



3. The proposed project is subject to PSD because Panhandle has not previously obtained a PSD permit for these engines. The project is therefore subject to PSD review for nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO) and volatile organic material (VOM). The project is not subject to PSD for particulate matter or sulfur dioxide because increases did not reach their respective significance thresholds.
4. After reviewing the materials submitted by Panhandle, the Illinois EPA has determined that the project will (i) comply with applicable Board emission standards (ii) comply with applicable federal emission standards and (iii) utilize Best Available Control Technology (BACT) on emissions of NO<sub>x</sub>, CO, and VOM, as specified by Condition 1.1.5 and 1.1.6(a).
5. The air quality analysis submitted by Panhandle and reviewed by the Illinois EPA shows that the proposed project will not cause violations of the ambient air quality standard for NO<sub>x</sub>, and CO. The air quality analysis shows compliance with the allowable increment levels established under the PSD regulations.
6. The Illinois EPA has determined that the proposed project complies with all applicable Illinois Air Pollution Board Regulations and the federal Prevention of Significant Deterioration of Air Quality Regulations (PSD), 40 CFR 52.21.
7. A copy of the application, the project summary and a draft of this permit were placed in a location in the vicinity of the project, and the public was given notice and an opportunity to examine this material and to submit comments and to request a public hearing on this matter.

The Illinois EPA is issuing approval to construct the proposed project subject to the following conditions and consistent with the specifications and data included in the application. Any departure from the conditions of this approval or terms expressed in the application would need to receive prior written authorization by Illinois EPA.

#### Conditions

##### 1.0 Unit Specific Conditions

##### 1.1 Natural Gas Fired Reciprocating Engines

##### 1.1.1 Description

The Permittee operates 2-cycle lean burn natural gas fired reciprocating engines which provide power to compressor units at the source that move natural gas through associated transmission pipelines. The principle form of emissions is the engine's exhaust. "Blowdown Emissions" also occur during the venting of the engines after shutdown for safety reasons. This permit addresses four engines installed at the source in 1988, which are being equipped with modern combustion control technology.

1.1.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Original Date of Installation	Emission Control Equipment
Internal Combustion Engines	Two Reciprocating Engines (Cooper Bessemer Model V250-12/16), Nominal 4,000 HP Each, #1116 and #1117	<u>1988</u>	Combustion Control Technology
	Two Reciprocating Engines (Cooper Bessemer Model GMVH 10C), Nominal 2,070 HP Each, #1118-#1119)	<u>1988</u>	Combustion Control Technology

1.1.3 Applicability Provisions and Applicable Regulations

- a. An "affected engine" for the purpose of these unit specific conditions, is a natural gas fired reciprocating engine as described in Conditions 1.1.1 and 1.1.2.
- b. The emissions of smoke or other particulate matter from any affected engine shall not have an opacity greater than 30 percent, pursuant to 35 IAC 212.123(a), except as allowed by 35 IAC 201.149, 212.123(b), or 212.124.
- c. Notwithstanding Condition 1.1.3(b), the Permittee is authorized to operate the engines with greater than 30 percent opacity during startup pursuant to 35 IAC 201.262, as the Permittee has affirmatively demonstrated that all reasonable efforts have been made to minimize startup emissions, duration of individual starts, and frequency of startups. This authorization is subject to the following and may be further evaluated during the processing of subsequent permits for the affected engines:
  - i. This authorization only extends for a period of up to two-hours following initial firing of fuel during each startup event for each engine.
  - ii. The Permittee shall take the following measures to minimize startup emissions:
 

Implementation of established startup procedures, including preheating an engine

prior to startup when sufficient time is available.

1.1.4 Non-Applicability of Regulations of Concern

- a. Each affected engine is not subject to the requirements of 35 IAC 212.321 because it does not have a process weight rate as defined in 35 IAC 211.5250.
- b. Each affected engine is not subject to the requirements of 35 IAC 215.143 because the blowdown emissions associated with engines are not considered to be vapor blowdown pursuant to 35 IAC 215.143.

1.1.5 Operational and Production Limits and Work Practices

- a. Natural gas shall be the only fuel used in the engines.
- b. The engines shall each be equipped, operated, and maintained with combustion controls, such as Clean-Burn™ technology to minimize emissions of NO<sub>x</sub>.
- c. Each affected engine shall be maintained and operated with good combustion practice to control emissions of NO<sub>x</sub> and VOM. At a minimum, these practices shall include:
  - i. Semiannual preventative maintenance and engine analysis in accordance with written procedures maintained by the Permittee with necessary adjustment to maintain each compressor/engine's performance in the same range as the initial stack test, which shall include the following:
    - A. Set-up, calibrate, and synchronize the performance analysis equipment per manufacture specification.
    - B. Power cylinder performance analysis with checks for combustion stability, peak pressure angle, detection of misfires, detonation, and pre-ignition.
    - C. Primary and secondary ignition analysis including checking the ignition timing on each spark plug.
    - D. Vibration analysis for the detection of mechanical problems such as worn leaking piston rings, piston/cylinder wear, fuel injection problems, etc.

- E. Compressor end analysis for detection of leaking valves or rings, or unnecessary recirculation of gas.
  - F. Check of the IHP (indicated horsepower) on each end of each compressor cylinder. Determine the compressor load. Observe the PT (pressure Vs time) pattern, the PV (pressure Vs volume) pattern, and vibration traces on the analyzer oscilloscope. Take pictures of these traces for each cylinder.
  - G. Check of the BMEP (brake mean effective pressure) on all power cylinders and check all hydraulic lifter adjustments.
- ii. Documentation and recordkeeping for these activities.

1.1.6 Emission Limitations

- a. i. The emissions of NO<sub>x</sub>, CO, and VOM from engines 1116 and 1117 each shall not exceed 0.61 lb/mmBtu, 0.67 lb/mmBtu, and 0.13 lb/mmBtu, respectively (equivalent to 2.0 g/hp-hr, 2.2 g/hp-hr, and 0.43 g/hp-hr, respectively) while operating in the normal load range.
- ii. The emissions of NO<sub>x</sub>, CO, and VOM from engines 1118 and 1119 each shall not exceed 0.63 lb/mmBtu, 0.63 lb/mmBtu and, 0.13 lb/mmBtu, respectively (equivalent to 2.0 g/hp-hr, 2.0 g/hp-hr, and 0.43 g/hp-hr, respectively) while operating in the normal load range.
- iii. For this purpose, the normal load range means operating at or above 80 percent of the rated fuel input to an engine.

Condition 1.1.6(a) above represents the application of the Best Available Control Technology (BACT) as required by Section 165 of the Clean Air Act.

- b. i. The emissions of the affected engines other than blowdown, shall not exceed the following limits:

Engine	NO <sub>x</sub>		CO		VOM		PM <sub>10</sub>	
	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)
1116	17.6	77.1	19.4	85.0	3.8	16.6	1.7	7.2
1117	17.6	77.1	19.4	85.0	3.8	16.6	1.7	7.2
1118	9.9	43.4	9.9	43.4	3.8	16.6	0.8	3.6
1119	9.9	43.4	9.9	43.4	3.8	16.6	0.8	3.6
Totals	55.0	241.0	58.6	256.8	15.2	66.4	5.0	21.9

- ii. The emissions of VOM associated with blowdown of the engines shall not exceed 12 tons/year. Compliance with this limit shall be determined from a running total of 12 months of data.
- iii. This permit is issued based on negligible emissions of SO<sub>2</sub> from the engines. For this purpose, emissions shall not exceed nominal emission rates of 0.1 lb/hour and 0.44 ton/year.
- c. The above limitations and all other related requirements of this permit become effective for a particular engine 90 days after completion of the installation of the combustion control system addressed by this permit. (See also Condition 1.1.10(a))

1.1.7 Testing Requirements

- a. Within 60 days after installation of combustion controls on each affected engine operating at the greatest load at which it will normally be operated but not later than 180 days after its installation, the Permittee shall perform emissions tests of the engines as follows. These tests shall be used as the initial compliance tests to demonstrate compliance with the limits and conditions set in this permit.
- b. Emissions shall be measured by an approved testing service at maximum load for NO<sub>x</sub>, CO, and VOM. During the initial performance tests, emissions shall also be measured at the minimum load and an intermediate load level for NO<sub>x</sub> and CO. The low load and intermediate load testing may be achieved through 20 minute test runs.
- c. The following USEPA methods and procedures shall be used for testing of emissions.

Location of Sample Points	USEPA Method 1 or 19
Gas Flow and Velocity	USEPA Method 2 or 19
Flue Gas Weight	USEPA Method 3 or 3A or 19
Moisture	USEPA Method 4 or 19
Nitrogen Oxides	USEPA Method 20

Carbon Monoxide	USEPA Method 10
Volatile Organic Material	USEPA Method 18 or 25A

- d. At least 60 days prior to the actual date of testing, a written test plan shall be submitted to the Illinois EPA for review. This plan shall describe the specific procedures for testing and shall include as a minimum:
  - i. The person(s) who will be performing sampling and analysis and their experience with similar tests.
  - ii. The specific conditions under which testing shall be performed including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for the engine will be tracked and recorded.
  - iii. The specific determinations of emissions that are intended to be made, including sampling and monitoring locations.
  - iv. The test method(s) which will be used, with the specific analysis method, if the method can be used with different analysis methods.
- e. The Illinois EPA shall be notified prior to these tests to enable it to observe these tests. Notification for the expected date of testing shall be submitted a minimum of 30 days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of 5 working days prior to the actual date of the test. The Illinois EPA may at its discretion accept notifications with shorter advance notice provided that the Illinois EPA will not accept such notifications if it interferes with the Illinois EPA's ability to observe testing.
- f. Three copies of the Final Reports for these tests shall be forwarded to the Illinois EPA, Compliance Section in Springfield within 30 days after the test results are compiled and finalized, in advance of the operating permit application if necessary. The Final Report from testing shall contain a minimum:
  - i. A summary of results;
  - ii. General information;

- iii. Description of test method(s), including a description of sampling points, sampling train, analysis equipment, and test schedule;
- iv. Detailed description of test conditions, including:
  - A. Fuel consumption (standard ft<sup>3</sup>);
  - B. Firing rate (million Btu/hr);
  - C. Engine output rate (HP), with supporting data and calculations; and
  - D. Engine burner settings, e.g., burner excess air and pressure settings.
- v. Data and calculations, including copies of all raw data sheets and records of laboratory analysis, sample calculations, and data on equipment calibration.

#### 1.1.8 Monitoring Requirements

On at least an annual basis, the Permittee shall measure the NO<sub>x</sub> and CO emissions from the affected engines using portable analyzers. As an alternate to such measurements, measurements may be conducted in 20 minute test runs using the procedures specified by Condition 1.1.7(c).

#### 1.1.9 Recordkeeping Requirements

- a. The Permittee shall maintain a file for the affected engines that includes:
  - i. The rated output of each engine in horsepower, as specified by the manufacturer or determined through performance testing.
  - ii. The design settings for the combustion control systems.
  - iii. The manufacturer's recommended maintenance practice for the combustion control system.
  - iv. The maintenance practices that the Permittee will follow if different or more detailed than the manufacturer. (See Condition 1.1.5(c)(i))
  - v. The VOM emission factors for engine blowdown with supporting information (e.g., exhaust volume and VOM content).

- b. The Permittee shall maintain the following operating records for the affected engines:
  - i. Hours of operation for each engine per year;
  - ii. Number of startups (blowdown events) totaled per month and per year for each engine; and
  - iii. Inspection, maintenance, and repair logs for each engine with dates and nature of activities. (See also Condition 1.1.5(c)(ii))
- c. The Permittee shall maintain the following emission records for the engines:
  - i. A copy of all testing conducted pursuant to Conditions 1.1.7 and 1.1.8.
  - ii. Annual aggregate NO<sub>x</sub>, CO and VOM emissions from the engines, based on hours of operation and number of startups and the applicable emission factors, with supporting calculations.

1.1.10 Reporting Requirements

- a. The Permittee shall promptly notify the Illinois EPA when installation of combustion control on an affected engine as provided by this permit, is completed and the requirements of this permit become applicable to the engine.
- b. The Permittee shall provide an annual report, submitted with the Annual Emission Report concerning startup of engines. At a minimum, this report shall include:

For each engine, the total number of startups.
- c. The Permittee shall promptly notify the Illinois EPA, Compliance Section of non-compliance with applicable operating requirements and emissions as follows:
- d. All reports and notifications required by this permit shall be made in duplicate to the following unless otherwise specified by the Illinois EPA.

Illinois Environmental Protection Agency  
Division of Air Pollution Control  
Compliance Section (#40)  
P.O. Box 19276  
Springfield, Illinois 62794-9276

Telephone: 217-782-5811 Fax: 217-782-6348

One copy shall also be sent to the following address:

Illinois Environmental Protection Agency  
Division of Air Pollution Control  
2009 Mall Street  
Collinsville, Illinois 62234

1.1.11 Operational Flexibility/Anticipated Operating Scenarios

N/A

1.1.12 Compliance Procedures

Compliance with the emission limits in Condition 1.1.6 shall be based on the recordkeeping requirements in Condition 1.1.9 and calculated based on the appropriate emission factors and formulas listed below:

Notwithstanding the procedures specifying compliance to applicable requirements, any person (including the Permittee) may also use other credible evidence to establish compliance or noncompliance with applicable requirements.

a. Blowdown Emissions

VOM Emissions = Blowdown Emission Factor x Number of Startups

b. Combustion Emissions

i. Emissions = Appropriate Emission Factor x Engine Operation

ii. A. Emission factors for NO<sub>x</sub>, CO and VOM shall be based on the results of emission testing and monitoring conducted pursuant to Conditions 1.1.7 and 1.1.8.

B. Until the results of such testing are available, emissions shall be determined with the following emission factors assuming that engines operate only at full load.

Pollutants	Engines 1116-1117 (g/hp-hr)	Engines 1118-1119 (g/hp-hr)
NO <sub>x</sub>	2.0	2.0
VOM	0.43	0.43
CO	2.2	2.0
PM <sub>10</sub>	0.19	0.18

$$\text{Emissions (lbs)} = \text{Appropriate Factor} \times \text{Operating Hours} \times \text{Engine Capacity (hp)} \times 453.9$$

- iii. Emission factors for pollutants other than NO<sub>x</sub>, CO and VOM shall be based on the standard emission factors from AP-42 or for formaldehyde from appropriate Gas Research Institute factors.
- 1.1.13 a. Under this permit, each affected engine may be operated for a period of up to 180 days from initial startup to allow for equipment shakedown and emission testing as required. This period may be extended by the Illinois EPA upon request of the Permittee if additional time is needed to complete shakedown or perform emission testing.
- b. Upon successful completion of emission testing demonstrating compliance with applicable short-term limitations, the Permittee may continue to operate the affected engines as provided a complete CAAPP application is submitted within 12 month of initial startup, as addressed by Section 39.5(5) of the Environmental Protection Act.
  - c. Total VOM emissions from the engines is the sum of VOM emitted from blowdown (See 1.1.12(a)) and those from combustion (See 1.1.12(b)(ii)).
- 1.1.14 a. Pursuant to 40 CFR 62.21(r)(2), this permit shall become invalid as applied to a particular engine if construction of the control system addressed by this permit is not commenced within 18 months after this permit becomes effective, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable period of time. The 18 month period may be extended by the Illinois EPA upon a satisfactory showing, then an extension is justified. This condition supersedes Standard Condition 1.

b. For purposes of the above provisions, the definitions of "construction" and "commence" at 40 CFR 52.21(b)(8) and (9) shall apply, which require that a source must enter into a binding agreement for on-site construction or begin actual on-site construction. (Also see the definition of "begin actual construction," 40 CFR 52.21(b)(11)).

1.1.15 This permit does not relieve the Permittee of the responsibility to comply with all local, state and federal regulations which are part of the applicable Illinois State Implementation Plan, as well as all other applicable federal, state, and local requirements.

If you have any questions on this permit, please call Bob Smet at 217/782-2113.

Donald E. Sutton, P.E.  
Manager, Permit Section  
Division of Air Pollution Control

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cc: Region 2