



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3041
Plant ID No.: 097-00065
Applicant: EQT Production, LLC
Facility Name: Alton Station
Location: Upshur County
NAICS Code: 486210
Application Type: Modification. Permit will supersede G30-161A
Received Date: February 4, 2013
Engineer Assigned: Steven R. Pursley, PE
Fee Amount: \$2,000.00
Date Received: February 15, 2013
Complete Date: March 6, 2013
Due Date: June 4, 2013
Applicant Ad Date: February 4, 2013
Newspaper: *The Record Delta*
UTM's: Easting: 570.55 km Northing: 4,921.28 km Zone: 17
Description: Construction and operation of support facilities associated with a natural gas production wellpad.

DESCRIPTION OF PROCESS

The Alton wellpad consists of two conventional wells, a compressor, a TEG Dehydrator, two line heaters and miscellaneous storage tanks. The incoming gas stream from the well will pass through a slug catcher to remove pipeline produced water from the gas stream which will be stored in one of the four existing produced fluid tanks. The gas from the wellpad (and other wellpads located in the area) will enter the compressor to increase the pressure and then enter one of the glycol towers where TEG absorbs the water present in the gas stream. The water is then boiled out of the glycol at the reboiler and recirculated through a closed loop system. The gas stream is regulated and measured via an orifice meter prior to entry to the gathering pipeline. Heat at the facility is provided by line heaters.

SITE INSPECTION

A site inspection of the facility was performed by the writer on March 20, 2013. To get to the well pad from Charleston take I-79 to exit 67. Turn right and then take an immediate left on US 19/ St. Rt. 4. Continue for northeast for 21.1 miles. When US 19 and St. Rt. 4 split, take St. Rt. 4. Continue for 7.4 miles until St. Rt. 4 ends and becomes St. Rt. 20. Go 2.1 miles on St. Rt. 20 and then turn right on Alexander-Helvetia Road. Go 13.7 miles and turn left on the access road. Go approximately 1,000 feet to the facility. GPS coordinates take at the site were 38° 46.06' N, 80° 11.3' W.

The following are pictures of the Alton Station taken on the day of the inspection:



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ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

EQT included in Attachment N of the permit application air emissions calculations for the equipment and processes at the Alton Station. The following will summarize the calculation methodologies used by EQT to calculate the potential-to-emit (PTE) of the proposed facility.

Gas-Fired Line Heaters

Criteria Pollutant emissions from the 1.54 mmbtu/hr natural gas-fired line heaters (E08 and E09) were based on the emission factors provided for natural gas combustion as given in AP-42 (AP-42 is a database of emission factors maintained by USEPA) Section 1.4. Emissions of Greenhouse Gases (GHGs) were based on Tables C-1 and C-2 of 40 CFR 98 - Federal GHG Reporting Rule.

Hourly emissions were based on the maximum design heat input (MDHI) of each unit and annual emissions were based on an annual operation of 8,760 hours. A heat content of the gas of 1,020 Btu/scf was used in the calculations.

Storage Tanks

Working and breathing emissions from the four 8,820 gallon produced fluids storage tanks were based on the TANKS 4.09d program as provided under AP-42, Section 7. Initially, the applicant stated that emissions from flashing in the tanks were negligible since they serve conventional wells and not the higher pressure deep wells. However, after being informed by the writer that a spreadsheet based on the Vasquez Beggs equation showed significant flashing emissions, the applicant agreed to use those numbers. Input and summary sheets for both programs were included in the permit application. An aggregate annual throughput of 168,000 gallons of liquid was used in the calculations for the storage tanks. These numbers are based on maximum historic data.

Truck Loading

Air emissions from condensate truck loading operations occur as fugitive emissions generated by displacement of vapors when loading trucks. The applicant used the working losses of the tanks to estimate VOC emissions from truck loading. The writer performed calculations using equation (1) of AP-42 Section 5.2 to verify these emissions. The submerged fill saturation factor from Table 5-2.1 was used as submerged fill will be required by the permit. Values for vapor pressure and molecular weight were taken from the Tanks report submitted with the application. The “working losses” method used by the applicant turned out to be more conservative (though both methods showed very small emissions) so those estimates were used. As no maximum hourly pumping rate was provided, hourly emissions were based on 1,000 hours of loading per year.

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Fugitives

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. Emissions of Greenhouse Gases (GHGs) were based on Subpart W of 40 CFR 98 - Federal GHG Reporting Rule.

GDU Emissions

Emissions from the Glycol Dehydration Unit were based on GRI GlyCalc 4.0 while emissions from the reboiler were based on AP-42 Section 1.4.

Compressor Engine

NO_x, CO and VOC emissions were based on manufacturer provided emission factors. SO₂, PM and all HAP emissions were based on AP-42 emission factors. All annual emissions were based on 8,760 hours per year of operation.

Emissions Summary

Based on the above estimation methodology, which is determined to be appropriate, the PTE of the Alton Station is given in the following tables:

Hourly Emissions (lb/hr)

	Compressor Engine	Line Heater 1	Line Heater 2	GDU	Reboiler	Fugitives	Truck Loading	Tanks	Total
PM/PM ₁₀ /PM _{2.5}	0.04	0.01	0.01	--	0.01	--	--	--	0.07
SO ₂	0.01	--	--	--	--	--	--	--	0.01
CO	1.22	0.13	0.13	--	0.02	--	--	--	1.5
NO _x	0.61	0.15	0.15	--	0.02	--	--	--	0.93
VOC	0.43	0.01	0.01	0.05	--	0.03	0.06	5.03	5.62
Formaldehyde	0.17	--	--	--	--	--	--	--	0.17
Benzene	0.01	--	--	--	--	--	--	--	0.01

Acetaldehyde	0.01	--	--	--	--	--	--	--	0.01
Acrolein	0.01	--	--	--	--	--	--	--	0.01
Methanol	0.01	--	--	--	--	--	--	--	0.01
Total HAPs	0.19	--	--	--	--	--	--	--	0.19

Annual Emissions (tons per year)

	Compressor Engine	Line Heater 1	Line Heater 2	GDU	Reboiler	Fugitives	Truck Loading	Tanks	Total
PM/PM ₁₀ /PM _{2.5}	0.19	0.05	0.05	--	0.01	--	--	--	0.30
SO ₂	0.01	--	--	--	--	--	--	--	0.01
CO	5.33	0.55	0.55	--	0.07	--	--	--	6.5
NO _x	2.66	0.66	0.66	--	0.08	--	--	--	4.06
VOC	2.58	0.04	0.04	0.23	--	0.09	0.03	22.01	25.02
CO ₂	1158	788	788	--	98	0.21	--	--	2832.21
CH ₄	0.02	0.01	0.01	55.13	--	24.25	--	--	79.42
CO _{2e}	1159	788	788	1158	99	509	--	--	4501
Formaldehyde	0.72	--	--	--	--	--	--	--	0.72
Benzene	0.02	--	--	--	--	--	--	--	0.02
Acetaldehyde	0.03	--	--	--	--	--	--	--	0.03
Acrolein	0.03	--	--	--	--	--	--	--	0.03
Methanol	0.03	--	--	--	--	--	--	--	0.03
Total HAPs	0.84	--	--	--	--	--	--	--	0.84

REGULATORY APPLICABILITY

The Alton Station is subject to the following substantive state and federal air quality rules and regulations: 45CSR2, 45CSR13, and 40 CFR 60 Subpart OOOO. Each applicable rule (and those that have questionable non-applicability) and EQT'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

Pursuant to the definition of "fuel burning unit" under 45CSR2 ("producing heat or power by indirect heat transfer"), 45CSR2 does not apply to the compressor engines.

The GDU Reboiler, however, 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 regenerator vapors/natural gas as fuel) should keep the opacity of the units well below 10% during normal operations.

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 Alton Station is the limitations on fuel burning units. The GDU Reboiler has been determined to meet the definition of a “fuel burning unit” under 45CSR2. 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.

Pursuant to the definition of “fuel burning unit” under 45CSR10 (“producing heat or power by indirect heat transfer”), the limitations on fuel burning units under 45CSR10 do not apply to the compressor engine.

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*

Since the Alton Station has a potential to emit in excess of six (6) lbs/hour and ten (10) TPY of a regulated pollutant it is considered an existing stationary source.

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 February 4, 2013 in *The Record Delta* and the affidavit of publication for this legal advertisement was submitted on February 14, 2013.

45CSR22 *Air Quality Management Fee Program*

As shown below (45CSR30 non-applicability), the facility is not subject to 45CSR 30 and, therefore, will pay its annual fees through the Rule 22 program.

45CSR27: To Prevent and Control the Emissions of Toxic Air Pollutants (non-applicability)

Pursuant to §45-27-3.1, the “owner or operator of a plant that discharges or may discharge a toxic air pollutant into the open air in excess of the amount shown in the Table A [of 45CSR27] shall employ [Best Available Technology] at all chemical processing units emitting the toxic air pollutant.” As shown in Table 11 above, the facility-wide PTE of formaldehyde is 0.72 TPY - greater than the 1,000 pound per year threshold given in Table A of 45CSR27. However, internal combustion engines do not meet the definition of “chemical processing units” under §45-27-2.4 and, therefore, they are not subject to BAT under 45CSR27.

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 proposed 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. However, as the facility is subject to a New Source Performance Standard (NSPS) - 40 CFR 60, Subpart OOOO - the facility would, in most cases, be subject to Title V as a “deferred source.”

However, pursuant to §60.5370(c), as a non-major source, EQT is not required to obtain a Title V permit for the proposed facility. Therefore, the Alton station is not subject to 45CSR30.

40 CFR 60 Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (non-applicability) .

Per §40.4230(a)(4), Subpart JJJJ does not apply to engines that “commenced construction” before June 12, 2006 unless that engine is reconstructed or modified per §40.4230(a)(5). EQT has stated that both the “new” Caterpillar 3406 TA engine was constructed before June of 2006. Additionally, per §60.14(e)(6), the relocation of an existing unit does not meet the definition of “modification”.

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 performed after hydraulic refracturing).

The following affected sources which commence construction, modification or reconstruction after the effective date are subject to the applicable provisions of this subpart:

Gas Wells

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

The gas wells serviced by the Alton site were drilled before August 23, 2011. Therefore, no requirements of 40 CFR 60 Subpart OOOO would apply.

Centrifugal Compressors

Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals that is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your centrifugal compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A centrifugal compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There are no centrifugal compressors at the Alton Facility. Therefore, all requirements regarding centrifugal compressors under 40 CFR 60 Subpart OOOO would not apply.

Reciprocating Compressors

Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your reciprocating compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There is one (1) reciprocating internal combustion engine located at the facility. However

it was constructed before the applicability date.

Pneumatic Controllers

Pursuant to §60.5365(d)(2), “[f]or 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” that is constructed after August 23, 2011 is subject to the applicable provisions of Subpart OOOO. The substantive requirements for pneumatic controllers are given under §60.5390. The applicant has indicated that they will comply with the bleed rate for controllers subject to the rule.

Storage Vessels

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.

40CFR60 Subpart OOOO defines a storage vessel as a unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

- * Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If the source does not keep or are not able to produce records,

as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.

- * Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
- * Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

This rule requires that the permittee determine the VOC emission rate for each storage vessel affected facility utilizing a generally accepted model or calculation methodology within 30 days of startup, and minimize emissions to the extent practicable during the 30 day period using good engineering practices. For each storage vessel affected facility that emits more than 6 tpy of VOC, the permittee must reduce VOC emissions by 95% or greater within 60 days of startup. The compliance date for applicable storage vessels is October 15, 2013.

The storage vessels located at the Alton Station were all constructed before August 23, 2011. Specifically, they were installed in July of 2011. Therefore they are not subject to the rule.

Group of all Equipment, except Compressors.

Addition or replacement of equipment for the purpose of process improvement that is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

Equipment associated with a compressor station, dehydration unit, sweetening unit,

underground storage vessel, field gas gathering system, or liquefied natural gas unit is covered by §§60.5400, 60.5401, 60.5402, 60.5421 and 60.5422 of this subpart if it is located at an onshore natural gas processing plant. Equipment not located at the onshore natural gas processing plant site is exempt from the provisions of §§60.5400, 60.5401, 60.5402, 60.5421 and 60.5422 of this subpart.

The equipment within a process unit of an affected facility located at onshore natural gas processing plants and described in paragraph (f) of this section are exempt from this subpart if they are subject to and controlled according to subparts VVa, GGG or GGGa of this part.

The Alton Station is not a natural gas processing plant. Therefore, Leak Detection and Repair (LDAR) requirements for onshore natural gas processing plants would not apply.

Sweetening Units

Each sweetening unit that processes natural gas is an affected facility; and

Each sweetening unit that processes natural gas followed by a sulfur recovery unit is an affected facility.

Facilities that have a design capacity less than 2 long tons per day (LT/D) of hydrogen sulfide (H₂S) in the acid gas (expressed as sulfur) are required to comply with recordkeeping and reporting requirements specified in §60.5423(c) but are not required to comply with §§60.5405 through 60.5407 and paragraphs 60.5410(g) and 60.5415(g) of this subpart.

Sweetening facilities producing acid gas that

is completely reinjected into oil-or-gas-bearing geologic strata or that is otherwise not released to the atmosphere are not subject to §§60.5405 through 60.5407, 60.5410(g), 60.5415(g), and 60.5423 of this subpart.

There are no sweetening units at the Alton Station. Therefore, all requirements regarding sweetening units under 40 CFR 60 Subpart OOOO would not apply.

40 CFR 63 Subpart HH: National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities-(NON-DELEGATION)

The Alton facility is a minor (or area) source of HAPs. Subpart HH contains requirements for both area and major sources, however, WVDAQ has not been delegated authority from USEPA to enforce the area source requirements of this rule. Therefore, unless otherwise stated, DAQ did not formally determine whether the permittee is subject to an area source air toxics standard requiring Generally Achievable Control Technology (GACT) promulgated after January 1, 2007 pursuant to 40 CFR 63, including the area source air toxics provisions of 40 CFR 63, Subpart HH.

40 CFR 63 Subpart ZZZZ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (non-delegation)

The compressor engine appears to be subject to the area source requirements of 40 CFR 63, Subpart ZZZZ. However, the DAQ has not been delegated authority from USEPA to enforce the area source requirements of this rule. Therefore, unless otherwise stated, DAQ did not formally determine whether the permittee is subject to an area source air toxics standard requiring Generally Achievable Control Technology (GACT)

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promulgated after January 1, 2007 pursuant to 40 CFR 63, including the area source air toxics provisions of 40 CFR 63, Subpart ZZZZ.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

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 (at least 0.01 lb/hr or 0.01 tpy) in their emissions estimate: Acetaldehyde, Acrolein, Benzene, Methanol, and Formaldehyde. 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
Formaldehyde	VO C	Yes	Category B1 - Probable Human Carcinogen
Benzene	VO C	Yes	Category A - Known Human Carcinogen
Acetaldehyde	VO C	Yes	Category B2 - Probable Human Carcinogen
Acrolein	VO C	No	Inadequate Data
Methanol	VO C	No	No Information

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

Since the facility will be a minor source as defined in 45CSR14, no modeling was performed.

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 4.1.2 of the draft permit, 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.
- * Daily wet gas throughput to the Dehy shall be monitored and recorded.
- * Within sixty (60) days of the issuance date of this permit, EQT shall be required to perform,

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or have performed, a site-specific analysis to determine the constituent properties of the condensate/produced-water. The analysis shall, at a minimum, include the same components as the analysis used to calculate storage tank emissions in Permit Application R13-3041. The sample shall be taken from the pressurized liquid stream, aqueous and organic, coming from the last separator that feeds the storage tanks. Where applicable, if the analysis shows average constituent properties that, when used to calculate emissions in the same manner as submitted in Permit Application R13-3041, result in emissions greater than the limits in 4.1.4. of the draft permit, EQT shall be required to, within thirty (30) days of receiving the results of the analysis, submit to the Director an appropriate permit application.

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 R13-3041 for the modification of the Alton Station near, Alexander, Upshur County, be granted to EQT Production, LLC.

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