



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3269A
Plant ID No.: 017-00158
Applicant: EQT Gathering, LLC
Facility Name: Janus Compressor Station
Location: Near West Union, Doddridge County
SIC/NAICS Code: 1311/211111
Application Type: Modification
Received Date: July 5, 2016 (Class II Administrative Update)
October 17, 2016 (Revised Full Modification)
Engineer Assigned: Joe Kessler
Fee Amount: \$2,000
Date Received: July 11, 2016 (\$300)
November 2, 2016 (\$1,700)
Complete Date: November 7, 2016
Due Date: February 5, 2016
Applicant's Ad Date: October 14, 2016
Newspaper: *The Doddridge Independent*
UTM's: 516.767 km Easting • 4,345.400 km Northing • Zone 17
Latitude/Longitude: 39.25777/-80.80566
Description: Updating the facility wide fugitive emission calculations, station volume venting, and pigging emissions calculations.

COPY

On July 5, 2016 EQT Gathering, LLC (EQT) submitted a Class II Administrative Update (A/U) to Permit Number R13-3269. After being deemed complete, and during the subsequent technical review, it was discovered that the increase in emissions associated with the proposed changes was in excess of the thresholds that would require the proposed changes to be reviewed as a full modification. It was also discovered that the original legal advertisement did not include the contribution from fugitive emission increases. Therefore, EQT was required to submit a revised full modification permit application with an additional fee and place a new legal advertisement. Thereafter, EQT withdrew the request to cease flaring of the storage tank vapors which may have made the permitting action eligible to be reviewed again as an A/U. However, due to the possible increase of VOCs over 144 lbs/day, it remained as a full modification.

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DESCRIPTION OF PROCESS/MODIFICATIONS

Existing Facility

On February 12, 2016, EQT was issued Permit Number R13-3269 to construct a natural gas compressor station located approximately 3.1 miles south-southwest of West Union, WV east of County Route (CR) 11 (Arnold's Creek Road). The Janus Compressor Station consists of four (4) Caterpillar G3616 4-Stroke Lean Burn (4SLB) 5,350 horsepower (hp) compressor engines, five (5) Capstone C200 NG 200kWe Microturbines, two (2) Exterran 125 mmscf/day triethylene glycol (TEG) dehydration units (GDUs), two (2) fuel gas heaters (1.15 and 0.77 mmBtu/hr), and two (2) 8,820 gallon produced liquid storage tanks.

Natural gas produced in area wells enter into the facility and is compressed by the engines (ENG-001 through ENG-004). The compressed gas is sent and through the GDUs (DEHY-001 and DEHY-002) where it is dehydrated to the desired level. The compressor engines are each controlled (CO, VOCs, and formaldehyde) by an EMIT Technologies EBX-9000-3036F-8C4E-48C oxidation catalyst (C1 through C4).

Glycol dehydration is a liquid desiccant system used for the removal of water from natural gas. In each GDU, lean, water-free glycol is fed to the top of an absorber (known as a "contactor") 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 transportation. The dehydrator still vent gases are each sent an associated enclosed flare (FLARE-001 and FLARE-002) for destruction. Additionally, each GDU contains several TEG storage tanks. However, the storage tanks are defined as *de minimis* sources under Table 45-13B of 45CSR13 as they are each less than 10,000 gallons and TEG has an extremely low vapor pressure (<0.01 mm Hg).

After leaving the absorber, each glycol stream - now referred to as "rich" glycol - is fed to a flash vessel where flashed hydrocarbon vapors are either sent to the reboiler as fuel or, if the reboiler is not in operation, sent to the associated enclosed flare. Any liquid hydrocarbons removed in the flash tank are sent to one of the 8,820 gallon produced liquid storage tanks (T-001 and T-002). Currently, vapors from the produced liquids storage tanks (working/breathing/flashing) are sent to an associated enclosed flare (FLARE-003) for control.

After leaving the flash vessel, in each unit, the rich glycol is fed to a Glycol Regenerator Column. Each Regenerator Column consists of a column, an overhead condenser, and the reboiler. The glycol is thermally regenerated to remove excess water and regain high purity. The heat for the regeneration is provided by two (2) 2.31 mmBtu/hr natural gas-fired reboilers (RB-001 and RB-002). The hot, lean glycol is cooled by a heat-exchanger and is then fed to a pump where it is sent to the glycol absorber for reuse. Liquids produced in the regeneration process are sent to one of the facility storage tanks.

A portion of the gas is withdrawn after dehydration but before the station outlet metering and sent to the fuel gas system. The fuel gas is directed through a fuel gas scrubber and metering before being directed to the compressor engines and other gas-powered equipment. Two (2) fuel gas heaters (HTR-1 and HTR-2) are used in the fuel gas system to prevent the formation of hydrates and to minimize condensate dropout from the pressure reduction.

There are many other small storage tanks at the facility (T-003 through T-024) that are used for bulk storage (lube oil storage, compressor oil storage, TEG storage, etc.). Any emissions from the miscellaneous tanks are, based on the vapor pressures of the materials stored, considered insignificant. Additionally, the facility utilizes an uncontrolled truck loadout (L1) to remove condensate and produced water from the site (estimated to be a maximum of 210,000 gallons/year). Five (5) 200 kWe uncontrolled Microturbines (EG-001 through EG-005) are used to produce primary power for the facility.

Proposed Modifications

EQT is now proposing to modify the existing facility by updating the facility-wide fugitive emission calculations, station volume venting, and pigging emissions calculations based on as-built component counts and updated maintenance scenarios.

SITE INSPECTION

On November 18, 2015, the writer conducted an inspection of the proposed location of the Janus Compressor Station. The Janus site is located in a rural area of Doddridge County approximately 3.1 miles south-southwest of West Union, WV east of County Route (CR) 11 (Arnold’s Creek Road). The writer was accompanied on the inspection by Mr. Alex Bosiljevac, Environmental Coordinator with EQT.

Due to the nature of the source and the proposed changes, the writer deemed an additional site inspection as not necessary. The facility was last “Part Of Site” inspected by DAQ Compliance/Enforcement (C/E) Inspector Mr. Douglas Hammel on April 27, 2016. Based on that inspection, the facility was determined to be “Status 30 - In Compliance.”

AIR EMISSIONS AND CALCULATION METHODOLOGIES

EQT included in Attachment N of the permit application air emissions calculations for the equipment and processes at the Janus Compressor Station. The following will only summarize the air emissions and calculation methodologies of the emission sources being modified as part of this permitting action.

Equipment Leaks

EQT based their revised VOC fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - “Protocol for Equipment Leak Emission Estimates” Table 2-4 (VOCs) with a 20% safety factor added on. No control efficiencies, as based on a Leak Detection and Repair (LDAR) protocol, were applied. Component counts were given and were based on updated field counts. VOC by-weight percentages (15%) of the natural gas was also used in the calculations and is based on a site-specific gas analysis taken on October 10, 2012.

Maintenance and Emergency Events

EQT also included in their fugitive emission estimate a certain number of scenarios (revised based on as-built data) where natural gas is released for emergency or maintenance purposes. Those included were filter maintenance (15 events/year), compressor blowdown/startup events (36 events/year), station emergency shutdowns (5 event/year), and “pigging” events (250 events/year). Emissions were calculated in accordance with Equations W-35 and W-36 in Subpart W of 40 CFR 98. VOC by-weight percentages (15%) of the natural gas was also used in the calculations and is based on a site-specific gas analysis taken on October 10, 2012.

Emissions Summary

Based on the above estimation methodology as submitted in Attachment N of the permit application, the post-modification facility-wide PTE of the revised Janus Compressor Station is given in Attachment A. The change in annual facility-wide PTE as a result of the modifications evaluated herein is given in the following table:

Table 1: Change in Facility-Wide Annual PTE (in tons/year)

Pollutant	R13-3269⁽¹⁾	R13-3269A	Change
CO	59.03	59.03	0.00
NO _x	127.10	127.10	0.00
PM _{2.5} /PM ₁₀ /PM	8.94	8.94	0.00
SO ₂	0.68	0.68	0.00
VOCs	95.71	114.50	18.79
Total HAPs	23.96	22.26	(1.70)

(1) Emissions taken from R13-3269 Fact Sheet Attachment A.

REGULATORY APPLICABILITY

This section will address the potential regulatory applicability/non-applicability of substantive state and federal air quality rules relevant to the emission units/sources modified at the Janus Compressor Station.

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 changes of the Janus Compressor Station evaluated herein has a potential to increase emissions in excess of 144 pounds per calendar day of a regulated pollutant and, therefore, pursuant to §45-13-2.17, the changes are defined as a “modification” under 45CSR13. Pursuant to §45-13-5.1, “[n]o person shall cause, suffer, allow or permit the construction, modification,

relocation and operation of any stationary source to be commenced without . . . obtaining a permit to construct.” Therefore, EQT is required to obtain a permit under 45CSR13 for the modification of the 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 ad ran on October 14, 2016 in *The Doddridge Independent* and the affidavit of publication for this legal advertisement was submitted on October 27, 2016.

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

The Janus Compressor Station is located in Doddridge County, WV. Doddridge County is classified as “in attainment” with all National Ambient Air Quality Standards. Therefore, as the facility is not a “listed source” under §45-14-2.43, the individual major source applicability threshold for all pollutants is 250 TPY. As given in Attachment A, the facility-wide PTE of the modified Janus Compressor Station is less than 250 TPY for all criteria pollutants. Therefore, the facility is not defined as a “major stationary source” under either 45CSR14 and the rule does not apply.

45CSR30: Requirements for Operating Permits

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 Janus Compressor Station meets 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 facility-wide PTE (see Attachment A) of a regulated pollutant does exceed 100 TPY. Therefore, the source is a major source subject to 45CSR30. The Title V (45CSR30) application, or revisions to that application as based on the proposed changes discussed herein, is due within twelve (12) months after the commencement date of any operation authorized by this permit.

40CFR60 Subpart OOOOa: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after September 18, 2015

40CFR60 Subpart OOOOa establishes emission standards and compliance schedules for the control of the pollutant greenhouse gases (GHG) and VOCs. The greenhouse gas standard in this subpart is in the form of a limitation on emissions of methane from affected facilities in the crude oil and natural gas source category that commence construction, modification or reconstruction after September 18, 2015. This subpart also establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO₂) emissions from affected facilities that commence construction, modification or reconstruction after September 18, 2015 (40 CFR 60, Subpart OOOO is applicable to those sources constructed prior to this date but after August 23, 2011). As the Janus Compressor Station was constructed after September 18, 2015, the facility is subject to the applicable provisions of Subpart OOOOa.

Compressor Engines

Pursuant to §60.5365a(c), “[e]ach reciprocating compressor affected facility, which is a single reciprocating compressor [not located at a well site]” that is constructed after September 18, 2015 is subject to the applicable provisions of Subpart OOOOa. As the Janus Compressor Station is located before the point of custody transfer, the compressor engines are applicable to Subpart OOOOa. The substantive requirements for the engines are given under §60.5385a(a); the engines’ “rod packing” must be replaced according to the given schedule and the engine must meet applicable MRR given under §60.5410a(c), §60.5415a(c), and §60.5420a(b).

Storage Tanks - (NON APPLICABILITY)

Pursuant to §60.5365a(e), for “[e]ach storage vessel affected facility, which is a single storage vessel with the potential for VOC emissions equal to or greater than 6 tpy as determined according to this section” that is constructed after September 18, 2015 must meet the control requirements under §60.5395a. The substantive requirement is to “VOC emissions by 95.0 percent within 60 days after startup.” The controlled PTE of each storage tank at the existing Janus Compressor Station is less than 6 TPY. Therefore, the storage tanks are not subject to the requirements of Subpart OOOOa.

Fugitive Emissions Components

Pursuant to §60.5365a(j), “[t]he collection of fugitive emissions components at a compressor station, as defined in §60.5430a, is an affected facility.” The Leak Detection and Repair (LDAR) requirements for a compressor station are given under §60.5497a.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the modified Janus Compressor Station 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 (PM₁₀ and 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 following table lists each HAP with a revised facility-wide PTE above 0.05 TPY and the associated carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 2: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Acetaldehyde	VOC	Yes	B2 - Probable Human Carcinogen
Acrolein	VOC	No	Inadequate Data
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Methanol	VOC	No	No Assessment Available
Biphenyl	VOC	Yes	Suggestive Evidence of Carcinogenic Potential
1,3-Butadiene	VOC	Yes	B2 - Probable Human Carcinogen
Naphthalene	VOC	Yes	C - Possible Human Carcinogen
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethylbenzene	VOC	No	Category D - Not Classifiable
Xylenes	VOC	No	Inadequate Data
2,2,4-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 of the modified facility are less than applicability thresholds that would define the proposed facility as “major” under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature and location of the proposed source, an air quality impacts modeling analysis was not required under §45-13-7.

MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS

There was no substantive change to the monitoring, compliance demonstration, and record-keeping requirements (MRR) in the permit.

PERFORMANCE TESTING OF OPERATIONS

There was no substantive change to the performance testing requirements in the permit.

CHANGES TO R13-3269

The following substantive changes were made to Permit Number R13-3269:

- The requirement to recalculate the fugitive emissions produced from component leaks under 4.1.12(a) was removed from the permit as the changes evaluated herein satisfy that requirement;
- The limited events under 4.1.12(c) were revised based on the new numbers provided by EQT;
- Requirement 4.1.12(e) was added to the permit requiring EQT to meet the applicable requirement of 40 CFR 60, Subpart OOOOa for mitigation of fugitive emissions; and
- 40 CFR 60, Subpart OOOO language was replaced with new Subpart OOOOa language wherever applicable in the permit.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of a Permit Number R13-3269A to EQT Gathering, LLC for the modification of the Janus Compressor Station located near West Union, Doddridge County, WV.



Joe Kessler, PE
Engineer

11/19/10

Date

Attachment A: Facility-Wide PTE
EQT Gathering, LLC: Janus Compressor Station
Permit Number R13-3269A: Facility ID 017-00158

Emission Unit	EP ID	CO		NO _x		PM ⁽¹⁾		SO _x		VOC		Acetaldehyde		HAPs	
		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Compressor Engine	ENG-001	2.04	8.93	5.90	25.83	0.39	1.71	0.02	0.10	3.93	17.23	0.33	1.44	0.84	3.66
Compressor Engine	ENG-002	2.04	8.93	5.90	25.83	0.39	1.71	0.02	0.10	3.93	17.23	0.33	1.44	0.84	3.66
Compressor Engine	ENG-003	2.04	8.93	5.90	25.83	0.39	1.71	0.02	0.10	3.93	17.23	0.33	1.44	0.84	3.66
Compressor Engine	ENG-004	2.04	8.93	5.90	25.83	0.39	1.71	0.02	0.10	3.93	17.23	0.33	1.44	0.84	3.66
Microturbines	EG-001	0.22	0.96	0.08	0.35	0.02	0.07	0.01	0.03	0.02	0.11	~0.00	~0.00	~0.00	~0.00
Microturbines	EG-002	0.22	0.96	0.08	0.35	0.02	0.07	0.01	0.03	0.02	0.11	~0.00	~0.00	~0.00	~0.00
Microturbines	EG-003	0.22	0.96	0.08	0.35	0.02	0.07	0.01	0.03	0.02	0.11	~0.00	~0.00	~0.00	~0.00
Microturbines	EG-004	0.22	0.96	0.08	0.35	0.02	0.07	0.01	0.03	0.02	0.11	~0.00	~0.00	~0.00	~0.00
Microturbines	EG-005	0.22	0.96	0.08	0.35	0.02	0.07	0.01	0.03	0.02	0.11	~0.00	~0.00	~0.00	~0.00
Dehy #1 Vent/Flash Tank ⁽²⁾	DEHY-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	6.80	0.00	0.00	0.68	2.96
Dehy #1 Reboiler ⁽³⁾	RB-001	0.16	0.69	0.19	0.83	0.01	0.06	~0.00	~0.00	0.01	0.05	~0.00	~0.00	~0.00	~0.00
Dehy #2 Vent/Flash Tank ⁽²⁾	DEHY-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	6.80	0.00	0.00	0.68	2.96
Dehy #2 Reboiler ⁽³⁾	RB-002	0.16	0.69	0.19	0.83	0.01	0.06	~0.00	~0.00	0.01	0.05	~0.00	~0.00	~0.00	~0.00
Fuel Gas Heater #1	HTR-1	0.08	0.35	0.09	0.41	0.01	0.03	~0.00	~0.00	0.01	0.02	~0.00	~0.00	~0.00	~0.00
Fuel Gas Heater #2	HTR-2	0.05	0.23	0.06	0.28	~0.00	~0.00	~0.00	~0.00	0.01	0.02	~0.00	~0.00	~0.00	~0.00
Dehy Enclosed Flares Combustion ⁽³⁾	FLARE-001, FLARE-002	0.96	4.20	1.14	5.00	0.08	0.48	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Tank Enclosed Flare Combustion ⁽³⁾	FLARE-003	2.82	12.34	3.35	14.69	0.25	1.11	0.02	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Storage Tanks ⁽²⁾	T-01, T-02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.42	0.00	0.00	<0.01	<0.01
Truck Loadout	L1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.09	0.00	0.00	0.00	0.00
Fugitive Emissions	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.03	30.80	~0.00	~0.00	0.39	1.69
Facility-Wide Total⁽⁴⁾ →		13.49	59.03	29.02	127.10	2.03	8.94	0.16	0.68	26.90	114.50	1.32	5.76	5.11	22.26

(1) All particulate matter emissions are assumed to be 2.5 microns or less.
(2) As emitted at the associated enclosed flare after 2% pass-through (5% for storage tank enclosed flare).
(3) Combustion exhaust only. Aggregate of both dehy flares.
(4) No individual HAP has a PTE over 10 TPY. As the PTE of all individual HAPs are less than 10 TPY (acetaldehyde is the highest emitted individual HAP) and the PTE of total HAPs is less than 25 TPY, the Janus Compressor Station is defined as a minor (area) source of HAPs for purposes of 40 CFR 61, 40CFR63, and Title V.