Commonwealth of Kentucky
Division for Air Quality

STATEMENT OF BASIS / SUMMARY

Title V, Operating
Permit: V-24-031
Columbia Gulf Transmission, LLC
Clementsville Transmission Station
170 Jackie Hollow Rd.
Liberty, KY 42539-9695
October 25, 2024
Durga Patil, Permit Review Branch

SOURCE ID:	21-045-00021
AGENCY INTEREST:	37648
ACTIVITY:	APE20200001

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SECTION 1 – SOURCE DESCRIPTION

SIC Code and description: 4922, Pipeline Transportation of Natural Gas

Single Source Det. ☐ Yes ☒ No If Yes, Affiliated Source AI:

Source-wide Limit ☐ Yes ☒ No If Yes, See Section 4, Table A

28 Source Category ☐ Yes ☒ No If Yes, Category:

County: Casey
Nonattainment Area ☒ N/A ☐ PM_{10} ☐ $PM_{2.5}$ ☐ CO ☐ NO_X ☐ SO_2 ☐ Ozone ☐ Lead
If yes, list Classification:

PTE* greater than 100 tpy for any criteria air pollutant ☒ Yes ☐ No
If yes, for what pollutant(s)?
☐ PM_{10} ☐ $PM_{2.5}$ ☒ CO ☒ NO_X ☐ SO_2 ☐ VOC

PTE* greater than 250 tpy for any criteria air pollutant ☒ Yes ☐ No
If yes, for what pollutant(s)?
☐ PM_{10} ☐ $PM_{2.5}$ ☐ CO ☒ NO_X ☐ SO_2 ☐ VOC

PTE* greater than 10 tpy for any single hazardous air pollutant (HAP) ☒ Yes ☐ No
If yes, list which pollutant(s): formaldehyde

PTE* greater than 25 tpy for combined HAP ☒ Yes ☐ No

*PTE does not include self-imposed emission limitations.

Description of Facility:
Columbia Gulf receives natural gas via pipeline from upstream sources, compresses it using reciprocating internal combustion engines (RICE) and natural gas-fired turbines and then transmits it via pipeline to downstream compressor stations. Gas is compressed using seven (7) 2,000-horsepower (HP) natural gas-fired two (2) -stroke lean-burn (2SLB) RICE (E01 – E07); one 10,500-HP natural gas-fired turbine (E09) and one 12,588-HP natural gas-fired turbine (E10). Auxiliary equipment includes two (2) 47-HP natural gas-fired four (4) –stroke rich-burn (4SRB) RICE (G2 and P2) used as emergency generator and fire pump, respectively and one 792-HP natural gas-fired 4SRB emergency RICE (G1). In addition, the source operates three (3) natural gas-fired tank heaters (H1 – H3) and one natural gas-fired heating system boiler (BL2) and numerous tanks used for the storage of various liquids such as oil and glycol.

The facility updated the pipeline components in 2012 and 2016-2018 time frames to be able to conduct bi-directional flow from the south through both the RICE engines and the turbines.

SECTION 2 – CURRENT APPLICATION AND EMISSION SUMMARY FORM

Permit Number: V-24-031 Activities: APE20200001

Received: July 6, 2020 Application Complete Date(s): October 6, 2020

Permit Action: ☐ Initial ☒ Renewal ☐ Significant Rev ☐ Minor Rev ☐ Administrative
Construction/Modification Requested? ☐Yes ☒No NSR Applicable? ☐Yes ☒No

Previous 502(b)(10) or Off-Permit Changes incorporated with this permit action ☐Yes ☒No

Description of Action:

- Renewal of permit V-15-024 R1.
- Update to fugitive component count based on pipeline component addition in 2012 at the RICE engines side and in 2016-2018 time frame at the turbines side. The increase in component count results in a total of 0.03 tpy of VOC and 0.004 tpy of HAP emissions and does not result in a significant emissions increase requiring further review under 401 KAR 51:017.
- Addition of HAP emissions from fugitive components and tank subject to 401 KAR 63:020.
- Removal of EU 06 (P2).

V-24-031 Emission Summary				
Pollutant	2023Actual (tpy)	Previous PTE V-15-024/V-15-024 R1	Change (tpy)*	Revised PTE V-24-031 (tpy)
CO	107.76	199.68	--	199.68
NO_X	1,277.6	4,401	1.0	4400
PT	19.98	34.6	--	34.6
PM_{10}	19.98	34.6	--	34.6
$PM_{2.5}$	19.98	34.6	--	34.6
SO_2	0.82	33.1	--	33.1
VOC	37.20	70.8	1.45	73.25
Lead	0.0005	0	--	1.71E-5
Greenhouse Gases (GHGs)				
Carbon Dioxide	136,207	193,247	14	193,245
Methane	2.56	137	107	244
Nitrous Oxide	0.25	0.131	0.048	0.179
CO_2 Equivalent (CO_2e)	--	196,703	2,713	199,399
Hazardous Air Pollutants (HAPs)				
Acetaldehyde	7.08	4.405	--	4.405
Acrolein	7.10	4.416	--	4.416
Benzene	1.77	1.103	0.02	1.123
Ethylbenzene	0.098	0.061	0.036	0.097
Formaldehyde		32.06	--	32.06
Hexane, n-Hexane	0.41	0.252	0.169	0.421
Methanol	2.26	1.412	--	1.412
Toluene	0.879	0.547	0.013	0.560
Xylenes	0.244	0.152	0.009	0.161
Combined HAPs:	--	44.415	0.255	44.67

* Change in emissions due to update to emission factors and addition of insignificant activities

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS

Emission Unit #01: E01 – E07 Seven (7) Cooper-Bessemer GMWA-8 Engines

Initial Construction Date: Various, see below.
E01 – E04: January 1, 1954; E05: January 1, 1956; E06 – E07: January 1, 1957

Process Description:
E01 – E07: Seven (7) Cooper-Bessemer GMWA-8 Engines
2SLB RICE each rated at 2,000 HP (2,200 HP Max)

Fuel:	Natural Gas Non-remote
Brake Specific Fuel Consumption:	8,400 Btu/bhp-hr
Maximum Fuel Consumption:	0.0165 mmscf/hr at 2,000 HP (0.0181 mmscf/hr at 2,200 HP)
Control Device:	None

Applicable Regulation:
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 through 63.6675, Tables 1a through 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

Comments:
- Existing spark ignition 2 stroke lean burn (2SLB) stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions do not have to meet the requirements of 40 CFR 63, Subpart ZZZZ and of Subpart A of Part 63, including initial notification requirements.
- Maintain records of the amount of natural gas usage on a monthly basis for a twelve (12) - month rolling total.
- Emission factor for NOx and CO (maximum hourly and annual average) for the units are from vendor test data, while the emission factors for other pollutants are from AP-42 Chapter 3.2, Table 3.2-1, with emissions of greenhouse gases from 40 CFR Part 98, Subpart C.
- In 2012, the facility added a small section of pipeline at the compressor that allows for bidirectional flow of natural gas through the pipeline. Though no application was submitted, in this renewal, the facility calculated the emissions increase from the project as the difference between the projected actual emissions and the baseline actual emissions (2009-2010). The projected actual emissions were assumed to be equal to the baseline emissions. Review of the emissions rate from these engines over the next 5 years following the project were below the projected actual emissions and so the project did not trigger further review under PSD for NOx, PM10/PM2.5 and VOC. The only emissions increase from the project is that of VOC emissions from the addition of pipeline components (0.02 tpy)

Emission Unit #02 & 03: E09 and E10 Stationary Combustion Turbines				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
SO_2	0.015 % by volume at 15% O_2 and on a dry basis **OR** Shall not burn any fuel which contains total sulfur in excess of 0.8% by weight (8000ppmw)	40 CFR 60.333(a) or (b)	0.6 lb/mmscf AP-42, Chapter 3.1, Table 3.1-2	Keep on site current tariff sheet specifying the maximum total sulfur content of the fuel
NOx	$STD = 0.0150\ \frac{(14.4)}{Y} + F$	40 CFR 60.332(a)(2)	234.25 lb/mmscf E09 561.75 lb/mmscf E10 Vendor test data	Initial and Testing every 5 years

STD = allowable ISO corrected (if required as given in 40 CFR 60.335(b)(1)) NOX emission concentration (percent by volume at 15 percent oxygen and on a dry basis);
Y = Manufacturer's rated heat rate at peak load (kilojoules per watt hour); and
F = NO_X emission allowance for fuel-bound nitrogen, N

Initial Construction Date: See below

Process Description:
E09 : Pratt & Whitney GGC-1 Turbine
Turbine rated at 10,500 HP (16,800 HP Max)
Installation Date: January 1, 1960
Total Heat Input: 132 mmBtu/hr (212 mmBtu/hr Max)
Fuel: Natural Gas
Brake Specific Fuel Consumption: 12,600 Btu/bhp-hr
Maximum Fuel Consumption: 0.130 mmscf/hr at 10,500 HP (0.208 mmscf/hr at 16,800 HP)
Control Device: None

E10 Solar Mars Turbine
Turbine rated at 12,588 HP (14,476 HP Max)
Installation Date: January 1, 1991
Total Heat Input: 110 mmBtu/hr (126 mmBtu/hr Max)
Fuel: Natural Gas
Brake Specific Fuel Consumption: 8,700 Btu/bhp-hr
Maximum Fuel Consumption: 0.107 mmscf/hr at 12,588 HP (0.124 mmscf/hr at 14,476 HP)
Control Device: None

Applicable Regulation:
401 KAR 60:005, Section 2(2)(pp), 40 C.F.R. 60.330 through 60.335 (Subpart GG), Standards of Performance for Stationary Gas Turbines. The regulation applies to E10 only based on the date of construction.

401 KAR 63:002, Section 2(4)(dddd), 40 C.F.R. 63.6080 through 63.6175, Tables 1 through 7 (Subpart YYYY), National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines. The turbines are located at a major source of HAPs and are thus an affected source. However, as cited in

Emission Unit #02 & 03: E09 and E10 Stationary Combustion Turbines

40 CFR 63.6090(b)(4), existing stationary combustion turbines in all subcategories do not have to meet the requirements of this subpart YYYY and of subpart A of 40 CFR 63. No initial notification is necessary for any existing stationary combustion turbine, even if a new or reconstructed turbine in the same category would require an initial notification

Comments:

- E09 has a heat input greater than 10 million Btu/hour but was installed in 1960, prior to the applicability date of October 3, 1977, and so not subject to NSPS GG.
- The initial performance test required by 40 CFR 60, Subpart GG was conducted in 1991. No further testing has been done since the regulation NSPS GG requires only initial testing and there is no control device on the turbine.
- A current tariff sheet specifying the maximum total sulfur content of the fuel shall be kept on-site.
- Emission factor for NOx, CO and VOC emissions from the turbine is derived from Vendor test data, while all others are from AP-42, Chapter 3.1, Tables 3.1-2a or Table 3.1-3 and greenhouse gases are from 40 CFR Part 98, Subpart C, Table C-1, C-2.
- In 2016 and 2017, the facility added a small section of pipeline at the turbines that allows for bidirectional flow of natural gas through the pipeline. Though no application was submitted, in this renewal, the facility calculated the emissions increase from the project as the difference between the projected actual emissions and the baseline actual emissions (2007-2008). The facility calculated the project actual emissions after taking into consideration any emissions that could have been accommodated during the baseline period and showed that the increase in emissions from this bidirectional project does not trigger further review under PSD. Review of the emissions rate from these engines over the next 5 years following the project were below the projected actual emissions and so the project did not trigger further review under PSD for NOx.

Emission Unit #04: G1 Emergency Generator

Initial Construction Date: January 1,1973

Process Description:
G1: Emergency Generator Waukesha L5790G
4SRB RICE rated at 792 HP (845 HP Max)

Fuel:	Natural Gas
Brake Specific Fuel Consumption:	8,237 Btu/bhp-hr
Maximum Fuel Consumption:	0.00682 mmscf/hr at 845 HP
Control Device:	None

Applicable Regulation:
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 through 63.6675, Tables 1a through 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

Comments:

- Emergency generator G1 does not have to meet any requirements under 40 CFR 63, Subpart ZZZZ per 40 CFR 63.6590(b)(3)(iii).

Emission Unit #04: G1 Emergency Generator

- The permittee must keep records of the amount of natural gas usage on a monthly basis for a twelve (12) - month rolling total.
- Emission factors are from AP-42, Chapter 3.2-3 for 4SRB; emissions of SO_2 are calculated using 0.25 grains S/100 scf and emissions of greenhouse gases are from 40 CFR Part 98, Subpart C.

Emission Unit #05: G2 Emergency Generator & P2 Emergency Fire Pump

Initial Construction Date: see below

Process Description:
G2: Emergency Generator Ford LSG-4231
4SRB RICE rated at 47 HP (52 HP Max)

Installation Date:	January 1, 1990
Fuel:	Natural Gas
Brake Specific Fuel Consumption:	10,600 Btu/bhp-hr
Maximum Fuel Consumption:	0.000488 mmscf/hr at 47 HP (0.00054 mmscf/hr at 52 HP)
Control Device:	None

Applicable Regulation:
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 through 63.6675, Tables 1a through 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

Comments:
- Emergency generator G2 and fire pump P2 are existing sources under Subpart ZZZZ and must meet work practice standards as specified in NESHAP ZZZZ.
- The permittee must keep records of the amount of natural gas usage on a monthly basis for a twelve (12) - month rolling total.
- Emission factors are from AP-42, Chapter 3.2-3 for 4SRB; emissions of SO_2 are calculated using 0.25 grains S/100 scf and emissions of greenhouse gases are from 40 CFR Part 98, Subpart C.

Emission Unit #07: BL2 Heating System Boiler Emission Unit #08: H1-H3 Three (3) Tank Heaters				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
PM	< 20% opacity	401 KAR 59:015 Section 4(2)	PM: 7.6 lb/mmscf SO_2: 0.25 grains S /100 scf AP-42, Table 1.4-2	Assumed to be in compliance based on combustion of natural gas as fuel
	0.56 lb/mmBtu	401 KAR 59:015 Section 4(1)(a)		
SO_2	3.0 lb/mmBtu	401 KAR 59:015 Section 5(1)(a)		

Initial Construction Date: *see below*

Process Description:
BL2: Heating System Boiler Ajax
Maximum Heat Input – 5.25 mmBtu/hr
Installation Date: January 1, 2006
Fuel: Natural Gas
Maximum Fuel Consumption: 0.00515 mmscf/hr

H1 –H3: Three (3) Tank Heaters Babcock & Wilcox
Maximum Heat Input: 0.125 mmBtu/hr (each)
Installation Date: January 1, 1988
Fuel: Natural Gas
Maximum Fuel Consumption: 0.000123 mmscf/hr each

Applicable Regulation:
401 KAR 59:015, New indirect heat exchangers. This regulation is applicable to each indirect heat exchanger having a heat input capacity greater than one (1) million BTU per hour (mmBtu/hr). This regulation applies to BL2 only.

401 KAR 63:002 Section 2(4)(iiii), 40 C.F.R. 63.7480 through 63.7575, Tables 1 through 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.

Comments:
- The facility is a major source of HAP and has a boiler (Ajax Heating System Boiler) and three (3) tank heaters (Babcock & Wilcox) that are subject to 40 CFR 63, Subpart DDDDD. The units burn natural gas fuel, and natural gas is not considered other gas 1 fuel according to the definition under 40 CFR 63.7575.
- 401 KAR 59:015 does not apply to the three tank heaters based on the heat input rating of each of those heaters.

Emission Unit FUG: Fugitive emissions from pipeline components

Initial Construction Date: 1954 though 2018

Process Description:
The facility consists of pipeline components – valves, connectors, pressure relief valves, open ended lines and meter connections. The facility added a small section of pipeline that allowed the facility to receive the inlet natural gas from the south main line and flow the gas to the line that feeds the reciprocating engines. Between 2016 and 2018, additional piping was added to do the same to the turbines. These components are not subject to modification under 40 CFR 60, Subparts OOOOa or OOOOb. There was no new compressor added during the project and therefore does the trigger the definition of modification of a compressor facility as it relates to fugitive components under the NSPS.

Applicable Regulation:
401 KAR 63:020, Potentially hazardous or toxic substances.

Comments:
- Emission factor for leaks are obtained using the equations in 40 CFR Part 98 Subpart W, Table 3 in the CFR prior to the updates of May 2024.
- HAP speciation was conducted using the gas analysis
- Modeling was conducted by the Division to show compliance with 401 KAR 63:20.

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS

Table A - Group Requirements:

N/A

Table B - Summary of Applicable Regulations:

Applicable Regulations	Emission Unit
401 KAR 59:015, New indirect heat exchangers	07(BL2)
401 KAR 63:020, Potentially hazardous matter or toxic substances	Insig. activities (FUG and A22 tank)
401 KAR 60:005, Section 2(2)(pp), 40 C.F.R. 60.330 through 60.335 (Subpart GG), Standards of Performance for Stationary Gas Turbines	03(E10)
401 KAR 63:002, Section 2(4)(dddd), 40 C.F.R. 63.6080 through 63.6175, Tables 1 through 7 (Subpart YYYY), National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines	02(E09) and 03(E10)
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 through 63.6675, Tables 1a through 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines	01(E01-E07) and 05(G2)
401 KAR 63:002 Section 2(4)(iiii), 40 C.F.R. 63.7480 through 63.7575, Tables 1 through 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters	07(BL2) and 08(H1-H3)

Table C - Summary of Precluded Regulations:

N/A

Table D - Summary of Non Applicable Regulations:

N/A

Air Toxic Analysis

401 KAR 63:020, *Potentially Hazardous Matter or Toxic Substances*
The Division for Air Quality (Division) has performed modeling using SCREEN on October 31, 2024, of potentially hazardous matter or toxic substances (Benzene, Ethyl Benzene, Hexane; N-Hexane, Toluene and Xylenes (Total)) that may be emitted by the facility based upon the process rates, material formulations, stack heights and other pertinent information provided by the applicant. Based upon this information, the Division has determined that the conditions outlined in this permit will assure compliance with the requirements of 401 KAR 63:020.

Single Source Determination

N/A

SECTION 5 – PERMITTING HISTORY

Permit	Permit Type	Activity#	Complete Date	Issuance Date	Summary of Action	PSD/Syn Minor
G-04-001 R1	Renewal	APE20040001	6/26/2006	5/27/2005	G permit	--
G-09-002	Renewal	APE20090001	2/11/2010	10/4/2010	Renewal	--
V-15-024	Renewal	APE20140001	1/12/2015	1/12/2016	Title V	--
V-15-024 R1	Minor Revision	APE20180001	3/7/2018	6/30/2018	Revision of testing requirements for Solar Mars Turbine (E10)	--

SECTION 6 – PERMIT APPLICATION HISTORY

N/A

APPENDIX A – ABBREVIATIONS AND ACRONYMS

AAQS – Ambient Air Quality Standards
BACT – Best Available Control Technology
Btu – British thermal unit
CAM – Compliance Assurance Monitoring
CO – Carbon Monoxide
Division – Kentucky Division for Air Quality
ESP – Electrostatic Precipitator
GHG – Greenhouse Gas
HAP – Hazardous Air Pollutant
HF – Hydrogen Fluoride (Gaseous)
MSDS – Material Safety Data Sheets
mmHg – Millimeter of mercury column height
NAAQS – National Ambient Air Quality Standards
NESHAP – National Emissions Standards for Hazardous Air Pollutants
NO_x – Nitrogen Oxides
NSR – New Source Review
PM – Particulate Matter
PM_{10} – Particulate Matter equal to or smaller than 10 micrometers
$PM_{2.5}$ – Particulate Matter equal to or smaller than 2.5 micrometers
PSD – Prevention of Significant Deterioration
PTE – Potential to Emit
SO_2 – Sulfur Dioxide
TF – Total Fluoride (Particulate & Gaseous)
VOC – Volatile Organic Compounds