

#### west virginia department of environmental protection

Division of Air Quality 601 57<sup>th</sup> Street SE Charleston, WV 25304 Phone (304) 926-0475 • FAX: (304) 926-0479 Earl Ray Tomblin, Governor Randy C. Huffman, Cabinet Secretary www.dep.wv.gov

#### **ENGINEERING EVALUATION / FACT SHEET**

#### **BACKGROUND INFORMATION**

Application No.:	R13-2087E
Plant ID No.:	039-00049
Applicant:	Columbia Gas Transmission, LLC (Columbia Gas)
Facility Name:	Coco Compressor Station
Location:	Elkview, Kanawha County, WV
NAICS Code:	486210 - Pipeline Transfer of Natural Gas
Application Type:	Modification
Received Date:	February 6, 2015
Engineer Assigned:	John Legg
Fee Amount:	\$2,000.00 (\$1,000.00 for Rule 13 and \$1,000.00 for 40CFR60,
	Subpart JJJJ)
Date Received:	February 9, 2015
Complete Date:	March 2, 2015 (original legal advertisement affidavit received)
Due Date:	June 2, 2015
Applicant Ad Date:	February 16, 2015
Newspaper:	The Charleston Gazette
UTM's:	Easting: 463.5 km Northing: 4,250.5 km Zone: 17
Latitude/Longitude:	38.401773 degrees N; -81,417764 E degrees
Description:	Install one (1) 1,175Hp natural gas-fueled emergency
	generator/engine set. Retired two (2) existing reciprocating
	engines/generators (275 hp and 306 hp). Note that the retired
	generators/engines were grandfathered/not covered under R13-
	2087D.

On February 6, 2015, Columbia Gas submitted permit modification R13-2087E. On February 9, 2014, the \$2,000.00 application fee (\$1,000.00 Rule 13 modification fee and \$1,000.00 fee for 40CFR60, Subpart JJJJ) was paid and the writer was assigned as the reviewing engineer. On February 16, 2014, the company ran their legal ad in *The Charleston Gazette*. On March 02, 2015, the DAQ received the original affidavit of publication for the legal ad and the application was deemed complete.

R13-2087E retires/removes two existing natural gas-fueled reciprocating engines/generators (G1 at 275 hp and G2 at 306 hp) and installs one new natural gas-fueled reciprocation engine/generator (G3 at 1,175 hp)

Table 1:Net Change in Coco Compressor Station's Potential To Emit Resulting from Permit Modification R13-2087E.												
					Total HAP							
Changes	lb/hr	-9.80	-21.83	-0.10	+0.14	-0.04	+0.35	0.44				
in PTE	ton/yr	-2.11	-4.89	-0.02	+0.001	-0.01	+0.09	+0.11				

## PROCESS DESCRIPTION

Columbia's Coco Station is located in Kanawha County, West Virginia, near the town of Elkview. The station receives natural gas via pipeline from an upstream compressor station, compresses it using reciprocating internal combustion engines (RICE), and transmits it via pipeline to a downstream station. The station is covered by SIC code 4922, operates under permits R13-2087D and Title V Permit No. R13-03900049-2012, and has the potential to operate 7days per week, 24 hours per day. The station currently consists of:

- Seven (7) natural gas-fueled RICE engines:
  - five (5) 890-hp
  - one (1) 1,100-hp
  - one (1) 4,000-hp
- Two (2) emergency natural gas-fueled generators:
  - one (1) 275-hp
    - one (1) 306-hp
- One (1) 4.2 MM Btu/hr natural gas-fueled boiler,
- Two (2) natural gas-fueled heaters (9.38 MM Btu/hr and 0.09 MM Btu/hr), and
- Numerous insignificant storage tanks of various sizes.

Table 2:   Existing Station Potential Annual Emissions (TPY).										
SourceNOxCOVOCSO2PM10/ PM2.5*CH2OTotal HAP										
Facility-Wide   927.5   75.9   44.1   0.29   17.2   19.2   27.7										
* CH2O is the chem	* CH2O is the chemical formula for formaldehyde.									

## PROPOSED MODIFICATION

This modification proposes to retire the 275-hp and 306-hp Ingersoll-Rand PVG-6 emergency generators currently located at the facility and replace them with one 1,175-hp Waukesha VGF-P48GL emergency generator. The emissions from the new unit are based on vendor specifications and AP-42 emission factors. Emission estimates are presented in Attachment N to the application and below in this evaluation.

No other changes in station equipment are currently being proposed. The date for starting construction and initial commercial operation is June 2015 (mistakenly and consistently listed as June 2016 in the permit application).

Permitted Under & Comments	Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Design Capacity	Control Device
R13-2087B	HTR2	H2	Heatec HCI-6010-40-G Regeneration Gas Heater	2005	9.38 MMBtu/hr	N/A
R13-2087D (Omitted in Application R13-2087E)	HTR4	H4	Heat Recovery Corporation Model 4384-22 Natural gas-fueled, direct-fired line heater	2008	38.0 MM Btu/hr	N/A
Not Permitted under Rule 13 To Be Retired	<del>008G1</del>	<del>61</del>	<del>Reciprocating</del> <del>Engine/Generator; Ingersoll-</del> <del>Rand PVG-6; 4-cycle, rich</del> <del>burn; emergency</del>	<del>1951</del>	<del>275 hp</del>	<del>N/A</del>
Not Permitted under Rule 13 To Be Retired	<del>008G2</del>	<del>62</del>	<del>Reciprocating</del> <del>Engine/Generator; Ingersoll-</del> <del>Rand PVG-6; 4-cycle, rich</del> <del>burn; emergency</del>	<del>1951</del>	<del>306 hp</del>	<del>N/A</del>
New R13-2087E	008G3	G3	Waukesha VGF-P48GL Emergency Generator #3	2015	1,175 HP	None

Table 3: R13-2087E Emission Units Table (Changes High-lighted in Red)

	ltem	Value	Comments
Emission Un	nit ID	008G3	G3 - Emission Point ID
Manufacture	r	Waukesha	
Model		VGF-PVG-6	
Certified EPA Emission		No	Initial and subsequent performance tests are planned per 40 CFR 60, Subpart JJJJ.
Regulation	Engine Family	Not Applicable	Not Certified
Certification Number		Not Applicable	Not Certified
	Emission	2.0 (NOx) (g/HP-hr)	160 (NOx) (ppmvd at 15% O <sub>2</sub> )
	Standards (40 CFR 60,	4.0 (CO) (g/HP-hr)	540 (CO) (ppmvd at 15% O <sub>2</sub> )
	Subpart JJJJ)	1.0 (VOC) (g/HP-hr) (formaldehyde not included)	86 (VOC) (ppmvd at 15% O <sub>2</sub> ) (formaldehyde not included)
Туре		Four (4) Stroke/Cycle; Lean Burn	
Engine Spee	ed (rpm)	1,800	
Displacemer	nt (cu. in)	2,924	
Compressio	n Ratio	11:1	
Combustion		Lean Burn, Open Chamber	
Air/Fuel Rati	o Setting	7.8% O <sub>2</sub>	
Frequency (	Hz)	60	
Voltage		480	
Fuel		Natural Gas	
Design Clas	s	4S-LB	4 stroke lean burn
Power	Output kWe	831	@
Rating	bhp	1,175	Maximum Speed of 1,800 rpm
	kVA	1039	
H2S (gr/100	scf)	< 1	
	HV) (Btu/bhp-hr) HV) (Btu/bhp-hr)	6,991 7733	

Table 4:Information on New, Natural Gas-fueled Emergency Generator Engine (008G3).									
ltem	Value	Comments							
Fuel Use (scfm)	148.5	8,908 (scfh)							
Annual Fuel Use (mmscf/yr)	4.454 (@ 500 hr/yr)								
Maximum Design Heat Input (mm Btu/hr)	9.09	Based on burning natural gas having heat content of 1,020 Btu/scf.							
Fuel Heating Value (Btu/scf)	1,020								
Manufacture Date	2015								
Date Installed	Estimated - Late Summer 2015	4/1/15 email from Jim Alexander to writer.							
Operating Hours	500								
Emissions Control Device	None								

## SITE INSPECTION

The writer did not visit the Coco Station for this modification application (R13-2087E). However, the facility is routinely inspected by DAQ Enforcement. On February 20, 2014, the most recent inspection, DAQ Enforcement Inspector Mike Kolb inspected the facility, found no violations, and gave the facility the inspection code of 30 for incompliance.

Directions (per application, entry 12A, page 2 of 4):

- Located near Elkview, Kanawha County, WV. Traveling from the intersection of State Route 114 and secondary Route 49, proceed 3.4 miles and bear right on Route 49. Go 3.6 miles from the intersection of Routes 47 and 49 and turn left onto secondary County Route 7/1 (Coco Road). Travel approximately 1.5 miles. The station is located on the right side of the road.

UTM coordinates (per application, page 2 of 4, entry 12.E, F, and G):

Northing	4,250.5	KM
Easting	463.5	KM
Zone	17	

Per Columbia Gas's legal advertisement in Attachment P to the application, the latitude and longitude coordinates are:

#### 38.401773 degrees North (latitude) -81.417764 degrees East (longitude)

#### ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Summarized below are the hourly and annual estimated emissions resulting from the installation of the new 1,175 Hp, natural gas-fueled emergency generator engine proposed under Permit Update R13-2087E for Columbia Gas's Coco Compressor Station, Elkview, Kanawha County, WV. The writer reviewed Columbia Gas's emissions calculations found in Attachment N to the permit application and found the calculations to be logical and correct.

Table 5: Hourly and Annual Emissions Resulting from New 1,175 Hp   Emergency Generator/Engine.										
Pollutant	Emission Factors	Emiss	sions	Comments						
		(lb/hr)	*(TPY)							
NOx (NO + NO2)	2.0 (g/bhp-hr)	5.18	1.30	Generator/Engine Vendor Data						
со	1.3 (g/bhp-hr)	3.37	0.84	Generator/Engine Vendor Data						
CO2	433 (g/bhp-hr)	1,121.64	280.41	Generator/Engine Vendor Data						
CO2e	117.1 (lb/MM Btu)	1,064	266	40 CFR 98 Subpart C						
	463 (g/bhp-hr)	1,199.35	299.84	Generator/Engine Vendor Data						
PM <sub>10</sub>	0.010 (lb/MM Btu)	0.09	0.02	AP-42 Table 3.2-2 (7/00) - 4SLB						
PM <sub>2.5</sub>	0.010 (lb/MM Btu)	0.09	0.02	AP-42 Table 3.2-2 (7/00) - 4SLB						
SO2 (Max. Hourly)	0.0571 (lb/MM Btu)	0.52		20 grains S/ 100 scf						
SO2 (Average Annual)	0.000714 (lb/MM Btu)		0.00162	0.25 grains S / 100 scf						
VOC	0.04 (g/bhp-hr)	0.10	0.03	Generator/Engine Vendor Data						
тнс	1.6 (g/bhp-hr)	4.14	1.04	Generator/Engine Vendor Data						
NMHC	0.24 (g/bhp-hr)	0.62	0.16	Generator/Engine Vendor Data						
NM, NEHC	0.04 (g/bhp-hr)	0.10	0.03	Generator/Engine Vendor Data						
CH4	1.36 (g/bhp-hr)	3.52	0.88	Generator/Engine Vendor Data						
Formaldehyde	0.05280 (lb/MM Btu)	0.48	0.12	AP-42 Table 3.2-2 (7/00) - 4SLB						

Table 5:Hourly and Annual Emissions Resulting from New 1,175 HpEmergency Generator/Engine.										
Pollutant	Emission Factors	Emissions		Emissions		Emissions		Comments		
		(lb/hr)	*(TPY)							
	0.19 (g/bhp-hr)	0.49	0.12	Generator/Engine Vendor Data						
Total HAPs	0.07220 (lb/MM Btu)	0.66	0.16	AP-42 Table 3.2-2 (7/00) - 4SLB						
* Based on operating the generator a maximum of 500 hours per year.										

Table 6:	Table 6:   Station Potential Annual Emission (TPY) After R13-2087E.									
Source	NOx	со	CO₂E	voc	SO <sub>2</sub>	PM <sub>10</sub> / PM <sub>2.5</sub>	CH₂O	Total HAP		
Facility-Wide (R13-2087D)	927.5	75.9	47,794	44.1	0.29	17.2	19.2	27.7		
Retire G1	-1.61	-2.71	-85.34	-0.02	-0.001	-0.03	-0.03	-0.05		
Retire G2	-1.79	-3.02	-94.96	-0.02	-0.001	-0.02	-0.02	-0.03		
Add G3	+1.30	+0.84	+266	+0.03	+0.002	+0.02	+0.12	+0.16		
Changes in PTE	-2.11	-4.89	+86	-0.02	+0.000	-0.01	+0.09	+0.11		
Facility-Wide (R13-2087E)	925.37	71.02	47,880	44.13	0.29	17.22	19.26	27.85		

Table 7:   Station Potential Hourly Emission (lb/hr) After R13-2087E.										
Source	NOx	со	CO₂E	voc	SO <sub>2</sub>	PM <sub>10</sub> / PM <sub>2.5</sub>	CH₂O	Total HAP		
Facility-Wide (R13-2087D)	249.03	43.65	8820	6.85	4.31	2.88	3.17	4.37		
Retire G1	-7.09	-11.93	-375	-0.09	-0.18	-0.06	-0.07	-0.10		
Retire G2	-7.89	-13.27	-418	-0.11	-0.20	-0.07	-0.07	-0.12		
Add G3	+5.18	+3.37	+1,064	+0.10	+0.52	+0.09	+0.49	+0.66		
Changes in PTE	-9.80	-21.83	+271	-0.10	+0.14	-0.04	+0.35	0.44		

Table 7:   Station Potential Hourly Emission (lb/hr) After R13-2087E.									
Source	NOx	со	CO₂E	voc	SO <sub>2</sub>	PM <sub>10</sub> / PM <sub>2.5</sub>	CH₂O	Total HAP	
Facility-Wide (R13-2087E)	239.23	21.82	9,091	6.75	4.45	2.84	3.52	4.81	

## REGULATORY APPLICABILITY

Columbia Gas's Coco Compressor Station is a major source for NOx estimated at 927.5 TPY and Hazardous Air Pollutants (HAPs): greater than 10 TPY for an individual HAP (formaldehyde estimated at 19. TPY) and greater than 25 TPY of aggregated HAPs (estimated at 27.9 TPY) under Title V and Prevention of Significant Deterioration (PSD) rules.

The new 1,175 hp natural gas-fueled reciprocating compressor engine/generator (GN-4) was added to permit R13-2087E in sections 5.0, 6.0 (40CFR60 Subpart JJJJ) and 7.0 (40CFR63 Subpart ZZZZ).

Only the rules related to the changes made under this modification are discussed below. Please see the previous engineering evaluations for further discussion of the rules applicable to this facility.

45 CSR 13 "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"

Columbia's Coco Compressor Station is a stationary source under Rule 13, Section 2.24.a. Before this modification, the facility operated under construction permit R13-2087D.

Because the potential increase in emissions from the proposed modification do not exceed PSD significance levels, the modification is classified as a minor modification with respect to PSD and is subject to the permitting requirements of 45 CSR 13.

Potential Emissions from Proposed New Equipment (tpy).												
Source	Operating Mode	Hr/Yr	NOx	со	C O2e	PM10	PM2.5	voc	SO2			
G3 - Emerg. Gen.	Normal	500	1.30	0.84	266	0.02	0.02	0.03	0.002			
	PSD Significance Level		40	100		15	10	40	40			

Columbia Gas submitted a complete application, published a Class I legal advertisement to notify the public, and paid the appropriate permitting fees: \$1,000.00 for Rule 13 review and \$1,000.00 for 40 CFR 60, Subpart JJJJ review.

#### 45CSR16 "Standards of Performance for New Stationary Sources"

This rule establishes and adopts standards of performance for new stationary sources promulgated by the United States Environmental Protection Agency pursuant to section 111(b) of the federal Clean Air Act, as amended. This rule codifies general procedures and criteria to implement the standards of performance for new stationary sources set forth in 40 CFR Part 60. The Secretary hereby adopts these standards by reference. The Secretary also adopts associated reference methods, performance specifications and other test methods which are appended to these standards.

NSPS apply to new, modified or reconstructed stationary sources meeting the criteria established in 40 CFR Part 60.

40CFR60,

Subpart JJJJ "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE))"

> NSPS Subpart JJJJ applies to stationary spark ignition engine manufactures and owners/operators. For natural gas-fired emergency engines manufactured after January 1, 2009, the applicable emission limits for engines greater than 130 hp rated capacity are:

- For NOx, the limit is 2.0 grams per horsepower-hour (g/hp-hr) or 160 ppmvd at 15 percent O<sub>2</sub>;
- For CO, the limit is 4.0 g/hp-hr or 540 ppmvd at 15 percent  $O_2$ ; and

For VOc, the limit is 1.0 g/hp-hr or 86 ppmvd at 15 percent  $O_2$ .

Because the new generator engine will not be a certified engine, performance testing per 40 CFR 60.4244 will be conducted initially and every 8,760 hours of operation or 3 years, whichever comes first.

The proposed emergency engine will be subject to Subpart JJJJ limits for engines greater than 130 hp. Based on manufacturer's data supplied by Columbia in Appendix N of the application, the engine will comply with these emission limits.

45CSR30 "Requirements for Operating Permits"

The facility is a Title V source, operating under Title V Permit No. R30-03900049-2012. Columbia's application package contained Attachment S, "Title V Permit Revision Information" which will enable the DAQ to modify the station's Title V permit to reflect the changes proposed in R13-2087E.

45 CSR 34 "Emission Standards for Hazardous Air Pollutants for Source Categories Pursuant to 40 CFR, Part 63"

> This rule establishes and adopts a program of national emission standards for hazardous air pollutants (NESHAPS) and other regulatory requirements promulgated by the United States Environmental Protection Agency pursuant to 40 CFR Parts 61, 63 and section 112 of the federal Clean Air Act, as amended (CAA). This rule codifies general procedures and criteria to implement emission standards for stationary sources that emit (or have the potential to emit) one or more of the eight substances listed as hazardous air pollutants in 40 CFR §61.01(a), or one or more of the substances listed as hazardous air pollutants in section 112(b) of the CAA. The Secretary hereby adopts these standards by reference. The Secretary also adopts associated reference methods, performance specifications and other test methods which are appended to these standards.

40CFR63, Subpart ZZZZ "National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combust Engines"

> Subpart ZZZZ establishes national emission limitations and operating limitations for HAPs emitted from stationary RICE located at major and area sources of HAP emissions. The subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

> Columbia's Coco Station is classified as a major source of HAP emissions (individual HAP with potential emissions greater than 10 ton/yr; aggregated HAP with potential emissions greater than 25 ton/yr) and will remain so after this modification.

> The proposed emergency generator is subject to the NESHAP for stationary RICE. The proposed engine is a 1,175-hp emergency generator which will not, and is not contractually obligated to be available for more than 15 hours per calendar year for emergency demand response programs and voltage deviation as described in 40 CFR 63.6640 (f) (2) (ii) and (iii). As a new emergency stationary RICE with a site rating greater than 500 brake horsepower at a major source of HAPs which does not operate for these purposes, the proposed engine does not have to meet the requrements of Subpart ZZZZ and Subpart A except for the initial notification requirements in 40 CFR 63.6645(f).

## TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Various non-criteria regulated pollutants are emitted from the combustion of natural gas. Columbia Gas's Coco Compressor station is an existing major source of HAPs. The increases in HAP emissions proposed under this modification, however, are estimated to be extremely small: +0.09 TPY formaldehyde; and +0.11 TPY aggregated HAPs.

#### AIR QUALITY IMPACT ANALYSIS

Emissions resulting from this modification are estimated to decrease or increase only slightly. For that reason no air modeling study was conducted for the source.

Source	Annual Emissions Changes (TPY)								
	NOx	со	CO₂E	voc	SO2	PM <sub>10</sub> /PM <sub>2.5</sub>	CH₂O	Total HAP	
Annual Emissions Changes Resulting from Implementing Permit Modification R13-2087E	-2.11	-4.89	+86	-0.02	+0.000	-0.01	+0.09	+0.11	

## MONITORING OF OPERATIONS

The new emergency generator will be operated in such a manner as to be considered an emergency stationary engine under 40 CFR 60, Subpart JJJJ.

To demonstrate compliance, Columbia will record monthly operating hours. This monthly record will be used to track 12-month rolling operating hours. The 12-month rolling operating hours will be reported to the state as part of the Station's semi-annual monitoring report.

Records for the emergency generator will include the hours and reason for operation, a maintenance plan and records of maintenance, and records of performance testing to demonstrate compliance with 40 CFR 60 Subpart JJJJ. The engine will be maintained and operated in a manner consistent with good air pollution control practices for minimizing emissions.

Because the new generator engine will not be a certified engine, performance testing per 40 CFR 60.4244 will be conducted initially and every 8,760 hours o operation or 3 years, whichever comes first.

Columbia will submit an initial notification and performance test results as required by 40 CFR 60.4245.

The new generator engine will be subject to limited requirements under 40 CFR 63, Subpart ZZZZ. Columbia will comply with this subpart by submitting the initial notification per 40 CFR Part 63.6645(f).

# CHANGES TO PERMIT

The changes made to permit R13-2087D to arrive at permit R13-2087E are detailed in RED in the compare file which can be found in Attachment A to this evaluation.

## **RECOMMENDATION TO DIRECTOR**

Columbia Gas's request for a modification permit to add one (1) 1,175 Hp, natural gasfueled emergency generator and to retire two (2) other 275 Hp and 306 Hp natural gas-fueled emergency generators at their Coco Compressor Station located near Elkview, Kanawha County, WV meets the requirements of all applicable rules and therefore should be granted said modification permit (R13-2087E).

John Legg, Permit Writer

May 6, 2015