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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3271
Plant ID No.:	041-00076
Applicant:	Atlantic Coast Pipeline, LLC
Facility Name:	Marts Compressor Station
Location:	Near Jane Lew, Lewis County
SIC/NAICS Code:	4922/486210
Application Type:	Construction
Received Date:	September 17, 2015
Engineer Assigned:	Joe Kessler
Fee Amount:	$4,500
Date Received:	October 28, 2015
Complete Date:	February 25, 2016
Due Date:	May 25, 2016
Applicant's Ad Date:	September 26, 2015
Newspaper:	*The Exponent Telegram*
UTM's:	545.53 km Easting • 4,332.66 km Northing • Zone 17
Latitude/Longitude:	39.13944/-80.46556
Description:	Construction of a natural gas compressor station.

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DESCRIPTION OF PROCESS

Atlantic Coast Pipeline, LLC (ACP) is proposing to construct a natural gas compressor station to be located approximately 4.2 miles west-northwest of Jane Lew, WV south of State Route (SR) 35 (Kincheloe Run Road). The proposed Marts Compressor Station will consist of four (4) Solar Combustion Turbines (20,500 brake-horsepower (bhp), 15,900 bhp, 10,915 bhp, and 7,700 bhp), one (1) 2,098 hp 4-Stroke Lean Burn (4SLB) natural gas-fired Caterpillar G3516C Emergency Generator (1,500 kW_e), one (1) 10.7 mmBtu/hr natural gas-fired boiler, and three (3) ancillary liquid storage tanks.

ACP (a company jointly owned by Dominion Resources, Duke Energy, Piedmont Natural Gas, and AGL Resources) has proposed the construction of a large compressor station to be used to transport natural gas along a proposed 556-mile long interstate pipeline system designed to move the gas from West Virginia to North Carolina and Virginia. To provide pressure for this station, ACP is proposing to install and operate the following natural gas-fired combustion turbines:

- A 20,500 bhp (170.0 mmBtu/hr) Solar Titan 130-20502S Combustion Turbine (CT-1);
- A 15,900 bhp (140.0 mmBtu/hr) Solar Mars 100-16000S Combustion Turbine (CT-2);
- A 10,915 bhp (94.5 mmBtu/hr) Solar Taurus 70-10802S Combustion Turbine (CT-3); and
- A 7,700 bhp (71.4 mmBtu/hr) Solar Taurus 60-7800S Combustion Turbine (CT-4).

Combustion turbines work by converting the energy in the fuel gas to mechanical energy that then powers the pipeline gas compressors. The compressors increase the pressure of the pipeline gas to provide it motive power to move from one location to another. To generate the maximum amount of mechanical energy from the fuel gas, combustion turbines operate similarly to a jet engine. Fresh atmospheric air flows through an air compressor that brings it to higher pressure. Energy is then added by spraying fuel into the compressed air and igniting it so the combustion generates a high-temperature flow. This high-temperature, high-pressure gas enters a turbine, where it expands down to the exhaust pressure, turning a shaft that powers both the turbine's air compressor and other large compressors that pressure the pipeline gas. The energy that is not used for shaft work comes out in the exhaust gases (which include primarily the pollutants NO_x, CO, and VOCs).

The proposed turbines will be equipped with Solar's $SoLoNO_x$ dry low-NO_x combustor technology and add-on emission controls: selective catalytic reduction (SCR) for NO_x control (SCR-01 through SCR-04) and use of an oxidation catalyst for CO, VOC, formaldehyde, and total Hazardous Air Pollutants (HAPs) control (OxCat-01 through OxCat-04). An SCR selectively reduces NO_x emissions by injecting ammonium (NH_3) into the exhaust gas stream upstream of a catalyst. The compounds NO_x, NH_3, and O_2 react on the surface of the catalyst to form N_2 and H_2O. Carbon monoxide oxidation catalysts are typically used on turbines to achieve control of CO and hydrocarbon emissions. The catalyst is usually made of a precious metal such as platinum, palladium, or rhodium. Other formulations, such as metal oxides for emission streams containing chlorinated compounds, are also used. The CO catalyst promotes the oxidation of CO and hydrocarbon compounds to carbon dioxide (CO_2) and water (H_2O) as the emission stream passes through the catalyst bed.

Additionally, the proposed facility will utilize a 10.7 mmBtu/hr natural gas-fired boiler (utilizing low-NO_x boilers) to provide process heat and a 2,098 hp 4SLB natural gas-fired Caterpillar G3516C Emergency Generator to provide backup power. Several liquid storage tanks (through TK-3) will be used at the proposed station to store pipeline liquids (TK-1: 2,500 gallons), waste oil (TK-2: 2,500 gallons), and ammonia (TK-3: 8,000 gallons).

SITE INSPECTION

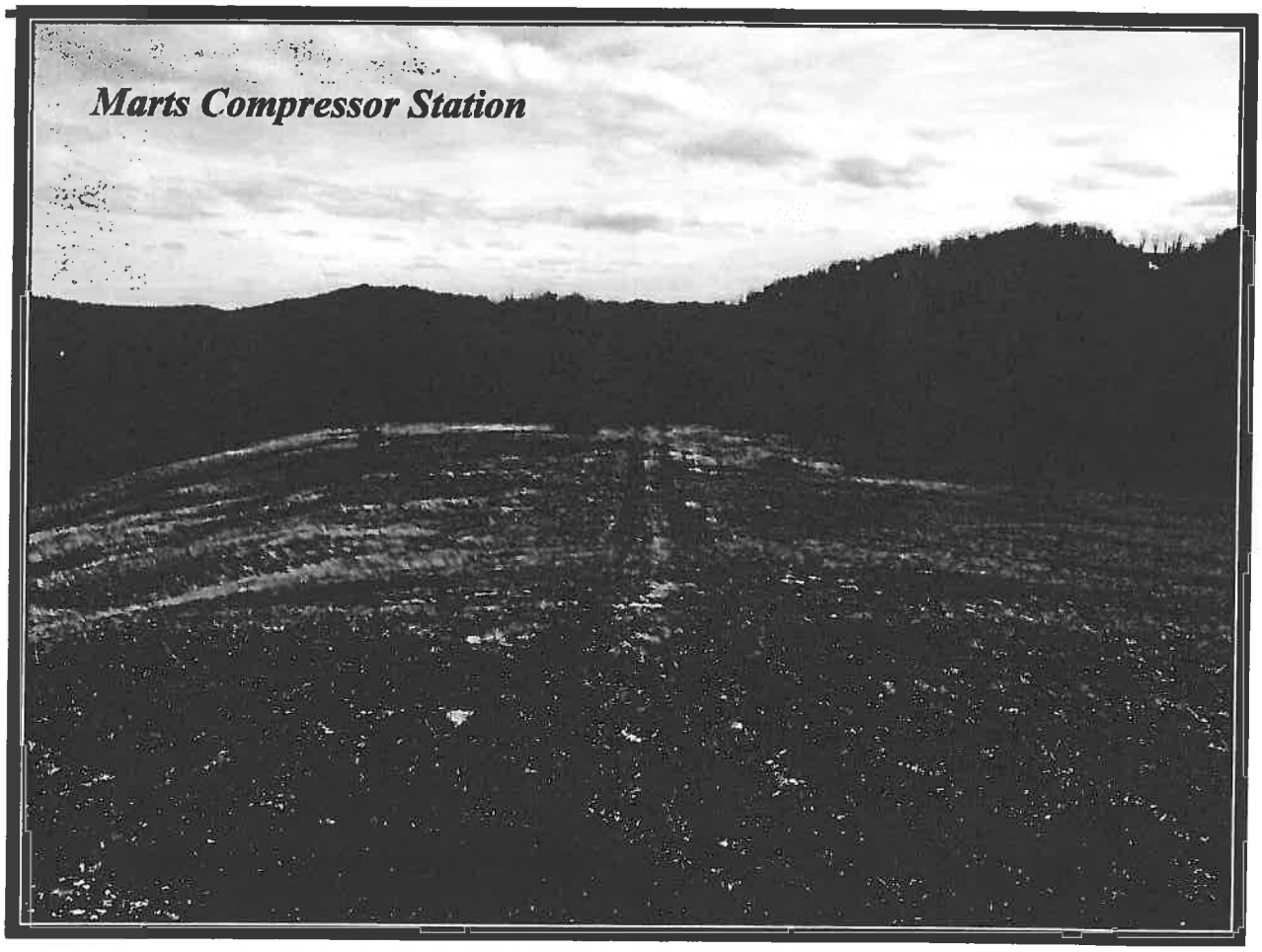
On November 18, 2015, the writer conducted an inspection of the proposed location of the Marts Compressor Station. The proposed Marts site is located in a rural area of Lewis County approximately 4.2 miles west-northwest of Jane Lew, WV south of State Route (SR) 35 (Kincheloe Run Road). The writer was accompanied on the inspection by Mr. Jay Riley, the (future) plant manager of the proposed station. Observations from the inspection include:

- The proposed facility will lie atop a hill approximately 4.2 miles west-northwest of Jane Lew, WV south of State Route (SR) 35 (Kincheloe Run Road). The area is mountainous and rural in nature with scattered homes and farms within several miles of the proposed location. Much natural gas construction activity (pipelines, well-heads, etc.) is located in the County;

- At the time of the inspection, there was no activity at the site; and

- The occupied dwelling located nearest to the proposed site is approximately 0.17 miles south of the proposed site at the bottom of the hill along Hollick Run Road. A currently (at the time of the inspection) occupied home near the beginning of the access road has been purchased and will be demolished.

The following is a picture of the proposed site of the Marts Compressor Station:



Directions: [Latitude: 39.13944, Longitude: -80.46556] From the I-79 Jane Lew exit proceed west on Hacker's Creek Road (SR 7) and then turn right on US 19 North (Main Street). From US 19 North, quickly turn left on Broad Run Road (SR 8). Stay on Broad Run Road until turning right onto Old Mill Road (SR 1). From Old Mill Road, turn left onto Hollick Run Road. Proceed on Hollick Run Road for approximately 0.3 miles and the facility access road will be on the right.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

ACP included in Attachment N of the permit application air emissions calculations for the proposed Marts Compressor Station. The following will summarize the calculation methodologies used by ACP to calculate the potential-to-emit (PTE) of the proposed facility.

Combustion Turbines

Potential emissions from the Solar Combustion Turbines (CTs) are generated from three different operating scenarios: steady-state, steady-state at low temperatures (0°F < t < -20°F), and startup/shutdown emissions (when the SoLoNO$_x$ system is not operating). The emissions from the combustion turbines are given in tabular form in Attachment A to this evaluation.

Steady-State (Normal Operation) Emissions

Uncontrolled emissions from the CTs during normal operation are based on unit-specific information provided by the turbine vendor (NO$_x$, CO, VOCs, formaldehyde, total HAPs, and particulate matter) and on emission factors (SO$_2$) taken from AP-42, Section 3.1 (AP-42 is a database of emission factors maintained by USEPA). Maximum hourly emissions are based on the highest given emission rate at normal conditions (temperatures above 0°F) and at full load. Annual emissions are based on the CTs operating 8,677 hours/year (the remaining hours emissions are based on other operating scenarios) for (NO$_x$, CO, VOCs, formaldehyde, and total HAPs and 8,760 hours for SO$_2$ and PM, respectively. All steady-state (normal operation) uncontrolled emissions are based on the turbines using the SoLoNO$_x$ combustion system. VOC emissions are based on 10% on the unburnt hydrocarbons (UHC) in the fuel gas being classified as VOCs.

Controlled emissions from the CTs during normal operation are based on use of the SCR (NO$_x$) and oxidation catalysts (CO and VOCs) to control emissions of NO$_x$, CO, and hydrocarbons at a vendor guaranteed rates of 44%, 80%, and 50%, respectively.

Low-Temperature Emissions

During periods of CT operation at low-temperatures (temperatures below 0°F), the SoLoNO$_x$ system either does not operate or does not operate as effectively. Therefore, potential uncontrolled emissions (of NO$_x$, CO, VOCs, formaldehyde and total HAPs) from operation during these periods are higher than in periods of normal operation. Maximum uncontrolled hourly emissions of these pollutants during these operational periods are based on information provided by the vendor. The annual emissions from this operational scenario is based on 50 hours/year (which is based on, according to ACP, historic meteorological data). Controlled emission rates are again based on the use of the SCR (NO$_x$) and oxidation catalysts (CO and VOCs) to control emissions of NO$_x$, CO, and hydrocarbons at a vendor guaranteed rates of 44%, 80%, and 50%, respectively.

Startup/Shutdown Emissions

During periods of CT operation at low-loads (less than 50%), while some effectiveness of all the control options are expected, to be conservative, ACP estimated that the emissions from the turbines are each uncontrolled. The only scenario identified by ACP where the turbines would operate at low-loads was during startup/shutdown. Therefore, potential emissions during these scenarios were based on uncontrolled emissions (of NO_x, CO, VOCs, formaldehyde and total HAPs) that are also higher during these periods than in periods of normal operation. Maximum uncontrolled hourly emissions of these pollutants during these operational periods are based on information provided by the vendor. The annual emissions from this operational scenario is based on 100 startup and 100 shutdown events per year with each event lasting an average of 10 minutes. This gives an annual hours of operation in these modes of 33.33 hours/year. As it is conservatively estimated that the control devices are not effective during these modes, no control percentages were applied to the uncontrolled emissions.

Hazardous Air Pollutants

As stated above, ACP used vendor emission factors to calculate the PTE of formaldehyde and total HAPs from the CTs. AP-42 Section 3.2, however, provides emission factors for other HAPs emitted from combustion turbines. The following table details the annual HAP emissions (based on 8,760 hours of operation/year and a control percentage of 50%) from the turbines using these emission factors:

Table 1: AP-42 Section 3.2 HAP CT Emission Calculations (lbs/year)(1)

Pollutant	Emission Factor (lb/mmBtu)	CT-1	CT-2	CT-3	CT-4	*Total*
		MDHI (mmBtu/hr)				
		170.00	140.00	94.50	71.40	
1,3-Butadiene	4.30e-07	0.32	0.26	0.18	0.13	*0.90*
Acetaldehyde	4.00e-05	29.78	24.53	16.56	12.51	*83.38*
Acrolein	6.40e-06	4.77	3.92	2.65	2.00	*13.34*
Benzene	1.20e-05	8.94	7.36	4.97	3.75	*25.01*
Ethylbenzene	3.20e-05	23.83	19.62	13.25	10.01	*66.70*
Naphthalene	1.30e-06	0.97	0.80	0.54	0.41	*2.71*
PAH	2.20e-06	1.64	1.35	0.91	0.69	*4.59*
Propylene Oxide	2.90e-05	21.59	17.78	12.00	9.07	*60.45*
Toluene	1.30e-04	96.80	79.72	53.81	40.66	*270.98*
Xylenes	6.40e-05	47.65	39.24	26.49	20.01	*133.40*

(1) Low-load and low-temperature scenario not considered in these calculations. Formaldehyde not included as vendor emission factor supplied.

Boiler Emissions

Combustion emissions from the 10.7 mmBtu/hr natural gas-fired boiler (WH-1) were based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4 (when using a low-NO_x combustor). Hourly emissions were based on the MDHI of the unit and annual emissions were based on an annual operation of 8,760 hours. A fuel/waste gas heat content value of 1,020 Btu/ft^3 was used in the calculations.

Emergency Generator

Potential emissions from the Caterpillar G3516C 4SLB 2,098 hp compressor engine (EG-1) were based on emission factors provided by the oxidation catalyst vendor, the engine vendor, and as given in AP-42, Section 3.2. Hourly emissions were based on the (as calculated using a fuel heat rating of 6,935 Btu/hp-hr) maximum design heat input (MDHI) of the engines of 14.55 mmBtu/hr and the maximum hp rating. Annual emissions were based on 100 hours of operation per year. The following table details the PTE of the compressor engine:

Table 2: Emergency Generator PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	1.95 g/hp-hr	Engine Vendor	9.02	0.45
NO_X	0.50 g/hp-hr	Engine Vendor	2.31	0.12
$PM_{2.5}/PM_{10}/PM^{(1)}$	9.91×10^{-3} lb/mmBtu	AP-42, Table 3.2-2	0.14	0.007
SO_2	5.88×10^{-4} lb/mmBtu	AP-42, Table 3.2-2	0.01	0.0004
VOCs	1.05 g/hp-hr	Engine Vendor	4.86	0.24
Total HAPs	Various	AP-42, Table 3.2-2	0.43	0.02
Formaldehyde	0.52 g/hp-hr	Engine Vendor	2.41	0.12

(1) Includes condensables.

Storage Tanks

ACP provided an estimate of the uncontrolled VOC emissions produced from the 2,500 gallon pipeline liquids and lube oil storage tanks (TK-1 and TK-2) using the TANKS 4.09d program (working/breathing losses) as provided under AP-42, Section 7. These were the only storage tanks on site determined to have the potential for any substantive emissions. The total emissions from each fixed roof storage tank are the combination of the calculated "breathing loss" and "working loss." The breathing loss refers to the loss of vapors as a result of tank vapor space breathing (resulting from temperature and pressure differences) that occurs continuously when the tank is storing liquid. The working loss refers to the loss of vapors as a result of tank filling or emptying operations. Standing losses are independent of storage tank throughput while working losses are dependent on throughput.

Hourly emissions (not calculated by TANKS) were based on the calculated annual losses as divided by 8,760 hours/yr. Annual emissions were as calculated by the TANKS program and based on specific throughputs of each tank (12,500 gallons of pipeline liquids and 10,000 gallons of lube oil). Based on the low-VOC and low-vapor pressure material stored, potential emissions from the storage tanks were very small: total emissions from the tanks were 0.08 lbs/hr and 0.35 tons/year.

Truck Loadouts

VOC emissions from pipeline liquid loading operations (LR-1) occur as fugitive emissions generated by displacement of vapors when loading trucks. The emission factor used to generate the VOC emissions is based on Equation (1) of AP-42 Section 5.2-4. In this equation, ACP used variables specific to the liquids loaded and to the method of loading - in this case "submerged loading: dedicated normal service." Additionally, worst-case annual emissions were based on a maximum loading rate of 12,500 gal/year of pipeline liquids. Maximum hourly emissions were based on a maximum loading rate of 90 gallons/minute. A conservative value of 20% was used to calculate the VOC percentage of the fluids.

Fugitives

Equipment Leaks

ACP based their 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. No control efficiencies, as based on a Leak Detection and Repair (LDAR) protocol, were applied. Component counts were given and shall be limited in the draft permit. VOC/HAP by-weight percentages (2.6% and 0.15%, respectively) of the natural gas was also used in the calculations.

Maintenance and Emergency Events

ACP also included in their fugitive emission estimate release of natural gas during compressor blowdown during startup/shutdown events (100 events/year/turbine). Emissions were calculated based on a gas loss of 38,000 scf/startup and 63,000 scf/shutdown (as based on conservative engineering estimates pursuant to data from an other similar station). VOC/HAP by-weight percentages (2.6% and 0.15%, respectively) of the natural gas was also used in the calculations.

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 proposed Marts Compressor Station is given in Attachment B.

REGULATORY APPLICABILITY

The proposed Marts Compressor Station is subject to the following substantive state and federal air quality rules and regulations: 45CSR2, 45CSR10, 45CSR13, 40 CFR 60 Subparts DC,

JJJJ and KKKK, and 40 CFR 63 Subpart ZZZZ. Each applicable rule (and those that have questionable non-applicability) and ACP'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 combustion turbines. However, the 10.7 mmBtu/hr natural gas-fired boiler has been determined to meet the definition of a "fuel burning unit" under 45CSR2 and is, therefore, subject to the applicable requirements therein. Each substantive 45CSR2 requirement is discussed below.

45CSR2 Opacity Standard - Section 3.1

Pursuant to 45CSR2, Section 3.1, the boiler is subject to an opacity limit of 10%. Proper maintenance and operation of the boiler (and the use of natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

45CSR2 Weight Emission Standard - Section 4.1.b

The allowable particulate matter (non-condensable total particulate matter) emission rate for the boiler, identified as a Type "b" fuel burning unit, per 45CSR2, Section 4.1.a, is the product of 0.09 and the total design heat input of the boiler in million Btu per hour. The maximum aggregate design heat input (short-term) of the boiler will be 10.7 mmBtu/hr. Using the above equation, the 45CSR2 particulate matter emission limit of the boiler will be 0.96 lb/hr. The maximum potential hourly PM emissions (including condensables) from the boiler is estimated to be 0.08 lb/hr. This emission rate is 8.31% of the 45CSR2 limit.

45CSR2 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 2 requires testing for initial compliance with the limits therein, monitoring for continued compliance, and keeping records of that compliance. The TMR&R requirements are clarified under 45CSR2A and discussed below.

45CSR2A Applicability - Section 3

Pursuant to §45-2A-3, as an individual applicable "fuel burning unit" under 45CSR2 with an MDHI less than 100 mmBtu/hr, the boiler is not subject to the Testing and MRR Requirements under 45CSR2A.

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

45CSR10 has requirements limiting SO_2 emissions from "fuel burning units," limiting in-stack SO_2 concentrations of "manufacturing processes," and limiting H_2S concentrations in process

gas streams. 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 combustion turbines. The proposed ACP boiler is defined as a "fuel burning unit" and subject to the applicable requirements discussed below.

45CSR10 Fuel Burning Units - Section 3

The allowable SO_2 emission rate for the boiler (located in Region III), identified as a Type "b" fuel burning unit, per 45CSR10, Section 3.3(f), is the product of 3.2 and the total design heat input of the boiler in million Btu per hour. The maximum aggregate design heat input (short-term) of the boiler will be 10.7 mmBtu/hr. Using the above equation, the 45CSR10 SO_2 emission limit of the boiler will be 34.24 lb/hr. The maximum potential hourly SO_2 emissions from the boiler is estimated to be 0.01 lb/hr. This emission rate is only a trace of the 45CSR10 limit.

45CSR10 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 10 requires to test for initial compliance with the limits therein, monitor for continued compliance, and keep records of that compliance. The TMR&R requirements are clarified under 45CSR10A and discussed below.

45CSR10A Applicability - Section 3

Pursuant to §45-10A-3.1(b), as the boiler combusts "natural gas, wood or distillate oil, alone or in combination," the boiler is not subject to the Testing and MRR Requirements under 45CSR10A.

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

As required under §45-13-8.3 ("Notice Level A"), ACP placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on September 26, 2015 in *The Exponent Telegram* and the affidavit of publication for this legal advertisement was submitted on October 20, 2015.

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

The Marts Compressor Station is proposed to be located in Lewis County, WV. Lewis 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 B, the facility-wide PTE of the proposed Marts 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.

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 Attachment B, the aggregate PTE of formaldehyde at the facility is greater than 0.5 TPY - greater than the 1,000 pound per year threshold given in Table A of 45CSR27. However, the combustion turbines and emergency generator do no 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

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 Marts Compressor 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 (see Attachment B) 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 a New Source Performance Standard (NSPS) - 40 CFR 60, Subpart Dc that does not contain a Title V permitting exemption, the proposed facility is subject to Title V as a non-major source. Non-major sources subject to Title V, pursuant to DAQ policy, are deferred from having to submit a Title V application.

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

40 CFR 60 Subpart Dc is the New Source Performance Standard (NSPS) for industrial-commercial-institutional steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity between 10 and 100 mmBtu/hr. The proposed boiler is subject to 40 CFR 60, Subpart Dc under the above applicability requirements of §60.40c(a). Subpart Dc does not have any emission standards

for boilers that combust only natural gas. Boilers are, however, subject to the record-keeping and reporting requirements given under §60.48c.

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 - (NON APPLICABILITY)

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 (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984." The largest storage tank proposed for the Marts Compressor Station that will store VOLs is 2,500 gallons, or 9.5 m^3. Therefore, Subpart Kb does not apply to any storage tanks at the proposed facility.

40 CFR 60 Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.

ACP's proposed Caterpillar G3516C 4SLB 2,098 hp emergency generator proposed for the Marts Compressor Station is defined under 40 CFR 60, Subpart JJJJ as stationary spark-ignition internal combustion engines (SI ICE) and is, pursuant to §60.4230(a)(4)(iv), subject to the applicable provisions of the rule. Pursuant to §60.4233(e): "Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE." Therefore, as the proposed ACP's emergency generator is greater than 100 hp, the engine must comply with the emission standards under Table 1 for "Emergency ≥ 130 hp:" NO_x - 2.0 g/HP-hr, CO - 4.0 g/HP-hr, and VOC - 1.0 g/HP-hr. The emission standards and the proposed compliance therewith of the engines are given in the following table:

Table 3: Caterpillar G3516C Subpart JJJJ Compliance

Pollutant	Standard (g/HP-hr)	Uncontrolled Emissions (g/bhp)(1)	Control Percentage	Controlled Emissions (g/bhp)(1)	JJJJ Compliant?
NO_x	2.0	0.50	0.00%	0.50	Yes
CO	4.0	1.95	0.00%	1.95	Yes
VOC	1.0	0.53	0.00%	0.53	Yes

(1) Pursuant to Subpart JJJJ, VOC emissions do not include CH_2O emissions. Uncontrolled emissions represent the highest emission rate given on vendor data sheet at various loads.

Use of an emergency engine further requires compliance with the operating requirements given under §60.4243(d).

40 CFR 60 Subpart KKKK: Standards of Performance for Stationary Combustion Turbines

40 CFR 60 Subpart KKKK is the NSPS for stationary combustion turbines of greater than 10 mmBtu/hr and which commenced construction, modification, or reconstruction after February 18, 2005. Subpart KKKK contains within it emission standards for NO_x and SO_2, compliance

methods, monitoring requirements, and reporting and record-keeping procedures for affected facilities applicable to the rule. The following discusses the applicable substantive requirements of Subpart KKKK relating to the proposed combustion turbines.

Pursuant to §60.4305(a), Subpart KKKK applies to stationary combustion turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 mmBtu) per hour, based on the higher heating value of the fuel, which commenced construction, modification, or reconstruction after February 18, 2005. Therefore, each of the proposed combustion turbines are subject to 40 CFR 60, Subpart KKKK.

Section §60.4320 requires affected facilities to meet NO_x emission standards given under Table 1 of the Subpart. As each unit is a turbine firing natural gas between 50 and 850 mmBtu/hr, pursuant to Table 1, each unit has to meet a NO_x limit of 25 ppm at 15% O_2 or 1.2 lb/MW-hr gross energy output. ACP has stated in the permit application that each unit will meet a post-control NO_x emission rate of 5 ppm at 15% O_2.

It is important to note that the preamble of the July 6, 2006 Federal Register (71 FR 38497) states clearly that the NO_x emissions standards noted above are not continuous and do not necessarily apply during times of startup/shutdown but ACP must, pursuant to §60.4333, "operate and maintain [ACP's] stationary combustion turbine, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction."

Section §60.4330(a) requires that a stationary combustion turbine located in a continental area meet either: (1) an SO_2 standard of 0.90 lb/MW-hr gross energy output or (2) not combust a any fuel which contains total potential sulfur emissions in excess of 0.060 lb-SO_2/mmBtu heat input. Additionally, §60.4365(a) exempts the permittee from monitoring fuel sulfur content (to show compliance with §60.4330(a)(2)) if a source burns only natural gas that is covered by a purchase or transportation contract that limits sulfur to no more than 20 grains per 100 scf. ACP will show compliance with this requirement.

Subpart KKKK also includes general compliance requirements (60.4333), monitoring requirements (60.4335-60.4370), reporting requirements (60.4375-60.4395), and performance testing requirements (60.4400-60.4415).

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

On April 27, 2012, the USEPA issued a final rule (with amendments finalized on 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.

Pneumatic Controllers - (NON APPLICABILITY)

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. According to information provided by ACP, as the Marts Compressor Station is located after the point of custody transfer, any pneumatic controllers are not applicable to this section of Subpart OOOO.

Storage Tanks - (NON APPLICABILITY)

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." ACP's storage tanks are potentially applicable to this section of Subpart OOOO. However, the PTE of each storage tank is far below 6 TPY and, therefore, the storage tanks are not subject to Subpart OOOO.

40 CFR 63 Subpart ZZZZ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

On June 1, 2013 the DAQ took delegation of the area source provisions of 40 CFR 63, Subpart ZZZZ. As the Marts Compressor Station is defined as an area source of HAPs (see Attachment B), the facility is subject to applicable requirements of Subpart ZZZZ. Pursuant to §63.6590(c):

> An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

§63.6590(c)(1) specifies that "[a] new or reconstructed stationary RICE located at an area source" is defined as a RICE that shows compliance with the requirements of Subpart ZZZZ by "meeting the requirements of . . . 40 CFR part 60 subpart JJJJ, for spark ignition engines." Pursuant to §63.6590(a)(2)(iii), a "stationary RICE located at an area source of HAP emissions is new if [the applicant] commenced construction of the stationary RICE on or after June 12, 2006." The Caterpillar G3516C 4SLB 2,098 hp emergency generator proposed for the Marts Compressor Station is defined as a new stationary RICE and, therefore, will show compliance with Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart JJJJ. Compliance with Subpart JJJJ is discussed above.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed Marts 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 (PM_{10} and $PM_{2.5}$), 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 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 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 4: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Acetaldehyde	VOC	Yes	B2 - Probable Human Carcinogen
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
n-Hexane	VOC	No	Inadequate Data
Toluene	VOC	No	Inadequate Data
Xylenes	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 proposed 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

Refer to Section 4.2 of the draft permit for the unit-specific monitoring, compliance demonstration, reporting, and record-keeping requirements (MRR).

PERFORMANCE TESTING OF OPERATIONS

Refer to Section 4.3 of the draft permit for the unit-specific performance testing requirements.

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 R13-3271 to Atlantic Coast Pipeline, LLC for the proposed construction and operation of the Marts Compressor Station located near Jane Lew, Lewis County, WV.

Joe Kessler, PE
Engineer

5/11/16
Date

Attachment A

Atlantic Coast Pipeline, LLC

R13-2371: 041-00076

Marts Compressor Station

Table A1: Combustion Turbine Uncontrolled Emission Factors and Control Percentages

Turbine ID Number	Turbine Model	bhp	MDHI		Uncontrolled Emission Factors													
					CO		NOx		$PM_{2.5}/PM_{10}/PM$		SO2		UHC		CH_2O		Total HAPs	
CT-4	Taurus 60	7,700	71.40	lb/mmBtu	4.00	lb/hr	2.40	lb/hr	1.50	lb/hr	0.0034	lb/mmBtu	2.30	lb/hr	0.00288	lb/mmBtu	0.00305	lb/mmBtu
CT-3	Taurus 70	10,915	94.50	lb/mmBtu	5.30	lb/hr	3.20	lb/hr	1.90	lb/hr	0.0034	lb/mmBtu	3.10	lb/hr	0.00288	lb/mmBtu	0.00305	lb/mmBtu
CT-2	Mars 100	15,900	140.00	lb/mmBtu	7.90	lb/hr	4.70	lb/hr	2.90	lb/hr	0.0034	lb/mmBtu	4.50	lb/hr	0.00288	lb/mmBtu	0.00305	lb/mmBtu
CT-1	Titan 130	20,500	170.00	lb/mmBtu	9.60	lb/hr	5.70	lb/hr	3.50	lb/hr	0.0034	lb/mmBtu	5.50	lb/hr	0.00288	lb/mmBtu	0.00305	lb/mmBtu
			Control %		*80%*		*44%*		*0%*		*0%*		*50%*		*50%*		*50%*	

Table A2: Combustion Turbine PTE

Turbine ID Number	Turbine Model	Operational Mode	CO		NO_x		$PM_{2.5}/PM_{10}/PM$		SO_2		VOC		Formaldehyde		Total HAPs	
			lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
CT-4	Taurus 60	Normal	0.80	3.47	1.33	5.78	1.50	6.57	0.24	1.06	0.12	0.50	0.10	0.45	0.11	0.47
		Low-Temp	4.80	0.12	17.80	0.45					0.23	0.01	0.21	0.01	0.22	0.01
		Startup	385.50	3.21	4.20	0.04					4.44	0.04	3.97	0.03	4.20	0.04
		Shutdown	198.00	1.65	2.40	0.02					2.28	0.02	2.04	0.02	2.16	0.02
		CT-4 Total		*8.45*		*6.28*		*6.57*		*1.06*		*0.56*		*0.50*		*0.53*
CT-3	Taurus 70	Normal	1.06	4.60	1.78	7.71	1.90	8.32	0.32	1.41	0.16	0.67	0.14	0.59	0.14	0.63
		Low-Temp	6.36	0.16	23.60	0.59					0.31	0.01	0.27	0.01	0.29	0.01
		Startup	438.60	3.66	4.80	0.04					5.04	0.04	4.42	0.04	4.69	0.04
		Shutdown	560.40	4.67	6.60	0.06					6.36	0.05	5.58	0.05	5.91	0.05
		CT-3 Total		*13.08*		*8.40*		*8.32*		*1.41*		*0.78*		*0.68*		*0.72*
CT-2	Mars 100	Normal	1.58	6.85	2.61	11.33	2.90	12.70	0.48	2.08	0.23	0.98	0.20	0.87	0.21	0.93
		Low-Temp	9.48	0.24	34.70	0.87					0.45	0.01	0.40	0.01	0.43	0.01
		Startup	741.00	6.18	8.40	0.07					8.52	0.07	7.63	0.06	8.08	0.07
		Shutdown	895.20	7.46	10.20	0.09					10.20	0.09	9.14	0.08	9.68	0.08
		CT-2 Total		*20.73*		*12.35*		*12.70*		*2.08*		*1.14*		*1.02*		*1.09*
CT-1	Titan 130	Normal	1.92	8.33	3.17	13.74	3.50	15.33	0.58	2.53	0.28	1.19	0.24	1.06	0.26	1.12
		Low-Temp	11.52	0.29	42.20	1.06					0.55	0.01	0.49	0.01	0.52	0.01
		Startup	1062.00	8.85	11.40	0.10					12.12	0.10	10.79	0.09	11.43	0.10
		Shutdown	1248.00	10.40	14.40	0.12					14.28	0.12	12.71	0.11	13.46	0.11
		CT-1 Total		*27.87*		*15.01*		*15.33*		*2.53*		*1.43*		*1.27*		*1.35*

Attachment B: Facility-Wide PTE

Atlantic Coast Pipeline, LLC: Marts Compressor Station
Permit Number R13-3271: Facility ID 041-00076

Emission Unit	EP ID	CO		NO_x		PM[1]		SO_x		VOC		Formaldehyde		Total HAPs	
		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Solar Titan 130[2]	CT-1	1.92	27.87	3.17	15.01	3.50	15.33	0.58	2.53	0.28	1.43	0.24	1.27	0.26	1.35
Solar Mars 100[2]	CT-2	1.58	20.73	2.61	12.35	2.90	12.70	0.48	2.08	0.23	1.14	0.20	1.02	0.21	1.09
Solar Taurus 70[2]	CT-3	1.06	13.08	1.78	8.40	1.90	8.32	0.32	1.41	0.16	0.78	0.14	0.68	0.14	0.72
Solar Taurus 60[2]	CT-4	0.80	8.45	1.33	6.28	1.50	6.57	0.24	1.06	0.12	0.56	0.10	0.50	0.11	0.53
Caterpillar G3516C EG	EG-01	9.02	0.45	2.31	0.12	0.14	0.01	0.01	~0.00	4.86	0.24	2.41	0.12	0.43	0.02
Boiler	WH-1	0.88	3.86	0.53	2.30	0.08	0.35	0.01	0.03	0.06	0.25	~0.00	~0.00	0.02	0.09
Storage Tanks	TK-1, TK-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.35	0.00	0.00	0.00	0.00
Truck Loading	LR-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.25	0.01	0.00	0.00	~0.00	~0.00
Fugitives	FUG-01, FUG-02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	51.50	0.00	0.00	n/a	2.91
Facility-Wide Total →		***15.26***	***74.44***	***11.73***	***44.46***	***10.02***	***43.28***	***1.64***	***7.11***	***11.04***	***56.26***	***3.09***	***3.59***	***1.17***	***6.71***
Facility-Wide PTE[3] →		***15.26***	***74.44***	***11.73***	***44.46***	***10.02***	***43.28***	***1.64***	***7.11***	***11.04***	***4.76***	***3.09***	***3.59***	***1.17***	***3.80***

(1) All particular matter emissions are assumed to be 2.5 microns or less.

(2) Hourly emissions of CO, NO_x, VOC and Formaldehyde represent those during normal, non-low temperature operation. Much higher calculated hourly emissions may occur during low-temperature and turbine startup/shutdowns. See Attachment A for these potential emissions. Annual emissions represent input from all operating scenarios at permit limited operational hours.

(3) PTE does not include fugitive emissions. No individual HAP has a PTE over 10 TPY (formaldehyde is the largest contributor). As the PTE of all individual HAPs are less than 10 TPY the PTE of total HAPs is less than 25 TPY, the Marts Compressor Station is defined as a minor (area) source for purposes of 40 CFR 61 and 40CFR63.