TECHNICAL REVIEW DOCUMENT
FOR
OPERATING PERMIT 95OPWE090

to be issued to:

Colorado Interstate Gas (CIG) Company
Cheyenne Compressor Station
Weld County
Source ID 1230051

Prepared by Doris Jung on August 24, 1998

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 and during Public Comment. The conclusions made in this report are based on information provided in the original application submittal of December 8, 1995 and additional information submitted on January 30, 1998, March 24, 1998 and April 1, 1998. 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.

II. Source Description

This source is classified as a natural gas transmission facility defined under Standard Industrial Classification 4922. This facility is a mainline compressor station which transmits natural gas from the Wyoming area to the Front Range area in Colorado. This is achieved by using seven (7) internal combustion engine driven compressors.

The facility is located approximately 4 miles north of Rockport in Weld County on Highway 85. There are two affected states within 50 miles of the plant: Wyoming and Nebraska. The following Federal Class I designated area is within 100 kilometers of the plant: Rocky Mountain National Park. The area in which the plant operates is designated as attainment for all criteria pollutants. Facility wide emissions for pollutants of concern, Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), and Hazardous Air Pollutants (HAPs) in tons per year (tpy) are as follows:

Pollutant	Potential to Emit (tpy)	Actual Emissions (tpy)
NO_x	571.1	322.3
CO	235.8	129.7
VOC	282.2	159.9
HAPs	32.7	18.98

Facility wide potential emissions and actual emissions are based on data in the Title V Operating Permit application and Division files.

This source is considered to be a major source in an attainment area (Potential to Emit > 250 tons per year) and is considered major for future purposes of Prevention of Significant Deterioration (PSD) regulations. Modifications up to this point in time have not triggered significance levels which would bring about PSD Review. 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 will result in the application of the PSD review requirements.

An EPA PSD Permit was issued to this facility on March 17, 1982. The permit covered two (2) internal combustion engines rated at 2,565 hp and two (2) internal combustion engines rated at 6,000 hp. According to CIG, these engines were never installed.

This facility currently is not subject to any Maximum Achievable Control Technology (MACT) standards. CIG indicated that the facility is not a 112(r) source. CIG certified to operating in compliance with all applicable requirements at the time of their application submittal on December 8, 1995.

III. Emission Sources

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

Units E001, E002, E003, E004 - Cooper 2-Cycle Clean Burn Internal Combustion Engine, Model GMVH-12, S/N: 48534, 48833, 48532, and 48531, 7,250 Btu/hp-hr, 2700 hp, Natural Gas Fired.

1. Applicable Requirements

These units were first placed in service in 1978 and are permitted under the final approval Colorado Construction Permits 11WE631-1, 2, 3, 4. The fuel use per engine limited by

Colorado Construction Permits 11WE631-1, 2, 3, 4 at 182.4 MMscf/yr is based on a fuel heating value of the 940 Btu/scf. In the correspondence received by the Division on April 1, 1998, CIG reported a fuel heating value of 945.83 Btu/scf. The fuel use limits listed below reflect the most recent reported heating value of the fuel. The applicable requirements for **each** engine are as follows:

- NO_x: 82.1 tpy (Colorado Construction Permits 11WE631-1, 2, 3, 4)
- CO: 26.3 tpy (Colorado Construction Permits 11WE631-1, 2, 3, 4)
- VOC: 36.2 tpy (Colorado Construction Permits 11WE631-1, 2, 3, 4)
- Fuel use limited to 181.3 MMscf/yr
- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

2. Emission Factors

Emissions from these engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, engine design specifications, and specific properties of the natural gas being burned. The pollutants of concern are NO_x, CO and VOC. For permitted engines, it is Division policy to convert horsepower-based emission factors to fuel-based emission factors. The emission factor conversion is accomplished by using the horsepower-based emission factor, the design heat rate of the engine, and the engine horsepower as shown in the attached Engineering Calculation Worksheet. The resulting fuel-based emission factors for CIG's proposed factors and AP-42 emission factors for 2-cycle lean-burn reciprocating engines from Table 3.2-1 (EPA Compilation of Air Pollutant Emission Factors, October 1996) are as follows:

Pollutant	AP-42 (lb/MMBtu)	CIG's (lb/MMBtu)
NO_x	2.7	0.96
CO	0.38	0.31
VOC	0.11	0.42

CIG's emission factors are lower than the AP-42 factors for NO_x and CO, and higher for VOC.

3. Monitoring Plan

Emissions will be determined by multiplying CIG's emission factors by the Btu consumption of the engine. CIG will be required to conduct the emissions calculations on a monthly basis with semi-annual reports and an annual compliance certification.

Since the NO_x and CO compliance emission factors for these engines are less than AP-42 emission factors, quarterly portable monitoring is required as indicated by the Internal Combustion engine monitoring grid developed by the Division (attached). Failure of a portable analysis indicates a possible exceedance and a re-test is required using calibration gasses. Failure to show compliance during subsequent retests requires notification of the Division and an EPA Reference Method stack test must then be

performed.

The Opacity standard of 20% will be demonstrated by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings, if necessary.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II.C.

4. Compliance Status

A current APEN reporting actual criteria emissions for the 1994 data year is on file with the Division for this engine. No records indicating non-compliance were found in a review of the facility's APCD files and the source certified in their application that they are currently in compliance with all applicable requirements. Therefore, this unit is currently considered to be in compliance with all applicable requirements.

Units E005, E006 - Cooper 2-Cycle Clean Burn Internal Combustion Engine, Model GMVH-12, S/N: 48867 and 48868, 6799.2 Btu/hp-hr, 2700 hp, Natural Gas Fired.

1. Applicable Requirements

Units E005 and E006 were first placed in service in 1983. They are permitted under final approval Colorado Construction Permits 13WE536-1, 2. The fuel use per engine limited by Colorado Construction Permits 13WE536-1, 2 at 151 MMscf/yr is based on the higher heating value of the fuel. It was brought to the Division's attention that the derivation of the engine heat rate (Btu/hp-hr) is based on the lower heating value of the fuel, as confirmed by the manufacturer. To be consistent with the heating value basis, fuel use limits and emissions may be calculated by using the lower heating value of the fuel. The applicable requirements for **each** engine are as follows:

- NO_x: 82.1 tpy (Colorado Construction Permits 13WE536-1, 2)
- CO: 26.3 tpy (Colorado Construction Permits 13WE536-1, 2)
- VOC: 36.2 tpy (Colorado Construction Permits 13WE536-1, 2)
- Fuel use limited to 170 MMscf/yr
- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

2. Emission Factors

Emissions from these engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, engine design specifications, and specific properties of the natural gas being burned. The pollutants of concern are NO_x, CO and VOC. For permitted engines, it is Division policy to convert horsepower-based emission factors to fuel-based emission factors. The emission factor conversion is accomplished by using the horsepower-based emission factor, the design heat rate of the engine, and the engine horsepower as shown in the attached Engineering Calculation Worksheet. The

AP-42 emission factors (EPA Compilation of Air Pollutant Emission Factors, October 1996) for 2-cycle lean-burn reciprocating engines from Table 3.2-1 and CIG's emission factors for the engine are as follows:

Pollutant	AP-42 (lb/MMBtu)	CIG's (lb/MMBtu)
NO_x	2.7	1.02
CO	0.38	0.33
VOC	0.11	0.45

CIG's emission factors are lower than the AP-42 factors for NO_x and CO, and higher for VOC.

3. Monitoring Plan

Emissions will be determined by multiplying CIG's emission factors by the Btu consumption of the engine. CIG will be required to conduct the emissions calculations on a monthly basis with semi-annual reports and an annual compliance certification.

Since the NO_x and CO compliance emission factors for these engines are less than AP-42 emission factors, quarterly portable monitoring is required as indicated by the Internal Combustion engine monitoring grid developed by the Division (attached). Failure of a portable analysis indicates a possible exceedance and a re-test is required using calibration gasses. Failure to show compliance during subsequent retests requires notification of the Division and an EPA Reference Method stack test must then be performed.

The Opacity standard of 20% will be demonstrated by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings, if necessary.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II.C.

4. Compliance Status

Current APENs reporting actual criteria emissions for the 1994 data year are on file with the Division for these engines. No records indicating non-compliance were found in a review of the facility's APCD files and the source certified in their application that they are currently in compliance with all applicable requirements. Therefore, these units are currently considered to be in compliance with all applicable requirements.

Unit E-7301 - Cooper 2-Cycle Clean Burn Internal Combustion Engine, Model GMVH-12C2, S/N: 46291, 6,950 Btu/hp-hr, 2700 hp, Natural Gas Fired.

1. Applicable Requirements

This unit was first placed in service in 1997 and is permitted under the initial approval

Colorado Construction Permit 97WE0032. Based upon the Final Approval Certification submitted by CIG, the Division granted Final Approval for Permit 97WE0032 on March 25, 1998. The fuel use of the engine limited by Colorado Construction Permit 97WE0032 at 156 MMscf/yr is based on the higher heating value of the fuel. It was brought to the Division's attention that the derivation of the engine heat rate (Btu/hp-hr) is based on the lower heating value of the fuel, as confirmed by the manufacturer. To be consistent with the heating value basis, fuel use limits and emissions may be calculated by using the lower heating value of the fuel. The applicable requirements for this engine are as follows:

- NO_x: 39.5 tpy (Colorado Construction Permit 97WE0032)
- CO: 39.0 tpy (Colorado Construction Permit 97WE0032)
- VOC: 30.0 tpy (Colorado Construction Permit 97WE0032)
- Fuel use limited to 173.8 MMscf/yr
- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

2. Emission Factors

Emissions from this engine are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, engine design specifications, and specific properties of the natural gas being burned. The pollutants of concern are NO_x, CO and VOC. For permitted engines, it is Division policy to convert horsepower-based emission factors to fuel-based emission factors. The emission factor conversion is accomplished by using the horsepower-based emission factor, the design heat rate of the engine, and the engine horsepower as shown in the attached Engineering Calculation Worksheet. The resulting fuel-based emission factors for CIG's proposed factors and AP-42 emission factors for 2-cycle lean-burn reciprocating engines from Table 3.2-1 (EPA Compilation of Air Pollutant Emission Factors, October 1996) are as follows:

Pollutant	AP-42 (lb/MMBtu)	CIG's (lb/MMBtu)
NO_x	2.7	0.48
CO	0.38	0.48
VOC	0.11	0.36

CIG's emission factors are higher than the AP-42 factors for CO and VOC, and lower for NO_x .

3. Monitoring Plan

Emissions will be determined by multiplying CIG's emission factors by the Btu consumption of the engine. CIG will be required to conduct the emissions calculations on a monthly basis with semi-annual reports and an annual compliance certification.

Since the NO_x compliance emission factor for this engine is less than AP-42 emission factor, quarterly portable monitoring is required as indicated by the Internal Combustion engine monitoring grid developed by the Division (attached). Flue gas analyzer testing for

CO will also be required because the relationship between NO_x and CO emission rates from the engine is critical for determining engine operating condition. Failure of a portable analysis indicates a possible exceedance and a re-test is required using calibration gasses. Failure to show compliance during subsequent retests requires notification of the Division and an EPA Reference Method stack test must then be performed.

The Opacity standard of 20% will be demonstrated by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings, if necessary.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II.C.

4. Compliance Status

A current APEN reporting actual criteria emissions for the 1997 data year is on file with the Division for this engine. No records indicating non-compliance were found in a review of the facility's APCD files and the source certified in their application that they are currently in compliance with all applicable requirements. Therefore, this unit is considered to be in compliance with all current applicable requirements.

Unit E-7401 - Cooper 2-Cycle Clean Burn Internal Combustion Engine, Model GMVH-12C2, S/N: to be installed, 6,975 Btu/hp-hr, 2700 hp, Natural Gas Fired.

1. Applicable Requirements

CIG submitted an APEN for a new engine on January 16, 1998. This new unit has been permitted under initial approval Colorado Construction Permit 98WE0030. This engine has not been installed as of the issue date of the permit. The addition of this unit, operating under the emissions limits below, is considered a PSD synthetic minor modification. The applicable requirements for this engine are as follows:

- This unit shall be installed by December 4, 1999 (Colorado Construction Permit 98WE0030)
- CIG shall notify the Division of the day of installation and start-up within 30 days of each event
- NO_x: 39.0 tpy and 3.31 ton/mo (Colorado Construction Permit 98WE0030)
- CO: 39.0 tpy and 3.31 ton/mo (Colorado Construction Permit 98WE0030)
- VOC: 30.0 tpy and 2.57 ton/mo (Colorado Construction Permit 98WE0030)
- Fuel use limited to 175.5 MMscf/yr and 14,905,296 scf/mo (Colorado Construction Permit 98WE0030)
- A source compliance test shall be conducted to measure the emission rate of oxides of nitrogen, carbon monoxide, and oxygen, using EPA approved methods. The test protocol must be in accordance with the requirements of the Air Pollution Control Division Compliance test manual and shall be submitted to the Division for review and approval at least thirty (30) days prior to testing. No compliance test shall be conducted without prior approval from the Division (Colorado Construction Permit 98WE0030)

- Manufacturer, model number, and serial number of the equipment for this emission unit shall be provided to the Division within 180 days of installation (Colorado Construction Permit 98WE0030, Regulation No. 3, Part B, Section IV.E)
- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

During the first twelve (12) months of operation, compliance with both the monthly and yearly emission and fuel use limitations shall be required. After the first twelve (12) months of operation, compliance with only the yearly limitation shall be required.

The semi-annual monitoring report submitted more than 180 days after commencement of operation shall serve as the self-certification for this unit.

2. Emission Factors

Emissions from this engine are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, engine design specifications, and specific properties of the natural gas being burned. The pollutants of concern are NO_x, CO and VOC. For permitted engines, it is Division policy to convert horsepower-based emission factors to fuel-based emission factors. The emission factor conversion is accomplished by using the horsepower-based emission factor, the design heat rate of the engine, and the engine horsepower as shown in the attached Engineering Calculation Worksheet. The resulting fuel-based emission factors for CIG's proposed factors and AP-42 emission factors for 2-cycle lean-burn reciprocating engines from Table 3.2-1 (EPA Compilation of Air Pollutant Emission Factors, October 1996) are as follows:

Pollutant	AP-42 (lb/MMBtu)	CIG's (lb/MMBtu)
NO_x	2.7	0.47
CO	0.38	0.47
VOC	0.11	0.36

CIG's emission factors are higher than the AP-42 factors for CO and VOC, and lower for NO_x .

3. Monitoring Plan

Emissions will be determined by multiplying CIG's emission factors by the Btu consumption of the engine. CIG will be required to conduct the emissions calculations on a monthly basis with semi-annual reports and an annual compliance certification.

The source shall conduct a compliance stack test on the engine for the initial demonstration of compliance with CO and NO_x compliance emission factors and permit limits within 180 days of permit issuance using EPA approved methods. The test protocol must be in accordance with the requirements of the Air Pollution Control Division Compliance test manual and shall be submitted to the Division for review and approval at least thirty (30) days prior to testing.

Since the NO_x compliance emission factor for this engine is less than AP-42 emission factor, quarterly portable monitoring is required as indicated by the Internal Combustion engine monitoring grid developed by the Division (attached). Flue gas analyzer testing for CO will also be required because the relationship between NO_x and CO emission rates from the engine is critical for determining engine operating condition. Failure of a portable analysis indicates a possible exceedance and a re-test is required using calibration gasses. Failure to show compliance during subsequent retests requires notification of the Division and an EPA Reference Method stack test must then be performed.

The Opacity standard of 20% will be monitored by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings, if necessary.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II.C.

4. Compliance Status

A current APEN for equipment covered under this emission unit is on file with the Division. Therefore, this unit is currently considered to be in compliance with all applicable requirements.

Unit F001 - Fugitive VOC Emissions from Equipment Leaks

1. Applicable Requirements

The Division has made the determination that Fugitive VOC emissions from equipment leaks at gas compression or processing facilities must be calculated and evaluated for the appropriate permitting requirements. Fugitive VOC emissions from equipment leaks are permitted under initial approval Colorado Construction Permit 96WE039. Based upon the Final Approval Certification submitted by CIG, the Division granted Final Approval for Permit 96WE039 on March 17, 1998. The applicable requirements are as follows:

- VOC: 5.0 tpy (Colorado Construction Permit 96WE039)
- APEN Reporting (Regulation No. 3, Part A, Section II)

This source does not meet the definition of an Onshore Natural Gas Processing Facility in New Source Performance Standard 40CFR60 Subpart KKK; therefore, Subpart KKK does not apply to this source.

2. Emission Factors

CIG has calculated emissions from equipment leaks based on emission factors from EPA's Protocol for Emission Leak Estimates (EPA 453-4/R-93-025). Factors are multiplied by the number of components of each type (e.g. Compressor Seals) and the VOC weight percentage in the organic portion of the gas stream. Division policy requires the source to determine the VOC weight percentage in the organic portion of the gas stream with an

extended gas analysis. However, since fugitive VOC emissions are low, the Division will waive this requirement and the VOC weight percentage in the organic portion of the gas stream as reported in the Title V Operating Permit application will be used to calculate emissions. EPA factors are given in terms of Total Organic Compounds.

3. Monitoring Plan

As a means of recordkeeping, CIG personnel must conduct an initial component count within 90 days of permit issuance to verify the existing hardware inventory. Records shall be kept of all component additions and deletions, and a running tally maintained. The calculation result will be compared to the annual VOC limit to determine compliance.

A Maintenance Plan will be required to be kept on site in order to document how leak prevention is handled throughout the year.

4. Compliance Status

A current APEN reporting actual criteria emissions for the 1994 data year is on file with the Division for fugitive emissions. No records indicating non-compliance were found in a review of the facility's APCD files and the source certified in their application that they are currently in compliance with all applicable requirements. Therefore, this unit is considered to be in compliance with all current applicable requirements.

IV. Insignificant Activities

Emissions from Venting during Engine Overhaul

CIG submitted calculations quantifying emissions from the release of natural gas during routine periodic maintenance of the compressor engines. Assuming 6,000 ft^3 of natural gas was vented from each engine once per year, emissions of VOC were determined to be well below reportable deminimis levels.

Emergency Generators

Emergency generators on site have been identified as meeting the insignificant activity criteria of Colorado Regulation No. 3, Part C, Section II.E.3.nnn.

Fuel Burning Equipment

CIG identified a combustion source that qualifies as an insignificant activity under Colorado Regulation No. 3, Part C, Section II.E.3.k, gaseous fuel burning equipment with a design heat rate less than 5 MMBtu/hr. This unit is listed in Appendix A in the Operating Permit.

Fuel Burning Equipment used to supply building heat

CIG identified a combustion source that qualifies as an insignificant activity under Colorado

Regulation No. 3, Part C, Section II.E.3.ggg, gaseous fuel burning equipment with a design heat rate less than 10 MMBtu/hr which is used solely for heating buildings for personal compfort. This unit is listed in Appendix A in the Operating Permit.

Storage Tanks

CIG identified storage tanks that qualify as insignificant activities under Colorado Regulation No. 3, Part C, Section II.E.3.aaa, ddd, and fff. These units are listed in Appendix A in the Operating Permit.

Landscaping Devices

CIG also listed landscaping devices that qualify as insignificant activities under Colorado Regulation No. 3, Part C, Section II.E.3.bb. These units are listed in Appendix A in the Operating Permit.

V. Alternative Operating Scenarios

CIG has indicated that replacement engines are typically not used during major engine overhaul. They are aware that any temporary or permanent replacement of engines at this site shall not be conducted without prior notification to the Division. The Division will determine whether the proposed change at the site will require a Construction Permit and/or modification of the Operating Permit. Installation of equipment not specifically identified in the Permit prior to notification to the Division shall be considered a violation subject to enforcement action.

VI. Permit Shield

The regulation citations identified as not applicable to this source in Section III of the Operating Permit are based on a condensed version of the requested Permit Shield citations as submitted with the original application for this facility. The original list contained many citations that were clearly unnecessary for the shield.

(Continued on the next page)

VII. Short Term Limits Deleted from Operating Permit

Construction Permit	Emission Unit	Short Term Limit	
11WE631-1, 2, 3, 4 13WE536-1, 2	E001, E002, E003, E004 E005, E006	NO_x:	18.75 lb/hr
		CO:	6.01 lb/hr
		VOC:	8.27 lb/hr
11WE631-1, 2, 3, 4	E001, E002, E003, E004	Fuel:	20,824 scf/hr
13WE536-1, 2	E005, E006	Fuel:	17,237 scf/hr
97WE0032	E-7301	NO_x:	9.1 lb/hr
		CO:	8.9 lb/hr
		VOC:	6.9 lb/hr
		Fuel:	18,804 scf/hr
96WE039	F001	VOC:	1.2 lb/hr