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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A177
Plant ID No.:	051-00222
Applicant:	Chevron Appalachia, LLC
Facility Name:	Berger Pad
Location:	Moundsville, Marshall County
NAICS Code:	211111
Application Type:	Construction
Received Date:	September 21, 2015
Engineer Assigned:	Roy F. Kees, P.E.
Fee Amount:	$4,000.00
Date Received:	September 23, 2015
Complete Date:	October 27, 2015
Due Date:	December 12, 2015
Applicant Ad Date:	September 22, 2015
Newspaper:	*Moundsville Daily Echo*
UTM's:	Easting: 520.510 km Northing: 4,413.910 km Zone: 17S
Description:	Application for a construction of a natural gas well pad consisting of eight (8) gas wells, eight (8) GPU line heaters, one (1) condensate line heater, one (1) 400 bbl test tank, one (1) temporary natural gas-fired RICE for vapor recovery, one (1) electric VRU, four (4) 400 bbl produced water tanks and truck loading.

DESCRIPTION OF PROCESS

This permit application is being filed by Chevron Appalachia, LLC (Chevron) and addresses operational activities associated with the Berger Pad A natural gas production site. Incoming raw natural gas from the wells enters the site through a pipeline. The raw gas is first routed through a line heater (BAP-0110, BAP-0210, BAP-0410, BAP-0510, BAP-0610, BAP-0810, BAP-0910, BAP-1010) to assist with the phase separation process in the downstream three-phase separator (MBD-0120, MBD-0220, MBD-0420, MBD-0520,

MBD-0620, MBD-0820, MBD-0920, MBD-1020). In the separators, produced water is removed from the raw gas and transferred to the produced water tank and test tanks (ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, ABJ-0014). Produced water flows from the separators to the test tank, where the tank acts as a separator. From the test tank, produced water flows to the four (4) produced water tanks. Condensate is removed from the raw gas in the separators and is transferred to the condensate flash vessel (MBD-0040). The condensate is routed through a line heater (BAP-0012) prior to the condensate flash vessel to aid in fluid separation. At these pressure and temperature conditions, light hydrocarbon constituents volatilize within the condensate flash vessel and are directed to the gas compression units (CBA-0050, CBA-1050). The permanent flash gas compressor (CBA-0050) will be an electric engine that will not generate emissions of regulated air pollutants. In order to handle the initial influx of fluids and associated volatilized hydrocarbons, Chevron Appalachia, LLC is proposing to install a second, temporary natural gas-fired flash gas compressor engine. The gas compressors increase the pressure of the recovered gas and are pumped into the natural gas sales line. The remaining condensate fluid flows from the condensate flash vessel to a condensate sales line. Two (2) electric condensate pumps are used to lift the condensate through the condensate sales line. From the phase separators, natural gas flows to the downstream sales pipeline. Emissions from the produced water and test tanks are directed to the electric vapor recovery unit (CBA-0055). As a second stage of compression, tank vapors are routed to the flash gas compressors and into the gas sales line. From the storage tanks, the produced water and blowdown fluids are pumped into tank trucks on an as needed basis and are disposed of off-site, with a maximum annual throughput of 50,021,000 gallons per year Vapors from the unloading of the tanks are directed to a vent stack (ZZZ-0011) and released to atmosphere. Emissions realized during VRU downtime, blowdown events, and emergency vents from the tanks located at the Berger Pad A Site are also directed to the vent stack. Various control systems are used at the site to monitor and regulate temperature, flow, and pressure. Other sources of emissions at the production site include fugitive component leaks and maintenance blowdowns.

Emissions from the facility's emission sources were calculated using the extended analysis of the condensate and produced water from Cavenney No.1H. These extended analysis are considered representative of the materials from Hamilton, being in the same Marcellus rock formation.

SITE INSPECTION

A site inspection was conducted on November 5, 2015 by James Robertson of the enforcement section. "There are scattered houses in the area but none within 300'. There was active fracking at the time of my visit but I walked the entire perimeter of the pad and saw no structures or dwellings that would be an issue. All are well over 300' away.

In my opinion this site is suitable for a General Permit."

The following are directions from downtown Moundsville to the Berger pad: Head west on 5th Street toward Morton Ave, turn left onto Tomlinson Ave, turn right onto 6th Street, turn left onto WV-2 S/Lafayette Ave, turn left onto State Route 2 Alternate, turn left onto Roberts Ridge Road, the access road will be on the left side approximately 3 miles down Roberts Ridge Road.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Maximum controlled point source emissions listed below were calculated by Chevron and reviewed for accuracy by the writer. Heater treater and combustor 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 ProMax, TANKS 4.0.9 and AP-42.

Emission Unit	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
BAP-0110,0210,0410,0510,0610,0810,0910,1010,0012 (9) 1.25 mmBtu/hr Heaters (Combined)	Nitrogen Oxides	0.90	3.87
	Carbon Monoxide	0.72	3.24
	Volatile Organic Compounds	0.05	0.18
	Sulfur Dioxide	<0.01	0.03
	Particulate Matter-10	0.06	0.27
	CO_2e	1,317.33	5,769.99
ABJ-0011 (A-D) ABJ-0014 (4) 400 bbl Produced Water and (1) Test Tank (Combined)	Volatile Organic Compounds	13.39	58.64
	Total HAPs	0.54	2.36

CBA-0050 625 hp Caterpillar G398TA	Nitrogen Oxides	0.28	1.21
	Carbon Monoxide	0.41	1.81
	Volatile Organic Compounds	0.28	1.21
	Sulfur Dioxide	<0.01	0.01
	Particulate Matter - 10	0.05	0.21
	Formaldehyde	0.10	0.44
ZZZ-0011 P.W. Loading	Volatile Organic Compounds	0.07	1.02
	Total HAPs	<0.01	<0.01
Fugitives F001	Volatile Organic Compounds	0.23	1.02
	Total HAPs	0.01	0.06

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

Pollutant	**Facility Wide Emissions (tons/year)**
Nitrogen Oxides	5.04
Carbon Monoxide	5.03
Volatile Organic Compounds	62.38
Particulate Matter-10/2.5	0.50
Sulfur Dioxide	0.04
Total HAPs	2.99
Carbon Dioxide Equivalent	6,720.84

REGULATORY APPLICABILITY

The proposed Chevron 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 Chevron'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 Heaters (BAP-0110, 0210, 0410, 0510, 0610, 0810, 0910, 1010, 0012) 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 Berger 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, Chevron 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"), Chevron placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on September 22, 2015 in *The Moundsville Daily Echo.*

45CSR22 Air Quality Management Fee Program

The Berger 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.

40 CFR 63, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

The CAT G398TAA Compressor Engine is subject to the requirements of 40 CFR 63 Subpart ZZZZ. The engine was manufactured prior to June 12, 2006 and has not been reconstructed or modified. The engine qualifies as a 4 stroke rich burn Spark Ignition (SI) Internal Combustion Engine (ICE). The engine is not classified as a black start or emergency engine. The Berger well site does not qualify as a remote side, since there are five of more buildings intended for human occupancy within a 0.25 mile radius of the engine. With a brake horsepower rating of 625, this engine is subject to the requirements of 63.6603(a), as outlined in Table 2d.12. The requirements for non-emergency, non-black start, non-remote 4SRB stationary RICE with more than 500 hp are as follows:

- Install NSCR to reduce HAP emissions from the stationary RICE.

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

Subpart OOOO applies to facilities that commence construction, reconstruction, or modification after August 23, 2011 (October 15, 2012 for well completions). Since the Berger pad will begin operation after August 23, 2011 it is subject to the requirements of Subpart OOOO. The tanks at the Berger facility will utilize a combustor, therefore the tanks will not have the potential to emit more than 6 tpy of VOC's, therefore the tanks will not be subject to the rule. The site will also include pneumatic controllers that were ordered and installed after August 23, 2011, therefore the controllers will be subject to the applicable provisions of Subpart OOOO. The proposed controllers have a bleed rate of 6.6 scf/day. The gas wells at the Berger pad will also be affected facilities subject to Subpart OOOO.

Non Applicability Determinations

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 (H001-H010) 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 Berger 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).

Berger shares the same SIC code as several other well pads owned by Chevron in the area. Therefore, the potential classification of the Berger 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 Berger natural gas production facility will operate with the same two-digit SIC code as a co-located Williams OVM facility, however the facilities are separately owned and operated. For this reason, emissions from the Chevron production sources at the Berger site and from the Williams OVM gathering system equipment (e.g., their compressors, dehydration units, and ancillary equipment) should not be aggregated for purposes of determining applicability of Clean Air Act Title I or Title V permitting programs or West Virginia's air permitting regulations. Even if the sources are at contiguous/adjacent property, these operations are separately owned and operated and are not under the control of the same person or persons under common control.

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

The natural gas-fired flash gas compressor that will be installed at the Berger natural gas production facility is not subject to the requirements of this Rule. The engine is a non-emergency spark ignition internal combustion engine with less than 500 bhp that will be installed at the site in 2015 but was constructed prior to June 12, 2006 (§60.4230(a)(4)(iii)). Please note that the engine has not been reconstructed or modified after June 12, 2006.

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 Berger 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 Berger 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. Chevron 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 Berger 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, Chevron 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, Chevron 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. Chevron 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, Chevron shall be required to take immediate corrective action.

- Chevron 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.

- Chevron 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 modification G70-A177 for the construction of a natural gas production facility near Moundsville, Marshall County, be granted to Chevron Appalachia, LLC.

Roy F. Kees, P.E.
Engineer - NSR Permitting

11/10/15
DATE