west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A166
Plant ID No.:	103-00105
Applicant:	SWN Production Company, LLC (SWN)
Facility Name:	Ridgetop Land Ventures Wellpad
Location:	Wetzel County
NAICS Code:	211111
Application Type:	Construction
Received Date:	June 4, 2015 – Resubmittal Received Date: June 29, 2015
Engineer Assigned:	William T. Rothwell II, P.E.
Fee Amount:	$1,500
Date Received:	June 8, 2015
Complete Date:	July 27, 2015
Due Date:	September 25, 2015
Applicant Ad Date:	June 10, 2015 – Resubmittal Ad Date: June 24, 2015
Newspaper:	*The Wetzel Chronicle*
UTM's:	Easting: 528.013 km Northing: 4,390.714 km Zone: 17
Description:	Application for a construction of a natural gas well pad consisting of five (5) GPUs, four (4) produced water tanks, four (4) condensate tanks, two (2) natural gas compressor engines, two (2) vapor recovery units, and truck loading.

PROCESS DESCRIPTION

The Ridgetop land Ventures wellpad will consist of three (3) wells. The facility is an oil and natural gas exploration and production facility, responsible for the production of condensate and natural gas. Storage of condensate and produced water will also occur on-site. Condensate, gas and water come from the wellhead to the production units, where the first stage of separation occurs. Fluids (condensate and produced water) will be sent to the heater treaters. The flash gas from the heater treaters will be captured, compressed, and sent into the pipeline using natural gas- fired engines. Produced water from the heater treaters flows into the produced water tanks.

Condensate flows from the heater treaters into the low pressure towers, where flash gas is recovered by the flash gas compressors and then compressed to the pipeline. The condensate then flows into the condensate storage tanks.

The natural gas stream will exit the facility for transmission via pipeline. Condensate and produced water are transported offsite via truck. Working, breathing and flashing vapors from the condensate and produced water storage tanks will be recovered by one of the two (2) vapor recovery units (VRUs). During periods of VRU downtime, vapors from both storage tanks will be routed to a combustor for control. The combustor has a destruction efficiency of at least 98%. The vapor combustor has natural gas-fired pilots to ensure a constant flame for combustion. Loading emissions will be controlled with vapor return, which has at least 70% capture efficiency, and will be routed to the VRUs.

The equipment on site will be:

- Two (2) 145-hp Caterpillar G3306 NA Engines w/ NSCR catalyst
- Five (5) 1.0 mmBTU/hr natural gas-fired GPU burners
- Two (2) 0.5 mmBTU/hr natural gas-fired heater treaters
- Four (4) 400-bbl Condensate Tanks Routed to VRUs with one vapor combustor
- Two (2) 400-bbl Produced Water Tanks Routed to VRUs with one vapor combustor
- One (1) 15.0 mmBTU/hr vapor combustor with one (1) 50-SCFH natural gas-fired pilot
- One (1) VRU powered by one (1) 92 HP GM Vortec engine w/ NSCR catalyst
- One (1) VRU powered by one (1) 77 HP Zenith 4.4L engine w/ NSCR catalyst
- Fugitive Emissions and Fugitive Haul Road Emissions

SITE INSPECTION

A site visit was conducted on 9/30/15 by James Robertson of DAQ Enforcement. "The area in general is remote with only a few scattered houses nearby. Construction was ongoing at the time of the site inspection and most of the equipment that will be permitted was already onsite and installed".

"There is one house near the pad that is very close to the 300' limit". However, SWN has obtained a waiver for the structure owned by Brad Carpenter. "I did not see any other houses or structures that would be within 300' of the pad".

From the Route 7 Staging area, take Brock Ridge (CR1/15) for 4 miles to the intersection with route 89. Turn right on Route 89 and travel 2 miles to Hollman Ridge (CR 1/17). Turn right on Hollman Ridge and travel 0.6 miles, then veer right onto Harland Ridge Road (CR1-19) and follow 0.7 miles and entrance is on the left.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Maximum controlled point source emissions listed below were calculated by SWN and reviewed for accuracy by the writer. Heater treater emissions were calculated using AP-42 emission factors. Engine emissions were calculated using manufacturer data as well as AP-42. Storage tank and loading emissions were calculated using direct measurement and AP-42.

Emission Unit	Pollutant	lb/hr	TPY
EU-ENGINE1 145-hp Caterpillar G3306 NA Engine w/Catalytic Converter	NOx	0.32	1.40
	CO	0.64	2.80
	VOC	0.24	1.05
	SO_2	<0.01	<0.01
	PM_{10}	0.02	0.09
	Formaldehyde	0.02	0.09
	CO_2e	155.19	679.73
EU-ENGINE2 145-hp Caterpillar G3306 NA Engine w/Catalytic Converter	NOx	0.32	1.40
	CO	0.64	2.80
	VOC	0.24	1.05
	SO_2	<0.01	<0.01
	PM_{10}	0.02	0.09
	Formaldehyde	0.02	0.09
	CO_2e	155.19	679.73
VRU-1 92-hp General Motors Vortec 5.7L NA Engine	NOx	0.20	0.89
	CO	0.41	1.78
	VOC	0.16	0.74
	SO_2	<0.01	<0.01
	PM_{10}	0.02	0.07
	Formaldehyde	0.02	0.07
	CO_2e	93	406
VRU-2 77-hp Zenith ZPP-644 4.4 L – L6 Engine	NOx	0.27	1.16
	CO	0.76	3.33
	VOC	0.29	1.27
	SO_2	<0.01	<0.01
	PM_{10}	0.02	0.10
	Formaldehyde	0.02	0.10
	CO_2e	140	613
EU-GPU1 to EU-GPU5 Five (5) 1.0-MMBtu/hr GPU Burners (Combined)	NOx	0.39	1.70
	CO	0.33	1.43
	VOC	0.02	0.09
	SO_2	<0.01	0.01
	PM_{10}	0.03	0.13
	CO_2e	586	2,565

EU-HT1 and EU-HT2 Two (2) 0.5-MMBtu/hr Heater Treaters (Combined)	NOx	0.08	0.34
	CO	0.07	0.29
	VOC	0.01	0.02
	SO_2	<0.01	<0.01
	PM_{10}	<0.01	0.03
	CO_2e	117	513
EU-TANKS-COND Four (4) 400-bbl Condensate Tanks Routed to Vapor Combustor	VOC	1.18	5.17
	Total HAP	0.03	0.14
EU-TANKS-PW Two (2) 400-bbl Produced Water Tanks routed to Vapor Combustor	VOC	0.07	0.30
	Total HAP	<0.01	<0.01
EU-LOAD-COND Condensate Truck Loading w/ Vapor Return routed to Combustor	VOC	10.90	47.73
	Benzene	<0.01	0.01
	Total HAP	0.27	1.17
EU-LOAD-PW Produced Water Truck Loading w/ Vapor Return routed to Combustor	VOC	0.61	2.96
	Benzene	<0.01	0.01
	Total HAP	<0.01	0.01
APC-COMB-TKLD One (1) 15.0 mm/BTU/hr Vapor Combustor – Loading Stream	NOx	1.17	5.13
	CO	0.98	4.31
	PM_{10}	0.09	0.39
	CO2e	1,764	7,728
EU-FUG Fugitive Emissions	VOC	0.64	2.80
	Total HAP	0.02	0.07
	CO_2e	116	507

The total facility potential to emit (PTE) is shown in the following table:

Pollutant	Facility Wide Emissions - TPY
NOx	12.02
CO	16.73
VOC	63.08
SO_2	0.05
PM_{10}	5.09
Total HAPs	2.60
CO_2e	13,966

REGULATORY APPLICABILITY

The proposed SWN natural gas production facility is subject to substantive requirements in the following state and federal air quality rules and regulations: 45CSR2, and 45CSR13. Each applicable rule (and ones that have reasoned non-applicability), and SWN's compliance therewith, will be discussed in detail below.

45CSR2: ***To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers***

The Heater Treaters (EU-HT1 & EU-HT2) have been determined to meet the definition of a "fuel burning unit" under 45CSR2 and are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the unit is less than 10 mmBtu/hr, it is not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the line heaters are subject to an opacity limit of 10%. Proper maintenance and operation of the unit (and the use of natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

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 construction of the Ridgetop Land Ventures natural gas production facility has a potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY and, therefore, pursuant to §45-13-2.24, the facility is defined as a "stationary source" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, SWN is required to obtain a permit registration under 45CSR13 for the construction and operation of the natural gas production facility.

As required under §45-13-8.3 ("Notice Level A"), SWN placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The initial ad ran on June 10, 2015, and the ad was ran for the second time after the resubmittal on June 24, 2015, in *The Wetzel Chronicle.*

45CSR22 Air Quality Management Fee Program

The Ridgetop Land Ventures Facility is not subject to 45CSR30. The facility is subject to 40CFR60 Subpart OOOO, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source, therefore, the facility is not subject and will pay its annual fees through the Rule 22 program.

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 two (2) 145 HP SI ICE's – Caterpillar G3306NA (EU-ENGINE1 & EU-ENGINE 2), one (1) 92 HP SI ICE – GM Vortec Engine (VRU-1), and one (1) 77 HP SI ICE – Zenith 4.4L Engine (VRU-2). Since all of the above engines were manufactured after 2008, SWN is subject to this rule.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for 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.

Owners and operators of new or reconstructed engines at areas sources must meet the requirements of Subpart ZZZZ by complying with either 40CFR60 Subpart IIII or Subpart JJJJ. Based on emissions calculations this facility is a minor source of HAP. The engines located at this facility were constructed after June 12, 2006 and are less than or equal to 500 hp. They are subject to NSPS Subpart JJJJ and comply with MACT Subpart ZZZZ by complying with the requirements in NSPS Subpart JJJJ.

40 CFR 60, Subpart OOOO Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011.

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

Gas well affected facilities are included in the G70-A general permit in Section 5.0.

b. For the natural gas production segment (between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not including natural gas processing plants), each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh.

There will be no pneumatic devices with a continuous bleed rate of greater than 6 scfh installed at this facility.

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, and has the potential for VOC emissions equal to or greater than 6 tpy as determined according to this section by October 15, 2013 for Group 1 storage vessels and by April 15, 2014, or 30 days after startup (whichever is later) for Group 2 storage vessels. A storage vessel affected facility that subsequently has its potential for VOC emissions decrease to less than 6 tpy shall remain an affected facility under this subpart.

The storage vessels located at this facility do have VOC emissions greater than 6 TPY. The storage vessels at this facility are classified as Group 2, meaning the storage vessels were constructed after April 12, 2013. SWN must reduce VOC emissions of storage vessels by 95% within 60 days after startup. SWN must also follow all compliance, control requirements, notification, recording keeping, and reporting requirements as laid defined in §60.5395. However, SWN has already stated they will be using a VRU with a 95% capture efficiency for the storage vessels, so the VOC emissions limitations will be met.

Non Applicability Determinations

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

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. All facilities are inspected by the DAQ Enforcement Section.

SWN predicts that there will be no objectionable odors or cause for objectionable odors present at the Ridgetop Land Ventures natural gas production facility.

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.

The facility-wide requirements of the general permit include the open burning limitations §§45-6-3.1 and 3.2.

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. Sections 5.0, 6.0 and 14.0 of the G70-A general permit include requirements for 45CSR6.

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.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

Pursuant to the exemption given under §45-10-10.1, as the MDHI of the Heater Treaters (EU-HT1 & EU-HT2) are less than 10 mmBtu/hr, the units are not subject to the substantive sections of 45CSR10.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration.

The facility-wide potential-to-emit of the Ridgetop Land Ventures natural gas production facility is below the levels that would define the source as "major" under 45CSR14 and, therefore, the construction evaluated herein is not subject to the provisions of 45CSR14.

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of "Building, structure, facility, or installation" as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

Ridgetop Land Ventures shares the same SIC code as several other well pads owned by SWN in the area. Therefore, the potential classification of the Ridgetop Land Ventures facility as one stationary source any other facility depends on the determination if these stations are considered "contiguous or adjacent properties."

"Contiguous or Adjacent" determinations are made on a case by case basis. These determinations are proximity-based, and it is important to focus on this and whether or not it meets the common sense notion of one stationary source. The terms "contiguous" or "adjacent" are not defined by USEPA. Contiguous has a dictionary definition of being in actual contact; *touching along a boundary or at a point.* Adjacent has a dictionary definition of not distant; nearby; *having a common endpoint or border.*

The Ridgetop Land Ventures natural gas production facility is not located contiguous with, or directly adjacent to any other SWN facility.

40 CFR 60 Subpart Kb ***Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984***

Pursuant to §60.110b, 40 CFR 60, Subpart Kb applies to "each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984." The largest storage tanks located at the Ridgetop Land Ventures facility are each 16,800 gallons, or 63.5 m^3. Therefore, Subpart Kb does not apply to any of the storage tanks.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Ridgetop Land Ventures 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_x), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM_{10}), Particulate Matter less than 2.5 microns ($PM_{2.5}$), and Sulfur Dioxide (SO_2). 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. SWN included the following HAPs as emitted in substantive amounts in their emissions estimate: Benzene, n-Hexane, Toluene, and Trimethylpentane The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Xylene	VOC	No	Inadequate Data
Trimethylpentane	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*.

AIR QUALITY IMPACT ANALYSIS

The estimated maximum emissions from the proposed Ridgetop Land Ventures 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 OF OPERATIONS

The following substantive monitoring, compliance demonstration, and record-keeping requirements (MRR) shall be required:

- For the purposes of demonstrating compliance with maximum limit for the aggregate production of condensate/liquids from the wells set forth in Section 4.0 of the general permit registration, SWN shall be required to monitor and record the monthly and rolling twelve month total of condensate/liquids (in gallons) produced in the wells. Monitoring and recording the monthly and rolling twelve month total of condensate/liquids (in gallons) unloaded from the storage tanks can be used to show compliance with this requirement.

- For the purposes of demonstrating compliance with visible emissions limitations set forth in Section 7.0 of the G70-A general permit, SWN shall be required to:

  (1) Conduct an initial Method 22 visual emission observation on the heater treaters to determine the compliance with the visible emission provisions. SWN shall be required to take a minimum of two (2) hours of visual emissions observations on the line heaters.

  (2) Conduct monthly Method 22 visible emission observations of the heater treater stack to ensure proper operation for a minimum of ten (10) minutes each month the line heaters are in operation.

  (3) In the event visible emissions are observed in excess of the limitations given under Section 7.5 of the G70-A general permit, SWN shall be required to take immediate corrective action.

- SWN shall be required to maintain records of all visual emission observations pursuant to the monitoring required under Section 7.2 of the G70-A general permit including any corrective action taken.

- SWN shall be required to report any deviation(s) from the allowable visible emission requirement for any emission source discovered during observations using 40CFR Part 60, Appendix A, Method 9 or 22 to the Director of the Division of Air Quality as soon as practicable, but in any case within ten (10) calendar days of the occurrence and shall include at least the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.

RECOMMENDATION TO DIRECTOR

Information supplied in the registration application indicates that compliance with all applicable regulations will be achieved. Therefore, it is the recommendation of the writer, that general permit G70-A166 for the construction of a natural gas production facility near New Martinsville, Wetzel County, be granted to SWN Production Company, LLC.

William T. Rothwell II, P.E.
Engineer

10/1/2015

Date