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# ENGINEERING EVALUATION/FACT SHEET

## B ACKGROUND INFORMATION

| | |
|---|---|
| Application No.: | R13-2837C |
| Plant ID No.: | 021-00001 |
| Applicant: | Columbia Gas Transmission LLC |
| Facility Name: | Glenville Compressor Station |
| Location: | Truebada |
| NAICS Code: | 486210 |
| Application Type: | Modification |
| Received Date: | August 6, 2013 |
| Engineer Assigned: | Edward S. Andrews, P.E. |
| Fee Amount: | $4,500.00 |
| Fee Deposit Date: | August 8, 2013 |
| Complete Date: | September 5, 2013 |
| Due Date: | December 4, 2031 |
| Applicant Ad Date: | August 8, 2013 |
| Newspaper: | *The Gilmer Democrat* |
| UTM's: | Easting: 519.7 km Northing: 4,308.5 km Zone: 17 |
| Description: | The application is for the installation of two new combustion turbines, fuel pre-heater, and replacement of the emergency generator. |

## Process Description

The Glenville Station is a transmission compressor station that services a natural gas pipeline system. The station receives natural gas via pipeline from an upstream compressor station, compresses it using reciprocating internal combustion engines and after this project, natural gas-fired turbines, and then transmits it via pipeline to a downstream station. Currently the station operates five reciprocating internal combustion engines for compression. These units are Clark TLA-6C engines rated at 2,000 brake horsepower (bhp) each (Emission Points E01, E02, E05, E06, and E07) and were installed in 1966, 1968, 1969, 1971, and 1971 respectively. The station is only a transmission station with no other gas processing capabilities (i.e. dehydration unit).

Auxiliary equipment at the station consists of a 530 bhp natural gas-fired emergency power generator (installed in 2008), and various storage tanks.

Columbia proposes to increase the compression capacity of the station by installing two new compressors that are driven by two combustion turbines. The proposed turbines are Solar Taurus 60 Turbines with a heat input rating of 60 MMBtu/hr with a power output 7,700 hp. A process heater will be added to preheat the natural gas just prior to being combusted in the turbine. This heater will be natural gas fired with a maximum design heat input rating of 1.1 MMBtu/hr.

Other emissions sources include replacing the existing emergency generator set with a larger unit that is rated at generating 825 kilo watts (kW) of electricity. The replacement set is equipped with a Dresser Waukesha P48GL/GDL engine, which is a 1,063 bhp, natural gas fueled, spark-ignition engine. The applicant notes up to 40 catalytic (natural gas-fired) heaters used for indoor air conditioning during the heating season may be installed at the facility.

## 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." with all applicable rules and regulations, which includes the facility Title V Operating Permit. This action only proposes the installation of new equipment that is scheduled for 2014. Thus, no site inspection for the proposed action is required.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions from the proposed new sources are indicated in the following table.

Table #1 Emission from New Sources at the Glenville Station

| Pollutant\Sources | Turbine #1* | | Turbine #2* | | Heater #2 | | Generator #2 | |
|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| Oxides of Nitrogen ($NO_x$) | 3.86 | 18.1 | 3.86 | 18.1 | 0.11 | 0.47 | 4.69 | 1.17 |
| Carbon Monoxide (CO) | 3.92 | 32.2 | 3.92 | 32.2 | 0.09 | 0.39 | 3.05 | 0.76 |
| Volatile Organic Compounds (VOCs) | 0.56 | 2.71 | 0.56 | 2.71 | 0.01 | 0.03 | 0.61 | 0.15 |
| Particulate Matter (PM)/ PM less than 10 microns ($PM_{10}$)/ PM less than 2.5 microns ($PM_{2.5}$) | 0.45 | 1.97 | 0.45 | 1.97 | 0.01 | 0.04 | 0.09 | 0.02 |
| Carbon Dioxide Equivalence ($CO_2e$) | 7,965 | 34,888 | 7,965 | 34,888 | 128 | 559 | 1,031 | 258 |
| Total Hazardous Air Pollutants (HAPs) | 0.07 | 0.31 | 0.07 | 0.31 | <0.01 | <0.01 | 0.64 | 0.16 |

* - Hourly Emissions for the Turbines are based on normal operating conditions; Annual Emissions includes operations less than normal (i.e. low load, low temperature, startup/shutdown cycles, etc.)

This action proposes to replace the existing generator set. None of the their existing sources at the facility is covered by a valid permit under 45 CSR 13. Thus, the potential increase in emissions from the facility is as noted in the above table.

## REGULATORY APPLICABLILITY

The Glenville Station as configured at the time of submittal of this application is classified as a Major Source under Prevention of Significant Deterioration (PSD), which is State Rule 45 CSR 14, and a Major Source for Hazardous Air Pollutants. The applicant must demonstrate that this project either does not trigger other permitting requirements or satisfies them within the application.

**PSD**

Prevention of Significant Deterioration requirements (major source permitting) applies to projects that have the potential to increase annual emissions beyond defined significance levels. This potential is evaluated as a two-step process. First any emission increase associated with the project itself is evaluated. If the project will result in a significant emission increase (45 CSR §§14-2.74 & 2.75), then the net emission increase must be determined, including all contemporaneous equipment changes.

The following table summarizes the annual potential from the project.

| Table #2 Major Modification Applicability Test | | | | | | |
|---|---|---|---|---|---|---|
| Source | $PM_{2.5}$ (tpy) | $NO_x$ (tpy) | CO (tpy) | $SO_2$ (tpy) | VOC (tpy) | $CO_{2e}$ (tpy) |
| Turbine #1 | 1.97 | 18.08 | 32.19 | 0.21 | 2.71 | 34,888 |
| Turbine #2 | 1.97 | 18.08 | 32.19 | 0.21 | 2.71 | 34,888 |
| Heater #2 (Fuel Preheater) | 0.04 | 0.47 | 0.39 | 0.003 | 0.03 | 559 |
| Generator | 0.02 | 1.17 | 0.76 | 0.002 | 0.15 | 258 |
| 40 Catalytic Heaters | 0.09 | 1.24 | 1.04 | 0.009 | 0.07 | 1,476 |
| Grand Total | 4.09 | 39.04 | 66.57 | 0.43 | 5.67 | 72,069.00 |
| PSD Significance Level | 10 (No) | 40 (No) | 100 (No) | 40 (No) | 40 (No) | 75,000 (No) |

Based on the potential of this project, it does not constitute a significant increase of emissions and is not required to undergo any further PSD review in accordance with 45 CSR 14. The project is classified as a minor modification and subject to the review process in 45 CSR13.

As such, the applicant prepared and submitted an complete application, paid the required filling fees under 45 CSR 22, and published a legal ad in accordance with 45CSR 13.

**NSPS**

New Source Performance Standards (NSPS) apply to certain new, modified, or reconstructed sources meeting criteria established in 40 CFR 60.

The fuel pre heater is rated for 1.09 MMBtu/hr. The definition of affected source in Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units) is units between 10 MMBtu/hr and up to 100 MMBtu/hr. Thus, the proposed fuel preheater is not an affected source and is not subject to the standards under Subpart Dc.

Turbines are driving compressors at a transmission station for a natural gas pipeline system. Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production) establishes standards for certain process equipment at oil and natural gas production sites. This regulation defines sites from the wellhead and the point of custody transfer to the natural gas transmission and storage segment. The Glenville Compressor is downstream of the custody transfer point of Columbia's transmission system. Therefore, the proposed compressors are not affected sources and not subject to the performance standards of Subpart OOOO.

Subpart KKKK

U.S. EPA has promulgated NSPS for stationary combustion turbines constructed, modified, or reconstructed after February 18, 2005, in Subpart KKKK. Subpart KKKK applies to combustion turbines with a peak heat input of 10 MMBtu/hr and greater. The proposed Solar Taurus turbines are rated at 71.3 MMBtu/hr (at $0^0$ F). Therefore, the purposed turbines are affected sources under this subpart.

Sources subject to Subpart KKKK are exempt from the requirements of Subpart GG (NSPS for combustion turbines constructed/modified/reconstructed after October 3, 1977).

This subpart establishes emissions standards for $NO_x$ and $SO_2$. These turbines would be limited to 0.060lb of $SO_2$ per MMBtu/hr of heat input. These turbines will be burning pipeline quality natural gas with a maximum sulfur content of 20 grains per 100 standard cubic feet of gas. Under 40 CFR §60.4365, a source is exempt from monitoring fuel sulfur content if the sources burns natural gas that is covered by an transportation agreement (Federal Energy Regulatory Commission tariff limit) with a maximum of 20 grains of sulfur per 100 standard cubic feet of gas (40 CFR §60.4365(a)).

40 CFR §60.4325 establishes $NO_x$ standards for affected units as specified in Table 1 of Subpart KKKK. The proposed units are new turbines firing natural gas with a heat input of greater than 50 MMBtu/hr and less than 850 MMBtu/hr. In this subcategory, these turbines are limited to a $NO_x$ standard of 25 ppm at 15 percent oxygen ($O_2$) content or 150 nana gram /Joule

of useful output. The selected turbines are equipped with a dry low $NO_x$ emission combustion system, known as SoLoNO$_x$™, which has been developed to provide the lowest emissions possible during normal operating conditions. Solar Taurus (manufacturer) predicts that the $NO_x$ emissions with the SoLoNO$_x$™ combustion controls from the turbine to be 15 ppm when the ambient temperatures are at or above $0^0$ F.

There are alternative standards for units operating at less 75 percent of peak load or when operating temperatures are less than $0^0$ F. The alternative limit is 150 ppm at 15% $O_2$ is listed Table 1 to Subpart KKKK. The manufacturer predicts that the $NO_x$ rate for the proposed turbines would increase up to 120 ppm for subzero operations. For low load operations, the manufacturer predicts that the $NO_x$ concentrations to increase slightly to 70 ppm for loads at or less than 50% of peak output and 50 ppm at idle conditions. The propose turbines are capable of meeting the $NO_x$ limitations under this subpart at normal and other than normal conditions.

This subpart requires sources to use one of two options in monitoring compliance with the standard, which are testing, continuous monitoring system. Sources can conduct testing every year and reduce the subsequent testing to every two years if the $NO_x$ results are at or less than 75% of the standard, which equates to 15 ppm for these two turbines. The applicant has elected to use the testing option at this time. The permit will be structure on the 15 ppm as the short term limit, which is 75% of the applicable limit, for the short term limit with initial testing and subsequent testing every two years. Under the subpart, sources electing to conduct testing are only required to submit test reports of the results in lieu of submitting excess emissions and monitor downtime reports in accordance with 40 CFR §60.7(c).

Subpart JJJJ

Subpart JJJJ (Standard of Performance for Stationary Spark Ignition Internal Combust Engines) applies to stationary spark ignition engines manufactured after July 1, 2007. The replacement generator set will be equipped with a spark ignition engine manufactured after July 1, 2007. Thus, the engine would be subject the standards of this subpart and subject to the emission limitations of Table 1 to Subpart JJJJ of Part 60, which include the following requirements for emergency engine greater than 130 bph.

- For $NO_x$, the limit is 2.0 grams per horsepower-hour (g/hp-hr) or 160 ppmvd at 15 % $O_2$.
- For CO, the limit is 4.0 g/hp-hr or 500 ppmvd at 15 % $O_2$.
- For VOC, the limit is 1.0 g/hp-hr or 86 ppmvd at 15 % $O_2$.

The proposed engine for the generator set is manufactured by Dresser Waukesha. The manufacturer claims that the $NO_x$ rate is predicted at 2 g/hp-hr; CO is 1.30 g/hp-hr; and VOC (Non-Methane Hydrocarbon) is 0.26 g/hp-hr. According to the manufacturer's data, this engine should be capable of meeting the emission standards of this subpart. However, the manufacturer did not certify the engine as specified under 40 CFR Part 90, 40 CFR Part 1048 or 40 CFR Part 1054. Therefore, the permit will require the applicant to conduct an initial performance test and

either conduct subsequent performance testing every 8,760 hours of operation or once every 3 years, whichever is sooner.

**NESHAP**

The station is classified as a major source of HAPs. Formaldehyde is the HAP that makes the facility a major source of HAPs, which is generated from the existing compressor engines. All of the proposed sources are a listed affected source under 40 CFR Part 63. The following will discuss the key applicable parts of each affected source with its corresponding subpart.

Subpart YYYY

The proposed turbines are classified as affected sources under the NESHAP for stationary combustion turbines promulgated under Subpart YYYY of 40 CFR Part 63. These proposed turbines are classified as new lean premix gas-fired turbines. Per 40 CFR §63.6095(d), U.S. EPA stayed the standards for new or reconstructed stationary turbine that are either a lean premix gas-fired or diffusion flame gas-fired stationary combustion turbine. The only requirement that the applicant must comply with under this subpart is the Initial Notification requirements until U.S. EPA takes final action to require compliance with the standards under the subpart. The application has satisfied the Initial Notification requirements through this permit application (See 40 CFR §63.5(d)(1)).

Subpart ZZZZ

The internal combustion engine for the emergency generator set is classified as an affected source under the NESHAP for Stationary Reciprocating Internal Combustion Engines (Subpart ZZZZ). The proposed engine will have a power output rating of 1,063 bhp and be operated as a limited use engine. Columbia intents not operate the generator for more than 15 hours per calendar year for emergency demand response as defined in 40 CFR §§63.6640(f)(2)(ii) and (iii). An emergency demand response is determined and declared by the Reliability Coordinator under the North American Electric Reliability Corporation (NERC) Reliability Standard EOP-002-3 or other authorized entity as determined by the Reliability Coordinator. According to 40 CFR §§63.6590(b) and (b)(1), the proposed engine is not required to meet the requirements of Subpart ZZZZ and the general requirements of Part 63 except for the initial notification requirements, which the applicant has satisfied thought submission of the permit application.

Subpart DDDDD

The proposed heater is classified as a process heater under the NESHAP for Industrial, Commercial, and Institutional Boiler and Process Heater (Subpart DDDDD) and therefore is an affected source under the subpart. The heater is designed to burn natural gas (Gas I Unit) and will have a heat input rating of 1.1 MMBtu/hr. These key features (natural gas and less than 5 MMBtu/hr heat input) makes this heater only being subject to the work practice requirements of

this subpart. The applicant will only be required to conduct tune-up to the heater once every five years and keep monthly fuel use records. These requirements and the corresponding reporting will be incorporated into the permit.

The station is a major source of air pollution and therefore subject to 40 CSR 30. This proposed permitting action does not affect the facility's status or requirements to obtain a valid and current Title V Operating Permit. Since the proposed modification involves new emission units, Columbia has 12 months after initial startup to update the facility operating permit. As part of this submission, Columbia included a Significant Modification Application with this permit application.

## TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The new emission units will not emit any pollutants that are not already being emitted by another emission source at the facility. Therefore, no information about the toxicity of the hazardous air pollutants (HAPs) is presented in this evaluation.

## AIR QUALITY IMPACT ANALYSIS

Based on the annual emission rates, the proposed modification is not classified as a major modification of a major source as defined by 45CSR14, so air quality modeling was not required.

## MONITORING OF OPERATIONS

Columbia proposed to monitor the different operating modes (i.e. normal, low load, low temperature, etc.) in terms of hours per month. This monitoring will be used to determine actual emissions to show compliance with the annual limits. The writer added to the applicant's plan was to monitor a parameter to indicate the load or percentage of load on the turbine. The applicable rules and regulations require tracking hours of operation for the generator set through the hour-meter, fuel used by the heater, testing, and maintenance records.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that the Glenville Station should meet applicable requirements of state rules and federal regulations. It is recommended that Columbia Gas Transmission, LLC be granted a 45CSR13 modification permit for the proposed modification to Glenville Compressor Station.

Edward S. Andrews, P.E.
Engineer

September 18, 2013
Date