

Permit Number: P010XXXX  
Facility Name: Ohio Shale Gas Well  
Facility ID: 0000000000  
Natural Gas Extraction Well Site, 7/29/11 DRAFT GP

# July 29, 2011 Draft Version of the Ohio EPA Air Program Natural Gas Well Site General Permit Terms and Conditions

**Permit Number:** P010XXXX  
**Facility Name:** Ohio Shale Gas Well  
**Facility ID:** 0000000000  
**Natural Gas Extraction Well Site, 7/29/11 DRAFT GP**

## **B. Facility-Wide Terms and Conditions**

1. This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
  - a) For the purpose of a permit-to-install document, the facility-wide terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.
    - (1) None.
  - b) For the purpose of a permit-to-operate document, the facility-wide terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.
    - (1) None.
2. The following emissions units contained in this permit are subject to 40 CFR Part 60, Subpart(s) A, Kb, KKK, VV, IIII, and JJJJ, and 40 CFR Part 63, Subpart(s) A, HH, and ZZZZ: Storage Tanks, Stationary ICEs (SI and CI), Equipment/Pipeline Leaks and Glycol Dehydration Units. The complete NSPS/MACT requirements may be accessed via the internet from the Electronic Code of Federal Regulations (e-CFR) website <http://ecfr.gpoaccess.gov> or by contacting the appropriate Ohio EPA District Office or local air agency.
3. Air contaminant sources that qualify as de minimus under OAC rule 3745-15-05, or under OAC rule 3745-31-03(A)(1) or (4) for exemption or registered for a permit-by-rule (PBR), are not subject to emission standards under this permit. Emissions from de minimis or exempt sources that are listed in this permit must be included in the total restricted potential to emit (PTE) calculations for this permit.
4. Emissions units permitted under a previously issued PTI/PTIO as portable sources, provided that the qualifying criteria for this General permit are met, shall be subject to the requirements of this permit during the time located at this well site.
5. The requirements of this permit are not intended to supersede any Ohio Department of Natural Resources requirements.
6. No type of equipment other than that listed in this permit, which would constitute a non exempt stationary air contaminant source, shall be installed or utilized on site. The permittee shall maintain an annual record of the equipment in use on site, and submit an annual report describing the equipment in use during the last year.
7. Modeling to demonstrate compliance with the "Toxic Air Contaminant Statute", ORC 3704.03(F)(4)(b), was not necessary because the maximum annual emissions for each toxic air contaminant, as defined in OAC rule 3745-114-01, will be less than 1.0 ton per year (or are subject to a standard under 40 CFR Part 63). OAC Chapter 3745-31 requires permittees to apply for and obtain a new or modified PTIO prior to making a "modification" as defined by OAC rule 3745-31-01. The permittee is hereby advised that changes in the composition of the materials, or use of new materials, that would cause the emissions of any toxic air contaminant to increase to above 1.0 ton per year may require the permittee to apply for and obtain a new PTIO.
8. The permittee remains subject to all applicable federal law and regulations and all applicable provisions of the Ohio State Implementation Plan as approved by the Administrator of the U.S. EPA. The provisions of the Ohio State Implementation Plan are independently enforceable by the U.S. EPA.

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## **C. Emissions Unit Terms and Conditions**

**1. Emissions Unit: Dehydration System, P001**

**Operations, Property and/or Equipment Description:**

P001	Glycol dehydration unit (includes contact tower or absorption column and glycol dehydration unit reboiler) and gas-condensate-glycol (GCG) separator (flash separator) controlled by an enclosed combustion or a vapor recovery device
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\* § = a section of text in 40 CFR.

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

a. None.

b) **Applicable Emissions Limitations and/or Control Requirements**

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	Emissions of Volatile Organic Compounds (VOC) shall not exceed 0.84 lb/hr and 3.68 tons/year.  See b)(2)a.
b.	OAC rule 3745-31-05(E)	See b)(2)b.
c.	40 CFR 63.771(c)	The emissions from the glycol dehydration unit shall be vented through a closed-vent system, designed and operated with no detectable emissions, to a control device meeting the requirements of §63.771(d).
d.	OAC rule 3745-17-07(A)(1)(a)	The emission limitation specified by this rule is less stringent than the emission limitation established pursuant to §63.771(c) for a closed-vent system.
e.	40 CFR 63.760(b)(2); and 40 CFR 63.764(d)(1)	A triethylene glycol (TEG) dehydration unit is an affected source subject to Part 63, Subpart HH for oil and natural gas production facilities.
f.	40 CFR 63.764(e)	Exemptions from control requirements.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
g.	40 CFR 63.760(b)(2)	A dehydration unit is not an affected area source subject to Part 63 Subpart HH if it is not using triethylene glycol
h.	ORC 3704.03(F)(4)	Units subject to Part 63, Subpart HH are exempt from this requirement. See g)(1) – (3)

(2) Additional Terms and Conditions

- a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC paragraph 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to ORC changes effective August 3, 2006 (S.B. 265 changes), such that BAT is no longer required by State regulation for NAAQS pollutant less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revision to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of 3745-31-05, then these emission limits/control measures no longer apply.
- b. These rule paragraphs apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.
  - i. This permit takes into account the following voluntary restrictions (including the use of any applicable air pollution control equipment) as proposed by the permittee for the purposes of avoiding BAT requirements under OAC rule 3745-31-05(A)(3) for VOC emissions.
    - (a) Use of closed-vent system flash tank (100 percent) and still vent control of 95 percent, such that emissions do not exceed 9.9 tons/year.
- c. The estimated emissions of hazardous air pollutants (HAP), calculated from the designed maximum natural gas and hydrocarbon liquid throughput to the glycol dehydration units and losses from the storage vessels with the potential for flash emissions, demonstrate this facility to be an "area source" of HAP.

[40 CFR 760(a)] and [40 CFR 761]

c) Operational Restrictions

	Applicable Rule	Requirement
1.	40 CFR 63.764(d)(1)(i)	A TEG dehydration unit must be equipped with a control device that meets the requirements of §63.765 and §63.771(d).

2.	40 CFR 63.771(c) and (d)(1)(iii); and  40 CFR 63.765	Emissions from a TEG dehydration unit must be vented through a closed-vent system to the control device; the collection system and control device must be designed and operated with no detectable emissions and operated at all times the TEG dehydration unit is in operation.
3.	40 CFR 63.771(c)	Emissions from the glycol dehydration unit shall be vented through a closed-vent system to a control device meeting the requirements of §63.771.
4.	40 CFR 63.771(c)(3); and  40 CFR 63.773(c)(2)(iv)	Each bypass device to the closed-vent system must be installed with a flow indicator which takes a reading once every 15 minutes and is installed with an alarm (for any bypass); or must install a car-seal or lock-and-key mechanism on the bypass device to maintain the bypass valve in a closed position.
5.	40 CFR 63.771(d)(1)(iii) or  ORC 3704.03(T)	A flare, used to demonstrate compliance, must be designed and operated in accordance with §63.11(b), except the net heating value of the gas shall instead be computed from the equation found in §60.485(g)(4).

d) Monitoring and/or Recordkeeping Requirements

#1	Applicable Rule	Requirement
1.	40 CFR 63.760(a)(1)(ii)	Must maintain records of the annual facility natural gas or hydrocarbon liquid throughput for each year.
2.	40 CFR 63.773(c)(2)(i) or (ii)	Requirements for a closed-vent system include initial and annual inspections to demonstrate that there are no detectable emissions (Method 21). Maintain the records of each test.
3.	40 CFR 63.773(d)(3)(i)(C) and 40 CFR 63.774(e)(3); or ORC 3704.03(T)	Where the control device is a flare, it must be equipped with a continuous recorder for the thermocouple or a heat sensing monitoring device for the pilot flame. A record must be maintained of all periods of time when the pilot flame is out when process gas is being vented to it.
4.	40 CFR 63.773(c)(2)(iv) and  40 CFR 63.773(d)(6)(v)	For each bypass device to the closed-vent system, must maintain a record of the flow indicator readings and/or the record of the monthly inspection of the car-seal or lock-and-key mechanism on the bypass device; and a record of each detected bypass.
5.	40 CFR 63.774(c) or (d)	If using the exemption in §63.764(e), must maintain the records for the actual annual average flowrate of natural gas to the glycol dehydration unit or the actual average emissions of benzene from the glycol dehydration unit process vent in accordance with 63.772(b)
6.	40 CFR 63.772(b)(1)  For 40 CFR 63.764(e)(1)	Must install and operate a monitoring instrument to directly measure and record the natural gas flow rate to the glycol dehydration unit



7.	40 CFR 63.774(f) and 40 CFR 63.764(d)(2)	If complying with the optimal glycol circulation rate, must keep a record of the calculation used to determine the optimum glycol circulation rate
8.	40 CFR 63.772(f) and (g) and 40 CFR 63.773(d)	If using and enclosed combustion or vapor recovery device to demonstrate compliance, must establish maximum or minimum monitoring parameter values in accordance with these paragraphs and maintain these records

e) Reporting Requirements.

(1) Reporting Requirements (#1) for units:

#1	Applicable Rule	Requirement
1.	40 CFR 63.775(c) and 40 CFR 63.9(b)	Must submit Initial notification to regulating authority and to U.S. EPA's Office of Air Quality Planning and Standards (may be submitted in permit application), to include the information required by these paragraphs.
2.	40 CFR 63.775(c)(8)	Or exempt from initial reporting requirements for area sources.
3.	40 CFR 63.775(e)(2) and (3); 40 CFR 63.775(d)(3)(i)(C) 40 CFR 63.773(d)(6)(v); and 40 CFR 63.10(e)(3)	Must submit periodic reports annually, by 1/31 following end of year, to include excursions from the requirements for a closed-vent system, bypass devices, loss of flame (flare), and/or the established operating parameter(s) established to demonstrate continuous compliance.
4.	40 CFR 63.775(d)	Notification of Compliance Report must be submitted within 180 of startup, to include the information identified in this paragraph.
5.	OAC 3745-21-10(A)(3) and (4)  For OAC 3745-21-10(F) test Method 21	Notice of Intent to Test must be submitted to the district office or local air agency and test results submitted within 30 days after the test date, as it pertains to the annual test for no detectable emissions for the closed-vent systems.
6.	40 CFR 63.775(f)	Notification of a process change, from information submitted in the Notification of Compliance Status Report, must be submitted within 180 days following the change.

(2) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

f) Testing Requirements

Compliance with the emission limitations specified in b)(1) of these terms and conditions shall be determined in accordance with the following methods:

(1) Testing Requirements (#1) for units:

#1	Applicable Rule	Requirement
1.	40 CFR 63.772(c) or ORC 3704.03(T)	No detectable emissions from the closed-vent system shall be demonstrated using Method 21.
2.	40 CFR 63.772(e)(2); 40 CFR 60.485(g)(4); and 40 CFR 63.11(b) or 40 CFR 60.18(c) through (f) or ORC 3704.03(T)	Must determine heat content, flowrate, and exit velocity of a flare, used to demonstrate compliance.

(2) Emissions Limitation:

Emissions of VOC shall not exceed 0.84 lb/hr and 3.68 tons/year.

Applicable Compliance Method:

VOC emissions are based on the GRI-GLY Calc™ model and procedures documented in the Gas Research Institute (GRI) report entitled "Atmospheric Rich/Lean Method for Determining Glycol Dehydrator Emissions and gas analysis. Potential VOC emissions are based on the maximum glycol circulation rate (gpm) for the largest glycol circulation pump on the dehydration unit, a representative extended gas analysis of the inlet wet gas, and the natural gas flowrate as determined by §63.772(b)(1)(i) times 110%. Alternatively Method 18 of 40 CFR Part 60 Appendix A; or ASTM D6420-99, Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry, with the provisions of 63.772(b)(1)(ii) may be used.

The gas stream from the glycol dehydration unit process vent, i.e., from the reboiler vent and the vent from the gas-condensate-glycol separator (flash tank), shall be routed through a closed-vent system to control device that meets the requirements of §63.771(d).

[40 CFR 63.772(b)] and [40 CFR 63.771(c) and (d)], or [ORC 3704.03(T)]

(3) The detection of leaks of VOC from the closed-vent systems and equipment designated for "no detectable emissions" shall be demonstrated as follows, initially upon startup and annually thereafter:

- a. The detection of leaks shall be determined in accordance with the test procedure set forth in U.S. EPA Method 21.
- b. The following calibration gases shall be used:
  - i. zero air, which consists of less than 10 ppmv of hydrocarbon in air; and

- ii. a mixture of air and methane or n-hexane at a concentration of approximately, but less than, 10,000 ppmv of methane or n-hexane.
- c. The leak detection instrument shall be calibrated before each use and shall meet the performance criteria of Method 21.

The closed-vent system shall be considered to have no detectable emissions if the instrument reading is less than 500 ppmv above background.

[40 CFR 63.772(c)] or [ORC 3704.03(T)]

- (4) For any control device other than a flare and the exempted control devices/scenarios in §63.772(e)(1), the permittee shall demonstrate that the control device achieves the 95% control (or 20 ppmv concentration) through: 1. the performance test methods identified in §63.772(3), 2. through a design analysis meeting the requirements of §63.772(e)(4), or 3. through calculating the mass rate of TOC (minus methane and ethane) or total HAP using the model GRI-GLYCalc™ in accordance with §63.772(e)(3)(iii)(B)(4).

[40 CFR 63.772(e)]

- (5) If demonstrating compliance through a performance test the following methods shall be used:
  - a. Method 1 or 1A from Part 60 Appendix A, as appropriate, shall be used for determining the sampling sites. For demonstration of compliance with the 95% control requirement, sampling sites will be locate at the inlet and outlet of the control devise.
  - b. Method 2, 2A, 2C, or 2D from Part 60 Appendix A, as appropriate, shall be used for determining the gas volumetric flow rate.
  - c. Method 18 from Part 60 Appendix A, Method 25 A from Part 60 Appendix A, or ASTM D6420-99 shall be used to determine compliance with the percent reduction requirement.

The sample gas collection and performance test shall be conducted in accordance with §63.772(e)(3). These methods shall also be used in the GRI-GLYCalc™ model identified above.

[40 CFR 63.772(e)(3)]

(6) Emission Limitation

There shall be no visible emissions from a flare, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

Applicable Compliance Method

Compliance with the visible emissions limitation shall be determined in accordance with U.S. EPA Method 22 in Appendix A of 40 CFR Part 60.

[40 CFR 60.18(c)(1)] or [40 CFR 63.11(b)(4)] or [40 CFR 63.772(e)(2)] and [40 CFR 63.774(e)(2)]

g) Miscellaneous Requirements

None

**2. Emissions Units: Spark Ignition Internal Combustion Engines, P002**

**Operations, Property and/or Equipment Description:**

P002	Stationary natural gas, spark ignition (SI), internal combustion engines (ICE); 1,555 total horsepower (HP) from the summation of all natural gas engines located at the facility
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- a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
- (1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.
- (a) None.
- (2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.
- (a) None.
- b) Applicable Emissions Limitations and/or Control Requirements
- (1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	40 CFR Part 60, Subpart JJJJ In accordance with 40 CFR 60.4230, the engines in this emissions group are subject to the New Source Performance Standards (NSPS) for Stationary Spark Ignition (SI) Internal Combustion Engines (ICE). 40 CFR 60.4233(e) 40 CFR 60.4231(e)-mfg. Table 1 to Part 60, Subpart JJJJ	The exhaust emissions shall not exceed the applicable NSPS grams per horsepower-hour (g/hp-hr) standards, for NOx, CO, and VOC, of Table 1 to Part 60, Subpart JJJJ. The natural gas engine emission limits are based on the worst-case limits from Table 1: 2.0 grams of nitrogen oxides per horsepower hour (2.0 g NOx/HP-hr) or 160 ppmvd at 15% O <sub>2</sub> ; 4.0 grams of carbon monoxide per horsepower hour (4.0 g CO/HP-hr) or 540 ppmvd at 15% O <sub>2</sub> ; and 1.0 grams of volatile organic compounds per horsepower hour (1.0 g VOC/HP-hr) or 86 ppmvd at 15% O <sub>2</sub> . See b)(2)c. and d.

b.	OAC rule 3745-17-11(B)(5)(a)	The limit specified by this rule is less stringent than the limit established based on AP-42 emission factors for PM <sub>10</sub> and condensable PM.
c.	OAC rule 3745-18-04(F)(4)	The SO <sub>2</sub> emission rate from natural gas can be considered to be equal to 0.0 lb/MMBtu, however the AP-42 emission factor has been used to establish an estimate of annual SO <sub>2</sub> emissions.
d.	OAC rule 3745-17-07(A)(1)	Visible particulate emissions from the exhaust stack serving this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.
e.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	<p>Emissions from all SI ICE combined shall not exceed:</p> <p>0.23 lb particulate emissions, PM<sub>10</sub>/PM<sub>2.5</sub> (PE) per hour and 1.0 ton PE/year;</p> <p>6.8 lbs nitrogen oxides (NOx) per hour and 30.0 tons NOx/year;</p> <p>14.0 lbs carbon monoxide (CO) per hour and 60.0 tons CO/year;</p> <p>3.4 lbs volatile organic compounds (VOC) per hour and 15.0 tons VOC/year; and</p> <p>0.0064 lb sulfur dioxide (SO<sub>2</sub>) per hour and 0.028 ton SO<sub>2</sub>/year.</p> <p>See b)(2)a.</p>
f.	OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)b.
g.	40 CFR Part 63 Subpart ZZZZ 40 CFR 63.6590(c)(1)	All SI ICE shall meet all applicable NESHAP requirements of 40 CFR Part 63 ZZZZ, the national emission standards for hazardous air pollutants for stationary reciprocating internal combustion engines. For new or reconstructed SI ICE rated 500 HP or less and operated at an area source, compliance with Part 63 Subpart ZZZZ is demonstrated by complying with Part 60 Subpart JJJJ.
h.	40 CFR Part 60 Subpart JJJJ 40 CFR 60.4233	All SI ICE shall meet all applicable NSPS requirements where the model year is subject to these standards.

(2) Additional Terms and Conditions

a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC rule 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to the Ohio Revised Code (ORC) changes effective August 3, 2006 (Senate Bill 265 changes), such that BAT is no longer required by State regulations for National Ambient Air Quality Standard (NAAQS) pollutant(s) less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 these emission limitations/control measures no longer apply.

b. These rules apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.

The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the PE, NO<sub>x</sub>, CO, VOC, and SO<sub>2</sub> emissions from this air contaminant source since the uncontrolled potential to emit for PE, NO<sub>x</sub>, CO, VOC, and SO<sub>2</sub> are less than ten tons per year.

c. The stationary spark ignition (SI) internal combustion engines (ICE) are subject to and shall be operated in compliance with the requirements of 40 CFR Part 60, Subpart JJJJ, the standards of performance for stationary SI ICE.

[40 CFR 60.4230(a)]

d. The owner/operator of all SI ICE shall limit emissions to standards as stringent as those identified in §60.4233(e) and found in Table 1 of Part 60, Subpart JJJJ.

[40 CFR 60.4233(e)] and [40 CFR 60.4231(e)]

c) **Operational Restrictions**

(1) The stationary SI ICE shall be installed, operated, and maintained according to the manufacturer's specifications, written instructions, and procedures over the entire life of the engines. The permittee shall operate and maintain the stationary SI ICE to achieve the emission standards identified in §60.4233(e) and found in Table 1 of NSPS Subpart JJJJ over the entire life of the engines. The air-to-fuel ratio controllers shall be set by the operator according to the manufacturer's operations manual, to ensure proper operation of the engines and their control device (catalytic converter) and to minimize emissions.

[40 CFR 60.4234], [40 CFR 60.4243(b)(1)], and [40 CFR 60.4243(g)]

d) **Monitoring and/or Recordkeeping Requirements**

(1) For an engine certified by the manufacturer, the permittee shall maintain the manufacturer's certification on site or at a central location for all facility ICE and it shall be made available for review upon request. If the manufacturer's certification is not kept on site, the permittee shall maintain a log for the location of each ICE and it shall identify

the agency-assigned emissions unit number, the manufacturer's identification number, and the identification number of the certificate. The manufacturer's operations manual shall be maintained at the same location as the ICE.

[40 CFR 60.4243(b)(1)]

- (2) The permittee shall maintain the following records and make them available upon request:
- a. all notifications submitted to comply with and all documentation supporting compliance with Part 60 Subpart JJJJ;
  - b. all notifications submitted to comply with and all documentation supporting compliance with Part 60 Subpart ZZZZ;
  - c. records of all maintenance conducted on the engines;
  - d. the certification from the manufacturer, documenting that the engines are certified to meet the emission standards identified in §60.4231(e); and
  - e. the information identified in 40 CFR Parts 90, 1048, 1054, and/or 1060 that is required to be provided by the manufacturer to the operator/owner, as applicable to the model year and horsepower of the engines.

[40 CFR 60.4245(a)]

e) Reporting Requirements.

- (1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the Director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve months for each air contaminant source identified in this permit.

[OAC 3745-15-03(B)(2) and (D)]

f) Testing Requirements

- (1) The summation of engine power from all the natural gas engines installed at the facility shall not exceed 1,555 HP. If any natural gas engine was purchased without an EPA certificate of conformity, such engines shall need to meet the performance testing requirements of §60.4243(b)(2), i.e., must conduct an initial performance test for all such engines and subsequent performance tests for engines greater than 500 horsepower (every 8,760 hours or 3 years whichever comes first).

[60.4243(b)(1) and (2)]

- (2) Compliance with the emission limitations in b)(1) of these terms and conditions shall be determined in accordance with the following methods:

a. Opacity Limitation:



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Visible particulate emissions from the exhaust stack serving this emissions unit shall not exceed 20% opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method:

If required, compliance shall be determined through visible emission observations performed in accordance with U.S. EPA Reference Method 9 in 40 CFR, Part 60, Appendix A.

b. Emission Limitations:

0.23 lb PE/hr

1.0 ton PE/year

Applicable Compliance Method:

The maximum PE emissions limit shall be established based on using the AP-42 emission factor of 0.01941 lb PM/MMBtu from Chapter 3.2 for Natural Gas-fired Reciprocating Engines, Table 3.2-3, "Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines". The limitation includes both filterable and condensable PM.

Compliance with the PE emissions limitation shall be determined by the following calculation:

$$0.01941 \text{ lb PE/MMBtu} \times 11.7 \text{ MMBtu/hr} = 0.23 \text{ lb PE/hr}$$

$$0.23 \text{ lb PE/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 1.0 \text{ ton/year}$$

If required, the permittee shall demonstrate compliance with the emission limitations through exhaust emission tests performed in accordance with 40 CFR Part 60, Appendix A, Methods 1 through 5, including condensables.

c. Emission Limitations:

2.0 grams NO<sub>x</sub> /HP-hr or 160 ppmvd at 15% O<sub>2</sub>

6.8 lbs NO<sub>x</sub>/hr

30.0 tons NO<sub>x</sub>/year

Applicable Compliance Method:

The emission limitations are based on the exhaust emissions standards identified in §60.4231(e) and by maintaining the engines according to the manufacturer's specifications. The g/HP-hr limit is the worst case emission limitation from Table 1 to Part 60 Subpart JJJJ; the pound per hour limit was established based on the summation of the combination of NSPS SI engines that would provide the highest engine power in operation during any one hour period of time; and the ton per year is the hourly limit times 8760 hours per year.

Compliance with the ton per year NO<sub>x</sub> emissions limitation shall be determined by the following calculation:

$$2.0 \text{ g NO}_x/\text{HP-hr} \times 1,555 \text{ HP} \times 1\text{lb}/454 \text{ g} = 6.85 \text{ lbs NO}_x/\text{hr}$$

$$6.85 \text{ lbs NO}_x/\text{hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 30.0 \text{ tons NO}_x/\text{year}$$

If required, the permittee shall demonstrate compliance with the NO<sub>x</sub> limitation according the requirements of §60.4244, using the applicable test methods in Table 2 to Part 60 Subpart JJJJ.

[40 CFR 60.4233(e)], [40 CFR 60.4244], and [Table 1 to Part 60 Subpart JJJJ]

d. Emission Limitations:

4.0 grams CO/HP-hr or 540 ppmvd at 15% O<sub>2</sub>

14.0 lbs CO/hr

60.0 tons CO/year

Applicable Compliance Method:

The emission limitations are based on the exhaust emissions standards identified in §60.4231(e) and by maintaining the engines according to the manufacturer's specifications. The g/HP-hr limit is the worst case emission limitation from Table 1 to Part 60 Subpart JJJJ; the pound per hour limit was established based on the summation of the combination of NSPS SI engines that would provide the highest engine power in operation during any one hour period of time; and the ton per year is the hourly limit times 8760 hours per year.

Compliance with the ton per year CO emissions limitation shall be determined by the following calculation:

$$4.0 \text{ g CO}/\text{HP-hr} \times 1,555 \text{ HP} \times 1\text{lb}/454 \text{ g} = 13.7 \text{ lbs CO}/\text{hr}$$

$$13.7 \text{ lbs CO}/\text{hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 60.0 \text{ tons CO}/\text{year}$$

If required, the permittee shall demonstrate compliance with the CO limitation according the requirements of §60.4244, using the applicable test methods in Table 2 to Part 60 Subpart JJJJ.

[40 CFR 60.4233(e)], [40 CFR 60.4244], and [Table 1 to Part 60 Subpart JJJJ]

e. Emission Limitations:

1.0 gram VOC/HP-hr or 86 ppmvd at 15% O<sub>2</sub>

3.4 lbs VOC/hr

15.0 tons VOC/year

Applicable Compliance Method:

The emission limitations are based on the exhaust emissions standards identified in §60.4231(e) and by maintaining the engines according to the manufacturer's specifications. The g/HP-hr limit is the worst case emission limitation from Table 1 to Part 60 Subpart JJJJ; the pound per hour limit was established based on the summation of the combination of NSPS SI engines that would provide the highest engine power in operation during any one hour period of time; and the ton per year is the hourly limit times 8760 hours per year.

Compliance with the ton per year VOC emissions limitation shall be determined by the following calculation:

$$1.0 \text{ g VOC/HP-hr} \times 1,555 \text{ HP} \times 1\text{lb}/454 \text{ g} = 3.425 \text{ lbs VOC/hr}$$

$$3.425 \text{ lbs VOC/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 15.0 \text{ tons VOC/year}$$

If required, the permittee shall demonstrate compliance with the VOC limitation according the requirements of §60.4244, using the applicable test methods in Table 2 to Part 60 Subpart JJJJ.

[40 CFR 60.4233(e)], [40 CFR 60.4244], and [Table 1 to Part 60 Subpart JJJJ]

f. Emission Limitations:

0.0068 lb SO<sub>2</sub>/hr

0.03 tons of SO<sub>2</sub>/year

Applicable Compliance Method:

The SO<sub>2</sub> emissions limit is based on using the AP-42 emission factor of 0.000588 lb SO<sub>2</sub>/MMBtu from Chapter 3.2 for Natural Gas-fired Reciprocating Engines, Table 3.2-1 through 3, "Uncontrolled Emission Factors for all natural gas Engines".

Compliance with the ton per year SO<sub>2</sub> emissions limitation shall be determined by the following calculation:

$$0.000588 \text{ lb SO}_2/\text{MMBtu} \times 11.7 \text{ MMBtu/hr} = 0.0068 \text{ lb SO}_2/\text{hr}$$

$$0.0068 \text{ lb SO}_2/\text{hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 0.03 \text{ tons/year}$$

g) Miscellaneous Requirements

(1) None.

**3. Emissions Units: Compression Ignition Engines, P003**

**Operations, Property and/or Equipment Description:**

P003	2007 to 2010 model year stationary compression ignition (diesel) (CI), internal combustion engines (ICE); 250 total horsepower (HP) from the summation of all non exempt diesel engines located at the facility
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2007 to 2010 model year, stationary compression ignition (CI) internal combustion engine (ICE); and greater than or equal to 175 HP and less than or equal to 750 HP; certified to 40 CFR 89.112 Tier 3 exhaust emission standards in Table 1

- a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
  - (1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.
    - (a) None.
  - (2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.
    - (a) None
- b) Applicable Emissions Limitations and/or Control Requirements
  - (2) The specific operations(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	40 CFR Part 60, Subpart IIII 40 CFR 60.4204(b) 40 CFR 60.4201(a) Table 1 to 40 CFR 89.112, Tier 3	The exhaust emissions from this engine shall not exceed:  0.20 gram PM/kW-hr 4.0 grams NOx + NMHC/kW-hr 3.5 grams CO/kW-hr See terms b)(2)(a through c)
b.	40 CFR 60.4207(b) 40 CFR 80.510(b)	The sulfur content of the diesel fuel burned in this engine shall not exceed 15 ppm or

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Natural Gas Extraction Well Site, 7/29/11 DRAFT GP

		0.0015% sulfur by weight. See terms b)(2)c, c(2), d(1), and e(2).
c.	40 CFR 89.113 (certified by manufacturer)	20% opacity during the acceleration mode 15% opacity during the lugging mode 50% opacity during the peaks in either the acceleration or lugging modes
d.	OAC rule 3745-17-07(A)(1)	Visible particulate emissions from the exhaust stack serving this engine shall not exceed twenty (20) percent opacity, as a six-minute average, except as specified by rule.
e.	ORC 3704.03(T)	Emissions from all CI ICE combined shall not exceed: 0.082 lb particulate emissions, PM <sub>10</sub> /PM <sub>2.5</sub> (PE) per hour and 0.36 ton PE/year; 1.23 lbs nitrogen oxides (NOx) per hour and 5.40 tons NOx/year; 1.44 lbs carbon monoxide (CO) per hour and 6.30 tons CO/year; 0.41 lb volatile organic compounds (VOC) per hour and 1.80 tons VOC/year; and 0.003 lb sulfur dioxide (SO <sub>2</sub> ) per hour and 0.013 ton SO <sub>2</sub> /year. See b)(2)a.
f.	OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)b.
g.	OAC rule 3745-17-11(B)(5)	The emission limitation specified by this rule is less stringent than the emission limitation established for PE pursuant to 40 CFR Part 60, Subpart IIII.
h.	40 CFR 63 Subpart ZZZZ 40 CFR 63.6590(c)	All CI ICE shall meet all applicable NESHAP requirements of 40 CFR Part 63 ZZZZ, the national emission standards for hazardous air pollutants for stationary reciprocating internal combustion engines. For new or reconstructed CI ICE rated 500 HP or less and operated at an area source, compliance with Part 63 Subpart ZZZZ is demonstrated by complying with Part 60 Subpart IIII.

i.	40 CFR Part 60 Subpart IIII 40 CFR 60.4202	All CI ICE shall meet all applicable NSPS requirements where the model year is subject to these standards.
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(3) Additional Terms and Conditions

- a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC rule 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to the Ohio Revised Code (ORC) changes effective August 3, 2006 (Senate Bill 265 changes), such that BAT is no longer required by State regulations for National Ambient Air Quality Standard (NAAQS) pollutant(s) less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 these emission limitations/control measures no longer apply.
- b. These rules apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.  
  
 The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the PE, NO<sub>x</sub>, CO, VOC, and SO<sub>2</sub> emissions from this air contaminant source since the uncontrolled potential to emit for PE, NO<sub>x</sub>, CO, VOC, and SO<sub>2</sub> are less than ten tons per year.
- c. The stationary compression ignition (CI) internal combustion engine (ICE) is subject to and shall be operated in compliance with the requirements of 40 CFR Part 60, Subpart IIII, the standards of performance for stationary CI ICE.  
  
 [40 CFR 60.4200(a)]
- d. The stationary CI ICE has been or shall be purchased certified by the manufacturer, to emission standards as stringent as those identified in §60.4201(a) and found in Tier 3 of §89.112, Table 1, for engines greater than or equal to 175 horsepower (130 kilowatt) and less than or equal to 750 horsepower (560 kilowatt), and to the opacity standards found in §89.113.  
  
 [40 CFR 60.4204(b)], [40 CFR 60.4201(a)], [40 CFR 60.4203], and [40 CFR 60.4211(c)]
- e. The quality of the diesel fuel burned in this engine shall meet the following specifications on an "as received" basis:
  - i. a sulfur content which is sufficient to comply with the allowable sulfur dioxide emission limitation of 0.0015 pound sulfur dioxide/MMBtu actual heat input; and 15 ppm sulfur or 0.0015% sulfur by weight;

- ii. a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent; and
- iii. a heating value greater than 135,000 Btu/gallon.

Compliance with the above-mentioned specifications shall be determined by using the analytical results provided by the permittee or oil supplier for each shipment of oil.

[40 CFR 60.4207(b)] and [40 CFR 80.510(b)]

c) Operational Restrictions

- (1) The stationary CI ICE shall be installed, operated, and maintained according to the manufacturer's specifications, written instructions, and procedures, and/or according to procedures developed by the permittee that have been approved by the engine manufacturer in writing, over the entire life of the engine. The CI ICE must also be installed and operated to meet the applicable requirements from 40 CFR Part 89, Control of Emissions from New and In-use Non-road CI ICE and Part 1068, the General Compliance Provisions for Engine Programs. The permittee shall operate and maintain the stationary CI ICE to achieve the Tier 3 emission standards in Table 1 to §89.112, as required per §60.4204.

[40 CFR 60.4206] and [40 CFR 60.4211(a)]

- (2) Diesel fuel burned in the CI, ICE shall not exceed the limit for sulfur as specified by §80.510(b), i.e., the maximum sulfur content of diesel fuel shall not exceed 15 ppm or 0.0015% sulfur by weight.

[40 CFR 60.4207(b)] and [40 CFR 80.510(b)]

- (3) If the stationary CI internal combustion engine is equipped with a diesel particulate filter to comply with the emission standards in §60.4204, the diesel particulate filter must be installed with a backpressure monitor that notifies the permittee when the high backpressure limit of the engine is approached.

[40 CFR 60.4209(b)]

d) Monitoring and/or Recordkeeping Requirements

- (4) For each shipment of oil received for burning in this engine, the permittee shall maintain records of the total quantity of the diesel oil received and the oil supplier's (or permittee's) analyses for sulfur content, in parts per million (§80.510) or percent by weight. The permittee shall perform or require the supplier to perform the analyses for sulfur content and heat content in accordance with §80.580, using the appropriate ASTM methods. These records shall be retained for a minimum of 5 years and shall be available for inspection by the Director or his/her representative.

[for 40 CFR 60.4207(b)]

- (5) The permittee shall maintain the manufacturer's certification, to the applicable Tier 3 emission standards in Table 1 of §89.112, on site or at a central location for all facility ICE and it shall be made available for review upon request. If the manufacturer's

certification is not kept on site, the permittee shall maintain a log for the location of each ICE and it shall identify the agency-assigned emissions unit number, the manufacturer's identification number, and the identification number of the certificate. The manufacturer's operations manual and any written instructions or procedures developed by the permittee and approved by the manufacturer shall be maintained at the same location as the ICE.

[40 CFR 60.4211(c)]

- (6) The permittee shall maintain a record of the diesel fuel burned in this ICE during each calendar year. The fuel oil usage can be calculated at the end of each year using the best method available to estimate the annual throughput which might include, but shall not be limited to: any flow meter installed on the engine, records of the volume of diesel fuel oil received with each delivery, the fuel oil levels recorded from the diesel storage tank, and/or the recorded or estimated hours of operation along with the manufacturer's documentation of the fuel flow rate.
- (7) If the stationary CI internal combustion engine is equipped with a diesel particulate filter to comply with the emission standards in §60.4204, the permittee shall keep records of the date, time, and any corrective action(s) taken in response to the notification from the backpressure monitor, that the high backpressure limit of the engine has been approached or exceeded.

[40 CFR 60.4214(c)]

e) Reporting Requirements.

- (8) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the Director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve months for each air contaminant source identified in this permit.

[OAC 3745-15-03(B)(2) and (D)]

- (9) The permittee shall identify in the annual permit evaluation report any period of time (date and number of hours) that the quality of oil burned in this engine did not meet the requirements established in §80.510(b), based upon the required fuel records; and the amount of non-compliant fuel burned on each such occasion.

For [40 CFR 60.4207(b)] and [40 CFR 80.510(b)]

- (10) If the stationary CI internal combustion engine is equipped with a diesel particulate filter to comply with the emission standards in §60.4204, the permittee shall include in the PER any records of the date, time, and any corrective action(s) taken in response to the notification from the monitor that the backpressure has been approached or exceeded.

[for 40 CFR 60.4214(c)]

f) Testing Requirements



(11) Compliance with the emission limitations in b)(1) of these terms and conditions shall be determined in accordance with the following methods:

a. Opacity Limitation:

20% opacity during the acceleration mode

15% opacity during the lugging mode

50% opacity during the peaks in either the acceleration or lugging modes

Applicable Compliance Method:

The ICE shall be purchased certified to the opacity standards of §89.113.

[40 CFR 60.4204(b)], [40 CFR 60.4201(a)], and [40 CFR 89.113]

b. Opacity Limitation:

Visible particulate emissions from the exhaust stack serving this engine shall not exceed 20 %opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method:

If required, compliance shall be determined through visible emission observations performed in accordance with U.S. EPA Reference Method 9 in 40 CFR, Part 60, Appendix A.

[OAC rule 3745-17-07(A)(1)]

c. Emission Limitations:

0.20 gram PM/kW-hr

0.082 lb/hr

0.36 tons PE/year

Applicable Compliance Method:

Compliance with the emission limitations shall be based on the manufacturer's certification and by maintaining the engine according to the manufacturer's specifications. The g/kW-hr limit is the emission limitation from Table 1 of §89.112, the Tier 3 exhaust emission standards for diesel engines between 175 and 750 horsepower (130 and 560 kilowatts).

Compliance with the ton per year PE emissions limitation shall be determined by the following calculation:

$0.20 \text{ g PM/kw-hr} \times \text{kw}/1.341 \text{ HP} \times 1 \text{ lb}/454\text{g} \times 250 \text{ HP} = 0.082 \text{ lb PM/hr}$

$0.082 \text{ lbs PM/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 0.36 \text{ tons PM/year}$

If required, the permittee shall demonstrate compliance with the emission limitations through performance tests conducted in accordance with the provisions in term f)(1)i below.

[40 CFR 60.4204(b)], [40 CFR 60.4201(a)], [40 CFR 60.4211(c)], and [40 CFR 60.4212(a) and (c)]

d. Emission Limitations:

4.0 grams NO<sub>x</sub> + NMHC/kW-hr

1.23 lb NO<sub>x</sub>/hr

5.40 tons NO<sub>x</sub>/year

Applicable Compliance Method:

Compliance with the emission limitations shall be based on the manufacturer's certification and by maintaining the engine according to the manufacturer's specifications. The g/kW-hr limit is the emission limitation from Table 1 of §89.112, the Tier 3 exhaust emission standards for diesel engines between 175 and 750 horsepower (130 and 560 kilowatts).

For the purpose of reporting emissions, where the limit is for NO<sub>x</sub> + NMHC, the NO<sub>x</sub> and VOC limits shall be calculated using a ratio of 74.6% NO<sub>x</sub> to 25.4% VOC.\*

$4.0 \text{ g NO}_x + \text{NMHC/kW-hr} \times 74.6\% \text{ NO}_x^* = 3.0 \text{ grams NO}_x/\text{kW-hr}$

Compliance with the ton per year NO<sub>x</sub> emissions limitation shall be determined by the following calculation:

$3.0 \text{ g NO}_x/\text{kW-hr} \times \text{kW}/1.341 \text{ HP} \times 1 \text{ lb}/454\text{g} \times 250 \text{ HP} = 1.23 \text{ lb NO}_x/\text{hr}$

$1.23 \text{ lbs NO}_x/\text{hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 5.40 \text{ tons NO}_x/\text{year}$

If required, the permittee shall demonstrate compliance with the emission limitations through performance tests conducted in accordance with the provisions in term f)(1)i below.

[40 CFR 60.4204(b)], [40 CFR 60.4201(a)], [40 CFR 60.4211(c)], and [40 CFR 60.4212(a) and (c)]

e. Emission Limitations:

3.5 grams CO/kW-hr

1.44 lb/hr

6.30 tons CO/year

Applicable Compliance Method:

Compliance with the emission limitations shall be based on the manufacturer's certification and by maintaining the engine according to the manufacturer's specifications. The g/kW-hr limit is the emission limitation from Table 1 of §89.112, the Tier 3 exhaust emission standards for diesel engines between 175 and 750 horsepower (130 and 560 kilowatts).

Compliance with the ton per year CO emissions limitation shall be determined by the following calculation:

$$3.5 \text{ g CO/kw-hr} \times \text{kw}/1.341 \text{ HP} \times 1 \text{ lb}/454\text{g} \times 250 \text{ HP} = 1.44 \text{ lb CO/hr}$$

$$1.44 \text{ lbs CO/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 6.30 \text{ tons CO/year}$$

If required, the permittee shall demonstrate compliance with the emission limitations through performance tests conducted in accordance with the provisions in term f)(1)i below.

[40 CFR 60.4204(b)], [40 CFR 60.4201(a)], [40 CFR 60.4211(c)] and [40 CFR 60.4212(a) and (c)]

f. Emission Limitations:

4.0 grams NO<sub>x</sub> + NMHC/kW-hr

0.41 lb VOC/hr

1.80 tons VOC/year

Applicable Compliance Method:

Compliance with the emission limitations shall be based on the manufacturer's certification and by maintaining the engine according to the manufacturer's specifications. The g/kW-hr limit is the emission limitation from Table 1 of §89.112, the Tier 3 exhaust emission standards for diesel engines between 175 and 750 horsepower (130 and 560 kilowatts).

For the purpose of reporting emissions, where the limit is for NO<sub>x</sub> + NMHC, the NO<sub>x</sub> and VOC limits shall be calculated using a ratio of 74.6% NO<sub>x</sub> to 25.4% VOC.\*

$$4.0 \text{ g NO}_x\text{+NMHC/kW-hr} \times 25.4\% \text{ NMHC}^* = 1.0 \text{ gram VOC/kW-hr}$$

Compliance with the ton per year VOC emissions limitation shall be determined by the following calculation:

$$1.0 \text{ g VOC/kw-hr} \times \text{kw}/1.341 \text{ HP} \times 1 \text{ lb}/454\text{g} \times 250 \text{ HP} = 0.41 \text{ lb VOC/hr}$$

$$0.41 \text{ lb VOC/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 1.80 \text{ tons VOC/year}$$

If required, the permittee shall demonstrate compliance with the emission limitations through performance tests conducted in accordance with the provisions in term f)(1)i below.

[40 CFR 60.4204(b)], [40 CFR 60.4201(a)], [40 CFR 60.4211(c)], and [40 CFR 60.4212(a) and (c)]

\*This ratio is based upon the linear relationship of NO<sub>x</sub> to NMHC from Table 1 of Subpart IIII, Table 1 from §89.112, to Tables 4, 5, and 6 from 40 CFR 1039.102.

g. Sulfur Content Limitations for Diesel Fuel:

Sulfur content 15 ppm or  $\leq$  0.0015% by weight sulfur

Applicable Compliance Method:

Compliance shall be demonstrated through the record keeping requirements for the sulfur content of each shipment of diesel oil received. If meeting the standards in §80.510(b), this calculates to approximately 0.0015 lb SO<sub>2</sub>/MMBtu.

[40 CFR 60.4207(b)] and [40 CFR 80.510(b)]

h. Emission Limitations:

0.013 tons of SO<sub>2</sub>/year

Applicable Compliance Method:

Compliance with the ton per year SO<sub>2</sub> emissions limitation shall be determined by the following calculation:

Where:

E = pound per hour emissions

HP = horse power of engine or the sum of the horse powers of a combination of engines fitting into the same model year and size category

S = % sulfur content of the fuel used. Since the sulfur content limit for the fuel is 0.0015%, use the value 0.0015 in the formula.

HP = horsepower of the engine or sum of the horse powers of the group of engines of the same range of model year and HP

TPY = tons per year SO<sub>2</sub> emissions

$$E = 250 \text{ HP} \times 1 \text{ gal}/18 \text{ HP-hr} \times 7.1 \text{ lbs/gal} \times 64 \text{ lb moles SO}_2/32 \text{ lb moles S} \times 0.0015\% \text{ S}$$

$$E = 0.003 \text{ lb SO}_2/\text{hr}$$

$$\text{TPY} = 0.003 \text{ lb SO}_2/\text{hr} \times 8760 \text{ hours/year} \times \text{ton}/2000 \text{ lbs} = 0.013 \text{ Ton SO}_2/\text{year}$$

The heating value of the diesel fuel may be adjusted to that provided by the supplier.

- i. If it is determined by the Ohio EPA that a compliance demonstration is required through performance testing, it shall be conducted using one of the following test methods or procedures:

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**Facility Name:** Ohio Shale Gas Well  
**Facility ID:** 0000000000  
**Natural Gas Extraction Well Site, 7/29/11 DRAFT GP**

- i. in accordance with §60.4212, conduct the exhaust emissions testing using the in-use testing procedures found in 40 CFR Part 1039, Subpart F, measuring the emissions of the regulated pollutants as specified in 40 CFR Part 1065; or
- ii. in accordance with §60.4213, conduct exhaust emissions testing using the test methods identified in Table 7 to Subpart IIII of Part 60.

If demonstrating compliance through the in-use testing procedures in 40 CFR Part 1039, Subpart F, exhaust emissions from the stationary CI ICE shall not exceed the "not to exceed" (NTE) numerical requirements, rounded to the same number of decimal places as the applicable standard in §89.112, determined from the following equation:

NTE requirement for each pollutant =  $1.25 \times \text{STD}$

Where:

STD = The standard specified for the pollutant in §89.112.

[40 CFR 60.4212(a) and (c)]

g) Miscellaneous Requirements

None

**4. Emissions Unit: Unpaved Roadways, F001**

**Operations, Property and/or Equipment Description:**

F001	Unpaved Roadways
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- a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
  - (1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.
    - (a) None.
  - (2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.
    - (a) None.
- b) Applicable Emissions Limitations and/or Control Requirements
  - (1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	Emissions of fugitive dust shall not exceed: 0.053 ton/year of fugitive particulate matter of 2.5 microns or less (PM <sub>2.5</sub> ); 0.53 ton/year of fugitive particulate matter of 10 microns or less (PM <sub>10</sub> ); 1.8 tons/year of fugitive particulate emissions (PE); and There shall be no visible emissions except for 3 minutes during any 60-minute period. Best available control measures that are sufficient to minimize or eliminate visible emissions of fugitive dust shall be used. See b)(2)a. through b)(2)f. See b)(2)g.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
b.	OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)h.
c.	OAC rule 3745-17-07(B)(5) (applicable only if this emissions unit is located in an area identified in Appendix A of OAC rule 3745-17-08)	<p>The emission limitation specified by this rule is less stringent than the emission limitation established pursuant to OAC rule 3745-31-05(A)(3).</p> <p>No visible PE from any unpaved roadway or parking area except for a period of time not to exceed thirteen minutes during any 60-minute observation period.</p>
d.	OAC rule 3745-17-08(B) (applicable only if this emissions unit is located in an area identified in Appendix A of OAC rule 3745-17-08)	See b)(2)a. through b)(2)f.

(2) Additional Terms and Conditions

- a. The permittee shall employ best available control measures on all unpaved roadways and parking areas for the purpose of ensuring compliance with the above-mentioned applicable requirements. In accordance with the permittee's application, the permittee has committed to treat the unpaved roadways and parking areas by application of chemical stabilization/dust suppressants and/or watering at sufficient treatment frequencies to ensure compliance. Nothing in this paragraph shall prohibit the permittee from employing other control measures to ensure compliance.
- b. The needed frequencies of implementation of the control measures shall be determined by the permittee's inspections pursuant to the monitoring section of this permit. Implementation of the control measures shall not be necessary for unpaved roadways and parking areas that are covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to ensure compliance with the above-mentioned applicable requirements. Implementation of any control measure may be suspended if unsafe or hazardous driving conditions would be created by its use.
- c. The permittee shall promptly remove, in such a manner as to minimize or prevent resuspension, earth and/or other material from paved streets onto which such material has been deposited by trucking or earth moving equipment or erosion by water or other means.
- d. Any unpaved roadway or parking area that is subsequently paved will require a General Permit for paved roadways and parking areas.

- e. Open-bodied vehicles transporting materials likely to become airborne shall have such materials covered at all times if the control measure is necessary for the materials being transported.
  - f. Implementation of the above-mentioned control measures in accordance with the terms and conditions of this permit is appropriate and sufficient to satisfy the best available technology requirements of OAC rule 3745-31-05.
  - g. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC rule 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to the Ohio Revised Code (ORC) changes effective August 3, 2006 (Senate Bill 265 changes), such that BAT is no longer required by State regulations for National Ambient Air Quality Standard (NAAQS) pollutant(s) less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 these emission limitations/control measures no longer apply.
  - h. These rules apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.
    - i. This PTIO takes into account the following voluntary restrictions (including the use of any applicable air pollution control equipment) as proposed by the permittee for the purposes of avoiding BAT requirements under OAC rule 3745-31-05(A)(3) for particulate emissions.
      - (a) Control measures identified in terms b)(2)a. through b)(2)f.
- c) Operational Restrictions
- (1) None.
- d) Monitoring and/or Recordkeeping Requirements
- (1) Except as otherwise provided in this section, the permittee shall perform inspections of each of the roadway segments and parking areas in accordance with the following frequencies:

<u>unpaved roadways and parking areas</u>	<u>minimum inspection frequency</u>
all roads and parking areas	daily

The purpose of the inspections is to determine the need for implementing the above-mentioned control measures. The inspections shall be performed during representative, normal traffic conditions. No inspection shall be necessary for a roadway or parking area that is covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to ensure compliance with the above-mentioned applicable requirements.



Any required inspection that is not performed due to any of the above-identified events shall be performed as soon as such event(s) has (have) ended, except if the next required inspection is within one week.

- (2) The permittee shall maintain records of the following information:
- a. the date and reason any required inspection was not performed, including those inspections that were not performed due to snow and/or ice cover or precipitation;
  - b. the date of each inspection where it was determined by the permittee that it was necessary to implement the control measures;
  - c. the dates the control measures were implemented; and
  - d. on a calendar quarter basis, the total number of days the control measures were implemented and the total number of days where snow and/or ice cover or precipitation were sufficient to not require the control measures.

The information required in Term d)(2)d. shall be updated on a calendar quarter basis within 30 days after the end of each calendar quarter.

e) Reporting Requirements

- (1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

[OAC 3745-15-03(B)(2) and (D)]

f) Testing Requirements

- (1) Compliance with the emission limitations in Term b)(1) shall be determined in accordance with the following methods:

a. Emission Limitations:

0.053 ton/year of fugitive PM<sub>2.5</sub>

0.53 ton/year of fugitive PM<sub>10</sub>

1.8 tons/year of fugitive PE

Applicable Compliance Method:

Compliance with fugitive PE and PM10 limitations shall be determined by using the emission factor equations in Section 13.2.2, in Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1 (revised 11/06) for unpaved roadways. Should further updates in AP-42 occur, the most current equations for unpaved roads shall be used. The ton per year emission limits are based on a

maximum of 10,000 vehicle miles traveled per year and a 95% control efficiency for PE, PM<sub>10</sub>, and PM<sub>2.5</sub>.

$$E = [k(s/12)^a(W/3)^b [(365-p)/365]]$$

Where:

E = size-specific emission factor (lbs PM<sub>10</sub>/VMT)

VMT= vehicle miles traveled per year

s = silt content of road surface material (%) = 10.0 %\*

W = mean vehicle weight (tons) = 25

p = 130 number of rain days per year

a = 0.9 for PM<sub>10</sub> and PM<sub>2.5</sub> (dimensionless constant)\*

a = 0.7 for PM (dimensionless constant)\*

b = 0.45 for PM, PM<sub>10</sub>, and PM<sub>2.5</sub> (dimensionless constant)\*

k = 0.15 lb/VMT for PM<sub>2.5</sub>\*

k = 1.5 lbs/VMT for PM<sub>10</sub> \*

k = 4.9 lbs/VMT for PM \*

Therefore:

$$E = 0.15 \text{ lb PM}_{2.5}/\text{VMT} \times (10/12)^{0.9} \times (25/3)^{0.45} \times (365-130/365)$$

$$E = 0.213 \text{ lb PM}_{2.5}/\text{VMT}$$

$$E = 1.5 \text{ lbs PM}_{10}/\text{VMT} \times (10/12)^{0.9} \times (25/3)^{0.45} \times (365-130/365)$$

$$E = 2.13 \text{ lbs PM}_{10}/\text{VMT}$$

$$E = 4.9 \text{ lbs PM}/\text{VMT} \times (10/12)^{0.7} \times (25/3)^{0.45} \times (365-130/365)$$

$$E = 7.22 \text{ lbs PM}/\text{VMT}$$

Maximum travel = 10,000 VMT/year

$$(10,000 \text{ VMT/yr})(0.213 \text{ lbs PM}_{10}/\text{VMT})(1 \text{ ton}/2000 \text{ lbs}) = 1.065 \text{ tons of PM}_{2.5} \text{ /year}$$

$$(10,000 \text{ VMT/yr})(2.13 \text{ lbs PM}_{10}/\text{VMT})(1 \text{ ton}/2000 \text{ lbs}) = 10.65 \text{ tons of PM}_{10} \text{ /year}$$

$$(10,000 \text{ VMT/yr})(7.22 \text{ lbs PM}/\text{VMT})(1 \text{ ton}/2000 \text{ lbs}) = 36.1 \text{ tons of PM/year}$$

Assuming 95% control for roadway watering:

$$(1.065 \text{ tons/year}) (0.05) = 0.053 \text{ ton of controlled PM}_{2.5}/\text{year}$$

$(10.65 \text{ tons/year}) (0.05) = 0.53 \text{ ton of controlled PM}_{10}/\text{year}$

$(36.1 \text{ tons/year}) (0.05) = 1.8 \text{ tons of controlled PM/year}^{**}$

\* AP-42 factors

\*\* PM = PE

b. Emission Limitation:

No visible PE from unpaved roadways and parking areas except for a period of time not to exceed 3 minutes during any 60-minute observation period.

No visible PE from any unpaved roadway or parking area except for a period of time not to exceed thirteen minutes during any 60-minute observation period.

Applicable Compliance Method:

If required, compliance with the visible PE limitation listed above shall be determined in accordance with Test Method 22 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources").

g) Miscellaneous Requirements

(1) None.

**5. Emissions Unit Group –Storage Tanks for water and/or petroleum liquids: T001 - T008**

EU ID	Operations, Property and/or Equipment Description
T001	Up to 16,800 gallon vertical fixed roof storage tank *
T002	Up to 16,800 gallon vertical fixed roof storage tank *
T003	Up to 16,800 gallon vertical fixed roof storage tank *
T004	Up to 16,800 gallon vertical fixed roof storage tank *
T005	Up to 16,800 gallon vertical fixed roof storage tank *
T006	Up to 16,800 gallon vertical fixed roof storage tank *
T007	Up to 16,800 gallon vertical fixed roof storage tank *
T008	Up to 16,800 gallon vertical fixed roof storage tank *
*	may be vented to common header or may incorporate vapor recovery and/or combustion control/flare

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions in this permit are federally enforceable, with the exception of those listed below, which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions in this permit are enforceable under state law only, with the exception of those listed below, which are federally enforceable.

a. None.

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	Total VOC emissions from all tanks shall not exceed 26.4 tons/year.  See b)(2)a. and b)(2)b.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
b.	OAC rule 3745-31-05(E) or OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)c.
c.	40 CFR Part 60 Subpart Kb	See b)(2)d.
d.	OAC Rule 3745-21-09(L)(2)(b)	See b)(2)e.

(2) Additional Terms and Conditions

- a. The Best Available Technology (BAT) requirements for this emission unit have been determined to be compliance with the terms and conditions of this permit.
- b. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC rule 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to ORC changes effective August 3, 2006 (S.B. 265 changes), such that BAT is no longer required by State regulations for NAAQS pollutant less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of 3745-31-05, then these emission limits/control measures no longer apply.
- c. These rule paragraphs apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.
  - i. This PTIO takes into account the following voluntary restrictions (including the use of any applicable air pollution control equipment) as proposed by the permittee for the purposes of avoiding BAT requirements under OAC rule 3745-31-05(A)(3) for VOC emissions.
    - (a) Use of vapor recovery and/or flare or equivalent control device, unless the uncontrolled potential to emit per tank is less than 9.9 tons/year and the total uncontrolled potential to emit for all tanks is less than 26.4 tons/year VOC.
- d. This emission unit is exempt from the control requirements of §60.110(b) because the tank size is less than 75 m<sup>3</sup>.
- e. The permittee shall not place, store, or hold in this fixed roof tank any petroleum liquid other than crude oil and condensate where there is no custody transfer, unless such tank is designed or equipped in accordance with the requirements of paragraph (L)(1) of OAC rule 3745-21-09 with an internal floating roof or equivalent control approved by the Director, prior to storing such petroleum liquids.

c) Operational Restrictions

- (1) Where the control device used is a flare, it shall be operated at all times when emissions are being vented to it.
- (2) A pilot flame shall be maintained at all times in the flare's pilot light burner or the flare shall be equipped with an auto ignition system.

d) Monitoring and/or Recordkeeping Requirements

- (1) The permittee shall record the annual throughput, in gallons per year. These records shall be maintained for at least 5 years and shall be made available to the Director or his representative upon verbal or written request.

e) Reporting Requirements

- (1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

f) Testing Requirements

- (1) Emission limitation:

Total VOC emissions from all tanks shall not exceed 26.4 tons/year.

Applicable Compliance Method:

Annual emissions shall be calculated using a current version of the U.S. EPA's TANKS software program.

g) Miscellaneous Requirements

- (1) None.

**6. Emissions Unit: Tank Truck Loading Rack, J001**

**Operations, Property and/or Equipment Description:**

J001	Truck Loading Rack for condensates
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- a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
  - (1) For the purpose of a permit-to-install document, the emissions unit terms and conditions in this permit are federally enforceable, with the exception of those listed below, which are enforceable under state law only.
    - a. None.
  - (2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions in this permit are enforceable under state law only, with the exception of those listed below, which are federally enforceable.
    - a. None.

b) **Applicable Emissions Limitations and/or Control Requirements**

- (1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	ORC 3704.03(T)	VOC emissions shall not exceed 24.9 tons/year.

(2) **Additional Terms and Conditions**

The annual VOC emissions limitation above represents the emissions units' potential to emit based on the maximum throughput. Therefore, no monitoring, record keeping, and/or reporting requirements, other than petroleum liquid throughput, are necessary to ensure compliance with this emission limitation.

c) **Operational Restrictions**

- (1) All loading operations performed at emissions unit J001 shall employ submerged or bottom fill.

d) **Monitoring and/or Recordkeeping Requirements**

- (1) The permittee shall record the annual throughput, in gallons per year.

e) **Reporting Requirements**

- (1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

f) Testing Requirements

- (1) Compliance with the emission limitations shall be determined in accordance with the following methods:

Emission Limitation:

24.9 tons VOC/year

Applicable Compliance Method:

Compliance with the emission limitation above shall be established by multiplying a loading loss factor (L\*) by the maximum pump capacity\*\* and by 60, and then dividing by 1000 for each day of operation during a calendar year.

The loading loss factor was derived using AP-42, Section 5.2, the "Loading Loss Equation".

\*L = 12.46 SPM/T

Where:

L = loading loss, pounds per 1000 gallons loaded (Q)

S = saturation factor, 0.6 for submerged fill

P = vapor pressure of liquid loaded, pounds per square inch absolute

M = molecular weight of vapor

T = temperature of bulk liquid (°R)

MW = 66

P @ 61°F = 6.02

Submerged Fill Factor = 0.6

Temperature = 520.67 °R

If required, the permittee shall demonstrate compliance with the annual allowable VOC emission limitations above in accordance with Methods 1 – 4 and 18, 25, or 25a, as appropriate, of 40 CFR Part 60, Appendix A.

g) Miscellaneous Requirements

- (1) None.



**7. Emissions Unit: Flare/Combustion Device, P005**

**Operations, Property and/or Equipment Description:**

P005	Excess Gas Flare/Combustor
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- a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
- (1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.
- (a) None.
- (2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.
- (a) None.
- b) Applicable Emissions Limitations and/or Control Requirements
- (1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	40 CFR 60.18(c)(1) 40 CFR 63.11(b)(4)	There shall be no visible emissions except for 5 minutes during any 2 consecutive hours.
b.	ORC 3704.03(T)	Carbon monoxide (CO) emissions shall not exceed 3.7 lbs/hr and 16.2 tons/year.
c.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	Nitrogen oxide (NOx) emissions shall not exceed 0.68 lb/hr and 3.0 tons/year.  Sulfur dioxide (SO <sub>2</sub> ) emissions shall not exceed 0.007 lb/hr and 0.031 ton/year.  Volatile organic compound (VOC) emissions shall not exceed 0.68 lb/hr and 3.0 ton/year.  The flare shall provide a destruction efficiency of 98.0% for the VOCs routed to it.

		See b)(2)a.
d.	OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)b.

(2) Additional Terms and Conditions

- a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC rule 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to the Ohio Revised Code (ORC) changes effective August 3, 2006 (Senate Bill 265 changes), such that BAT is no longer required by State regulations for National Ambient Air Quality Standard (NAAQS) pollutant(s) less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 these emission limitations/control measures no longer apply.
- b. These rule paragraphs apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.
  - i. This PTIO takes into account the following voluntary restrictions (including the use of any applicable air pollution control equipment) as proposed by the permittee for the purposes of avoiding BAT requirements under OAC rule 3745-31-05(A)(3) for VOC emissions.
    - (a) Destruction efficiency of 98.0% efficiency for VOC.
  - ii. The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the NO<sub>x</sub>, SO<sub>2</sub>, and particulate from this air contaminant source since the uncontrolled potential to emit for NO<sub>x</sub>, SO<sub>2</sub>, and particulate are less than ten tons per year.
- c. A pilot flame shall be maintained at all times in the flare's pilot light burner or the flare shall be equipped with a functioning auto ignition system. The flare and auto ignition system shall be installed and maintained in accordance with the manufacturer's recommendations, instructions, and/or operating manuals.

[40 CFR 63.773(d)(3)(i)(C)], [40 CFR 60.18], or [40 CFR 63.11]

c) Operational Restrictions

- (1) All collected gas shall be vented to a flare designed and operated as follows:
  - a. The flare shall be designed for and operated with no visible emissions, as determined by Method 22 of Appendix A of 40 CFR Part 60, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

- b. The flare shall be operated with a flame present at all times when gases are vented to it. The presence of a pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame. The net heating value of the gas being combusted and the actual exit velocity shall be calculated as required in the Testing Section of this permit.
- c. The net heating value ( $H_T$ ) of the gas being combusted and actual exit velocity of the flare shall be calculated as required in the Testing Section of this permit.

[40 CFR 60.632], [40 CFR 60.485(g)], [40 CFR 60.633(g) for press.relief] and [40 CFR 60.18(c) through (f)] or [40 CFR 63.11(b)]

- (2) Flares shall be steam-assisted, air-assisted, or non-assisted, and shall comply with the following requirements for the heat content in paragraph "a" **and** the maximum tip velocity in paragraph "b", **or** shall comply with the alternative requirements in paragraph "c" for nonassisted flares:

- a. Steam-assisted or air-assisted flares shall have a net heating value of 300 Btu/scf (11.2 MJ/scm) or greater, for the gas being combusted.

Nonassisted flares shall have a net heating value of 200 Btu/scf (7.45 MJ/scm) for the gas being combusted.

- b. Steam-assisted and/or nonassisted flares shall be designed for and operated with an exit velocity of less than 18.3 m/sec (60 ft/sec), with the following exceptions:

- i. steam-assisted and nonassisted flares, having a net heating value of 1,000 Btu/scf (37.3 MJ/scm) for the gas being combusted, can be designed for and operated with an exit velocity equal to or greater than 18.3 m/sec (60 ft/sec), but less than 122 m/sec (400 ft/sec); and

steam-assisted and nonassisted flares can be designed for and operated with an exit velocity of less than the velocity calculated below for  $V_{max}$ , and less than 122 m/sec (400 ft/sec):

$$\text{Log}_{10} (V_{max}) = (H_T + 28.8)/31.7$$

where:

$V_{max}$  = maximum permitted velocity, m/sec;

28.8 = constant;

31.7 = constant; and

$H_T$  = the net heating value as determined in the Testing Section of this permit.

- ii. Air-assisted flares shall be designed and operated with a maximum exit velocity,  $V_{max}$ , calculated as follows:

$$V_{max} = K_1 + K_2 H_T$$

where:

$V_{max}$  = maximum permitted velocity, m/sec (ft/sec)

$H_T$  = the net heating value of gas being combusted, MJ/scm (Btu/scf)

$K_1$  = 8.706 m/sec or 28.56 ft/sec

$K_2$  = 0.7084 m<sup>4</sup>/MJ-sec or 0.087 ft<sup>4</sup>/Btu-sec

OR

- c. Nonassisted flares that have a diameter of 3 inches or greater and a hydrogen content of 8.0 percent (by volume), or greater, shall be designed for and operated with an exit velocity of less than 37.2 m/sec (122 ft/sec) and less than the velocity,  $V_{max}$ , as determined by the following equation:

$$V_{max} = (X_{H_2} - K_1) K_2$$

where:

$V_{max}$  = maximum permitted velocity, m/sec;

$K_1$  = constant, 6.0 volume-percent hydrogen;

$K_2$  = constant, 3.9 (m/sec)/volume-percent hydrogen; and

$X_{H_2}$  = the volume-percent of hydrogen, on a wet basis, as calculated by using the ASTM Method D1946-90.

[40 CFR 60.632], [40 CFR 60.633(g)], [40 CFR 485(g)(3)], and [40 CFR 60.18(c) through (f)] or [40 CFR 63.11(b)]

d) Monitoring and/or Recordkeeping Requirements

- (1) The permittee shall monitor the flare to ensure that it is operated and maintained in conformance with its design and the requirements contained in this permit. The net heating value of a gas, the actual exit velocity for the flare, and the maximum permitted velocity for an air-assisted flare shall be determined as required by §60.18, §63.11, and/or OAC rule 3745-10(P), as applicable.

[40 CFR 60.18] or [40 CFR 63.11(b)]

- (2) The permittee shall record the following information each day for the flare and process operations:
- all periods during which there was no pilot flame; and
  - the operating times for the flare, monitoring equipment, and the associated emissions unit.

[40 CFR 60.13] and/or [40 CFR 63.11]

e) Reporting Requirements

- (1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit. The permittee shall identify in the annual permit evaluation report all periods of time during which the pilot flame was not functioning properly or the flare was not maintained as required in this permit. The reports shall include the date, time, and duration of each such period.

[OAC 3745-15-03(B)(2) and (D)] and [40 CFR 60.19] and/or [40 CFR 63.10]

f) Testing Requirements

- (1) The net heating value of the gas being combusted at the flare shall be calculated as follows:

$$H_T = k \sum_{i=1}^n C_i H_i$$

where:

$H_T$  = net heating value of the sample, MJ/scm; where the net enthalpy per mole of off gas is based on combustion at 25 degrees Celsius and 760 mm Hg, but the standard temperature of 20 degrees Celsius is used for determining the volume corresponding to one mole;

$k$  = constant,  $1.740 \times 10^{-7}$  (1/ppm) (g mole/scm) (MJ/kcal), where the standard temperature for "g mole/scm" is 20 degrees Celsius;

$C_i$  = concentration of sample component "i" in ppm on a wet basis, as measured for organics by Reference Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946-90;

$H_i$  = net heat of combustion of sample component "i", kcal/g mole at 25 degrees Celsius and 760 mm Hg. The heat of combustion may be determined using ASTM D4809-95 if published values are not available or cannot be calculated;

$i$  = subscript denoting a specific component in the sample; and

$n$  = total number of components within the sample.

The conversion factor of "26.84 Btu scm/MJ scf" can be used to convert the net heating value of the gas ( $H_T$ ) from MJ/scm to Btu/scf.

[40 CFR 60.632], [40 CFR 60.485(f) and (g)(4)], and [40 CFR 60.18] or [40 CFR 63.11]

- (2) The actual exit velocity of the flare shall be determined by dividing the volumetric flow rate (in units of standard temperature and pressure) of the flare header or headers that feed the flare, as determined by Reference Methods 2, 2A, 2C, or 2D (found in 40 CFR

Part 60, Appendix A), as appropriate, by the unobstructed (free) cross-sectional area of the flare tip.

The conversion factor of "3.281 ft/m" can be used to convert the velocity from m/sec to ft/sec.

[40 CFR 60.632], [40 CFR 60.485(g)], and [40 CFR 60.18], or [40 CFR 63.11]

(3) Emission Limitations:

0.007 lb SO<sub>2</sub>/hr

0.031 tons of SO<sub>2</sub>/year

Applicable Compliance Method:

The emissions limit for SO<sub>2</sub> is based on using the AP-42 emission factor of 0.000588 lb SO<sub>2</sub>/MMBtu from Chapter 3.2 for Natural Gas-fired Reciprocating Engines, Table 3.2-3, "Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines" and using the estimated burner rating of 9.2 MMBtu/hr. Estimated SO<sub>2</sub> emissions shall be determined by the following calculation:

$$0.0007 \text{ lb SO}_2/\text{MMBtu} \times 10.0 \text{ MMBtu/hr} = 0.007 \text{ lb SO}_2/\text{hr}$$

$$0.007 \text{ lb SO}_2/\text{hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 0.031 \text{ ton SO}_2/\text{year}$$

(4) Emission Limitations:

0.68 lb NO<sub>x</sub>/hr

3.0 tons of NO<sub>x</sub>/year

Applicable Compliance Method:

The emissions limit for NO<sub>x</sub> is based on using the AP-42 emission factor of 0.068 lb NO<sub>x</sub>/MMBtu from Chapter 13.5 for Industrial Flares, Table 13.5-1, "Emission Factors for Flare Operations" and using the estimated burner rating of 9.2 MMBtu/hr. Estimated NO<sub>x</sub> emissions shall be determined by the following calculation:

$$0.068 \text{ lb NO}_x/\text{MMBtu} \times 10.0 \text{ MMBtu/hr} = 0.68 \text{ lb NO}_x/\text{hr}$$

$$0.68 \text{ lb NO}_x/\text{hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lbs} = 3.0 \text{ ton NO}_x/\text{year}$$

(5) Emission Limitations:

3.7 lbs CO/hr

16.2 tons of CO/year

Applicable Compliance Method:

The emissions limit for CO is based on using the AP-42 emission factor of 0.37 lb CO/MMBtu from Chapter 13.5 for Industrial Flares, Table 13.5-1, "Emission Factors for

Flare Operations” and using the estimated burner rating of 9.2 MMBtu/hr. Estimated CO emissions shall be determined by the following calculation:

$$0.37 \text{ lb CO/MMBtu} \times 10.0 \text{ MMBtu/hr} = 3.7 \text{ lbs CO /hr}$$

$$3.7 \text{ lbs CO/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton/2000 lbs} = 16.2 \text{ tons CO/year}$$

(6) Emission Limitations:

0.68 lb VOC/hr

3.0 tons of VOC/year

Applicable Compliance Method:

The emissions limits are based on the potential VOC emissions routed to the enclosed flare and a destruction efficiency of 99.8%.

$$34.0 \text{ lbs VOC/hr} \times (100\% - 98.0\% \text{ control}) = 0.68 \text{ lb VOC/hr}$$

$$0.68 \text{ lb VOC/hr} \times 8760 \text{ hrs/yr} \times 1 \text{ ton/2000 lbs} = 3.0 \text{ tons VOC/year}$$

(7) Emission Limitation

There shall be no visible emissions from the flare, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

Applicable Compliance Method

Compliance with the visible emissions limitation shall be determined in accordance with U.S. EPA Method 22 in Appendix A of 40 CFR Part 60.

[40 CFR 60.18(c)(1)] or [40 CFR 63.11(b)(4)]

g) Miscellaneous Requirements

(8) None.

**8. Emissions Unit: Equipment/Pipeline Leaks, P006**

**Operations, Property and/or Equipment Description:**

P006	<p>Ancillary and Associated equipment: compressors, pumps, piping, gas-water/condensate/oil separators</p> <p>Equipment/pipeline leaks from valves, flanges, pressure relief devices, open end valves or lines, and pump and compressor seals in VOC or wet gas service.</p>
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a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions in this permit are federally enforceable, with the exception of those listed below, which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions in this permit are enforceable under state law only, with the exception of those listed below, which are federally enforceable.

a. None.

b) **Applicable Emissions Limitations and/or Control Requirements**

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	<p>Emissions of Volatile Organic Compounds (VOC) shall not exceed:</p> <p>9.72 tons/year total from fugitive equipment leaks.</p> <p>See b)(2)a.</p>
b.	OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)b.
c.	Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants, Part 60, Subpart KKK 40 CFR 60.630	The facility is subject to the provisions of Subpart KKK, which references additional requirements identified in Subparts VV, the Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry.



(2) Additional Terms and Conditions

a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC paragraph 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to ORC changes effective August 3, 2006 (S.B. 265 changes), such that BAT is no longer required by State regulation for NAAQS pollutant less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revision to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of 3745-31-05, then these emission limits/control measures no longer apply.

b. These rule paragraphs apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan.

The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the Volatile Organic Compounds (VOC) emissions from this air contaminant source since the uncontrolled potential to emit for VOC is less than ten tons per year.

c. The annual emissions limitations above represent the emissions units' potential to emit. Therefore, no monitoring, record keeping and/or reporting requirements are necessary to ensure compliance with the emissions limitations.

c) Operational Restrictions

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	40 CFR 60.632 and 40 CFR 60.486(b) and (c)	When a leak is detected a weatherproof identification tag with the equipment identification number and the date detected shall be attached to the leaking equipment, valve, or seal.
b.	40 CFR 60.632 and 40 CFR 60.482-4	Except during pressure releases, each pressure relief device shall be operated with "no detectable emissions", as indicated by an instrument reading of less than 500 ppm above background.
c.	40 CFR 60.632 and 40 CFR 60.482-3	Each compressor that is not equipped with a closed vent system capable of capturing and transporting any leakage from the drive shaft to a process, fuel gas system, or control device shall be equipped with a barrier fluid system to prevent VOC leakage

d) Monitoring and/or Recordkeeping Requirements

	Applicable Rule	Requirements
1.	40 CFR 632(e) and 40 CFR 60.486	Recordkeeping requirements
2.	40 CFR 60.486(b)	Requirements to attach a weatherproof identification tag to

		leaking equipment
3.	40 CFR 60.635(b)(1)	Requirements to attach a weatherproof identification tag to a leak detected on a pressure relief device
4.	40 CFR 60.486(c)	Requirements to maintain a log of each leak detected for 2 years and the information to be maintained
5.	40 CFR 60.486(d)	Required records for the design for the closed vent systems and control devices and period of time when they were not in operation as required.
6.	40 CFR 60.635(b)(2)	Required records for pressure relief devices; must be maintained for 2 years.
7.	40 CFR 60.486(e)	Required records for equipment identification and records for each leak test conducted (dates and results)
8.	40 CFR 60.486(f)	Required records for valves and pumps identified as unsafe or difficult to monitor
9.	40 CFR 60.486(g)	Records required for valves where complying with §60.483-2 for skip leak detection and repair
10.	40 CFR 60.486(h)	Records required for the barrier fluid system sensor that detects failure of the seal for pumps and compressors
11.	40 CFR 60.635(c); 40 CFR 60.480(d); and 40 CFR 60.486(i) and (j)	Records required for exemptions from the leak detection requirements or demonstration that a piece of equipment is "not in VOC service" or "in wet gas service"

e) Reporting Requirements

	Applicable Rule	Requirements
1.	40 CFR 60.636 and 40 CFR 60.487	Semiannual reports are required to be submitted for equipment leaks of VOC from onshore natural gas processing plants. The information identified in these 2 paragraphs shall be included in the reports. The report shall include the number of detected leaks, with the dates of attempted and final repair.

- (1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit. The report shall include the date of any leak that was detected and not repaired within 15 days of discovery, the reason for the delay of repair, the date of final repair, and any Method 21 test results conducted for the leak during the period.

f) Testing Requirements

	Applicable Rule	Requirements
1.	40 CFR 632(d) and 40 CFR 60.485	Test methods and procedures
2.	40 CFR 60.485(b)	Method 21 shall be used to determine the presence of a leak in

		accordance with this paragraph
3.	40 CFR 60.485(c)	Method 21 shall be used for determining compliance with no detectable emissions in accordance with this paragraph
4.	40 CFR 60.485(d) and (f)	Demonstration that a piece of equipment is "not in VOC service"
5.	40 CFR 60.485(e) and (f)	Demonstration that a piece of equipment is "in light liquid service"
6.	40 CFR 60.485(g)	Standards for a flare

(1) Compliance with the emission limitations shall be determined in accordance with the following methods:

a. Emission Limitation:

Emissions of VOC shall not exceed 9.72 tons/year total from fugitive equipment leaks.

Applicable Compliance Method:

The annual VOC limit is the estimated potential-to-emit, based upon the emissions unit's maximum capacity and the design efficiency of the capture and control systems.

The detection of leaks of VOC into the ambient air from equipment shall be determined as follows:

- i. The detection of leaks shall be determined in accordance with the test procedure set forth in U.S. EPA Method 21.
- ii. The following calibration gases shall be used:
  - (a) zero air, which consists of less than ten ppmv of hydrocarbon in air; and
  - (b) a mixture of air and methane or n-hexane at a concentration of approximately, but less than, 10,000 ppmv of methane or n-hexane.
- iii. The leak detection instrument shall be calibrated before each use and shall meet the performance criteria of Method 21, from 40 CFR Part 60 Appendix A.

[40 CFR 60.632] and [40 CFR 60.485(b) and (c)]

b. Emission Limitation

There shall be no visible emissions from equipment, i.e., from valves, flanges, pressure relief devices, open end valves or lines, connectors, and pump and compressor seals in VOC or wet gas service

Applicable Compliance Method

**Permit Number:** P010XXXX  
**Facility Name:** Ohio Shale Gas Well  
**Facility ID:** 0000000000  
**Natural Gas Extraction Well Site, 7/29/11 DRAFT GP**

Compliance with the visible emissions limitation shall be determined in accordance with U.S. EPA Method 22 in Appendix A of 40 CFR Part 60.

g) Miscellaneous Requirements

- (1) None.