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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A082A
Plant ID No.:	103-00073
Applicant:	EQT Production Company (EQT)
Facility Name:	Big 192 Wellpad
Location:	Jacksonburg, Wetzel County
NAICS Code:	211111
Application Type:	Modification
Received Date:	October 13, 2015
Engineer Assigned:	Roy F. Kees, P.E.
Fee Amount:	$4,000.00
Date Received:	October 19, 2015
Complete Date:	November 16, 2015
Due Date:	December 31, 2015
Applicant Ad Date:	October 21, 2015
Newspaper:	The Wetzel Chronicle
UTM's:	Easting: 535.8 km Northing: 4,375.4 km Zone: 17
Description:	Modification to add two (2) additional wells, one (1) enclosed combustor, four (4) 400 bbl storage tanks, one (1) 140 bbl sand separator tank, two (2) line heaters, three (3) thermoelectric generators and one (1) 100 bbl dehy drip tank.

DESCRIPTION OF PROCESS

The following process description was included with Registration Application G70-A082A:

The project involves the construction and operation of two (2) line heaters, four (4) storage vessels for produced fluids, one (1) enclosed combustor, three (3) thermoelectric generators, one (1) sand separator tank, and one (1) dehydrator drip tank at an existing natural gas production wellpad operation (BIG-192). The project also seeks to increase the liquid throughputs at the wellpad.

The wellpad currently consists of multiple wells (total of 18), each with the same basic operation. The incoming gas stream from the underground wells passes through a sand separator, where sand, water and residual solids are displaced and transferred to the sand separator tank. The gas then flows into a three phase separator which separates water and condensate from the gas stream. The water and condensate in the separator is transferred to storage vessels. Emissions from the storage vessels will be controlled by three (3) enclosed combustors (C001-C002 and C004). The wet gas is processed through a tri-ethylene glycol dehydrator prior to sending to the gas line. Liquids from the dehydrator contact tower, BTEX blow case and flash gas tank are transferred to the dehydrator drip tank. Emissions from the dehydrator unit is controlled by a separate enclosed combustor (C003), while emissions from the dehydrator drip tank will be controlled by the three (3) enclosed combustors that control the tanks (C001-C002 and C004). Once the tanks (i.e., sand separator, condensate, and dehydrator drip tank) are filled, the contents are loaded into trucks for transport. Liquid loading for the condensate tanks is vapor balanced. The recovered vapors are routed to the combustors. At the wellpad, heat is provided by line heaters, and electricity is provided by thermoelectric generators.

SITE INSPECTION

A site inspection of the proposed facility was conducted by Doug Hammell of the DAQ Enforcement Section on October 9, 2013. The site was deemed appropriate for the proposed facility. The closest residence is approximately 2,800 ft away NNW.

From Jackonsburg, WV, head south on WV-20S to Co. Rd. 7/6/Richwood Run Road and travel 0.3 miles. Turn left onto Co. Rd. 7/6/Richwood Run Road and travel 1.9 miles. Make a slight right to stay on Co. Rd. 7/6/Richwood Run Road and travel approximately 1.4 miles. The facility will road will be on the right.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Maximum controlled point source emissions listed below were calculated by EQT and reviewed for accuracy by the writer. Fugitive emissions of VOC and HAPs from leaking components were estimated using facility estimated component counts and types with EPA emission factors. Emission factors used are based on average measured total organic carbon (TOC) from component types. Greenhouse gas emissions from component leaks were calculated according to the procedures in 40CFR98 Subpart W.

The following table indicates which methodology was used in the emissions determination:

Emission Unit ID#	Process Equipment	Calculation Methodology
S001-S012, S026-S029, S038-S041, S042, S048	Twenty (20) 400 bbl (16,800 gal) Condensate Storage Tanks, One (1) 140 bbl Sand Separator Tank and one (1) 100 bbl Dehy Drip Tank	E&P Tanks, EPA Tanks 4.09d
S013 - S023, S030 - S034, S043-S044	Eighteen (18) 1.54 MMBTU/hr Line Heaters	EPA AP-42 Emission Factors
S024, S025, S045-S047	Two (2) 0.029 MMBTU/hr and three (3) 0.013 MMTU/hrThermoelectric Generators	EPA AP-42 Emission Factors
L001	Condensate Truck Loading (60,871,608 gal/yr)	EPA AP-42 Emission Factors
C001, C002, C003, C004	Vapor Combustors	EPA AP-42 Emission Factors
S035	Glycol Dehydration Unit Still Vent	GRI GlyCalc 4.0
S036	Glycol Dehydration Unit Reboiler	EPA AP-42 Emission Factors

The total facility potential to emit (PTE) for the Big 192 Pad is shown in the following table:

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	30.42
Carbon Monoxide	25.56
Volatile Organic Compounds	44.75
Particulate Matter-10	2.31
Particulate Matter-2.5	2.31
Sulfur Dioxide	0.18
Total HAPs	6.57
Carbon Dioxide Equivalent	44,081

Maximum detailed controlled point source emissions were calculated by EQT and checked for accuracy by the writer and are summarized in the table on the next page.

Emission Unit	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
S001-S012, S026-S029, S038-S041, S048 (20) 400 bbl Storage Tanks, Dehy Drip Tank and Loading with Combustors (C001, C002, C004) (Combined)	Nitrogen Oxides	3.64	15.93
	Carbon Monoxide	3.05	13.37
	Volatile Organic Compounds	1.88	8.24
	Sulfur Dioxide	0.02	0.10
	Particulate Matter-10	0.28	1.22
	CO_2e	4,955	21,700
S042 Sand Separator Tank	Volatile Organic Compounds	0.12	0.53
	Total HAPs	0.01	0.06
S013-S023, S030-S034, S043-S044 (18) 1.54 MMBTU/hr Line Heaters	Nitrogen Oxides	2.38	10.43
	Carbon Monoxide	2.00	8.76
	Volatile Organic Compounds	0.13	0.57
	Sulfur Dioxide	0.01	0.06
	Particulate Matter - 10	0.18	0.79
	CO_2e	3,244	14,206
S024-S025, S045-S047 (2) 0.029 & (3) 0.013 MMBTU/hr Thermoelectric Generators	Nitrogen Oxides	0.01	0.04
	Carbon Monoxide	0.01	0.03
	Volatile Organic Compounds	<0.01	<0.01
	Sulfur Dioxide	<0.01	<0.01
	Particulate Matter - 10	<0.01	<0.01
	CO_2e	12	50
S027 Liquids Loading (Uncaptured)	Volatile Organic Compounds	0.29	1.26
	Total HAPs	0.01	0.03

Fugitives	Volatile Organic Compounds	4.31	18.86
	Total HAPs	0.09	0.39
	CO_2e	528	2,309
S035 130 MMSCF/Day Dehydrator with Combustor C003	Nitrogen Oxides	0.72	3.16
	Carbon Monoxide	0.61	2.66
	Volatile Organic Compounds	3.48	15.25
	Sulfur Dioxide	<0.01	0.02
	Particulate Matter - 10	0.09	0.24
	CO_2e	1,058	4,634
	Benzene	0.11	0.47
	Toluene	0.37	1.61
	Ethylbenzene	0.27	1.20
	Xylenes	0.39	1.72
	n-Hexane	0.01	0.05
	Total HAPs	1.16	5.06
S036 2.31 MMBTU/hr Reboiler	Nitrogen Oxides	0.20	0.87
	Carbon Monoxide	0.17	0.73
	Volatile Organic Compounds	0.01	0.05
	Sulfur Dioxide	<0.01	0.01
	Particulate Matter - 10	0.02	0.07
	CO_2e	271	1,184

REGULATORY APPLICABILITY

The proposed modifications are subject to substantive requirements in the state and federal air quality rules and regulations listed. Each applicable rule (and ones that have reasoned non-applicability) are reviewed below.

45CSR2 (To Prevent and Control 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) million B.T.U.'s per hour 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.

The individual heat input of the proposed fuel burning units (S013-S023, S030-S034, S043-S044 & S036) are below 10 MMBTU/hr. Therefore, this unit is exempt from the aforementioned sections of 45CSR2. However, EQT would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

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.

This permitting action proposes one (1) additional vapor combustor at the Big 192 Wellpad. The vapor combustor has negligible particulate matter emissions. 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.

45CSR10 (To Prevent and Control Air Pollution from the Emissions of Sulfur Oxides)

45CSR10 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 3 (weight emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting). 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.

The individual heat inputs of the proposed fuel burning unit (S013-S023, S030-S034, S043-S044 & S036) are below 10 MMBTU/hr. Therefore, this unit is exempt from the aforementioned sections of 45CSR10.

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 Big 192 Wellpad natural gas production facility meets the definition of a 'stationary source' under 45CSR13 because it is subject to substantive requirements as referenced in 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, EQT 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"), EQT placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The Class I legal advertisement was published on October 21, 2015 in *The Wetzel Chronicle*.

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to this source because they are subject to 40CFR60 Subpart OOOO.

45CSR22 (Air Quality Management Fee Program)

The Big 192 Wellpad 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 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 Big 192 Wellpad began operation after August 23, 2011 it is subject to the requirements of Subpart OOOO. The tanks at the Big 192 Wellpad will utilize a vapor combustor to control emissions, therefore the tanks will not have the potential to emit more than 6 tpy of VOC's, and will not be subject to the rule. The gas wells at the Big 192 Wellpad will also be affected facilities subject to Subpart OOOO.

40CFR63 Subpart HH (National Emission Standards for Hazardous Air Pollutants for Oil and Natural Gas Production Facilities)

Subpart HH establishes national emission limitations and operating limitations for HAPs emitted from oil and natural gas production facilities located at major and area sources of HAP emissions. The glycol dehydration unit at the Big 192 Wellpad is subject to the area source requirements for glycol dehydration units. However, because the facility is an area source of HAP emissions and the actual average benzene emissions from the glycol dehydration unit is below 0.90 megagram per year (1.0 tons/year) it is exempt from all requirements of Subpart HH except to maintain records of actual average flowrate of natural gas to demonstrate a continuous exemption status.

Non Applicability Determinations

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

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).

With the issuance of R13-3123A, a source aggregation determination was made at that time that the Big 192 Wellpad emissions would not be aggregated with other facilities. The Big 192 Wellpad shares the same SIC code as several other well pads owned by EQT in the area. Therefore, the potential classification of the Big 333 Wellpad 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 a plant. 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 Big 333 Pad and Big 192 Pad are located approximately 0.5 miles from each other. EQT has cut an access road that leads from the Big 333 Pad to the Big 192 Pad. There is no other way to access the Big 192 Pad without the access road that was non-existent prior to this development. There is no other development or housing associated with this access road. It is the opinion of the writer that these facilities are located on 'adjacent' properties.

Therefore, the facilities meet all three (3) prongs to be considered the same "Building, structure, facility, or installation". Therefore, the emissions from these facilities have been aggregated in determining major source or PSD status.

The total facility PTE for the Big 192 Pad, **including the Big 333 Pad** is shown in the following table:

Pollutant	**Facility Wide PTE (tons/year)**
Nitrogen Oxides	45.64
Carbon Monoxide	38.35
Volatile Organic Compounds	60.89
Particulate Matter-10	2.93
Sulfur Dioxide	0.27
Formaldehyde	0.01
Total HAPs	7.18
Carbon Dioxide Equivalent	65,580

As shown in the following table, EQT is not subject to 45CSR14 or 45CSR19 review. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, the fugitive emissions are not included in the PTE below.

Pollutant	**PSD (45CSR14) Threshold (tpy)**	**NANSR (45CSR19) Threshold (tpy)**	**Big 192 & Big 333 PTE (tpy)**	**45CSR14 or 45CSR19 Review Required?**
Carbon Monoxide	250	NA	38.35	No
Nitrogen Oxides	250	NA	45.64	No
Sulfur Dioxide	250	NA	0.27	No
Particulate Matter 10	250	NA	2.93	No
Ozone (VOC)	250	NA	60.89	No

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 (m3) 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 Big 192 Wellpad are each 16,800 gallons, or 63.5 m^3. Therefore, Subpart Kb does not apply to any of the storage tanks.

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.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Big 192 Wellpad 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. EQT included the following HAPs as emitted in substantive amounts in their emissions estimate: Benzene, n-Hexane, Toluene, and Ethylbenzene. 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
Ethylbenzene	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 Big 192 Wellpad 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, EQT 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, EQT shall be required to:

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

b. 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.

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

- EQT 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.

- EQT 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.

- EQT shall be required to maintain records of actual average flowrate of natural gas to demonstrate a continuous exemption status for the glycol dehydration unit under 40CFR63 Subpart HH.

RECOMMENDATION TO DIRECTOR

The information provided in the registration application indicates EQT's Big 192 Wellpad meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Wetzel County location should be granted a G70-A Modification for this proposed permitting action.

Roy F. Kees, P.E.
Engineer

12/3/15
Date