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west virginia department of environmental protection

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Jim Justice, Governor  
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### BACKGROUND INFORMATION

Application No.: R13-3358  
Plant ID No.: 017-00166  
Applicant: CONE Midstream Partners LP  
Facility Name: Cain Run (Laverne) Station  
Location: New Milton, Doddridge County  
NAICS Code: 486210  
Application Type: Construction  
Received Date: February 3, 2017  
Engineer Assigned: Jonathan Carney  
Fee Amount: \$4,500.00  
Date Received: February 16, 2017  
Complete Date: March 2, 2017  
Due Date: May 31, 2017  
Applicant Ad Date: February 14, 2017  
Newspaper: *The Herald Record*  
UTM's: Easting: 4,335.746      Northing: 520.430      Zone: 17S  
Description: CONE would like to construct a compression site consisting of a Caterpillar G3516 compressor, 20 MMscf/day TEG dehydration unit with ground flare, desiccant dehydrator vessels, 400 bbl storage vessel, PIG launcher, and a capstone microturbine generator. Due to previous pipeline work the desiccant dehydrator vessels and PIG launcher were previously installed at this site, but were determined to be below permitting thresholds.

### DESCRIPTION OF PROCESS

The following description is from application R13-3358:

CONE Midstream Partners LP is applying for a construction permit in accordance with 45CSR13, for the operation of the Cain Run (Laverne) compression and dehydration station. The site will consist of a single Compressor, TEG dehydration unit with ground flare, 400 bbl process water tank, desiccant dehydrator vessels, PIG launcher, and a capstone microturbine generator.

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The station collects gas from unconventional wells and provides compression and dehydration services. The compressor is proposed to be driven by a Caterpillar G3516BLE 4SLB engine rated for 1380 hp and manufactured on 4-16-2012. As a result, the unit will be controlled by an oxidation catalyst to meet NSPS requirements under subpart JJJJ. The dehydration capabilities at Cain Run will consist of two options, a desiccant dehydration system which can be operated in parallel with a TEG Dehydration Column. The dehydration units will utilize a ground flare control device to minimize emissions. The desiccant dehydrator vessels produce brine liquids but no direct emissions to the atmosphere with the exception of blowdown venting with respect to recharging the vessels with salt. This is assumed to be at a maximum 1 time per week. The liquids removed from the process by the desiccant dehydrator vessels and TEG Dehydrator will be stored in a single 400-barrel (bbl) storage vessel. The tank's resulting emissions will be uncontrolled as a result of containing mostly water.

The source's potential to emit was modeled using ProMax equation of state (EOS) software based on site specific gas sampling taken from the pipeline feeding the desiccant dehydrator vessels on 6-10-16. The desiccant dehydrator vessels and the pig launcher piping are currently installed at the site due to having emissions below permitting thresholds.

In accordance with DAQ guidance, emission potentials were evaluated and reported for truck loading, fugitive equipment leaks, pig launcher blowdown venting, compressor blowdowns and desiccant dehydrator blowdowns.

#### SITE INSPECTION

Inspection Date: March 1, 2017

Inspected By: Douglas Hammell, DAQ Air Compliance

Findings and Recommendations:

According to the DAQ inspector Douglas Hammell, Cone's proposed Cain (Laverne) Station 17-166, has same lat/long as existing CNX OXF-11 pad.

The site is suitable for proposed R13-3358 currently in-house.

No houses observed along Freedom Rd / CR-19/11 to access rd nor 1000 ft beyond. Closest house per Google Earth is on Cain Run, ~3000 E [39.173632, -80.751403].

The pigging station is already in place per app (pic- pigging station).

What appeared to be vertical separators may be desiccant vessels per app (pic no.13).

The large CAT G3516 compressor, TEG dehy and additional 400bbl storage tank requested in app were not observed.



**ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER**

<b>Emission Unit ID#</b>	<b>Process Equipment</b>	<b>Calculation Methodology</b>
CE-1	1,380 bhp Caterpillar G3516 4SLB Reciprocating Internal Combustion Engine (RICE) w/Oxidation Catalyst	Mfg. data, AP-42, 40CFR98
MG-1	30 kW MicroTurbine Generator	Mfg. data
RBV-1	TEG Reboiler	AP-42
RSV-1	TEG Dehy Still Vent	GlyCalc
F-1	Ground Flare	AP-42
T1	Produced Water Tank	ProMax
TL-1	Truck Loading	AP-42
CE-1	Compressor Blowdown	Fesco Gas Analysis, mass balance

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PIG Launcher	Piping Blowdown for PIG	ProMax Oxford 11
Desiccant Dehy	Blowdowns for Desiccant Dehydrator Vessels	ProMax, mass balance

The total facility PTE (excluding fugitives) for the Station is shown in the following table:

<b>Pollutant</b>	<b>R13-3358 PTE (tons/year)</b>
Nitrogen Oxides	14.17
Carbon Monoxide	29.75
Volatile Organic Compounds	14.88
Particulate Matter-10/2.5	0.46
Sulfur Dioxide	0.07
Formaldehyde	5.20
Total HAPs	6.14
Carbon Dioxide Equivalent	8956.25

Emission Point ID#	Emission Unit Description	NOx		CO		VOC		PM <sub>10</sub>		SO <sub>2</sub>		Total HAPs	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-1	1,380 bhp Caterpillar G3516 4SLB Reciprocating Internal Combustion Engine (RICE) w/Oxidation Catalyst	3.04	13.33	6.08	26.65	2.13	9.33	0.10	0.45	0.01	0.03	1.40	6.14
MG-1	30 kW MicroTurbine Generator	0.02	0.08	0.05	0.24	0.01	0.03	-	-	-	-	-	-
RBV-1	TEG Reboiler	0.04	0.16	0.03	0.14	0.00	0.01	0.00	0.01	0.00	0.00	-	-
RSV-1	TEG Dehy Still Vent	-	-	-	-	-	-	-	-	-	-	-	-
F-1	Ground Flare	0.14	0.60	0.62	2.72	0.28	1.23	-	-	0.08	0.04	-	-
T1	Produced Water Tank	-	-	-	-	0.00	0.00	-	-	-	-	-	-
TL-1	Truck Loading	-	-	-	-	0.00	0.00	-	-	-	-	-	-
CE-1	Compressor Blowdown	-	-	-	-	39.65	1.19	-	-	-	-	-	-
PIG Launcher	Piping Blowdown for PIG	-	-	-	-	26.61	0.80	-	-	-	-	-	-
Desiccant Dehy	Blowdowns for Desiccant Dehydrator Vessels	-	-	-	-	88.08	2.29	-	-	-	-	-	-
Total		3.24	14.17	6.78	29.75	156.76	14.88	0.10	0.46	0.09	0.07	1.40	6.14

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## REGULATORY APPLICABILITY

### **45CSR2 - Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers**

*The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units.*

*45CSR2 states that any fuel burning unit that has a heat input under ten (10) MMBTU/hr is exempt from Sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date. If the individual heat input of all of the proposed fuel burning units are below 10 MMBTU/hr, these units are exempt from the aforementioned sections of 45CSR2. However, the registrant would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.*

The indirect heat exchanger utilized as the TEG reboiler will be subject to the visible emission standard.

The reboiler burner utilized on the dehydration system at this site is exempt from the weight emission standards of 45 CSR 2.

### **45CSR4 - To Prevent and Control the Discharge of Air Pollutants Into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors**

The facility is subject to the requirements of 45CSR4 and shall not allow the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

### **45CSR6 - To Prevent and Control Air Pollution from the Combustion of Refuse**

*45CSR6 prohibits open burning, establishes emission limitations for particulate matter, and establishes opacity requirements. Sources subject to 45CSR6 include completion combustion devices, enclosed combustion devices, and flares.*

*All completion combustion devices, enclosed combustion devices, and flares are subject to the particulate matter weight emission standard set forth in §45-6-4.1; the opacity requirements in §§45-6-4-3 and 4-4; the visible emission standard in §45-6-4.5; the odor standard in §45-6-4.6; and, the testing standard in §§45-6-7.1 and 7.2.*

*Enclosed combustion control devices and flares that are used to comply with emission standards of NSPS, Subpart OOOO are subject to design, operational, performance, recordkeeping and reporting requirements of the NSPS regulation that meet or exceed the requirements of 45CSR6.*

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The ground flare is subject to this standard. The applicant estimates that the ground flare will be able to comply with the PM limits and opacity limits of this regulation. The applicant calculates the Rule 6 PM limit to be 0.262 lb/hr. The applicant indicates that AP-42 Chapter 13 specifies that combustion sources using natural gas should not have PM emissions and therefore no PM/soot factor is given.

#### **45CSR10 - To Prevent and Control Air Pollution from the Emission of Sulfur Oxides**

45CSR10 establishes emission limitations for SO<sub>2</sub> emissions which are discharged from stacks of fuel burning units. A “fuel burning unit” means and includes any furnace, boiler apparatus, device, mechanism, stack or structure used in the process of burning fuel or other combustible material for the primary purpose of producing heat or power by indirect heat transfer. Sources that meet the definition of “Fuel Burning Units” per 45CSR10-2.8 include GPUs, in-line heaters, heater treaters, and glycol dehydration unit reboilers.

Fuel burning units less than 10 MMBtu/hr are exempt.

The TEG dehy reboiler fuel burning unit is rated at 0.375 MMBtu and is therefore exempt from this subpart.

#### **45CSR13 - Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation**

The applicant meets the definition of a stationary source because the source is subject to a substantive requirement of an emission control rule promulgated by the Secretary and the source discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant. The facility is also subjective to substantive regulatory requirements, 40 CFR 60 Subpart JJJJ, 40 CFR 60 Subpart OOOOa, and 40 CFR 63 Subpart HH.

As required under §45-13-8.3 (“Notice Level A”), CONE Midstream Partners LP placed a Class I legal advertisement in a “newspaper of *general circulation* in the area where the source is . . . located.” The ad ran on February 14, 2017 in the *The Herald Record* and the affidavit of publication for this legal advertisement was submitted on February 23, 2017. The application fee of \$4,500 was received on February 16, 2017.

#### **45CSR16 - Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**

45CSR16 applies to all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section.

The applicant is subject to 40CFR60 Subpart JJJJ and 40CFR60 Subpart OOOOa.

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## **40CFR60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines**

Subpart JJJJ sets forth nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compound (VOC) emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine.

This subpart applies to compressor engine, CE-1, because it will be manufactured on or after July 1, 2007. Engine CE-1 will have to meet the following emission standards: NO<sub>x</sub> 1.0 g/hp-hr, CO 2.0 g/hp-hr, and VOC 0.7 g/hp-hr. These emissions standards will have to be met over the entire life of the engine. The non-certified engine, CE-1, will have to undergo initial performance testing and be tested every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance with the emission standards of 40CFR60 Subpart JJJJ.

## **40CFR60, Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after September 18, 2015**

*40CFR60 Subpart OOOOa establishes emission standards and compliance schedules for the control of the pollutant greenhouse gases (GHG). The greenhouse gas standard in this subpart is in the form of a limitation on emissions of methane from affected facilities in the crude oil and natural gas source category that commence construction, modification or reconstruction after September 18, 2015. This subpart also establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO<sub>2</sub>) emissions from affected facilities that commence construction, modification or reconstruction after September 18, 2015. The effective date of this rule is August 2, 2016.*

*For each compressor station, the registrant must reduce GHG (in the form of a limitation on emissions of methane) and VOC emissions by complying with fugitive emissions monitoring as required in §60.5397a and the alternative means of emission limitations in §60.5398a.*

*Each well affected facility-*This is a natural gas compression site. There are no well affected facilities located at this facility.

*Each centrifugal compressor affected facility -* No centrifugal compressors are located at this facility.

*Each reciprocating compressor affected facility -* The reciprocating compressor at this station is an affected facility since it will be constructed after September 18, 2015.

The compressor must undergo rod packing replacement every 26,000 hrs or 3 years whichever is earlier.

*Each pneumatic controller affected facility-* The applicant has estimated the emissions from the pneumatic control valves to be less than 6 scf/hr. Therefore, the pneumatic valves are not subject to this subpart.



*Each storage vessel affected facility-* The applicant has estimated the VOC emissions from this storage vessel to be less than 6 tpy. The storage vessel is therefore not an affected source under this subpart.

*Fugitive Emissions Monitoring-* The facility is subject to fugitive component equipment leak standards. The permittee is required to develop and implement a fugitive monitoring plan and conduct quarterly optical gas imaging (OGI) surveys after the initial survey.

#### **40CFR63 Subpart HH - National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities**

This Subpart applies to owners and operators of each triethylene glycol (TEG) dehydration unit that are located at oil and natural gas production facilities.

The Cain Run Station TEG is subject to the area source requirements of Subpart HH. The TEG shall comply by utilizing a ground flare for control to maintain actual emissions of benzene below the 1 tpy exemption threshold.

#### **40CFR63 Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines**

*Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This Subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. This section reflects EPA's final amendments to 40 CFR part 63, Subpart ZZZZ that were issued on January 15, 2013 and published in the Federal Register on January 30, 2013.*

Compressor engine (CE-1) is an affected engine under this subpart. Since it is a new stationary reciprocating engine located at an area source under this subpart, it must meet the requirements of 40CFR60 Subpart JJJJ. No further requirements apply for such engines under 40CFR63 Subpart ZZZZ.

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

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. The Station is classified as an area source of hazardous air pollutants. Listed below is a description of the primary hazardous air pollutants for this facility.

##### **Benzene**

Benzene is found in the air from emissions from burning coal and oil, gasoline service stations, and motor vehicle exhaust. Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in

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animal tests. Increased incidence of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen.

### **Toluene**

The acute toxicity of toluene is low. Toluene may cause eye, skin, and respiratory tract irritation. Short-term exposure to high concentrations of toluene (e.g., 600 ppm) may produce fatigue, dizziness, headaches, loss of coordination, nausea, and stupor; 10,000 ppm may cause death from respiratory failure. Ingestion of toluene may cause nausea and vomiting and central nervous system depression. Contact of liquid toluene with the eyes causes temporary irritation. Toluene is a skin irritant and may cause redness and pain when trapped beneath clothing or shoes; prolonged or repeated contact with toluene may result in dry and cracked skin. Because of its odor and irritant effects, toluene is regarded as having good warning properties. The chronic effects of exposure to toluene are much less severe than those of benzene. No carcinogenic effects were reported in animal studies. Equivocal results were obtained in studies to determine developmental effects in animals. Toluene was not observed to be mutagenic in standard studies.

### **Ethylbenzene**

Ethyl benzene is mainly used in the manufacturing of styrene. Acute (short-term) exposure to ethyl benzene in humans results in respiratory effects, such as throat irritation and chest constriction, irritation of the eyes, and neurological effects, such as dizziness. Chronic (long-term) exposure to ethyl benzene by inhalation in humans has shown conflicting results regarding its effects on the blood. Animal studies have reported effects on the blood, liver, and kidneys from chronic inhalation exposure to ethyl benzene. Limited information is available on the carcinogenic effects of ethyl benzene in humans. In a study by the National Toxicology Program (NTP), exposure to ethyl benzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. EPA has classified ethyl benzene as a Group D, not classifiable as to human carcinogenicity.

### **Xylenes**

Commercial or mixed xylene usually contains about 40-65% m-xylene and up to 20% each of o-xylene and p-xylene and ethyl benzene. Xylenes are released into the atmosphere as fugitive emissions from industrial sources, from auto exhaust, and through volatilization from their use as solvents. Acute (short-term) inhalation exposure to mixed xylenes in humans results in irritation of the eyes, nose, and throat, gastrointestinal effects, eye irritation, and neurological effects. Chronic (long-term) inhalation exposure of humans to mixed xylenes results primarily in central nervous system (CNS) effects, such as headache, dizziness, fatigue, tremors, and incoordination; respiratory, cardiovascular, and kidney effects have also been reported. EPA has classified mixed xylenes as a Group D, not classifiable as to human carcinogenicity. Mixed xylenes are used in the production of ethylbenzene, as solvents in products such as paints and coatings, and are blended into gasoline.

### **Formaldehyde**

Formaldehyde is used mainly to produce resins used in particle board products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an

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association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects 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

Modeling was not required of this source due to the fact that the facility is not subject to 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants) or 45CSR19 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment) as seen in the table listed in the Regulatory Discussion section under 45CSR14/45CSR19.

### SOURCE AGGREGATION

“Building, structure, facility, or installation” is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term “adjacent” and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

The Station will operate under NAICs code 486210 (Pipeline Transportation of Natural Gas).

CONE’s Cain Station is co-located on property with CNX’s Oxford 11 Well Pad

CONE is the operator of the Cain Station. CNX is the operator of the Oxford 11 Well Pad. However, CNX and CONE both own a significant partnership interest in CONE MLP. Therefore, the partnership that exists between these facilities lends itself to common control.

The Cain Station will operate under SIC code 4922 (Natural Gas Transmission). CNX’s Oxford 11 Well Pad has a SIC code of 1311 that has been filed with the SEC. Since these two facilities do not share the same two digit major SIC code, the emissions from these two (2) facilities should not be aggregated in determining major source or PSD status.

### MONITORING OF OPERATIONS

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The permittee must monitor the catalytic oxidizer control device temperature. The permittee must maintain proper operation of the automatic air/fuel ratio controller or feedback controller.

The permittee must perform an initial performance test on the compressor engine and every 8760 hours or 3 years, whichever comes first, thereafter.

The compressor must undergo rod packing replacement every 26,000 hrs or 3 years whichever is earlier.

Visible emissions from the TEG reboiler must undergo initial visible emissions observation and monthly thereafter.

The permittee is required to monitor the presence of the flare pilot flame.

The permittee is required to monitor the dry natural gas throughput of the dehydration system.

The permittee is required to develop and implement a fugitive monitoring plan and conduct quarterly optical gas imaging (OGI) surveys after the initial survey.

#### RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that the CONE Midstream Partners LP natural gas compression and dehydration facility should meet all the requirements of applicable rules and regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Doddridge County location should be granted a 45CSR13 construction permit for their facility.

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Jonathan Carney  
Permit Writer

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DATE

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