04 / 30 / 2016

Telephone Number (402) 492-7455

Send original renewal application to:

ND Department of Health
Division of Air Quality
918 E. Divide, 2nd Floor
Bismarck, ND 58501-1947

Send copy of renewal application to:

Air Program (8P-AR)
Office of Partnerships & Regulatory
Assistance
US EPA Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Attachment 2

Typical NBPL Gas Composition VOC Content

Calculate MW and BTU Content of Fuel Gas

	mole %	MW	lb/mole	BTU/Scf HHV	BTU/Scf LHV	wt%	VOC wt%
C1	89.4609	16.043	14.35221219	905.6126907	813.2890419	81.12732745	
C2	7.3679	30.069	2.215453851	130.6918102	119.1978862	12.52307642	
C3	0.7086	44.096	0.312464256	17.870892	16.4104674	1.766235733	1.766235733
iC4	0.0380	58.123	0.02208674	1.238572	1.14038	0.124847526	0.124847526
nC4	0.0499	58.123	0.029003377	1.6316801	1.5022395	0.163944515	0.163944515
iC5	0.0082	72.151	0.005916382	0.3288364	0.3032278	0.033442946	0.033442946
nC5	0.0061	72.151	0.004401211	0.245098	0.2261148	0.024878289	0.024878289
C6+	0.0040	86.178	0.00344712	0.205648	0.176156	0.019485194	0.019485194
N2	1.3462	28.013	0.377111006	0	0	2.13165801	
CO2	0.8307	44.01	0.36559107	0	0	2.066540409	
H2	0.1629	2.016	0.003284064	0.52804035	0.44610165	0.018563503	
He	0.0178	4	0.000712	0	0	0.004024652	
	100.00		17.69097126	1058.353268	952.6916153	100	2.132834203
			AGA Real				
			Heating Value	1061.11557			

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
Site Greenhouse Gas Pollutant Potential-To-Emit Summary

Site Greenhouse Gas Pollutant Emission Summary							
Unit	CO₂ (tpy)	CO₂e (tpy)	Methane (tpy)	CO₂e (tpy)	N₂O (tpy)	CO₂e (tpy)	Total CO₂e (tpy)
CE1	162,297	162,297	11.64	244.34	2.75	852.24	163,394
EG1	2,770	2,770	5.45	114.45	0.01	1.62	2,886
HE2	684	684	0.01	0.24	0.01	3.59	688
TOTAL	165,751	165,751	17.10	359.04	2.77	857.44	166,967

**Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
CE1 Greenhouse Gas Pollutant Calculations**

Emission Unit ID: CE1

Description: Cooper-Rolls Coberra 6562-DLE Compressor Turbine

Rating: 38,000 horsepower (ISO)

Max. Heat Input: 317 million British thermal units per hour (MMBtu/hr)

Fuel Type: Natural Gas

Controls: Dry low NOx combustion

Conversion: 2,000 lb/ton

Conversion: 8,760 hours per year

Pollutant	Emission Factor ^a	Emission Factor Units	Global Warming Potential	Emissions		
				(lb/hr)	(ton/yr)	(ton/yr CO ₂ e ^b)
CO ₂	116.9	lb/MMBtu	1	37,054.1	162,297	162,297
Methane	8.38E-03	lb/MMBtu	21	2.66	11.635	244.341
N ₂ O	1.98E-03	lb/MMBtu	310	0.63	2.749	852.237

^a CO₂ emission factor based on Table C-1 to Subpart C of 40 CFR 98 and

CH₄ and N₂O emission factors are based on Table 12.7 of the Climate Registry Default Emission Factors.

^b Global warming potential or CO₂e is based on Table A-1 to Subpart A of 40 CFR 98.

Example calculations:

$$\text{CO}_2 \text{ ton/yr: } (116.9 \text{ lb/MMBtu}) * (317 \text{ MMBtu/hr}) * (8,760 \text{ hours/year} / (2,000 \text{ lb/ton})) = 162,297 \text{ ton/yr CO}_2$$

$$\text{CO}_2\text{e ton/yr: } (162,297 \text{ ton/yr}) * (1 \text{ GWP}) = 162,297 \text{ ton/yr CO}_2\text{e}$$

$$\text{Methane ton/yr: } (0.00838 \text{ lb/MMBtu}) * (317 \text{ MMBtu/hr}) * (8,760 \text{ hours/year} / (2,000 \text{ lb/ton})) = 11.635 \text{ ton/yr Methane}$$

$$\text{CO}_2\text{e ton/yr: } (11.635 \text{ ton/yr}) * (21 \text{ GWP}) = 244.341 \text{ ton/yr CO}_2\text{e}$$

**Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
EG1 Greenhouse Gas Pollutant Calculations**

Emission Unit ID: EG1

Description: Caterpillar G3412 SITA

Rating: 448 kilowatts (kW)

Rating: 600 horsepower

Max. Heat Input: 5.41 million British thermal units per hour (MMBtu/hr)

Fuel Type: Natural Gas

Controls: None

Conversion: 2,000 lb/ton

Conversion: 500 hours per year

Pollutant	Emission Factor ^a	Emission Factor Units	Global Warming Potential	Emissions		
				(lb/hr)	(ton/yr)	(ton/yr CO ₂ e ^b)
CO ₂	116.9	lb/MMBtu	1	632.4	2,770	2,770
Methane	2.30E-01	lb/MMBtu	21	1.24	5.450	114.451
N ₂ O	2.20E-04	lb/MMBtu	310	0.00	0.005	1.616

^a CO₂ emission factor based on Table C-1 to Subpart C of 40 CFR 98,

N₂O emission factor is based on Table C-2 to Subpart C of 40 CFR 98 and

Methane emission factor is based on Table 12.7 of the Climate Registry Default Emission Factors.

^b Global warming potential or CO₂e is based on Table A-1 to Subpart A of 40 CFR 98.

Example calculations:

$$\text{CO}_2 \text{ ton/yr: } (116.9 \text{ lb/MMBtu}) * (5 \text{ MMBtu/hr}) * (500 \text{ hours/year} / (2,000 \text{ lb/ton})) = 2,770 \text{ ton/yr CO}_2$$

$$\text{CO}_2\text{e ton/yr: } (2,770 \text{ ton/yr}) * (1 \text{ GWP}) = 2,770 \text{ ton/yr CO}_2\text{e}$$

$$\text{Methane ton/yr: } (0.23000 \text{ lb/MMBtu}) * (5 \text{ MMBtu/hr}) * (500 \text{ hours/year} / (2,000 \text{ lb/ton})) = 5.450 \text{ ton/yr Methane}$$

$$\text{CO}_2\text{e ton/yr: } (5.450 \text{ ton/yr}) * (21 \text{ GWP}) = 114.451 \text{ ton/yr CO}_2\text{e}$$

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
HE2 Greenhouse Gas Pollutant Calculations

Emission Unit ID: HE2 (HE2 is an insignificant activity.)

Description: Hydronic Boiler

Max. Heat Input: 1.336 million British thermal units per hour (MMBtu/hr)

Fuel Type: Natural Gas

Controls: None

Conversion: 2,000 lb/ton

Conversion: 8,760 hours per year

Pollutant	Emission Factor ^a	Emission Factor Units	Global Warming Potential	Emissions		
				(lb/hr)	(ton/yr)	(ton/yr CO ₂ e ^b)
CO ₂	116.9	lb/MMBtu	1	156.2	684	684
Methane	1.98E-03	lb/MMBtu	21	0.00	0.012	0.243
N ₂ O	1.98E-03	lb/MMBtu	310	0.00	0.012	3.592

^a CO₂ emission factor based on Table C-1 to Subpart C of 40 CFR 98 and

CH₄ and N₂O emission factors are based on Table 12.7 of Climate Registry Default Emission Factors.

^b Global warming potential or CO₂e is based on Table A-1 to Subpart A of 40 CFR 98.

Example calculations:

$$\text{CO}_2 \text{ ton/yr: } (116.9 \text{ lb/MMBtu}) * (1 \text{ MMBtu/hr}) * (8,760 \text{ hours/year}) / (2,000 \text{ lb/ton}) = 684 \text{ ton/yr CO}_2$$

$$\text{CO}_2\text{e ton/yr: } (684 \text{ ton/yr}) * (1 \text{ GWP}) = 684 \text{ ton/yr CO}_2\text{e}$$

$$\text{Methane ton/yr: } (0.00198 \text{ lb/MMBtu}) * (1 \text{ MMBtu/hr}) * (8,760 \text{ hours/year}) / (2,000 \text{ lb/ton}) = 0.012 \text{ ton/yr Methane}$$

$$\text{CO}_2\text{e ton/yr: } (0.012 \text{ ton/yr}) * (21 \text{ GWP}) = 0.243 \text{ ton/yr CO}_2\text{e}$$

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
Site Criteria Pollutant Potential-To-Emit Summary

Site Criteria Pollutant Emission Summary										
Unit	NOX (lb/hr)	NOX (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	PM10 (lb/hr)	PM10 (tpy)	SO2 (lb/hr)	SO2 (tpy)
CE1	*	234.18	22.40	98.11	3.00	13.14	2.09	9.16	2.09	9.14
EG1	11.96	2.99	20.13	5.03	0.16	0.04	0.11	0.03	0.003	0.0008
HE2	0.13	0.55	0.11	0.46	0.01	0.03	0.01	0.04	0.001	0.003
TOTAL		237.72		103.61		13.21		9.23		9.14

*51.5 lb/hr in DLE and 78 lb/hr in non-DLE

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
Site Hazardous Air Pollutant Potential-To-Emit Summary

Pollutant	CAS Number	CE1 (ton/yr)	EG1 (ton/yr)	HE2 (ton/yr)	Total (ton/yr)
Acenaphthene	83-32-9	-	-	9.93E-09	9.93E-09
Acenaphthylene	208-96-8	-	-	9.93E-09	9.93E-09
Acetaldehyde	75-07-0	5.55E-02	3.77E-03	-	5.93E-02
Acrolein	107-02-8	8.89E-03	3.56E-03	-	1.24E-02
Anthracene	120-12-7	-	-	1.32E-08	1.32E-08
Arsenic	7440-38-2	-	-	1.10E-06	1.10E-06
Benzene	71-43-2	1.67E-02	2.14E-03	1.16E-05	1.88E-02
Benzo(a)anthracene	56-55-3	4.17E-03	-	9.93E-09	4.17E-03
Benzo(a)pyrene	50-32-8	-	-	6.62E-09	6.62E-09
Benzo(b)fluoranthene	205-99-2	-	-	9.93E-09	9.93E-09
Benzo(e)pyrene	192-97-2	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	6.62E-09	6.62E-09
Benzo(k)fluoranthene	207-08-9	-	-	9.93E-09	9.93E-09
Beryllium	7440-41-7	-	-	6.62E-08	6.62E-08
Biphenyl	92-52-4	-	-	-	-
1,3-Butadiene	106-99-0	5.97E-04	8.97E-04	-	1.49E-03
Cadmium	7440-43-9	9.61E-03	-	6.07E-06	9.61E-03
Carbon Tetrachloride	56-23-5	-	2.39E-05	-	2.39E-05
Chlorobenzene	108-90-7	-	1.74E-05	-	1.74E-05
Chloroform	67-66-3	-	1.85E-05	-	1.85E-05
Chromium	7440-47-3	1.83E-02	-	7.72E-06	1.83E-02
Chrysene	218-01-9	-	-	9.93E-09	9.93E-09
Cobalt	7440-48-4	-	-	4.63E-07	4.63E-07
Dibenzo(a,h)anthracene	53-70-3	-	-	6.62E-09	0.00
Dichlorobenzene	106-46-7	-	-	6.62E-06	6.62E-06
7,12-Dimethylbenz(a)anthracene	57-97-6	-	-	8.82E-08	8.82E-08
1,3-Dichloropropene	542-75-6	-	1.72E-05	-	1.72E-05
Ethylbenzene	100-41-4	4.44E-02	3.35E-05	-	4.45E-02
Ethylene Dibromide	106-93-4	-	2.88E-05	-	2.88E-05
Fluoranthene	206-44-0	1.67E-03	-	1.65E-08	1.67E-03
Fluorene	86-73-7	-	-	1.54E-08	1.54E-08
Formaldehyde	50-00-0	9.86E-01	2.77E-02	4.14E-04	1.01E+00
Indeno(1,2,3-c,d)pyrene	193-39-5	-	-	9.93E-09	9.93E-09
Manganese	7439-96-5	1.11E-01	-	2.10E-06	1.11E-01
Mercury	7439-97-6	9.21E-03	-	1.43E-06	9.21E-03
Methanol	67-56-1	-	4.14E-03	-	4.14E-03
Methylene Chloride	75-09-2	-	5.57E-05	-	5.57E-05
2-Methylnaphthalene	91-57-6	-	-	1.32E-07	1.32E-07
3-Methylchloranthrene	56-49-5	-	-	9.93E-09	9.93E-09
n-Hexane	110-54-3	-	-	9.93E-03	9.93E-03
Naphthalene	91-20-3	1.80E-03	1.31E-04	3.36E-06	1.94E-03
Nickel	7440-02-0	1.60E-01	-	1.16E-05	1.60E-01
PAH	NA	3.05E-03	1.91E-04	-	3.25E-03
Phenanthrene	85-01-8	-	-	9.38E-08	9.38E-08
Phenol	108-95-2	1.76E-02	-	-	1.76E-02
Propylene	115-07-1	-	-	-	-
Pyrene	129-00-0	-	-	2.76E-08	2.76E-08
Perylene	198-55-0	-	-	-	-
Propylene Oxide	198-55-0	4.03E-02	-	-	4.03E-02
Selenium	7782-49-2	-	-	1.32E-07	1.32E-07
Styrene	100-42-5	-	1.61E-05	-	1.61E-05
Toluene	108-88-3	1.80E-01	7.55E-04	1.88E-05	1.81E-01
Tetrachloroethane	79-34-5	-	-	-	-
1,1,2,2-Tetrachloroethane	79-34-5	-	3.42E-05	-	3.42E-05
1,1,2-Trichloroethane	79-00-5	-	2.07E-05	-	2.07E-05
2,2,4-Trimethylpentane	540-84-1	-	-	-	-
Vinyl Chloride	75-01-4	-	9.71E-06	-	9.71E-06
Xylene	108-38-3	8.89E-02	2.64E-04	-	8.91E-02
Total		1.758	0.0438	0.0104	1.81

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
CE1 Criteria and Hazardous Air Pollutant Calculations

Emission Unit ID: CE1

Description: Cooper-Rolls Coberra 6562-DLE Compressor Turbine

Rating: 38,000 horsepower (ISO)

Max. Heat Input: 317 million British thermal units per hour (MMBtu/hr)

Fuel Type: Natural Gas

Controls: Dry low NOx combustion

Wt% Sulfur: 0.007 2.0 grains per 100 scf = 0.007 Weight Percent

Conversion: 2,000 lb/ton

Conversion: 8,760 hours per year

650 hours per year non-DLE

8,110 hours per year DLE

Pollutant	Emission Factor	Emission Factor Units	Emissions	
			(lb/hr)	(ton/yr)
NOx (DLE)	51.5	lb/hr	51.5	209
NOx (non-DLE)	78.0	lb/hr	78.0	25
CO	22.4	lb/hr	22.4	98
VOC	3.0	lb/hr	3.0	13
PM10	0.0066	lb/MMBtu	2.1	9.2
SO2	0.0066	lb/MMBtu	2.1	9.1
HAP^a				
Acetaldehyde	4.00E-05	lb/MMBtu	1.27E-02	5.55E-02
Acrolein	6.40E-06	lb/MMBtu	2.03E-03	8.89E-03
Benzene	1.20E-05	lb/MMBtu	3.80E-03	1.67E-02
Benzo(a)anthracene	3.00E-06	lb/MMBtu	9.51E-04	4.17E-03
1,3-Butadiene	4.30E-07	lb/MMBtu	1.36E-04	5.97E-04
Cadmium	6.92E-06	lb/MMBtu	2.19E-03	9.61E-03
Chromium	1.32E-05	lb/MMBtu	4.18E-03	1.83E-02
Ethylbenzene	3.20E-05	lb/MMBtu	1.01E-02	4.44E-02
Fluoranthene	1.20E-06	lb/MMBtu	3.80E-04	1.67E-03
Formaldehyde	7.10E-04	lb/MMBtu	2.25E-01	9.86E-01
Manganese	8.02E-05	lb/MMBtu	2.54E-02	1.11E-01
Mercury	6.63E-06	lb/MMBtu	2.10E-03	9.21E-03
Naphthalene	1.30E-06	lb/MMBtu	4.12E-04	1.80E-03
Nickel	1.15E-04	lb/MMBtu	3.65E-02	1.60E-01
Phenol	1.27E-05	lb/MMBtu	4.03E-03	1.76E-02
PAH	2.20E-06	lb/MMBtu	6.97E-04	3.05E-03
Propylene Oxide	2.90E-05	lb/MMBtu	9.19E-03	4.03E-02
Toluene	1.30E-04	lb/MMBtu	4.12E-02	1.80E-01
Xylene	6.40E-05	lb/MMBtu	2.03E-02	8.89E-02
Total HAP	0.001266		0.40	1.758

NOx, CO and VOC factors are based on manufacturer's data.

SO2 and PM10 emission factors are based on AP-42, Table 3.1-2a (April 2000).

(PM10 factor has been updated from previous application.)

^a HAP emission factors based on AP-42, Table 3.1-3 (April 2000) for natural gas-fired turbines and EPA FIRE Database (Version 6.23).

Example calculations:

$$\text{NOx ton/yr: } (51.5 \text{ lb/hr}) * (8,110 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 209 \text{ ton/yr NOx}$$

$$\text{CO ton/yr: } (22.4 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 98 \text{ ton/yr CO}$$

$$\text{VOC ton/yr: } (3.0 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 13 \text{ ton/yr VOC}$$

$$\text{PM10 lb/hr: } (0.0066 \text{ lb/MMBtu}) * (317 \text{ MMBtu/hr}) = 2.1 \text{ lb/hr PM10}$$

$$\text{PM10 ton/yr: } (2.1 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 9.2 \text{ ton/yr PM10}$$

$$\text{SO2 lb/MMBtu: } (0.0070 \text{ wt\% S}) * (0.94) = 0.0066 \text{ lb/MMBtu SO2}$$

$$\text{SO2 lb/hr: } (0.007 \text{ lb/MMBtu}) * (317 \text{ MMBtu/hr}) = 2.1 \text{ lb/hr SO2}$$

$$\text{SO2 ton/yr: } (2.1 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 9.1 \text{ ton/yr SO2}$$

$$\text{Acrolein lb/hr: } (0.0000064 \text{ lb/MMBtu}) * (317 \text{ MMBtu/hr}) = 0.002 \text{ lb/hr Acrolein}$$

$$\text{Acrolein ton/yr: } (0.002 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.01 \text{ ton/yr Acrolein}$$

**Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
EG1 Criteria Pollutant Calculations**

Emission Unit ID: EG1

Description: Caterpillar G3412 SITA

Rating: 448 kilowatts (kW)

Rating: 600 horsepower

Heat Input: 5.41 million British thermal units per hour (MMBtu/hr)

Fuel Type: Natural Gas

Controls: None

Conversion: 2,000 lb/ton

Conversion: 500 hours per year

Pollutant	Emission Factor	Emission Factor Units	(lb/hr)	(ton/yr)
NOx	2.21	lb/MMBtu	12.0	2.99
CO	3.720	lb/MMBtu	20.1	5.03
VOC	2.96E-02	lb/MMBtu	0.16	0.04
PM10	1.94E-02	lb/MMBtu	0.105	0.03
SO2	5.88E-04	lb/MMBtu	0.003	0.0008

Note: The criteria pollutant emission factors are based on AP-42, Table 3.2-3 (July 2000). The PM10 emission factor includes filterable plus condensable PM.

Example calculations:

$$\text{NOx lb/hr: } (5.41 \text{ MMBtu/hr}) * (2.21 \text{ lb/MMBtu}) = 11.96 \text{ lb/hr NOx}$$

$$\text{NOx ton/yr: } (12.0 \text{ lb/hr}) * (500 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 2.99 \text{ ton/yr NOx}$$

$$\text{CO lb/hr: } (5.41 \text{ MMBtu/hr}) * (3.720 \text{ lb/MMBtu}) = 20.13 \text{ lb/hr CO}$$

$$\text{CO ton/yr: } (20.13 \text{ lb/hr}) * (500 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 5.03 \text{ ton/yr CO}$$

$$\text{VOC lb/hr: } (5.41 \text{ MMBtu/hr}) * (0.030 \text{ lb/MMBtu}) = 0.16 \text{ lb/hr VOC}$$

$$\text{VOC ton/yr: } (0.16 \text{ lb/hr}) * (500 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.04 \text{ ton/yr VOC}$$

$$\text{PM10 lb/hr: } (5.41 \text{ MMBtu/hr}) * (0.0194 \text{ lb/MMBtu}) = 0.11 \text{ lb/hr PM10}$$

$$\text{PM10 ton/yr: } (0.11 \text{ lb/hr}) * (500 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.03 \text{ ton/yr PM10}$$

$$\text{SO2 lb/hr: } (5.41 \text{ MMBtu/hr}) * (0.0006 \text{ lb/MMBtu}) = 0.003 \text{ lb/hr SO2}$$

$$\text{SO2 ton/yr: } (0.003 \text{ lb/hr}) * (500 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.0008 \text{ ton/yr SO2}$$

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
EG1 Hazardous Air Pollutant Calculations

Emission Unit ID: EG1

Description: Caterpillar G3412 SITA

Rating: 448 kilowatts (kW)

Rating: 600 horsepower

Heat Input: 5.41 million British thermal units per hour (MMBtu/hr)

Fuel Type: Natural Gas

Controls: None

Conversion: 2,000 lb/ton

Conversion: 500 hours per year

Pollutant	CAS Number	Emission Factor	Emission Factor Units	Emissions	
				(lb/hr)	(ton/yr)
Acenaphthene	83-32-9	-	-	-	-
Acenaphthylene	208-96-8	-	-	-	-
Acetaldehyde	75-07-0	2.79E-03	lb/MMBtu	1.51E-02	3.77E-03
Acrolein	107-02-8	2.63E-03	lb/MMBtu	1.42E-02	3.56E-03
Anthracene	120-12-7	-	-	-	-
Arsenic	7440-38-2	-	-	-	-
Benzene	71-43-2	1.58E-03	lb/MMBtu	8.55E-03	2.14E-03
Benzo(a)anthracene	56-55-3	-	-	-	-
Benzo(a)pyrene	50-32-8	-	-	-	-
Benzo(b)fluoranthene	205-99-2	-	-	-	-
Benzo(e)pyrene	192-97-2	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-
Benzo(k)fluoranthene	207-08-9	-	-	-	-
Beryllium	7440-41-7	-	-	-	-
Biphenyl	92-52-4	-	-	-	-
1,3-Butadiene	106-99-0	6.63E-04	lb/MMBtu	3.59E-03	8.97E-04
Cadmium	7440-43-9	-	-	-	-
Carbon Tetrachloride	56-23-5	1.77E-05	lb/MMBtu	9.58E-05	2.39E-05
Chlorobenzene	108-90-7	1.29E-05	lb/MMBtu	6.98E-05	1.74E-05
Chloroform	67-66-3	1.37E-05	lb/MMBtu	7.41E-05	1.85E-05
Chromium	7440-47-3	-	-	-	-
Chrysene	218-01-9	-	-	-	-
Cobalt	7440-48-4	-	-	-	-
1,3-Dichloropropene	53-70-3	1.27E-05	lb/MMBtu	6.87E-05	1.72E-05
Dibenzo(a,h)anthracene	106-46-7	-	-	-	-
Dichlorobenzene	57-97-6	-	-	-	-
7,12-Dimethylbenz(a)anthracene	542-75-6	-	-	-	-
Ethylbenzene	100-41-4	2.48E-05	lb/MMBtu	1.34E-04	3.35E-05
Ethylene Dibromide	106-93-4	2.13E-05	lb/MMBtu	1.15E-04	2.88E-05
Fluoranthene	206-44-0	-	-	-	-
Fluorene	86-73-7	-	-	-	-
Formaldehyde	50-00-0	2.05E-02	lb/MMBtu	1.11E-01	2.77E-02
Indeno(1,2,3-c,d)pyrene	193-39-5	-	-	-	-
Manganese	7439-96-5	-	-	-	-
Mercury	7439-97-6	-	-	-	-
Methanol	67-56-1	3.06E-03	lb/MMBtu	1.66E-02	4.14E-03
Methylene Chloride	75-09-2	4.12E-05	lb/MMBtu	2.23E-04	5.57E-05
2-Methylnaphthalene	91-57-6	-	-	-	-
3-Methylchloranthrene	56-49-5	-	-	-	-
n-Hexane	110-54-3	-	-	-	-
Naphthalene	91-20-3	9.71E-05	lb/MMBtu	5.25E-04	1.31E-04
Nickel	7440-02-0	-	-	-	-
Phenol	108-95-2	-	-	-	-
PAH	85-01-8	1.41E-04	lb/MMBtu	7.63E-04	1.91E-04
Perylene	108-95-2	-	-	-	-
Phenanthrene	115-07-1	-	-	-	-
Propylene	129-00-0	-	-	-	-
Propylene Oxide	198-55-0	-	-	-	-
Pyrene	198-55-0	-	-	-	-
Selenium	7782-49-2	-	-	-	-
Styrene	100-42-5	1.19E-05	lb/MMBtu	6.44E-05	1.61E-05
Toluene	108-88-3	5.58E-04	lb/MMBtu	3.02E-03	7.55E-04
Tetrachloroethane	79-34-5	-	-	-	-
1,1,2,2-Tetrachloroethane	79-34-5	2.53E-05	lb/MMBtu	1.37E-04	3.42E-05
1,1,2-Trichloroethane	79-00-5	1.53E-05	lb/MMBtu	8.28E-05	2.07E-05
2,2,4-Trimethylpentane	540-84-1	-	-	-	-
Vinyl Chloride	75-01-4	7.18E-06	lb/MMBtu	3.88E-05	9.71E-06
Xylene	108-38-3	1.95E-04	lb/MMBtu	1.05E-03	2.64E-04
Total HAPs				0.18	0.0438

The emission factors are based on AP-42, *Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines*, Table 3.2-3 (July 2000).

Example calculations:

$$\text{Acetaldehyde lb/hr: } (0.00279 \text{ lb/MMBtu}) * (5.41 \text{ MMBtu/hr}) = 0.02 \text{ lb/hr Acetaldehyde}$$

$$\text{Acetaldehyde ton/yr: } (0.02 \text{ lb/hr}) * (500 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.004 \text{ ton/yr Acetaldehyde}$$

**Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
HE2 Criteria Pollutant Calculations**

Emission Unit ID: HE2 (HE2 is an insignificant activity.)

Description: Hydronic Boiler

Max. Heat Input: 1.336 million British thermal units per hour (MMBtu/hr)

Heating Value: 1,061 British thermal units per standard cubic foot (Btu/scf)

Fuel Usage: 0.0013 million standard cubic feet per hour (MMscf/hr)

Fuel Type: Natural Gas

Controls: None

Conversion: 2,000 lb/ton

Conversion: 8,760 hours per year

Pollutant	Emission Factor	Emission Factor Units	(lb/hr)	(ton/yr)
NOx	100.0	lb/MMscf	0.13	0.55
CO	84.0	lb/MMscf	0.11	0.46
VOC	5.5	lb/MMscf	0.01	0.03
PM10	7.6	lb/MMscf	0.01	0.04
SO2	0.6	lb/MMscf	0.001	0.003

The emission factors are based on AP-42, *Emission Factors for Criteria Pollutant and Greenhouse Gases From Natural Gas Combustion*, Tables 1.4-1 and 2 (July 1998).

Example calculations:

$$\text{NOx lb/hr: } (0.0013 \text{ MMscf/hr}) * (100 \text{ lb/MMscf}) = 0.13 \text{ lb/hr NOx}$$

$$\text{NOx ton/yr: } (0.1 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.55 \text{ ton/yr NOx}$$

$$\text{CO lb/hr: } (0.0013 \text{ MMscf/hr}) * (84 \text{ lb/MMscf}) = 0.11 \text{ lb/hr CO}$$

$$\text{CO ton/yr: } (0.11 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.46 \text{ ton/yr CO}$$

$$\text{VOC lb/hr: } (0.0013 \text{ MMscf/hr}) * (5.5 \text{ lb/MMscf}) = 0.01 \text{ lb/hr CO}$$

$$\text{VOC ton/yr: } (0.01 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.03 \text{ ton/yr VOC}$$

$$\text{PM10 lb/hr: } (0.0013 \text{ MMscf/hr}) * (7.6 \text{ lb/MMscf}) = 0.01 \text{ lb/hr PM10}$$

$$\text{PM10 ton/yr: } (0.01 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.04 \text{ ton/yr PM10}$$

$$\text{SO2 lb/hr: } (0.0013 \text{ MMscf/hr}) * (0.6 \text{ lb/MMscf}) = 0.001 \text{ lb/hr SO2}$$

$$\text{SO2 ton/yr: } (0.001 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.003 \text{ ton/yr SO2}$$

Northern Border Pipeline Company
Compressor Station No. 6 (Glen Ullin, North Dakota)
Permit No. T5-O93003
Title V Renewal Application
HE2 Hazardous Air Pollutant Calculations

Emission Unit ID: HE2 (HE2 is an insignificant activity.)
Description: Hydronic Boiler
Max. Heat Input: 1.336 million British thermal units per hour (MMBtu/hr) (HHV)
Heating Value: 1,061 British thermal units per standard cubic foot (Btu/scf)
Fuel Usage: 0.0013 million standard cubic feet per hour (MMscf/hr)
Fuel Type: Natural Gas
Controls: None
Conversion: 2,000 lb/ton
Conversion: 8,760 hours per year

Pollutant	CAS Number	Emission Factor	Emission Factor Units	Emissions	
				(lb/hr)	(ton/yr)
Acenaphthene	83-32-9	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Acenaphthylene	208-96-8	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Acetaldehyde	75-07-0	-	-	-	-
Acrolein	107-02-8	-	-	-	-
Anthracene	120-12-7	2.40E-06	lb/MMscf	3.02E-09	1.32E-08
Arsenic	7440-38-2	2.00E-04	lb/MMscf	2.52E-07	1.10E-06
Benzene	71-43-2	2.10E-03	lb/MMscf	2.64E-06	1.16E-05
Benzo(a)anthracene	56-55-3	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Benzo(a)pyrene	50-32-8	1.20E-06	lb/MMscf	1.51E-09	6.62E-09
Benzo(b)fluoranthene	205-99-2	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Benzo(e)pyrene	192-97-2	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	1.20E-06	lb/MMscf	1.51E-09	6.62E-09
Benzo(k)fluoranthene	207-08-9	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Beryllium	7440-41-7	1.20E-05	lb/MMscf	1.51E-08	6.62E-08
Biphenyl	92-52-4	-	-	-	-
1,3-Butadiene	106-99-0	-	-	-	-
Cadmium	7440-43-9	1.10E-03	lb/MMscf	1.39E-06	6.07E-06
Carbon Tetrachloride	56-23-5	-	-	-	-
Chlorobenzene	108-90-7	-	-	-	-
Chloroform	67-66-3	-	-	-	-
Chromium	7440-47-3	1.40E-03	lb/MMscf	1.76E-06	7.72E-06
Chrysene	218-01-9	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Cobalt	7440-48-4	8.40E-05	lb/MMscf	1.06E-07	4.63E-07
1,3-Dichloropropene	53-70-3	-	-	-	-
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	lb/MMscf	1.51E-09	6.62E-09
Dichlorobenzene	106-46-7	1.20E-03	lb/MMscf	1.51E-06	6.62E-06
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	lb/MMscf	2.01E-08	8.82E-08
Ethylbenzene	100-41-4	-	-	-	-
Ethylene Dibromide	106-93-4	-	-	-	-
Fluoranthene	206-44-0	3.00E-06	lb/MMscf	3.78E-09	1.65E-08
Fluorene	86-73-7	2.80E-06	lb/MMscf	3.53E-09	1.54E-08
Formaldehyde	50-00-0	7.50E-02	lb/MMscf	9.44E-05	4.14E-04
Hexane	110-54-3	1.80E+00	lb/MMscf	2.27E-03	9.93E-03
Indeno(1,2,3-c,d)pyrene	193-39-5	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Manganese	7439-96-5	3.80E-04	lb/MMscf	4.78E-07	2.10E-06
Mercury	7439-97-6	2.60E-04	lb/MMscf	3.27E-07	1.43E-06
2-Methylnaphthalene	91-57-6	2.40E-05	lb/MMscf	3.02E-08	1.32E-07
3-Methylchloranthrene	56-49-5	1.80E-06	lb/MMscf	2.27E-09	9.93E-09
Methanol	67-56-1	-	-	-	-
Methylene Chloride	75-09-2	-	-	-	-
Naphthalene	91-20-3	6.10E-04	lb/MMscf	7.68E-07	3.36E-06
Nickel	7440-02-0	2.10E-03	lb/MMscf	2.64E-06	1.16E-05
Phenol	108-95-2	-	-	-	-
PAH	85-01-8	-	-	-	-
Perylene	108-95-2	-	-	-	-
Phenanathrene	85-01-8	1.70E-05	lb/MMscf	2.14E-08	9.38E-08
Propylene	129-00-0	-	-	-	-
Propylene Oxide	198-55-0	-	-	-	-
Pyrene	129-00-0	5.00E-06	lb/MMscf	6.30E-09	2.76E-08
Selenium	7782-49-2	2.40E-05	lb/MMscf	3.02E-08	1.32E-07
Styrene	100-42-5	-	-	-	-
Toluene	108-88-3	3.40E-03	lb/MMscf	4.28E-06	1.88E-05
Tetrachloroethane	79-34-5	-	-	-	-
1,1,2,2-Tetrachloroethane	79-34-5	-	-	-	-
1,1,2-Trichloroethane	79-00-5	-	-	-	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	-
Vinyl Chloride	75-01-4	-	-	-	-
Xylene	108-38-3	-	-	-	-
Total HAPs				0.0024	0.0104

The emission factors are based on AP-42, *Emission Factors for Speciated Organic Compounds From Natural Gas Combustion*, Table 1.4-3 (July 1998) and *Emission Factors for Metals From Natural Gas Combustion* Table 1.4-4 (July 1998)

Example Calculations:

$$\text{Hexane lb/hr: } (1.8 \text{ lb/MMscf}) * (0.0013 \text{ MMscf/hr}) = 0.002 \text{ lb/hr Hexane}$$

$$\text{Hexane ton/yr: } (0.002 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = 0.009 \text{ ton/yr Hexane}$$