



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2837B
Plant ID No.:	041-00011
Applicant:	Dominion Transmission Inc.
Facility Name:	Kennedy Station
Location:	Lewis County
NAICS Code:	486210
Application Type:	Modification
Received Date:	December 1, 2011
Engineer Assigned:	David Keatley
Fee Amount:	\$2000.00
Date Received:	December 5, 2011
Complete Date:	February 16, 2012
Due Date:	May 16, 2012
Applicant Ad Date:	December 7, 2011
Newspaper:	<i>The Weston Democrat</i>
UTM's:	Easting: 543.59 km Northing: 4,328.71 km Zone: 17
Description:	Removing one existing compressor engine, installing a different engine, and adding an emergency generator.

DESCRIPTION OF PROCESS

The Kennedy Station is a transmission compressor station that services a natural gas pipeline system. Currently compressor engines (EN02 and EN03) at the facility receive natural gas from a pipeline and compresses it to increase the pressure of the natural gas stream. The current compressor engine EN02 will be replaced with engine EN04. The proposed compressor engine EN04 is a natural gas fired 1,183 bhp Caterpillar four-stroke lean-burn engine. EN04 will have a Miratech catalytic converter to reduce emissions of carbon monoxide (CO) and volatile organic compounds (VOCs).

The compressed natural gas stream is then sent to an existing Cameron triethylene glycol (TEG) dehydration unit to reduce the moisture content of the natural gas stream. The

process to remove the moisture begins with the compressed natural gas stream flowing countercurrent to lean TEG in the contactor bed. The contactor bed is rated for 23 million standard cubic feet per day (mmscfd). Once the compressed dehydrated natural gas comes out of the contactor bed it is then sent to the pipeline. In the contractor bed the lean TEG absorbs water and hydrocarbons from the compressed wet natural gas. The TEG which has become rich with absorbed moisture and hydrocarbons is sent to the regenerator. The heat generated from the natural gas fired reboiler (RBR01) is used to liberate the moisture and hydrocarbons from the rich TEG in the regenerator. The reboiler has a 1.104 million British Thermal Units per hour (mmBTU/hr) capacity. The regenerator vapors exit the still vent to the Questor Technology, Inc. Model 100 Flare (F2) that combusts most of the hydrocarbons reducing VOC and HAP emissions and odor. The flare has a 4.0 MMBTU/hr capacity.

Engine GE-01 is part of a generator set which would supply back-up electrical power for the station. The 131.6 bhp natural gas fired Cummins Model WSG-1068 four-stroke rich-burn engine will be limited to 500 hours of operation per year. The engine will have a Heraeus three-way catalyst to reduce contaminants by the following amounts: VOC, 99%; NOx, 91%; and CO, 95%.

SITE INSPECTION

A full on-site inspection was last performed by the WVDAQ on June 3, 2009. On that date Mike Kolb found the facility to be "in compliance."

Directions from Charleston. Take I79 N toward Jane Lew. Take Exit 105 (Jane Lew) and turn right onto CR 7. Go 0.8 miles on CR7 till US19 S. Take US19 S for 4.7 miles until CR12 N (Jackson's Mill Road). Take CR12 N for 2.4 miles, bear left and cross the narrow bridge to Jackson's Mill State 4H Camp. CR 12 changes to CR 10. On CR 10 proceed 0.6 miles to CR 1, turn left and go 200 yards to Valley Chapel Road. Turn right and go 1.3 miles, turn left and cross a wooden bridge to the site.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The emission factors for EN04 come from the catalyst manufacturer (Miratech), engine manufacturer (Caterpillar), and AP-42. The emission factor in g/bhp-hr from Caterpillar is: NOx, 1.00. The emission factor in g/bhp-hr from Miratech are: CO, 2.00; and VOC, 0.35. Emission factors in lb/MMBTU from AP-42 are: SO₂, 5.88 x 10⁻⁴; PM₁₀, 9.987 x 10⁻³; and PM_{2.5}, 9.987 x 10⁻³.

The emission factors for GE01 come from the engine manufacturer and AP-42. The emissions factors in g/bhp-hr from Cummins are: NOx, 0.02; CO, 0.01; and VOC, 0.14.

The following table is the estimated point source emissions due to the modification:

Source ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EN04	Caterpillar G3516B 1,183 bhp	Nitrogen Oxides	2.61	11.42
		Carbon Monoxide	5.216	22.85
		Volatile Organic Compounds	0.913	3.998
		Sulfur Dioxide	0.0055	0.024
		Particulate Matter-10	0.0936	0.4098
		Formaldehyde	0.97	4.23
GE01	Cummins WSG-1068 Auxiliary Generator 131.6 bhp	Nitrogen Oxides	<0.01	<0.01
		Carbon Monoxide	<0.01	<0.01
		Volatile Organic Compounds	0.04	0.01
		Sulfur Dioxide	<0.01	<0.01
		Particulate Matter-10	0.17	0.0042
		Formaldehyde	0.02	<0.01

The following table represents the proposed estimated total facility emissions:

Pollutant	Emissions (Before) (tons/year)	Emissions (After) (tons/year)	Change in Emissions (tons/year)
Nitrogen Oxides	187.07	26.40	-160.67
Carbon Monoxide	57.07	41.68	-15.39
Volatile Organic Compounds	110.06	85.16	-24.90
Total Particulate Matter	1.09	0.79	-0.3
Particulate Matter-10	1.09	0.79	-0.3
Sulfur Dioxide	0.05	0.05	0
Formaldehyde	2.83	4.88	2.05
Benzene	0.28	0.28	0
Ethylbenzene	0.18	0.18	0
Toluene	0.78	0.78	0
Xylenes	2.72	2.72	0
n-Hexane	0.16	0.16	0

REGULATORY APPLICABILITY FOR THIS MODIFICATION

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*

45CSR13 applies to this source due to the fact that they exceed the regulatory emission threshold for regulated air pollutants of 6 lb/hr and 10 ton/year (NO_x, CO and

Fact Sheet R13-2837B
Dominion Transmission, Inc.
Kennedy Station

VOCs). Since this source required a Modification Permit a \$1,000 application was paid.

45CSR16 - *Standards of Performance for New Stationary Sources Pursuant to 40CFR60*

45CSR16 incorporates by reference the standards of performance for new stationary sources (40CFR60). Kennedy Station has two engines (EN04 and GE01) that are subject to 40CFR60 Subpart JJJJ, and is therefore subject to 45CSR16.

45CSR22 - *Air Quality Management Fee Program*

The facility is subject to the requirements of 45CSR22. This source has a total reciprocating engine capacity greater than 1,000 hp and is a 8D source and shall pay an annual fee of \$500. Since this source is subject to an NSPS (Subpart JJJJ) an additional \$1,000 NSPS fee was paid.

45CSR30 - *Air Quality Management Fee Program*

Kennedy Station is an existing major source subject to 45CSR30. Changes authorized by this permit cause this facility to become a minor source.

40CFR60 Subpart JJJJ - *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*

40CFR60 Subpart JJJJ sets forth emission limits, fuel requirements, installation requirements, and monitoring requirements based on the date of construction, date of manufacture, and horsepower (hp) of the spark ignition internal combustion engine. This subpart applies to engines EN04 and GE01 because the site will commence construction after June 12, 2006 engines will be manufactured on or after July 1, 2007 and exceeds 500 hp. EN04 will have a manufacture date after January 1, 2011 and is required to meet the following emission standards: NO_x 1.0 g/hp-hr, CO 2.0 g/hp-hr, and VOC 0.7 g/hp-hr. To demonstrate compliance with the emission standards EN04 will be required to have an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first. The performance tests will be for the regulated air pollutants NO_x, CO, and VOCs. GE01 is for emergencies and will have a manufacture date after January 1, 2009 and is required to meet the following emission standards: NO_x 2.0 g/hp-hr, CO 4.0 g/hp-hr, and VOC 1.0 g/hp-hr. GE01 has no testing required because it is an EPA certified engine. Both engines will also have to keep maintenance records.

Unless otherwise stated WVDEP DAQ did not determine whether the registrant 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 and 40 CFR 63, Subpart ZZZZ.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The following information was obtained from USEPA's Air Toxic Website.

Formaldehyde

Formaldehyde is used mainly to produce resins used in particleboard products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

AIR QUALITY IMPACT ANALYSIS

Based on the annual emission rates this facility will not be a major source as defined by 45CSR14, so air quality modeling was not required.

MONITORING OF OPERATIONS

Presence or absence for existing Flare F2 is required. Measuring the wet natural gas throughput of contactor is required. Proper maintenance of the catalytic converters is required. Proper maintenance of the engines EN04 and GE01 is required.

CHANGES TO PERMIT R13-2837A

The current compressor engine EN02 will be replaced with engine EN04. Installation of a new emergency generator GE01. Section 5.0 of the permit was added.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates Dominion Transmission natural gas transmission station should meet applicable requirements of state rules and federal regulations. It is recommended that Dominion Transmission's proposed changes to Kennedy natural gas transmission station should be granted a 45CSR13 modification permit for their facility.

David Keatley
Permit Writer

Date