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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3053A
Plant ID No.:	009-00117
Applicant:	SWN Production Company
Facility Name:	State of WV DNR A Pad
Location:	near Colliers, Brooke County
NAICS Code:	211111
Application Type:	Class II Administrative Update
Received Date:	October 1, 2014
Engineer Assigned:	David Keatley
Fee Amount:	$1,300
Date Fee Received:	October 2, 2014
Complete Date:	February 24, 2015
Due Date:	May 25, 2015
Applicant Ad Date:	October 1, 2015
Newspaper:	*The Intelligencer*
UTM's:	Easting: 539.481 km Northing: 4,463.486 km Zone: 17T
Description:	Permit R13-3053A will supersede and replace permit R13-3053. This application proposes installing and operating one (1) 23.6-bhp flash gas compressor, removing one (1) 145-bhp flash gas compressor engine, and reducing the condensate and produced water throughputs.

DESCRIPTION OF PROCESS

The facility is an oil and natural gas exploration and production facility, responsible for the production of natural gas and condensate. Condensate, gas, and water come from the wellhead(s) to two (2) 1.0-mmBtu/hr gas production units (GPUs), where the first stage of separation occurs. Natural gas from the GPUs will exit the facility via pipeline. Liquids (condensate and produced water) from the GPUs will be sent to one (1) 0.5-mmBtu/hr heater treater. A Heater Treater is used to treat emulsions, which are stable mixtures of condensate, solids, and water. These units use thermal, gravitational, mechanical, and sometimes chemical methods to break the emulsions and separate the condensate from water. Elevating the emulsion temperature is particularly effective in lowering condensate viscosity and promoting phase separation. The process causes hydrocarbons, including methane, to vaporize and escape. The

flash from the heater treater is captured via a flash gas compressor driven by a natural gas fired engine. Produced water from the heater treater flows into three (3) 400-bbl produced water tanks. Condensate from the heater treater flows into a low-pressure tower. Flash gases from the low pressure tower are routed via hard piping (with 100% capture efficiency) to the inlet of the flash gas compressor to be compressed. Condensate from the low-pressure tower(s) flows to the three (3) 400-bbl condensate storage tanks. The natural gas stream will exit the facility via pipeline. Condensate and produced water are transported off site via truck. Loading emissions will be controlled with vapor return, which has at least 70% capture efficiency, routed to the 15 mmBtu/hr vapor combustor for at least 98% destruction efficiency. Working, breathing and flashing vapors from the 400 bbl condensate storage tanks and 400 bbl produced water storage tanks will be routed to the vapor combustors with 98% destruction efficiency. The vapor combustor has a natural gas fired pilot to ensure a constant flame for combustion. This facility also has two (2) 1.5-mmBtu/hr line heaters which will be operated when needed.

SITE INSPECTION

A site inspection was performed by DEP DAQ's Compliance and Enforcement NPRO Angela Cary on December 10, 2014. Ms. Carry determined that the facility was in compliance.

Travel on I-79N to I-70W. Take Exit 17 towards PA-18/Jefferson Ave. Turn right onto E. Wylie St., then turn right onto Jefferson Ave. Travel 9.5 miles to continue onto PA-844W/E. Main St. and then continue onto WV 27 W/Washington Pike. Take sharp right onto Pot Rock Road and then turn right onto Cross Creek Road. Take first left onto Putney Ridge Road, then take slight right onto CR 16/Tent Church Road and continue 0.8 mile to arrive at the site.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this class II administrative update application consist of the combustion emissions from the compressor engine (EU-ENG2), 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), and fugitive emissions (EU-FUG).

Table 1: Calculation Methodology

Emission Unit ID#	Process Equipment	Calculation Methodology
EU-ENG2	23.6 bhp Kubota DG972-E2 Flash Gas Compressor Engine	Manufacturer's Data, EPA AP-42 Emission Factors
EU-TANKS-COND	Three (3) 400 bbl Condensate Tanks [1]	EPA Tanks 4.0.9d Emission Estimation Software, ProMax Process Simulation
EU-TANKS-PW	Three (3) 400 bbl Produced Water Tanks [1]	EPA Tanks 4.0.9d Emission Estimation Software, ProMax Process Simulation
EU-LOAD-COND	Condensate Truck Loading [2]	EPA AP-42 Emission Factors
EU-LOAD-PW	Produced Water Truck Loading [2]	EPA AP-42 Emission Factors
APC-COMB-TKLD	15.0 MMBTU/hr Vapor Combustor [3]	EPA AP-42 Emission Factors, TCEQ Air Permit Technical Guidance, Mass Balance

[1] Maximum annual emissions based on average daily production with rolling daily throughput total not to exceed maximum annual throughput.

[2] Maximum hourly based on average hourly truck loading rate.

[3] NOx and CO emission factors are from TCEQ Air Permit Technical Guidance for Flares and Thermal Oxidizers. PM emission factors are from EPA AP-42.

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: Control Device Efficiencies

Emission Unit	Pollutant	Control Device	Control Efficiency
EU-TANKS-COND, EU-TANKS-PW Storage Tanks	Volatile Organic Compounds	APC-COMB-TKLD	98.00 %
	Total HAPs		98.00 %
EU-LOAD-COND, EU-LOAD-PW Loadout Racks	Volatile Organic Compounds	Vapor Return/ APC-COMB-TKLD	69.00 %

Table 3: New/Modified Maximum Estimated Controlled Air Emissions

Emission Point ID	Emission Unit ID	Process Unit	Pollutant	Maximum Controlled Emission Rate	
				Hourly (lb/hr)	Annual (ton/year)
EP-ENG2	EU-ENG2	Kubota DG972-E2	Nitrogen Oxides	0.31	1.36
			Carbon Monoxide	5.55	24.31
			Particulate Matter-10	<0.01	0.02
			Volatile Organic Compounds	0.31	1.36
			Carbon Dioxide Equivalent	29	126
EP-TANKS-COND	EU-TANKS-COND	Three (3) Condensate Tanks 400-bbl each	Volatile Organic Compounds	1.08	4.72
			Ethylbenzene	<0.01	0.02
			n-Hexane	0.06	0.27
			Toluene	<0.01	0.02
			Xylenes	0.02	0.07
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	1.33	5.84
			Ethylbenzene	<0.01	0.02
			n-Hexane	0.03	0.34
			Toluene	<0.01	0.02
			Xylenes	0.01	0.02
			Carbon Dioxide Equivalent	0.02	0.09
EU-LOAD-PW	EP-LOAD-PW	Produced Water Truck Loading	Volatile Organic Compounds	<0.01	0.02
			Carbon Dioxide Equivalent	0.34	1.47
APC-COMB-TKLD	APC-COMB-TKLD	MRW Vapor Combustor	Nitrogen Oxides	2.07	9.07
			Carbon Monoxide	4.13	18.09
			Particulate Matter	0.04	0.18
			Volatile Organic Compounds	1.12	4.91
			n-Hexane	0.06	0.26

			Toluene	<0.01	0.02
			Ethylbenzene	<0.01	0.02
			Xylenes	0.02	0.09
			Carbon Dioxide Equivalent	1,757	7,694
EU-FUG	EP-FUG	Fugitive Emissions	Volatile Organic Compounds	0.57	2.50
			Ethylbenzene	<0.01	0.01
			n-Hexane	0.03	0.11
			Toluene	<0.01	0.01
			Xylenes	0.01	0.02
			Carbon Dioxide Equivalent	13	54

Table 4: Maximum Estimated Controlled Summarized PTE

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	13.17
Carbon Monoxide	44.64
Volatile Organic Compounds	19.50
Particulate Matter	1.07
Sulfur Dioxide	0.02
Formaldehyde	0.02
Ethylbenzene	0.07
n-Hexane	1.04
Toluene	0.07
Xylenes	0.26
Carbon Dioxide Equivalent	10,718

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.

SWN has one (1) vapor combustor at the State of WV DNR A pad. The vapor combustor is 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 an hourly particulate matter emissions rate of 0.04 lb/hr as can be seen in Table 3. 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 combustor 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)

The only pollutant which increases with the changes in this application is carbon monoxide. The increase of this pollutant will be 4.91 lb/hr and 21.51 tons/yr is less than the modification thresholds of 6 lb/hr and 10 tons/yr and is therefore eligible to be a Class II administrative update.

45CSR22 (Air Quality Management Fee Program)

This facility is a minor source and not subject to 45CSR30. This facility has a maximum horsepower capacity less than 1,000 hp and is a 9M source and is required to pay a $200 annual fee. SWN is required to keep their Certificate to Operate current.

40CFR60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE))

40CFR60.4230 states that a source that commenced construction after June 12, 2006 whose SI ICE was less than 500 hp and was manufactured on or after July 1, 2008 is

subject to this rule. SWN has proposed to install one (1) 23.6-HP SI ICE. Since the SI ICE that SWN will install was manufactured after January 1, 2011, SWN is subject to this rule.

EU-ENG2 is subject to this subpart due to the manufacturer's date of the engine. ENG001 is a certified engine and the Certificate on Conformity will be available in the file. To keep the designation of certified this engine must be operated and maintained to the manufacturer's emission-related written instructions and must keep records of conducted maintenance to demonstrate compliance.

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

EPA published in the Federal Register new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 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 two (2) natural gas wells that currently exist at the State of WV DNR A 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. The compliance date for these hydraulically fractured wells is October 15, 2012. SWN is required under §60.5410 to submit an initial notification, initial annual report, maintain a log of records for each well completion, and maintain records of location and method of compliance. §60.5420 requires SWN demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.

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.

There is one (1) reciprocating internal compressor associated with a 23.6 bhp engine located at the State of WV DNR A Pad. This engine will be delivered after the effective date of this regulation. However, §60.5365(c) states that 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. Therefore, all requirements regarding reciprocating compressors under 40 CFR 60 Subpart OOOO would not apply.

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:

- 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.

- Process vessels such as surge control vessels, bottoms receivers or knockout vessels.

- 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 compliance date for applicable storage vessels is October 15, 2013.

All six (3) EU-TANKS-COND tanks located at the State of WV DNR B Pad emit more than 6 tpy of VOC without controls (78.75 tpy each). SWN has proposed using a vapor combustor to reduce emissions below 6 tpy and is therefore not subject to this section.

40CFR63 Subpart ZZZZ (National Emissions 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.

The facility is a minor source of hazardous air pollutants (HAPS < 10 tpy of an individual HAP and < 25 tpy of aggregate HAPs) as can be seen in Table 3. The facility is therefore

considered an area source (§63.6585(c)). The engine is considered new stationary RICE (§63.6590(a)(2)(iii)) due to the installation date of the engine (EU-ENG2) being after June 12, 2006.

Stationary RICE subject to Regulations under 40 CFR Part 60 must meet the requirements of those subparts that apply (40 CFR 60 Subpart JJJJ, for spark ignition engines) if the engine is a new stationary RICE located at an area source (§63.6590(c)(1)). No additional requirements apply for this engine under this subpart.

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 2. 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 can be seen in Table 4.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates SWN's State of WV DNR A Pad meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Brooke County location should be granted a 45CSR13 construction permit for this proposed permitting action.

David Keatley

David Keatley
Permit Writer – NSR Permitting

February 26, 2015

Date