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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-2247B
Plant ID No.: 039-00048
Applicant: Columbia Gas Transmission
Facility Name: Clendenin Compressor Station
Location: Clendenin, Kanawha County
NAICS Code: 486210
Application Type: Modification
Received Date: April 29, 2014
Engineer Assigned: Laura Jennings
Fee Amount: \$ 3,500.00
Date Received: May 1, 2014 and July 11, 2014
Complete Date: July 11, 2014
Due Date: October 9, 2014
Applicant Ad Date: May 8, 2014
Newspaper: *Charleston Gazette*
UTM's: Easting: 4260.8 km Northing: 472.746 km Zone: 17
Description: Upgrade the Solar Centaur T-4500 Turbine [05806] from 3,550 HP to 4,500 HP and add one 0.1 MMBtu/hr fuel gas heater [HTR2]. There were additional changes requested in the application that apply only to the Title V operating permit.

DESCRIPTION OF PROCESS

Columbia's Clendenin Station receives natural gas via pipeline from an upstream compressor station. It currently compresses it using electric motors, reciprocating internal combustion engines and a natural gas-fired turbine, and then transmits it via pipeline to a downstream station.

The proposed project will increase the output of an existing Solar Centaur T-4500 turbine engine [05806], which drives a centrifugal compressor, from a rating of 3,550 hp to 4,500 hp. One (1) new indirect-fired fuel gas heater [HTR2] rated at 0.1 MMBtu/hr will be installed.

There are additional proposed changes that are described in the permit application;

however, many of the proposed changes impact only the corresponding Title V permit and are not currently included in the current R13-2247A permit. This evaluation will focus only on those proposed changes subject to the R13-2247B permit with the exception of the PSD evaluation in the regulatory section of this evaluation that must be conducted on a facility-wide basis and therefore will address all proposed changes for this project.

Changes to the emission units table in permit R13-2247A are shown in the following emission units table.

Table 1 - Emission Units Table:

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type and Date of Change	Control Device
05806	E06	Solar Centaur T-4500 Turbine	1971	4,500 HP	Upated from 3,550 HP	n/a
HTR2	H2	Total Energy Resources Indirect-Fired Fuel Gas Heater	2014	0.1 MMBtu/hr	New	n/a
Aux #1	Aux #1	Auxiliary Generated	1995	240 HP	Removed from permit	n/a

SITE INSPECTION

The Clendenin Compressor station is an existing and well known facility to WVDAQ. As such, no site inspection is planned as part of this engineering evaluation.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The revised emissions associated with the proposed changes to permit R13-2247B are shown in the table below and includes the basis of the emissions calculations.

The emission calculations were reviewed and verified by the writer.

Table 2 - Emissions Summary:

Emission Point ID	Emission Unit ID	Regulated Pollutant	Basis of Emissions Calculation	Maximum Potential Uncontrolled Emissions	
				lb/hr	tpy
E06	05806	NO _x	Manufacturing Data	27.47	117.21
		CO	Manufacturing Data	10.14	43.25
		VOC	Manufacturing Data	0.58	2.48
		SO ₂	Typical U.S. gas quality	2.63	0.14
		PM	Manufacturing Data	0.83	3.54
		CH ₂ O	AP-42	0.03	0.14
		CO ₂ e	40 CFR 98, Subpart C	5,398	23,047
H2	HTR2	NO _x	AP-42	0.01	0.04
		CO	AP-42	0.01	0.04
		VOC	AP-42	0.0005	0.002
		SO ₂	Typical U.S. gas quality	0.01	0.0003
		PM	AP-42	0.0007	0.003
		CH ₂ O	AP-42	0.00001	0.00003
		CO ₂ e	40 CFR 98, Subpart C	12	51

The change in emissions for the R13-2247B permit do not include the reductions associated with the Title V permit at the facility because most of the equipment is not included in the existing R13-2247A permit. Because the existing permit does not include emission limits for E06 engine that is being uprated, the original potential emissions are based on information previously submitted in a prior permit application. The change in potential emissions is shown in the following table.

Emission Change Table:

Regulated Pollutant	Existing Maximum Potential Emissions (E06 and H2)	Proposed Maximum Potential Emissions (E06 and H2)	Change in potential emissions
	TPY	TPY	TPY
NO _x	85.7	117.25	31.55
CO	6.86	43.29	36.43
VOC	0.75	2.48	1.73

SO ₂	0.15	0.14	-0.01
PM	6.05	3.54	-2.51

REGULATORY APPLICABILITY

The following state and federal regulations were reviewed in regards to the uprating of the existing turbine engine [05806 / E06] and the proposed addition of one new fuel gas heater [HTR2/H2] associated with this R13 application.

State Regulations:

45CSR2 TO PREVENT AND CONTROL PARTICULATE AIR POLLUTION FROM COMBUSTION OF FUEL IN INDIRECT HEAT EXCHANGERS

HTR2 is a fuel burning unit and is therefore subject to 45CSR2 that requires that smoke and particulate matter emissions from fuel burning units do not exceed opacity levels of 10 percent based on a six-minute block average. HTR2 burns only pipeline quality natural gas as fuel and as such will be in compliance with requirement 45CSR2-3.1.

HTR2 is a fuel burning unit with a rating of 0.1 MMBtu/hr. Any fuel burning unit having a heat input less than 10 MMBtu/hr is exempt from sections 4, 5, 6, 8, and 9.

45CSR10 TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF SULFUR OXIDES

HTR2 is a fuel burning unit with a rating of 0.1 MMBtu/hr. Fuel burning units that have a design heat input under 10 MMBtu/hr are exempt from section 3 and sections 6 through 8. (45CSR10-10.1)

§ 45-10-4.1 requires that the in-stack SO₂ concentration not exceed 2,000 ppm by volume. The fuel gas heater burns only natural gas and will be in compliance with this requirement.

45CSR13 PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

The applicant has met the applicable requirements of this rule by publishing a Class I Legal Advertisement, paid the \$1,000 application fee for a modification permit, paid the \$ 2,500 NESHAP fee, and submitted a complete modification permit application.

PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES OF AIR POLLUTION FOR THE PREVENTION OF SIGNIFICANT DETERIORATION

The facility is a major source under the Prevention of Significant Deterioration (PSD) rules; however, the proposed modification is not subject to PSD regulations because the proposed changes do not increase net emissions of any regulated pollutants above the PSD significance thresholds.

Kanawha County was previously classified as a PM_{2.5} nonattainment area for both the annual and the 2006 24-hour standards; however, Kanawha County was redesignated to attainment in April 2014. Kanawha County is in attainment with the National Ambient Air Quality Standards (NAAQS).

Determination of Major Source Status:

Clendenin Compressor Station is an existing major source of criteria pollutants for purposes of New Source Review according to the definition provided in 45 CSR §14-2.43.b. Notwithstanding the stationary source size specified in subdivision 2.43.a, any stationary source which emits or has the potential to emit 250 tpy or more of any regulated NSR pollutants on a facility-wide basis.

The existing facility-wide potential emissions were provided in this permit application and are based on the equipment listed in the current Title V permit R30-03900048-2012. They are shown in Table 3 below. The facility is classified as a major source of NO_x and CO.

Table 3 - Existing station potential annual emissions(tpy):

Source	NO _x	CO	VOC	SO ₂	PM ₁₀ / PM _{2.5}	CH ₂ O	Total HAP
Facility-Wide	3,017	318.6	83.8	0.57	9.7	32.7	44.9

Determination of Major Modification:

A "major modification" is defined under section 2.40 of 45CSR14 as a:

. . . physical change in or change in the method of operation of a major stationary source which results in: a significant emissions increase (as defined in subsection 2.75) of any regulated NSR pollutant (as defined in subsection 2.66); and a significant net emissions increase (as defined in subsections 2.46) of that pollutant from the major stationary source. [. . .]

Section 3.4 of 45CSR14 provides guidance on the process of determining if proposed changes are a major modification. §45-14-3.4(a) states that:

. . . consistent with the definition of major modification contained in subsection 2.40, a project is a major modification for a regulated NSR pollutant if it causes two types of emissions increases -- a significant emissions increase (as defined in subsection 2.75), and a significant net emissions increase (as defined in subsections 2.46 and 2.74). The proposed project is not a major modification if it does not cause a significant emissions increase. [. . .]

Therefore, for the proposed changes to meet the definition of a major modification, the changes themselves must result in a significant emissions increase. The methodology for calculating the emissions increase under the first step is given under Sections 3.4(b), 3.4(c), 3.4(d) and 3.4(f). The substantive language of each is given below:

[§45-14-3.4(b)]

The procedure for calculating (before beginning actual construction) whether a significant emissions increase (i.e., the first step of the process) will occur depends upon the type of emissions units being modified, according to subdivisions 3.4.c through 3.4.f.

[§45-14-3.4(c)]

Actual-to-projected-actual applicability test for projects that only involve existing emissions units. -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the projected actual emissions (as defined in subsection 2.63) and the baseline actual emissions (as defined in subdivisions 2.8.a and 2.8.b), for each existing emissions unit, equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

[§45-14-3.4(d)]

Actual-to-potential test for projects that only involve construction of a new emissions unit(s). -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the potential to emit (as defined in subsection 2.58) from each new emissions unit following completion of the project and the baseline actual emissions (as defined in subdivision 2.8.c) of these units before the project equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

[§45-14-3.4(f)]

Hybrid test for projects that involve multiple types of emissions units. -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in subdivisions 3.4.c through 3.4.d as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

It is important to note that when any emissions decrease is claimed (including those associated with the proposed modification), the second step of the test is triggered - a determination if the project results in a "significant net emissions increase." This determination is defined under the definition of "net emissions increase" [§45-14-2.46] and must include "any other increases and decreases in actual emissions at the major source that are contemporaneous with the particular change and are otherwise creditable." A change is contemporaneous if it "occurs not more than five (5) years prior to the date on which construction on the particular change commences nor later than the date on which the increase from the particular change occurs."

Proposed Modification

To increase the overall reliability of the station, Columbia Gas is proposing to:

- * Increase output from one (1) Solar Centaur T-4500 turbine engine [05806];
- * Convert two (2) compressors driven by natural gas-fired reciprocating engines [05803 and 05804] to electric power; and
- * Add one (1) 0.1 MMBtu/hr Total Energy Resources fuel gas heater [HTR2].

The Solar Centaur T-4500 turbine is currently permitted as an output of 3,550 hp. The modification proposes to increase the output of the turbine to 4,500 hp (nominal). In addition, two natural gas-fired reciprocating engine-driven compressors were converted to electric power in 2012, and two similar compressors will be converted with this project. The electric motors associated with these four compressors will have a power output of 3,500 hp each.

The modification also proposes to add one fuel gas heater rated at 0.1 MMBtu/hr.

No other changes in equipment are currently being proposed. There is no construction associated with the uprating of the turbine.

Contemporaneous Equipment Changes

With this project, Columbia Gas will modify five units: one existing turbine will be uprated, two existing reciprocating engines will be replaced by electric motors, and the electric motors associated with the four compressors operating on electric power will be uprated. Additionally, one fuel gas heater will be installed. In tabular form, the contemporaneous equipment modification are shown below in Table 4. Due to the insignificant nature of the catalytic heaters which have been installed or will be installed at the station, these heaters were not included on the table of contemporaneous changes provided by Columbia Gas.

Table 4 - Contemporaneous Equipment Changes:

Equipment	Emission Point ID	Action	Date
Cooper-Bessemer LSV-12 Engine	E01	Retired	2012
Cooper-Bessemer LSV-12 Engine	E02	Retired	2012
Cooper-Bessemer LSV-12 Engine	E03	To be retired	2015
Cooper-Bessemer LSV-12 Engine	E04	To be retired	2015
Solar Centaur T-4500 Turbine	E06	To be uprated	2014
Well McLain BG988 Boiler	BL3	Retired	2011
Total Energy Resources Fuel Gas Heater	H2	To be installed	2014

Step 1 - Significant Emissions Increase Determination

The potential annual emissions associated with the project are summarized in Table 5. The table lists the potential emissions of the proposed fuel gas heater and the turbine at its uprated output.

Table 5 - PTE of Proposed New and Modified Equipment (tpy):

Source	Regulated NSR Pollutants						
	NO _x	CO	CO ₂ e*	PM ₁₀	PM _{2.5}	VOC	SO ₂
Uprated Solar Centaur Turbine Unit 05806	117.2	43.25	23,047	3.54	3.54	2.48	0.14

Heater - Unit HTR2	0.04	0.04	51	0.003	0.003	0.002	0.0003
Total	117.3	43.29	23,099	3.55	3.55	2.48	0.14
PSD Significance Level	40	100	75,000	15	10	40	40

* On June 23, 2014, the United States Supreme Court issued a decision addressing the application of stationary source permitting requirements to greenhouse gases. In very brief summary, the Supreme Court said that EPA may not treat GHG as an air pollutant for the purposes of determining whether a source is a major source required to obtain a PSD or Title V permit.

Potential NO_x emissions from the uprated turbine and new heater exceed the Step 1 PSD significant threshold; therefore the net emissions change was determined.

Step 2 - Significant Net Emissions Increase Analysis

Baseline past actual NO_x emissions from the engines that were retired in 2012 and for the Solar Centaur Turbine that will be up-rated as part of this project are shown in Table 6. The baseline period provided is from January 2009 - December 2010.

Baseline emissions from the engines that will be retiring in 2015 as part of this project were provided by the applicant in the application; however will not be used by the writer in this PSD applicability analysis.

The hybrid test [§45-14-3.4(f)] will be used because the project includes both existing equipment and new proposed equipment. The determination of significant net emissions is shown in Table 7.

Table 6 - Baseline Emissions (tpy)

Source	NO _x (tpy)
(2) Cooper-Bessemer LSV-12 (retired Nov 2012)	271.36
Solar Centaur Turbine @ 3,550 hp [05806]	18.43
Heater - Unit HTR2	0
Total	289.79

Table 7 - Significant Net Emissions Determination:

	NO _x (tpy)
Total Potential Emissions from the Project	117.3
Baseline Emissions	289.79
Net Emissions	-172.49
PSD Significance Threshold	40
Significant?	NO

45CSR30 REQUIREMENTS FOR OPERATING PERMITS

The facility has an existing Title V operating permit R30-03900048-2012 and has submitted a combined application for a significant modification application to this permit.

Federal Regulations:

40CFR60, Subpart KKKK (NSPS FOR STATIONARY COMBUSTION TURBINES)

This subpart is not applicable because the uprating of the existing turbine [05806] is not considered a modification according to the NSPS definitions because the modification will not include capital investment.

40CFR63, Subpart YYYY (NESHAP FOR STATIONARY COMBUSTION TURBINES)

This subpart is applicable. The station is a major HAP source under 40 CFR 63, and therefore the combustion turbine is an affected source under Subpart YYYY. Because of a stay of standards for gas-fired turbines issued on August 18, 2004, the only requirement that the turbine is subject to is the initial notification pursuant to 40 CFR § 63.6145.

40CFR63, Subpart DDDDD (NESHAP FOR INDUSTRIAL, COMMERCIAL, AND INDUSTRIAL BOILERS AND PROCESS HEATERS)

The new fuel gas heater [HTR2] is subject to this subpart because it is located at a major source of HAP and therefore meets the applicability requirements of § 63.7485.

The new fuel gas heater [HTR2] is a new affected source (gas 1 subcategory) and is less than 5 MMBtu/hr heat input. As such it is not subject to emission limits or operating limits; however, it is subject to tune-ups every five years as specified in § 63.7540. [§ 63.7500(d)]

The initial compliance date for new affected sources is upon startup.

The facility will demonstrate compliance by demonstrating compliance with the permit requirements.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There are no new hazardous air pollutants associated with this application.

AIR QUALITY IMPACT ANALYSIS

The proposed changes in this permit application does not meet the definition of a major modification according to the definitions in 45CSR14; therefore, modeling is not required for this permit application.

MONITORING OF OPERATIONS

- There are no changes to the monitoring requirements for the updated [E06] turbine as a result of this permit application.
- Added a monitoring requirement for VE observations for the HTR2 fuel gas heater consistent with the language in the corresponding Title V permit for the existing HTR1 fuel gas heater.
- Added 5 year tune-up requirement for 40 CFR 63, Subpart DDDDD for the HTR2 fuel gas heater.

CHANGES TO PERMIT R13-2247A

- Miscellaneous changes to permit to address current officials and the current permit version
- Updated the reference in 3.1.3 from 45CSR§15 to 45CSR§34
- Updated the EPA address in 3.5.3
- Updated the Emission Units Table 1.0 as indicated in the process description of this evaluation
- Revised 6.1.1 from 3,550 hp to 4,500 hp and from 48,890 scfh to 45,192 scfh.
- Added Section 7.0 for the Source-Specific Requirements for HTR2

RECOMMENDATION TO DIRECTOR

It is recommended that permit modification R13-2247B be granted to Columbia Gas Transmission, Clendenin Compressor Station located in Clendenin, Kanawha County, WV. Based on the information provided in the permit application, including all supplemental information received, the applicant will be in compliance with all federal and state regulations.



Laura M. Jennings
Permit Engineer

9/23/14

Date