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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2715E
Plant ID No.:	071-00008
Applicant:	Columbia Gas Transmission, LLC
Facility Name:	Seneca Compressor Station
Location:	Pendleton County
SIC/NAICS Code:	4922/486210
Application Type:	Modification
Received Date:	October 3, 2014
Engineer Assigned:	Joe Kessler
Fee Amount:	$2,000
Date Received:	October 10, 2014 ($1,000) November 18, 2014 ($1,000)
Complete Date:	December 1, 2014
Due Date:	March 1, 2014
Applicant Ad Date:	October 2, 2014
Newspaper:	*The Pendleton Times*
UTM's:	640.9 km Easting • 4,301.2 km Northing • Zone 17
Latitude/Longitude:	38.84861/-79.37607
Description:	Removing synthetic minor limits on Solar Turbines 03708 (E07) and 03709 (E08) based on retroactive reclassification of Seneca Compressor Station as a minor source in 2013 prior to installation of these turbines.

Columbia Gas Transmission, LLC's (CGT) Seneca Compressor Station was constructed in the early 1950's and was, therefore, at the time the minor and major source permitting rules (45CSR13, and 45CSR14/19, respectively) were promulgated, considered a grandfathered source. However, since that time the station has undergone several modifications and has been the subject of various permitting actions. To place the current application in context, the following will summarize each of these previous permitting actions. They are presented in a generally chronological order.

R13-2715

On October 29, 2007, Permit Number R13-2715 was issued to replace the station's two existing Allison turbines (identified as E02 and E03) with two new natural gas-fired Solar Taurus 60-7800S turbines (E05 and E06).

R13-2715A

On December 18, 2007, a Class I Administrative Update to R13-2715 was issued to CGT for a revision of the natural gas consumption rates of the new Solar Taurus turbines (E05 and E06) as well as revise the full-load CO emission rates of these units.

R13-2715B

On January 7, 2008, a Class I Administrative Update to R13-2715A was issued to CGT for a revision of the performance testing requirements of the Solar Taurus turbines (E05 and E06) and revisions to the PM_{10} and SO_2 emission rates of the units.

R13-2715C

On June 4, 2013, Permit Number R13-2715C was issued to CGT for the addition of two new Solar turbines (E07 and E08), the replacement of two existing grandfathered emergency generators (G1 and G2), and the addition of 36 space heaters. This permit was issued as a synthetic minor to a major source.

R13-2715D

On August 4, 2014, Permit Number R13-2715D was issued to CGT for a revision of the CO emission rate of the new Solar Saturn (E07) turbine. In addition, capacities and emission factors of units permitted originally in Permit R13-2715C were updated.

DESCRIPTION OF PROCESS/MODIFICATIONS

Existing Facility Description

CGT's Seneca Station is located near Seneca Rocks, Pendleton County, WV. The station receives natural gas via pipeline from an upstream compressor station, compresses it using natural gas fired turbines and then transmits it via pipeline to a downstream station. The station currently has five (5) primary natural gas fired turbines including two (2) Solar Taurus 60-7800S turbines rated at 7,700 horsepower (hp) each that were installed in 2008, one (1) GE 3132R Frame 3 turbine rated at 13,750 hp that was purchased in 1971 and moved to the Seneca Station in 1981, one (1) refurbished Solar Saturn 10 turbine rated at 1,557 hp, and one (1) Solar Mars 100 turbine rated at 15,432 hp. Associated with the Mars turbine is a small (0.85 mmbtu/hr) fuel gas heater. Columbia also has a Waukesha model VGF-l36GL (rated at 880 hp) emergency generator and 36 catalytic space heaters (0.072 MMBTU/hr each) at the facility.

Proposed Modifications

In this modification, CGT is proposing to remove synthetic minor limits on the Solar Turbines (E07) and (E08) based on a retroactive reclassification of Seneca Compressor Station as a minor

source in 2013 prior to installation of these turbines. The basis for this reclassification is an incorrect calculation of the facility-wide potential-to-emit (PTE) in Permit Application R13-2715C which calculated the (at the time existing, which have since been removed) grandfathered emergency generators G1 and G2's PTE as based on operating 8,760 hours per year. Per EPA guidance, it would have been appropriate to calculate the PTE of the emergency generators (even in the absence of specific hours of operation limits in a permit) at 500 hours per year.

Therefore, CGT is now proposing to remove the synthetic minor hours of operation limits placed on turbines E07 and E08 in R13-2715C as they were not required to classify the modification at that time as a "minor modification." The synthetic minor limits were in the form of an aggregate emission limit for both engines (4.1.5.) based on the Mars engine operating 8,760 hours/year and the Saturn engine operating 800 hours/year. In the existing permit (R13-2715D), the emission limit is enforced not by restricting the hours of operation of the Saturn engine, but rather by limiting the natural gas consumed by the Saturn engine (4.1.7.).

SITE INSPECTION

Due to the nature of the proposed modification, the author did not perform a site inspection of the facility for this permitting action. The facility was last inspected by DAQ Compliance/ Enforcement (C/E) Inspector Karl Dettinger of the Eastern Panhandle Regional Office on February 5, 2013. This inspection found the facility be "Status 30 - In Compliance."

AIR EMISSIONS AND CALCULATION METHODOLOGIES

CGT provided detailed calculations of the facility-wide pre-2013 modification PTE and the calculations of the PTE of the new emission units added under R13-2715C (and updated under R13-2715D) in Attachment N of the permit application. This information is substantively the same as previously submitted and reviewed in previous permit applications. It will be summarized below under the Regulatory Applicability: 45CSR14 Section. This section will discuss the emissions from the Solar Saturn Turbine which is the only emission unit being substantively modified as part of this permitting action.

Solar Saturn Combustion Turbine

Potential emissions from the 15.82 mmBtu/hr (HHV @ 30 °F) natural gas-fired Solar Saturn combustion turbine are based on emission factors provided from the vendor, based on the emission factors provided for natural gas combustion as given in AP-42 Section 3.1. (AP-42 is a database of emission factors maintained by USEPA), material balance, and on emission factors from 40 CFR 98, Subpart C. Hourly emissions were where appropriate based on the MDHI of the engine and annual emissions were revised from R13-2715C/D to be based on 8,760 hours of operation per year. The following table details the emission factor source and the PTE of the combustion turbine:

Table 1: Solar Saturn Combustion Turbine PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO[(1)]	0.973 lb/mmBtu	Vendor Data	15.39	67.43
NO_X[(1)]	0.600 lb/mmBtu	Vendor Data	9.48	41.51
$PM_{2.5}$	0.018 lb/mmBtu	Vendor Data	0.32	1.38
PM_{10}	0.018 lb/mmBtu	Vendor Data	0.32	1.38
PM	0.018 lb/mmBtu	Vendor Data	0.32	1.38
SO_2	0.0034 lb/mmBtu	20 grains S/100 scf (hourly) 0.25 grains S/100 scf (yearly)	1.00	0.05
VOCs[(1)]	0.028 lb/mmBtu	Vendor Data	0.44	1.94
Formaldehyde	0.00071 lb/mmBtu	AP-42, Section 3.1	0.01	0.05
Total HAPs	0.00103 lb/mmBtu	AP-42, Section 3.1	0.02	0.07
CH_4	0.0022 lb/mmBtu	40 CFR 98, Subpart C	0.03	0.15
N_2O	0.00022 lb/mmBtu	40 CFR 98, Subpart C	0.00	0.02
CO_2	116.98 lb/mmBtu	40 CFR 98, Subpart C	1,850.62	8,105.73
CO_2e	139.9 lb/mmBtu	Calculated	1,852.53	8,114.09

(1) CO, NO_x, and VOC annual emissions reflect aggregate emissions from various operating modes. Emission factor is for steady-state operation at 30 °F. Vendor data given in ppmvd @ 15% O_2: CO - 400 ppm, NO_x - 150 ppm, VOC - 20 ppm (20% of UHC emission factor).

Existing Facility-Wide PTE (Post R13-2715E Modification)

The following table details the proposed post-modification facility-wide PTE of the Seneca Compressor Station.

Table 2: Facility-Wide Post-Modification Annual (ton/yr) PTE

Source	CO	NO_x	PM[(1)]	SO_2	VOCs	CO_2e
Solar Saturn Turbine (E07)	67.60	41.50	1.32	0.05	1.94	8,576
Solar Mars Turbine (E08)	63.00	31.80	9.42	0.37	3.88	61,264
Emergency Generator 3 (G3)	0.63	0.97	0.02	~0.00	0.02	200
Heater 2 (HTR2)	0.31	0.37	0.03	~0.00	0.02	436
Catalytic Heaters (SH1)	0.93	1.11	0.08	0.01	0.06	1,329
Heater 1 (HTR1)	0.21	0.25	0.02	0.00	0.01	297
GE Frame 3 Turbine (E04)	45.40	177.30	3.66	0.40	1.16	64,880
Solar Taurus Turbine 1 (E05)	50.50	18.79	1.96	0.21	14.15	32,440
Solar Taurus Turbine 2 (E06)	50.50	18.79	1.96	0.21	14.15	32,440

Equipment Leaks	0.00	0.00	0.00	0.00	0.40	258
Venting	0.00	0.00	0.00	0.00	11.35	7,349
Facility-Wide Totals →	**279.08**	**290.88**	**18.47**	**1.25**	**47.14**	**209,469**

(1) All particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.

Facility-Wide Emissions Increase

The only change in emissions resulting from the modifications permitted herein is the increase attributable to the removal of the 800 hour/yr limit (as enforced through a fuel consumption limit) on the Solar Saturn Turbine. Based on this change, the following table lists the increase in facility-wide emissions at the Seneca Compressor Station:

Table 3: Change in Facility-Wide Post-Modification Annual (ton/yr) PTE

Source	CO	NO_x	PM[(1)]	SO_2	VOCs	CO_2e
R13-2715D	217.58	253.08	17.27	1.20	44.78	200,901
R13-2715E	279.08	290.88	18.47	1.25	47.74	209,469
Change in Emissions→	**61.50**	**37.80**	**1.20**	**0.05**	**2.96**	**8,568**

(1) All particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.

REGULATORY APPLICABILITY

The Solar Saturn Turbine (only emission unit being modified in this permitting action) is subject to substantive requirements in the following state and federal air quality rules and regulations: 40 CFR 60 Subpart KKKK. Each applicable rule (and ones that have reasoned non-applicability), and CGT's compliance therewith, will be discussed in detail below.

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 change to the Solar Saturn Turbine has the potential to increase the PTE of the Seneca Compressor Station in excess of six (6) lbs/hour and ten (10) TPY of a regulated pollutant (see Table 3 above) and, therefore, pursuant to §45-13-2.17, the change is 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, CGT is required to obtain a permit under 45CSR13 for the modification of the facility.

As required under §45-13-8.3 ("Notice Level A"), CGT 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 2, 2014 in *The Pendleton Times* and the affidavit of publication for this legal advertisement was submitted on October 20, 2014.

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

As noted above, in this modification, CGT is proposing to remove synthetic minor limits on Solar Turbines 03708 (E07) and 03709 (E08) based on a retroactive reclassification of Seneca Compressor Station as a minor source in 2013 prior to installation of these turbines. The basis for this reclassification is an incorrect calculation of the facility-wide PTE in Permit Application R13-2715C which calculated the (at the time existing, which have since been removed) grandfathered emergency generators G1 and G2's PTE as based on operating 8,760 hours per year.

Per EPA guidance (September 6, 1995 memorandum authored by John Seitz), it would have been appropriate to calculate the PTE of the emergency generators (even in the absence of specific hours of operation limits in a permit) at 500 hours per year. Specifically, the guidance document states that "[t]he EPA believes that 500 hours is an appropriate default assumption for estimating the number of hours that an emergency generator could be expected to operate under worst-case conditions." The DAQ concurs that in the case of the grandfathered emergency generators at Seneca, it would have been appropriate to calculate their PTE based on 500 hours/year.

Therefore, as shown below in Table 4 below, when the Solar Turbines and other new equipment were added in 2013, the Seneca Compressor Station would not have been defined, pursuant to §45-14-2.43(a) and (b), as a "major stationary source" at that time. This would have then defined, pursuant §45-14-2.43(c), a "major modification" of the Seneca Compressor Station as an increase of PTE of 250 tons per year of any PSD pollutant. As shown below in Table 4, the addition of the Solar Turbines operating without any hours of operation limits and the other new equipment would not have exceeded 250 tons per year of any PSD pollutant.

It is important to note that the pre-2013 emission rate of CO_2e (in excess of 100,000 tons/year) does not define the source as a major stationary source for the purposes of triggering use of the "significant" emissions increase thresholds under §45-14-2.74(a) to determine major modification classification. This has been the case since GHGs began to be regulated from "non-anyway" sources on July 1, 2011 (see EPA's Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule) and is not a result (although it was reinforced) of the June 23, 2014 Supreme Court of the United States ruling in *Utility Air Regulatory Group v. Environmental Protection Agency*.

R13-2715C Pre-Modification PTE

The following table details the as-calculated pre-2013 facility-wide annual PTE of the Seneca Compressor Station with the annual PTE of the emergency generators calculated at 500 hours/year.

Table 4: 2013 Pre-Modification Facility-Wide Annual (ton/yr) PTE

Source	CO	NO_x	PM[(1)]	SO_2	VOCs	CO_2e
Peerless Boiler (BLR1)[(2)]	0.91	1.08	0.08	0.84	0.06	1,292
Peerless Boiler (BLR2)[(2)]	0.91	1.08	0.08	0.84	0.06	1,292
Heater 1 (HTR1)	0.21	0.25	0.02	0.00	0.01	297
GE Frame 3 Turbine (E04)	45.40	177.30	3.66	0.40	1.16	64,880

Solar Taurus Turbine 1 (E05)	50.50	18.79	1.96	0.21	14.15	32,440
Solar Taurus Turbine 2 (E06)	50.50	18.79	1.96	0.21	14.15	32,440
Emergency Generator 1 (G1)[2]	4.10	2.50	0.02	~0.00	0.03	130
Emergency Generator 2 (G2)[2]	2.00	1.20	0.01	~0.00	0.02	63
Facility-Wide Totals[3] ➜	**154.53**	**220.99**	**7.79**	**2.50**	**29.64**	**132,834**

(1) All particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
(2) These emission units have since been removed.
(3) Pursuant to §45-14-2.43(a) and (b), as "compressor station" is not a listed source under 2.43(a), Seneca would be defined as a major source if any PSD pollutant PTE would exceed 250 tons/year.

PTE New Sources Added R13-2715E

The following table details the as-calculated PTE of the new sources added under the Permit Number R13-2715C (emissions reflect updated emission factors as permitted under R13-2715D and annual operating restrictions from the Solar Saturn removed.).

Table 5: R13-2715C/D New Sources Only Annual (ton/yr) PTE

Source	CO	NO_x	PM[1]	SO_2	VOCs	CO_2e
Solar Saturn Turbine (E07)[2]	67.60	41.50	1.32	0.05	1.94	8,576
Solar Mars Turbine (E08)	63.00	31.80	9.42	0.37	3.88	61,264
Emergency Generator 3 (G3)	0.63	0.97	0.02	~0.00	0.02	200
Heater 2 (HTR2)	0.31	0.37	0.03	~0.00	0.02	436
Catalytic Heaters (SH1)	0.93	1.11	0.08	0.01	0.06	1,329
Equipment Leaks	0.00	0.00	0.00	0.00	0.40	258
Venting	0.00	0.00	0.00	0.00	11.35	7,349
Facility-Wide Totals ➜	**132.47**	**75.75**	**10.87**	**0.43**	**17.67**	**79,412**

(1) All particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
(2) Calculated at an annual operating rate of 8,760 hours per year.

Retroactive 45CSR14 Applicability Discussion

Based on a retroactive PSD applicability determination using a 500 hour limit on calculating the PTE of the grandfathered emergency generators, it has been determined that adding the Solar Turbines (without any hours of operation limit) and other new equipment in 2013 properly calculated would not have constituted a "major modification" under 45CSR14 and subject the action to PSD review. Therefore, it is appropriate now to remove the hours of operation limit (as was enforced through a fuel consumption limit)) on the Solar Saturn engine and that this action is not a violation of §45-14-19.7 and will not require a retroactive PSD review.

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

40 CFR 60 Subpart KKKK is the New Source Performance Standard (NSPS) for stationary combustion turbines of greater than 10 mmBtu/hr and that which commenced construction, modification, or reconstruction after February 18, 2005. Subpart KKKK contains within it emission standards, 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 Solar Saturn Turbine (the only emission unit modified in this permitting action).

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, the 18.52 mmBtu/hr natural gas-fired Solar Saturn Turbine is 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. Based on the R13-2315C engineering evaluation, the Solar Saturn Turbine is a reconstructed turbine. Therefore, as a reconstructed turbine firing natural gas less than 50 mmBtu/hr, pursuant to Table 1, it has to meet a NO_x limit of 150 ppm at 15% O_2 or 8.7 lb/MW-hr gross energy output. CGT has provided vendor data showing a NO_x emission rate of 150 ppm at 15% O_2.

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. CGT will show compliance with this requirement.

Subpart KKKK 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).

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides general toxicity information for those regulated pollutants that may be increased from the proposed changes in substantive amounts 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), Particulate Matter less than 10 microns (PM_{10}), Particulate Matter less than 2.5 microns ($PM_{2.5}$), 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 HAPs regulations promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs to the modified emission unit 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 requested change evaluated herein will result in a small increase of annual formaldehyde emissions from the Solar Saturn turbine (0.05 ton/year) and only trace amounts of other individual HAPs. The following table lists each formaldehyde's general carcinogenic risk as based on analysis provided in the Integrated Risk Information System. EPA's Integrated Risk Information System (IRIS) is a human health assessment program that evaluates information on health effects that may result from exposure to environmental contaminants. For a complete discussion of the known health effects of each compound, and the underlying studies supporting these assessments, refer to the IRIS database located at *www.epa.gov/iris*.

Table 6: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen

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 (e.g., smoking). As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*.

AIR QUALITY IMPACT ANALYSIS

The proposed modification does not meet the definition of a "major modification" pursuant to 45CSR14 and, therefore, an air quality impact (computer modeling) analysis was not required. Additionally, based on the nature of the proposed modification, modeling was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, RECORD-KEEPING, AND REPORTING REQUIREMENTS

No changes are being made in the monitoring, compliance demonstrations, record-keeping, and reporting requirements of the permit.

TESTING OF OPERATIONS

No additional testing requirements were added as a part of this modification.

CHANGES TO PERMIT R14-0012E

The substantive made changes to R13-2315D were limited to:

- The annual emission limits of E07 and E08 were decoupled and based on each unit operating 8,760 hours/year [4.1.5.];
- The annual fuel consumption limit of E07 was recalculated based on operating 8.760 hours per year[4.1.7.]; and
- The E07 and E08 operational flexibility language was removed as it was no longer necessary [4.3.8.].

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 Permit Number R13-2315E to Columbia Gas Transmission, LLC for the above discussed changes to the Seneca Compressor Station located near Seneca Rock, Pendleton County, WV.

Joe Kessler, PE
Engineer

Date