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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-2999A
Plant ID No.: 103-00052
Applicant: EQT Production Company
Facility Name: Big 57-176 Meter Site
Location: Wetzel County
NAICS Code: 211111
Application Type: Class II Administrative Update
Received Date: September 8, 2015
Engineer Assigned: Joe Kessler
Fee Amount: \$300
Date Received: September 23, 2015
Complete Date: December 23, 2015
Due Date: February 21, 2016
Applicant Ad Date: December 16, 2015
Newspaper: *Wetzel Chronicle*
UTM's: Easting: 539.1 km Northing: 4,378.3 km Zone: 17
Latitude/Longitude: 39.55320/-80.54511
Description: Class II Administrative Update to remove the Glycol Dehydration Unit vapor combustor (C001).

DESCRIPTION OF PROCESS/MODIFICATIONS

Existing Facility

On February 23, 2013, Permit Number R13-2999 was issued to EQT Production Company (EQT) for the after-the-fact construction and operation of the Big 57-176 Meter Site. The existing facility consists of a 38.0 mmscf/day Glycol Dehydration Unit (GDU) used for dehydrating natural gas from nearby production wells prior to transmission along the pipeline system.

Glycol dehydration is a liquid desiccant system used for the removal of water from natural gas. Lean, water-free glycol is fed to the top of an absorber (known as a "contactor tower") where it is contacted with the wet natural gas stream. The glycol removes water from the natural gas by physical

absorption and is carried out the bottom of the column. The dry natural gas leaves the top of the absorption column and is fed into a pipeline for further processing or transportation.

After leaving the absorber, the glycol stream - now referred to as "rich" glycol - is fed to a flash vessel where hydrocarbon vapors are removed and used in the reboiler as a fuel. In the existing facility, any excess flash tank off gas is sent to the combustor for control. Any liquid hydrocarbons produced in the flash tank are skimmed from the glycol. After leaving the flash vessel, the rich glycol is heated in a heat-exchanger and fed to the glycol regenerator column. The regenerator column consists of a column, an overhead condenser, and a 0.31 mmBtu/hr gas-fired reboiler (S002). The glycol is thermally regenerated to remove excess water and regain the high purity. In the existing facility, the hydrocarbons produced in the glycol regenerator process (S001) are sent to the combustor (C001) for control (95% minimum combustion efficiency). The hot, lean glycol is cooled by the heat-exchanger and is then fed to a pump where it is sent to the glycol absorber for reuse. The emission points associated with this process are the combustor (E001) and the combustion exhaust of the reboiler (E002). The GDU uses triethylene glycol (TEG).

Proposed Modifications

EQT is now requesting authorization to remove the vapor combustor from the GDU and release vapors from the GDU Still Vent and flash tank uncontrolled. This request is associated with submission of updated calculations (based on a new site-specific gas analysis) showing much lower uncontrolled emissions produced in the GDU. Additionally, EQT lowered their fugitive VOC emissions from equipment leaks based on the revised gas analysis and an updated component count.

SITE INSPECTION

On December 5, 2012, during the review of Permit Application R13-2999, the writer conducted an inspection of the Big 57-176 Meter Site. The facility is located at the junction of County Route (CR) 15 (North Fork Road) and CR 80 (Shuman Hill Road) approximately 3.6 miles north of Smithfield, Wetzel County, WV. While the location is very rural in nature, there was an occupied residence directly south of the facility along CR 80. The GDU was in operation at the time of the site inspection. No opacity was visible from any of the units and no noticeable smell was detected.

Directions: [Latitude: 39.55320, Longitude: -80.54511] From the junction of WV State Route (SR) 20 (Galmish Road) and County Route 15 (North Fork Road) in Pine Grove, travel east on CR 15 for approximately 12.7 miles (0.9 miles after the CR 15/CR 80 junction) to the access road on the right.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

Only emissions associated with emission units/source that were modified as part of this permitting action are discussed below.

Fact Sheet R13-2999A
EQT Production Company
Big 57-176 Meter Site

Glycol Regenerator Column/GDU Flash Tank Emissions

Uncontrolled VOC and Hazardous Air Pollutant (HAP) emissions from the glycol regenerator and GDU flash tank are based on the emissions calculation program GRI-GLYCalc Version 4.0. GRI-GLYCalc is a well-known program for estimating air emissions from glycol units using TEG. Included in the application is a copy of the appropriate GLY-Calc analysis sheets. A site-specific gas analysis taken on November 14, 2014 was used to provide inputs to GLY-Calc and was included in the permit application.

Equipment Leaks

EQT based their fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - "Protocol for Equipment Leak Emission Estimates." Emission factors were taken from Table 2-4 and no control efficiency, as based on a Leak Detection and Repair (LDAR) protocol, was applied. Actual site component counts were used in the calculations and a site-specific gas analysis taken on November 14, 2014 was used to provide inputs to the calculations.

Emissions Summary

The aggregate emissions associated with the Big 57-176 Meter Site are given in the following tables:

Table 1: Facility-Wide Aggregate Hourly (lb/hr) Criteria Pollutant PTE Summary.

Source	CO	NO _x	PM ⁽¹⁾	SO ₂	VOCs	HAPs
GDU Still Vent/Flash Tank	0.00	0.00	0.00	0.00	2.74	0.10
Reboiler	0.02	0.03	~0.00	~0.00	0.00	0.00
Equipment Leaks	0.00	0.00	0.00	0.00	0.33	0.00
Facility-Wide Totals →	0.02	0.03	0.00	0.00	3.07	0.10

(1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.

Table 2: Facility-Wide Aggregate Annual (ton/yr) Criteria Pollutant PTE Summary.

Source	CO	NO _x	PM ⁽¹⁾	SO ₂	VOCs	HAPs
GDU Still Vent/Flash Tank	0.00	0.00	0.00	0.00	12.01	0.44
Reboiler	0.10	0.12	0.01	~0.00	0.00	0.00
Equipment Leaks	0.00	0.00	0.00	0.00	1.20	<0.01
Facility-Wide Totals →	0.10	0.12	0.01	0.00	13.21	0.45

(1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.

The change in annual facility-wide PTE as a result of the modifications evaluated herein is given in the following table:

Fact Sheet R13-2999A
EQT Production Company
Big 57-176 Meter Site

Table 3: Change in Facility-Wide Annual PTE (in tons/year)

Pollutant	R13-2999	R13-2999A	Change
CO	0.32	0.10	-0.22
NO _x	0.31	0.12	-0.19
PM _{2.5} /PM ₁₀ /PM	0.03	0.01	-0.02
SO ₂	~0.00	~0.00	0.00
VOCs	7.08	13.21	6.13
Total HAPs	0.20	0.45	0.25

(1) Emissions taken from R13-2892C and G60-C069 Engineering Evaluation/Fact Sheet.

REGULATORY APPLICABILITY

This section will address the potential regulatory applicability/non-applicability of substantive state and federal air quality rules relevant to the emissions units/sources modified as part of this permitting action.

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

The GDU Reboiler has been determined to meet the definition of a “fuel burning unit” under 45CSR2 and is, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the GDU Reboiler is less than 10 mmBtu/hr, the unit 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 reboiler is subject to an opacity limit of 10%. Proper maintenance and operation of the reboiler (and the use of flash tank off-gases as fuel) should keep the opacity of the unit well below 10% during normal operations.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse (NON APPLICABILITY)

With the removal of the combustor, 45CSR6 will no longer apply to any units at the facility.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides (NON APPLICABILITY)

45CSR10 has requirements limiting SO₂ emissions from “fuel burning units,” limiting in-stack SO₂ concentrations of “manufacturing processes,” and limiting H₂S concentrations in process gas streams. The only potential applicability of 45CSR10 to the Big 57-176 Meter Site is the limitations on fuel burning units. The GDU Reboiler has been determined to meet the definition of a “fuel

burning unit” under 45CSR10. However, pursuant to the exemption given under §45-10-10.1, as the MDHI of the GDU Reboiler is less than 10 mmBtu/hr, the unit is not subject to the limitations on fuel burning units under 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 proposed modifications at the Big 57-176 Meter Site will increase the PTE of a regulated pollutant (see Table 3 above). However, the increase in PTE is below six (6) lbs/hour *and* ten (10) TPY of any regulated pollutant that would, pursuant to §45-13-2.17, define the installation as a “modification” under 45CSR13. Therefore, pursuant to §45-13-4.2(b)(1), EQT is requesting a Class II Administrative Update to make a “[c]hange in a permit condition as necessary to allow changes in operating parameters, emission points, control equipment or any other aspect of a source which results in an increase . . . of any existing regulated air pollutant . . . “

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 ad ran on December 16, 2015 in the *Wetzel Chronicle* and the affidavit of publication for this legal advertisement was submitted on December 23, 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 facility 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. Therefore, the Big 57-176 Meter Site is not subject to the permitting requirements under 45CSR30. However, as the facility is subject to a Maximum Achievable Control Technology (MACT) rule - 40 CFR 63, Subpart HH - the facility would, in most cases, be subject to Title V as a “deferred source.” Pursuant to §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 Big 57-176 Meter Site is not subject to 45CSR30.

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

When originally permitted, as the DAQ had not yet taken delegation of 40 CFR 63 Subpart HH, the GDU was not evaluated for compliance with the rule. However, 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 Big 57-176 Meter Site - an area source of HAPs (see Table 2) - “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.”

Pursuant to information in the permit application, the maximum aggregate PTE of benzene emissions from the GDU process vent is 0.03 TPY. Therefore, the GDU is exempt from the Subpart HH requirements given under §63.764(d).

40 CFR 60, Subpart OOOO: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution - (NON APPLICABILITY)

The Big 57-176 Meter Site does not include any gas wells, compressor engines, pneumatic controllers, or storage tanks with a PTE of 6 TPY or greater. Therefore, the facility is not subject to any substantive provision of 40 CFR 60, Subpart OOOO.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed GDU 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 (PM₁₀), Particulate Matter less than 2.5 microns (PM_{2.5}), and Sulfur Dioxide (SO₂). 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 and programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits 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. The modified GDU has the potential to emit the following HAPs in substantive amounts: Hexane, Benzene, Toluene, Ethyl-benzene, and Xylene. The following table lists each HAP’s carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 4: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethyl-benzene	VOC	No	Category D - Not Classifiable
Xylene	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects 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 57-176 Meter Site 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 modifications, modeling was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, RECORD-KEEPING, AND REPORTING REQUIREMENTS

There was no substantive addition to the monitoring, compliance demonstration, and record-keeping (MRR) requirements in the draft permit. However, all MRR related to the combustor was removed from the draft permit.

PERFORMANCE TESTING OF OPERATIONS

No changes to performance testing requirements were made as part of this permitting action.

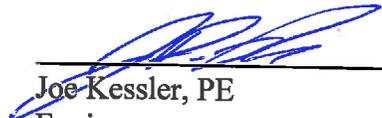
CHANGES TO PERMIT R13-2999A

The substantive changes made to R13-2999 were limited to:

- The combustor was removed from the control device column of the Emissions Units Table 1.0;
- The GDU Still Vent/Flash Tank emission limits under 4.1.3(a) were revised;
- 40 CFR 63, Subpart HH language was added under 4.1.3(b) and (c); and
- Requirements 4.1.5. and 4.2.3. relating to use of the GDU combustor were removed from the draft permit.

RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-2999A indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-2999A to EQT Production Company for a Class II Administrative Update to the Big 57-176 Meter Site located near Smithfield, Wetzel County, WV.



Joe Kessler, PE
Engineer



Date