



west virginia department of environmental protection

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**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Application No.: R13-3237A  
Plant ID No.: 017-00148  
Applicant: CNX Gas Company, LLC  
Facility Name: Oxford 11  
Location: Doddridge County  
NAICS Code: 212111  
Application Type: Construction  
Received Date: June 12, 2015  
Engineer Assigned: Caraline Griffith  
Fee Amount: \$1,300  
Date Received: June 12, 2015  
Complete Date: June 30, 2015  
Due Date: August 31, 2015  
Applicant Ad Date: June 16, 2015  
Newspaper: *The Herald Record*  
UTM's: 520.430 km Easting • 4,335.746 km Northing • Zone 17  
Latitude/Longitude: 39.17100/-80.76355  
Description: Permit update to reflect the replacement of a flash gas compressor (CE-2) with a newer model.

**SUMMARY/DESCRIPTION OF PROCESS**

The currently permitted flash gas compressor CE-2 was a 630 hp G3508 TALE unit. This compressor skid was assigned unit #1826 and although the engine was manufactured on January 25, 2007, the unit was initially ordered on April 28, 2006. Therefore the unit “commenced construction” on April 28, 2006 and this classified the source as an existing unit under 40CFR63, Subpart ZZZZ.

As a result of internal commitments made by CNX Gas to build lower emitting facilities, the compressor engine as initially ordered could not meet their initial standards. Therefore, a new unit had to be ordered. The newer unit has a manufacturing date that subjects it to 40CFR60, Subpart JJJJ emission standards and therefore the need for this Class II Administrative Update. Although emissions will be reduced the new substantive requirements applicable to this engine pushes it into the Class II Administrative Update permit processing category.

The new replacement engine for CE-2 will be a G3508BLE, 690 hp unit, USA Compression #1600, which was manufactured on February 12, 2013. This new unit along with its hospital grade catalyst will reduce emissions by the following levels:

**Table 1: Reduction in Emissions**

<b>Pollutant</b>	<b>TPY</b>
NOx	-8.84
CO	-12.59
VOC	-1.31
Formaldehyde	-1.49

### **SITE INSPECTION**

On April 2, 2015, Joe Kessler conducted an inspection of the Oxford 11 natural gas production facility. The Oxford 11 site is located in a remote and rural area of Doddridge County approximately 6.0 miles southwest of New Milton, WV along a new access road created off of CR 19/11 (Freedom Road). The wells were in the process of being hydraulically fractured at the time of the inspection. No occupied residences were visible from the site and the nearest was estimated to be approximately 0.75 miles north along CR 19/11 (at the location of the residence the road is called South Fork of the Hughes Road). The following is a picture of the Oxford 11 well-pad taken on the day of the inspection:



*Directions:* [Latitude: 39.17100, Longitude: -80.76355] From the United States Route (USR) 50, travel south on WV State Route (SR) 18 for approximately 9.3 miles and turn right onto County Route (CR) 54 (Porto Rico Road). Proceed on CR 54 for 1.4 miles until it transitions into CR 54/1. Remain on CR 54/1 for approximately 2.5 miles and then turn right onto CR 40. After about 0.3 miles, turn left onto CR 19/11 (Freedom Road). Proceed on CR 19/11 for approximately 1.0 mile until Oxford 11 access road will be on the left.

## **AIR EMISSIONS AND CALCULATION METHODOLOGIES**

CNX included in Attachment N of the permit application air emissions calculations for the equipment and processes at the Oxford 11 natural gas production facility. The following will summarize the calculation methodologies used by CNX to calculate the potential-to-emit (PTE) of the proposed facility.

### ***Natural Gas-Fired Heaters/Generator***

Criteria Pollutant emissions from the natural gas-fired GPUs (1e through 6e), line heater (7e), low pressure separator combustion exhaust (8e), and thermoelectric generator were based on the

emission factors provided for natural gas combustion as given in AP-42 (AP-42 is a database of emission factors maintained by USEPA) Section 1.4. Hourly emissions were based on the maximum design heat input (MDHI) of each unit and annual emissions were based on an annual operation of 8,760 hours. A heat content of the gas of 1,020 Btu/scf was used in the calculations.

**Compressor Engines**

Potential emissions from the old Caterpillar G3508 TALE 4SLB 630 hp flash gas compressor engine (10e) and the new Caterpillar G3508BLE 4SLB 690 hp flash gas compressor engine (10e) were based on post-control emission factors provided by the engine vendor and as given in AP-42, Section 3.2. Hourly emissions were based on the (as calculated using a fuel heat rating of 8,038 Btu/hp-hr and 7,895 Btu/hp-hr, respectively) MDHI of the engines and the maximum hp rating. Annual emissions were based on 8,760 hours of operation per year. The following tables detail the potential-to-emit (PTE) of each compressor engine:

**Table 2: Comparison Data: Caterpillar G3508 TALE 4SLB 630 hp Compressor Engine PTE and Caterpillar G3508BLE 4SLB 690 hp Compressor Engine Controlled PTE**

Emission Unit (Source) ID No.		CE-2		CE-2	
Engine Manufacturer and Model		Caterpillar G3508 BLE		Caterpillar 3508 TALE	
Engine Fuel Consumption Data	Engine Type	4SLB		4SLB	
	APCD Type	CAT		None	
	Fuel Type	RG		PQ	
	Operating bhp/rpm	690/1400		630/1400	
	BSFC (Btu/bhp-hr)	8,332		7,895	
	Fuel Throughput (ft <sup>3</sup> /hr)	4,910		5,270	
	Fuel Throughput (MMft <sup>3</sup> /yr)	43.02		46.17	
	Operation (hrs/yr)	8,760		8,760	
Reference	Potential Emissions	lbs/hr	TPY	lbs/hr	TPY
MD	Nox	0.77	3.34	2.78	12.17
MD	CO	0.32	1.41	3.20	14.0
MD	VOC	0.38	1.67	0.69	2.99
AP	SO2	0.01	0.02	0.01	0.02

AP	PM10	<0.01	0.01	<0.01	0.01
MD	Formaldehyde	0.08	0.34	0.42.	1.83

## **REGULATORY APPLICABILITY**

The proposed new engine to be installed at the CNX Gas Company Oxford 11 Wellpad facility will be subject to 40CFR60, Subpart JJJJ.

### ***45 CFR 13: Minor New Source Review Permitting Requirements***

The emission changes associated with the requested compressor engine upgrade to a newer unit reduced the facility's emissions of Nox, CO, and VOCs. However, the new unit triggers substantive requirements under NSPS Subpart JJJJ due to its manufacture date of February 12, 2013. Therefore, a Class II Administrative Update is necessary to make this amendment because even though emissions are reduced, new requirements are triggered.

### ***40 CFR 60 Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines***

CNX's two (2) proposed compressor engines proposed for the Oxford 11 facility are defined under 40 CFR 60, Subpart JJJJ as stationary spark-ignition internal combustion engines (SI ICE) and are each, pursuant to §60.4230, potentially subject to the applicable provisions of the rule. This part includes regulations pertinent for owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP. The Caterpillar G3508 BLE engine is considered a new unit constructed after June 12, 2006 and manufactured on February 12, 2013. CNX Gas Company must meet the requirements for emission standards under Table 1 of 40CFR60, Subpart JJJJ.

## **TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS**

The following toxicity analysis was taken from the previous permit evaluation for permit R13-3237. It is still relevant to the new permit and was therefore included below for reference.

This section provides an analysis for those regulated pollutants that may be emitted from the Oxford 11 natural gas production facility and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO<sub>x</sub>), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM<sub>10</sub>), Particulate Matter less than 2.5 microns (PM<sub>2.5</sub>), and Sulfur Dioxide (SO<sub>2</sub>). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific

Hazardous Air Pollutants (HAPs) standards promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. CNX included the following HAPs as emitted in substantive amounts in their emissions estimate: Formaldehyde, n-Hexane, Benzene, Toluene, Ethylbenzene, and Xylenes. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

**Table 3: Potential HAPs - Carcinogenic Risk**

HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethyl-benzene	VOC	No	Category D - Not Classifiable
Xylenes	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at [www.epa.gov/iris](http://www.epa.gov/iris).

### **AIR QUALITY IMPACT ANALYSIS**

The estimated maximum emissions from the proposed Oxford 11 natural gas production facility are less than applicability thresholds that would define the proposed facility as a “major stationary source” under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature of the proposed construction, modeling was not required under 45CSR13, Section 7.

## **MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS**

The following monitoring, compliance demonstrations, reporting, and recording requirements were taken from the previous evaluation because they are still relevant and applicable to the new permit. They are listed for reference:

The permit primarily incorporates the monitoring, compliance demonstration, reporting, and record-keeping requirements (MRR) as given in the G70-A General Permit. However, specific non-general MRR requirements are included in the permit. These requirements are given in the following:

- For the purposes of demonstrating compliance with the maximum hours the Low Pressure Separator may vent gas to the Flare set forth in 4.1.4(a) of the permit, CNX shall be required to monitor and record the monthly and rolling twelve month amount of time (in hours) that the flash gas is sent to the Flare.
- For the purposes of demonstrating compliance with the maximum Low Pressure Separator throughput limit set forth in 4.1.4(c) of the permit, CNX shall be required to monitor and record the daily, monthly and rolling twelve month amount of the gas throughput of the Low Pressure Separator.
- For the purposes of demonstrating compliance with the maximum truck loadout limits set forth in 4.1.6(b) of the permit, CNX shall be required to monitor and record the monthly and rolling twelve month amount of produced water and condensate loaded into trucks.
- For the purposes of demonstrating compliance with the maximum combustion limits set forth in 4.1.7(b) of the permit, CNX shall be required to monitor and record the monthly and rolling twelve month amount of the waste gases heat content (not including pilot gas) that is sent to the Flare for destruction. The heat content of the waste gases shall be calculated based on site specific analysis of the gas performed at least once per quarter or, after approval by the Director, a less frequent rate if it is determined that the heat content of the waste gases is stable and a reasonable conservative value used in lieu of frequent testing.

As stated above, extensive MRR from the G70-A is incorporated in the permit; specifically the MRR relevant to control devices not subject to Subpart OOOO, visibility monitoring/testing, and closed vent requirements.

## **PERFORMANCE TESTING OF OPERATIONS**

The following performance and testing requirements were taken from the previous evaluation because they are still relevant and applicable to the new permit. They are listed for reference:

As with MRR above, the permit primarily incorporates the performance testing requirements as given in the G70-A General Permit. However, specific non-general performance testing requirements are included in the permit. These requirements are given in the following:

- At such reasonable time(s) as the Secretary may designate, in accordance with the provisions of 3.3 of the permit, CNX shall be required to conduct or have conducted test(s) to determine compliance with the emission limitations or minimum control device efficiencies established in this permit and/or applicable regulations.
- Within one hundred eighty (180) days of the issuance date of this permit, CNX shall be required to use a site specific sample to determine the potential emissions of the storage tanks. The type and location of the sample shall be appropriate for the calculation methodology or model being used to calculate the emissions. The sample location shall be equipped with appropriate sampling access and temperature and pressure instrumentation. CNX shall be required to re-evaluate the VOC and HAP potential emissions based on the site specific sample within 90 days of receiving the analysis of the site specific sample pursuant to 40 CFR 60, Section 5365(e). If the VOC potential emissions (as controlled) are higher than the potential emissions given in permit application R13-3237, the DAQ shall be notified. The notification shall include whether or not this change in emissions affects applicability determination to 40 CFR 60, Subpart OOOO for any storage tank. The notification to the Director shall be provided no later than 30 days from the date of discovery of the increased emissions.

### **RECOMMENDATION TO DIRECTOR**

The information provided in permit application R13-3237A indicates that compliance with all applicable federal and state air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-3237A to CNX Gas Company, LLC for the construction and operation of the Oxford 11 natural gas production facility located near New Milton, Doddridge County, WV.

  
Caraline Griffith  
Permit Engineer

July 20, 2015  
Date