west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2977B
Plant ID No.:	009-00102
Applicant:	Chesapeake Appalachia, LLC (CHK)
Facility Name:	Robert Bone Pad
Location:	Bethany, Brooke County
NAICS Code:	211111
Application Type:	Class I Administrative Update
Received Date:	October 1, 2014
Engineer Assigned:	David Keatley
Fee Amount:	$0
Date Fee Received:	Not Applicable (NA)
Complete Date:	February 11, 2015
Due Date:	April 12, 2015
Applicant Ad Date:	NA
Newspaper:	*NA*
UTM's:	Easting: 533.831 km Northing: 4,452.109 km Zone: 17T
Description:	Permit R13-2977B will supersede and replace permit R13-2977A. With this permitting action the following equipment will be removed: one (1) 145-bhp engine, one (1) 0.5 mmBtu/hr heater treater, and a low-pressure tower (changing the process flow of the facility).

DESCRIPTION OF PROCESS

The facility is an oil and natural gas exploration and production facility, responsible for the production of natural gas and condensate. Raw natural gas (condensate, natural gas, and water) flow from the one (1) natural gas well to the wellhead to be metered to the gas production unit (GPU). The GPU is heated by a 1.0 mmBtu/hr burner. The gas from the GPU exits the facility via pipeline. Produced water from the GPU flows into three (3) 400-bbl produced water tanks. Condensate from the GPU flows to the three (3) 400-bbl condensate tanks. Condensate and produced water will be loaded into trucks and are transported off site. Loading emissions will be controlled with vapor return, which has at least 70% capture efficiency, routed to the vapor combustor for at least 98% destruction efficiency. Working, breathing and flashing vapors

from the 400-bbl condensate tanks and 400-bbl produced water tanks will be routed to the vapor combustors with 98% destruction efficiency. The 15 mmBtu/hr MRW Technologies vapor combustor have natural gas fired pilots to ensure a constant flame for combustion.

SITE INSPECTION

A site inspection was conducted by Michael Wade of DAQ's Compliance and Enforcement's Northern Panhandle Regional Office on January 8, 2014. The facility was deemed in compliance.

From Wheeling, WV, travel north on SR 2 to the intersection of SR 2 and CR 67, just south of the community of Wellsburg, WV. Turn right onto CR 67 and travel 4.5 miles to the intersection of CR 67 and CR 30 (Hukill Run Road). Turn right on CR 30 and travel 0.7 miles to the well pad access road on the right.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this modification application consist of: three (3) condensate tanks (EU-TANKS-COND), three (3) produced water tanks (EU-TANKS-PW), condensate truck loading (EU-LOAD-COND), produced water truck loading (EU-LOAD-PW), one (1) vapor combustor (APC-COMB-TKLD), one (1) vapor combustor pilot (EU-PILOT), and fugitive emissions (EU-FUG).

Table 1: Calculation Methodology

Emission Unit ID#	Process Equipment	Calculation Methodology
EU-TANKS-COND	Three (3) Condensate Tanks 400-bbl (each)	EPA TANKS 4.0.9d Emission Estimation Software, ProMax Process Simulation
EU-TANKS-PW	Three (3) Produced Water Tanks 400-bbl (each)	EPA Tanks 4.09 Emission Estimation Software, ProMax Process Simulation
EU-LOAD-COND	Condensate Truck Loading	EPA AP-42 Emission Factors
EU-LOAD-PW	Produced Water Truck Loading	EPA AP-42 Emission Factors
APC-COMB-TKLD	One (1) 15.0-MMBTU/hr Vapor Combustor	EPA AP-42 Emission Factors
EU-PILOT	Vapor Combustor Pilot	EPA AP-42 Emission Factors

Fugitive emissions for the facility are based on calculation methodologies presented in the 2009 American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry. The factors presented in the API Compendium are for methane emissions. Therefore, the fugitive VOC and HAP emissions were calculated using a representative gas analysis and the weight percent of each respective pollutant.

Table 2: Modified Estimated Maximum Controlled Air Emissions

Emission Point ID	Emission Unit ID	Process Unit	Pollutant	Maximum Controlled Emission Rate	
				Hourly (lb/hr)	Annual (ton/year)
EP-TANKS-COND	EU-TANKS-COND	Three (3) Condensate Tanks 400-bbl (each)	Volatile Organic Compounds	1.76	7.71
			Benzene	<0.01	0.1
			Ethylbenzene	0.01	0.03
			n-Hexane	0.10	0.45
			Toluene	0.01	0.03
			Xylenes	0.03	0.11
EP-TANKS-PW	EU-TANKS-PW	Three (3) Produced Water Tanks 400-bbl (each)	Volatile Organic Compounds	<0.01	<0.01
EU-LOAD-COND	EP-LOAD-COND	Condensate Truck Loading	Volatile Organic Compounds	0.18	0.80
			n-Hexane	0.01	0.05
			Xylenes	<0.01	0.01
			Carbon Dioxide Equivalent	0.11	0.48
EU-LOAD-PW	EP-LOAD-PW	Produced Water Truck Loading	Volatile Organic Compounds	<0.01	<0.01
			Carbon Dioxide Equivalent	0.25	1.10
APC-COMB-TKLD	APC-COMB-TKLD	Vapor Combustor Tank/Load	Nitrogen Oxides	2.07	9.07
			Carbon Monoxide	4.13	18.09
			Particulate Matter	0.04	0.18
			Volatile Organic Compounds	1.73	7.58
			n-Hexane	0.10	0.44
			Benzene	<0.01	0.01
			Toluene	0.01	0.03
			Ethylbenzene	0.01	0.03

		Stream	Xylenes	0.02	0.09
			Carbon Dioxide Equivalent	1,756	7,694
EP-PILOT	EU-PILOT	Vapor Combustor Pilot	Nitrogen Oxides	0.01	0.04
			Carbon Monoxide	<0.01	0.02
			Particulate Matter	<0.01	<0.01
			Volatile Organic Compounds	<0.01	<0.01
			Sulfur Dioxide	<0.01	<0.01
			Carbon Dioxide Equivalent	5.30	23.21
EU-FUG	EP-FUG	Fugitive Emissions	Volatile Organic Compounds	0.34	1.47
			n-Hexane	0.02	0.06
			Xylenes	<0.01	0.02
			Carbon Dioxide Equivalent	5.25	23.01

Table 3: Summarized Estimated Maximum Controlled Facility Wide Air Emissions

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	10.33
Carbon Monoxide	19.11
Volatile Organic Compounds	17.63
Particulate Matter	0.53
Sulfur Dioxide	0.01
Benzene	0.01
Ethylbenzene	0.07
n-Hexane	1.02
Toluene	0.07
Xylenes	0.22
Total HAPs	1.39
Carbon Dioxide Equivalent	9,024

Table 4: Required Control Device Efficiencies:

Emission Unit	Pollutant	Control Device	Control Efficiency
EU-TANKS-COND, EU-TANKS-PW Storage Tanks	Volatile Organic Compounds	Vapor Combustor	98.00 %
	Total HAPs		98.00 %
EU-LOAD-COND, EU-LOAD-PW Loadout Racks	Volatile Organic Compounds	Vapor Return/ Combustion	70.00 %

REGULATORY APPLICABILITY

The following rules and regulations apply to the facility:

45CSR4 (To Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors)

This facility shall not cause the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public. 45CSR4 states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable.

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

The purpose of this rule is to prevent and control air pollution from combustion of refuse.

CHK has two (2) vapor combustors at the facility. The vapor combustors are subject to section 4, emission standards for incinerators. The vapor combustor has an allowable emission rate of 1.01 pounds of particulate matter per hour (assuming a natural gas density of 0.044 lb/ft^3). The vapor combustor has and estimated amounts of particulate matter emissions of 0.04 lb per hour. Therefore, the facility's vapor combustor should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the vapor combustor and the hours of operation. The facility will also monitor the flame of the vapor combustors and record any malfunctions that may cause no flame to be present during operation.

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)

This facility qualifies for a Class I Administrative Update because the air emissions have decreased.

45CSR22 (Air Quality Management Fee Program)

This facility is a minor source as can be seen in Table 3 and not subject to 45CSR30. This facility is a 9M source and has a $200 annual fee. CHK is required to keep their Certificate to Operate current.

40CFR60 Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

EPA issued it new source performance standards (NSPS) and air toxics rules for the oil and gas sector on April 17, 2012. 40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

a. Each gas well affected facility, which is a single natural gas well.

The gas wells that currently exist at the Robert Bone Pad were drilled principally for the production of natural gas and were done so after August 23, 2011. Therefore, these wells would be considered affected facilities under this subpart.

b. Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your reciprocating compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

With this application this facility will not have any reciprocating compressors.

c. Each storage vessel affected facility, which is a single storage vessel, located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment.

40CFR60 Subpart OOOO defines a storage vessel as a unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

1. Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If the source does not keep or are not able to produce records, as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel

described herein is considered to be a storage vessel since the original vessel was first located at the site.

2. Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
3. Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

This rule requires that the permittee determine the VOC emission rate for each storage vessel affected facility utilizing a generally accepted model or calculation methodology within 30 days of startup, and minimize emissions to the extent practicable during the 30 day period using good engineering practices. For each storage vessel affected facility that emits more than 6 tpy of VOC, the permittee must reduce VOC emissions by 95% or greater within 60 days of startup.

The storage vessels located at the Robert Bone Pad emit more than 6 tpy of VOC uncontrolled (128.44 tpy and 2.57 tpy). Therefore, CHK would be required by this section to reduce VOC emissions by 95%. CHK has proposed to install a vapor combustor with 98% control efficiency to capture the VOC emissions from the storage tanks.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There will be small amounts of various regulated hazardous air pollutants emitted from the operation of this facility as seen in Table 1. The facility is a minor source of HAPs as can be seen in Table 2. If you want to obtain additional information about certain hazardous air pollutants feel free to visit [http://www.epa.gov/ttn/atw/hlthef/hapindex.html].

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) as seen in Table 3.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates compliance with all state and federal air quality requirements will be satisfied. Therefore CHK's request to construct and operate its Robert Bone Pad natural gas production facility is recommended to the Director of Air Quality.

David Keatley
Permit Writer – NSR Permitting

February 11, 2015

Date