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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3095A
Plant ID No.:	017-00058
Applicant:	EQM Gathering Opco, LLC
Facility Name:	Pandora Station
Location:	Doddridge County
NAICS Code:	211111
Application Type:	Modification
Received Date:	March 30, 2015
Engineer Assigned:	Steven R. Pursley, PE
Fee Amount:	$1,000.00
Date Received:	April 8, 2015
Complete Date:	April 30, 2015
Due Date:	July 29, 2015
Applicant Ad Date:	March 31, 2015
Newspaper:	*The Herald Record*
UTM's:	Easting: 525.32 km Northing: 4,357.16 km Zone: 17
Description:	Application to increase the permitted throughputs of two produced fluids tanks, reduce the size of two vapor combustors and install a methanol tank, fuel heater and and vapor combustor.

DESCRIPTION OF PROCESS

Natural gas will enter the station via a distribution pipeline system and is first compressed, using one of four natural gas fired compressors rated at 4,735 hp (2 units) and 2,370 hp (2 units). The compressed natural gas stream will then be processed through one of two triethylene glycol (TEG) dehydration units (each rated at 120 mmscfd) with associated reboilers and controlled with enclosed vapor combustors (each rated at 3 mmbtu/hr). The dehydration unit introduces TEG to the gas stream in a contact tower to absorb water vapor from the gas to a level not exceeding 7 pounds per million cubic feet.

The glycol is then sent to the natural gas-fired reboiler, rated at 2.31 mmbtu/hr of heat input. The water is evaporated from the glycol in the reboiler and exhausted and then the glycol is sent back to the contact tower. The natural gas stream from the contact tower flows into the pipeline to be transported further along the distribution system via the sales pipeline. The station will also be equipped with ten small storage tanks designed to support the engines, dehydration unit and pipeline fluids.

SITE INSPECTION

No site inspection of the facility was deemed necessary for this permitting action. However, a site inspection of the proposed site was performed by the writer for the original permit application. The following narrative comes directly from Engineering Evaluation R13-3095:

"*A site inspection of the facility was performed by the writer on September 5, 2013. The facility will be located in a rural section of Doddridge County along Brush Run Road. There are several residences adjacent to the facility. To get to the facility from Charleston take I-77 north to exit 176. Turn east on US Route 50 and go approximately 43.2 miles. Then turn left on State Route 18 and go approximately 0.5 miles. Turn right and go over the bridge. At the end of the bridge turn right on Smithton Road (County Route 30/50) and go approximately 1.0 mile. Then turn left on Rock Run Road (County Route 5) and go approximately 5.3 miles. At the stop sign turn left on Big Flint Road (County Route 3) and go approximately 1.6 miles. Next, turn right on Brush Run Road (County Route 3/1). Go approximately 1.0 mile and the access road should be on the right. It should be noted that no access road currently exists at this entry point. Since EQT has numerous new and existing wells in the area, there may or may not be existing access roads to the site from other entry points. The following picture of the area was taken on the day of the inspection. The facility will be located at the top of the hill in the background (obscured by trees), not the field in the foreground.*"

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Existing facility wide emissions are as follows (based on Engineering Evaluation R13-3095):

CO		NO_x		PM		SO_2		VOCs		HAPs
lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	tpy
11.44	50.15	18.49	81.02	1.37	5.70	0.19	0.45	16.67	58.99	22.73

Emissions from the parts of the facility effected by this modification are as follows. Note that VOC emissions included in the vapor combustor tables represent ONLY the emissions due to the combustion of the gas. Uncombusted VOC emissions (95% control efficiency) from the tanks are included in the tank tables. Uncombusted VOC emissions from the dehy were included in the emissions from the dehy (which is not being modified in this application).

Existing Vapor Combustor Emissions (two12mmbtu/hr combusters)

Pollutant	Source	Hourly (lb/hr)	Annual (ton/yr)
NO_x	AP-42	2.12	9.30
CO	AP-42	1.78	7.80
$PM/PM_{10}/PM_{2.5}$[1]	AP-42	0.16	0.70
VOCs	AP-42	0.06	0.25
SO_x	AP-42	0.01	0.06

(1) Filterable + Condensable.

New Vapor Combustor Emissions (two 3 mmbtu/hr combusters & one 41 mmbtu/hr combustors)

Pollutant	Source	Hourly (lb/hr)	Annual (ton/yr)
NO_x	AP-42	4.17	18.20
CO	AP-42	3.49	15.30
$PM/PM_{10}/PM_{2.5}$[1]	AP-42	0.32	1.39
VOCs	AP-42	0.11	0.49
SO_x	AP-42	0.02	0.12

(1) Filterable + Condensable.

Vapor Combustor increases:

Pollutant	Source	Hourly (lb/hr)	Annual (ton/yr)
NO_x	AP-42	2.05	8.90
CO	AP-42	1.71	7.50
$PM/PM_{10}/PM_{2.5}$[1]	AP-42	0.16	0.69
VOC	AP-42	0.05	0.24
SO_x	AP-42	0.01	0.06

(1) Filterable + Condensable.

New Line Heater

Pollutant	Source	Hourly (lb/hr)	Annual (ton/yr)
NO_x	AP-42	0.07	0.30
CO	AP-42	0.06	0.25
VOC	AP-42	0.01	0.02

Pollutant	Source	Hourly (lb/hr)	Annual (ton/yr)
$PM/PM_{10}/PM_{2.5}$[1]	AP-42	0.01	0.02
SO_x	AP-42	0.01	0.01
Total HAPs	AP-42	0.01	0.01

New Methanol Tank

Pollutant	Source	Hourly (lb/hr)	Annual (ton/yr)
VOCs	TANKS4.0.9d	0.01	0.02
Total HAPs	TANKS4.0.9d	0.01	0.02

Existing Produced Fluids Tanks Throughput PTE (two tanks combined)

Pollutant	Source	Hourly (lb/hr)	Annual[2] (ton/yr)
VOCs	CHEMCAD 6.5.2/TANKS4.0.6d[1]	0.30	0.64
Total HAPs	CHEMCAD 6.5.2/TANKS4.0.6d[1]	0.02	0.02

[1]CHEMCAD for flashing emissions, TANKS for working and breathing losses.
[2]Based on 10,000 gallons of produced fluids per year (1,000 gallons of condensate/yr)

New Produced Fluids Tank Throughput PTE[1] (two tanks combined)

Pollutant	Source	Hourly (lb/hr)	Annual[2] (ton/yr)
VOCs	E&P TANK v2.0	0.14	0.58
Total HAPs	E&P TANK v2.0	0.01	0.02

[1]Assumes 95% control efficiency for enclosed combuster
[2]Based on 105,000 gallons of produced fluids per year.

Decrease in PTE from Produced Fluids Tanks (two combined)

Pollutant	Hourly (lb/hr)	Annual (ton/yr)
VOCs	-0.16	-0.06
Total HAPs	-0.01	0.00

Existing Liquids Loading Losses

Pollutant	Source	Hourly (lb/hr)	Annual[1] (ton/yr)
VOC	AP-42	1.00	0.01

[1]Based on 20,000 gallons per year of total produced fluids, submerged loading and 10 hours per year of total loading time since no hourly emissions or loading time was given. No vapor return system was proposed so emissions are uncontrolled.

New Liquids Loading Losses

Pollutant	Source	Hourly (lb/hr)	Annual[1] (ton/yr)
VOC	AP-42	5.00	0.05

[1]Based on 210,000 gallons per year of total produced fluids, submerged loading and 10 hours per year of total loading time since no hourly emissions or loading time was given. No vapor return system was proposed so emissions are uncontrolled.

Increase in Liquids Loading Losses

Pollutant	Hourly (lb/hr)	Annual (ton/yr)
VOC	4.00	0.04

Therefore the total **increase** in emissions due to this modification will be as follows:

Source	CO		NO_x		PM/PM_{10}		SO_2		VOCs		HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Vapor Combustors	1.71	7.50	2.05	8.90	0.16	0.69	0.01	0.06	0.05	0.24	--	--
New Line Heater	0.06	0.25	0.07	0.30	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01
New Methanol Tank	--	--	--	--	--	--	--	--	0.01	0.02	0.01	0.02
Prod. Fluids Tanks	--	--	--	--	--	--	--	--	-0.16	-0.06	-0.01	0.00
Loading Losses	--	--	--	--	--	--	--	--	4.00	0.04	--	--
Total	**1.77**	**7.75**	**2.12**	**9.20**	**0.17**	**0.71**	**0.02**	**0.07**	**3.91**	**0.26**	**0.01**	**0.03**

The total PTE of the new facility will be as follows:

CO		NO_x		PM		SO_2		VOCs		HAPs[1]
lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	tpy
13.21	57.90	20.61	90.22	1.54	6.41	0.21	0.52	20.53	59.01	23.10

[1]HAP emissions do not equal existing facility + increase because the application includes all HAPs whereas

the previous engineering evaluation only summed the individual HAPs which were emitted in quantities greater than 0.01 tpy. Had the original engineering evaluation included all HAPs, the new total of 23.10 tpy would represent a decrease of 0.55 tpy.

REGULATORY APPLICABILITY

The modifications to the proposed Pandora Station are subject to the following substantive state and federal air quality rules: 45CSR6, 45CSR13, and 40 CFR 60 Subpart OOOO. Each applicable rule (and those that have questionable non-applicability) and EQM's compliance therewith will be discussed in detail below.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

EQM has proposed flaring for control of the waste gas produced from GDU and from the produced liquids tanks. The vapor combustor that will control emissions from the produced liquids tank is a new 41mmbtu/hr flare. The two vapor combustors that will control emissions from the GDU are new, down sized flares. The vapor combustors meet the definition of an "incinerator" under 45CSR6 and is, therefore, subject to the requirements therein. The substantive requirements applicable to the vapor combustors are discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Where, the factor, F, is as indicated in Table I below:

Table I: Factor, F, for Determining Maximum Allowable Particulate Emissions

Incinerator Capacity	Factor F
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

Based on information included in the application, the maximum vapor mass sent to each 3 mmbtu/hr vapor combustor will be 94.8 lbs/hr (back calculated from controlled emissions from the still vent and flash vent and assuming a 95% control efficiency). Based on the above equation, the particulate matter limit of the vapor combustor is 0.26 lbs/hr. Particulate matter emissions from each vapor combustor are expected to be 0.02 pounds per hour.

Based on information included in the application, the maximum vapor mass sent to the 41 mmbtu/hr vapor combustor will be 1,294 lb/hr (given 0.5983 mmscf of gas per day and 20 lb/mol for the waste stream and assuming 1 mol of gas per 385 scf). Based on the

above equation, the particulate matter limit of the vapor combustor is 3.51 lbs/hr. Particulate matter emissions from the vapor combustor are expected to be 0.28 pounds per hour.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, the vapor combustor has a 20% limit on opacity during operation. Proper design and operation of the vapor combustor should prevent any substantive opacity from the vapor combustors.

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 proposed modification of the Pandora Station has a potential to emit in excess of six (6) lbs/hour and ten (10) TPY of a regulated pollutant and, therefore, pursuant to §45-13-2.24, the modification 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, EQM is required to obtain a permit under 45CSR13 for the modification and operation of the facility.

As required under §45-13-8.3 ("Notice Level A"), EQM placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on March 31, 2015 in the *Herald Record* and the affidavit of publication for this legal advertisement was submitted on April 10, 2015.

45CSR30: Requirements for Operating Permits - (NON APPLICABILITY)

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The modified Pandora Station does not meet the definition of a "major source under §112 of the Clean Air Act" as outlined under §45-30-2.26 and clarified (fugitive policy) under 45CSR30b. The proposed facility-wide PTE of any regulated pollutant does not exceed 100 TPY. Additionally, the facility-wide PTE does not exceed 10 TPY of any individual HAP or 25 TPY of aggregate HAPs.

However, as the facility is subject to two New Source Performance Standard (NSPS) - 40 CFR 60, Subpart JJJJ and Subpart OOOO - and two Maximum Achievable Control Technology (MACT) rules - 40 CFR 63, Subpart ZZZZ and 40 CFR 63, Subpart HH, the facility would, in most cases, be subject to Title V as a "deferred source." However, pursuant to §60.4230(c), §60.5370(c), §63.6585(d), and §63.760(h) as a non-major "area

source," EQT is not required to obtain a Title V permit for the proposed facility. Therefore, the Pandora Station is not subject to 45CSR30.

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

On April 27, 2012, the USEPA issued a final rule (Federal Register Date: August 16, 2012) that consists of federal air standards for natural gas wells that are hydraulically fractured, along with requirements for several other sources of pollution in the oil and gas industry that currently are not regulated at the federal level. Each potentially applicable section of Subpart OOOO is discussed below.

Compressor Engines

EQM is not proposing to install any compressor engines under this modification.

Pneumatic Controllers

EQM is not proposing to install any pneumatic controllers under this modification.

Storage Tanks

Pursuant to §60.5365(e), for "[e]ach 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" that is constructed after August 23, 2011 and, pursuant to §60.5395 has "VOC emissions equal to or greater than 6 tpy" must meet the control requirements under §60.5395 as of October 15, 2013. The substantive requirement is to "reduce VOC emissions by 95.0 percent or greater."

EQM is proposing to significantly increase throughput to two storage tanks with this modification. However, controlled emissions from each tank will still not exceed 6 tpy.

40 CFR 63 Subpart HH: National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities

On June 1, 2013 the DAQ took delegation of the area source provisions of 40 CFR 63, Subpart HH. Pursuant to §63.760(a)(3), as the Pandora Station - an area source of HAPs - "process[es], upgrade[s], or store[s] natural gas prior to the point at which natural gas enters the natural gas transmission and storage source category or is delivered to a final end user," it is defined as an area source subject to the applicable provisions under Subpart HH.

Pursuant to §63.760(b)(2), each TEG GDU located at an area source that meets the requirements under §63.760(a)(3) is defined as an affected facility under Subpart HH. The requirements for affected sources at area sources are given under §63.764(d). However,

for a GDU, exemptions to these requirements are given under §63.764(e): if (1) "actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters [3 mmscf/day] per day" or (2) "actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram [1 TPY] per year."

The maximum PTE of benzene emissions from each GDU process vent is 0.41 TPY (unchanged from the original application). Therefore, the GDUs are exempt from the Subpart HH requirements given under §63.764(d).

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Pandora natural gas gathering 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. EQM included the HAPs listed in the following table as emitted in substantive amounts (at least 0.01 lb/hr or 0.01 tpy) in their emissions estimate in the original permit application (R13-3095). The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
1,1,2,2-tetrachloroethane	VOC	Yes	Category C - Possible Human Carcinogen
2,2,4-trimethylpentane	VOC	No	Inadequate Data
Acetaldehyde	VOC	Yes	Category B2 - Probable Human Carcinogen
Acrolein	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Biphenyl	VOC	No	Category D - Not Classifiable as to Human Carcinogenity
Carbon Tetrachloride	VOC	Yes	Category B2 - Probable Human Carcinogen
Ethylbenzene	VOC	No	Category D - Not Classifiable as to Human Carcinogenity
Ethylene Dibromide	VOC	Yes	Category B2 - Probable Human Carcinogen
Formaldehyde	VOC	Yes	Category B1 - Probable Human Carcinogen
Methanol	VOC	No	Not Assessed
Naphthalene	VOC	Yes	Category C - Possible Human Carcinogen
n-Hexane	VOC	No	Inadequate Data
Toluene	VOC	No	Inadequate Data
Trimethylpentane	VOC	No	Inadequate Data
Xylene	VOC	No	Inadequate Data

AIR QUALITY IMPACT ANALYSIS

Since this is a minor modification to an existing source that is not major (as defined in 45CSR14) no modeling was performed.

MONITORING OF OPERATIONS

No monitoring above that which is already required in R13-3095 is deemed necessary except that the same monitoring requirements applicable to the originally proposed vapor combustors will also be applied to the new vapor combustors.

CHANGES TO PERMIT R13-3095

* The permit was put into the most recent boilerplate

* The Methanol tank and new line heater were added to Table 1.0.

* Vapor Combustor 7C was added as a control on the produced fluids tank in Table 1.0.

* A typo was corrected in condition 4.1.6.b. The CO emission limit was incorrect in the original permit.

* The capacity of vapor combustors 5C and 6C was reduced from 12 mmbtu/hr each to 3 mmbtu/hr each in condition 4.1.7.a.

* The new methanol tank (T010) was added to condition 4.1.9. Additionally, the emission limits in 4.1.9.b were revised from 0.64 tpy to 0.58 tpy.

* The maximum truck loadout in condition 4.1.10.b was revised from 20,000 gallons per year to 210,000 gallons per year.

* Condition 4.1.14 was added.

* A reference to condition 4.1.14 was added to condition 4.5.1.

* Condition 4.1.5.c was added.

* Condition 4.2.2 was updated to reflect language from the new draft G70 general permit.

* Condition 4.3.4 was added to reflect language (specifically general permit conditions 15.2.2 and 15.3) from the new draft G70 general permit.

* Condition 4.4.4 was added to reflect language (specifically general permit condition 15.4.1) from the new draft G70 general permit.

* Conditions 4.5.2 and 4.5.3 were added to reflect language (specifically general permit conditions 15.5.1 and 15.5.2) from the new draft G70 general permit.

RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-3095A for the modification of the Pandora Station near, West Union, Doddridge County, be granted to EQM Gathering Opco, LLC.

Steven R. Pursley, PE
Engineer

July 14, 2015