July 6, 2016

Mr. William F. Durham
Director
WVDEP, Division of Air Quality
601 – 57th Street SE
Charleston, West Virginia 25304

Re: Columbia Gas Transmission, Temporary Rule 13 Permit Application, Glenville Compressor Station (Facility I.D. 021-00001)

Dear Mr. Durham,

Columbia Pipeline Group (CPG) and SLR International Corporation have prepared the attached Temporary Rule 13 Permit Application for the Glenville Compressor Station located in Gilmer County, West Virginia (Facility I.D. 021-00001). The affected source is currently permitted under R13-3110.

The need for temporary coverage as proposed by this application has become necessary to facilitate the engine manufacturer's tuning of CPG's turbine for low load conditions. The field trial test program will apply to Emission Unit ID 013T2 – Solar Taurus 60 7802S Turbine Engine in an effort to establish a new low load control algorithm. The objective of the testing is to reduce the low load emissions from the unit for criteria pollutants NO_X, CO, and VOC. The unit is currently permitted to allow for twelve (12) hours of operation at low load conditions; however this testing has identified the need for a temporary allowance of additional hours under these conditions. CPG is asking for an increase of thirty (30) hours pushing the low load operation from 12 hours annually to 42 hours annually. This proposed increase in hours for low load operation indicates the need to increase the facility's potential to emit (PTE) on a temporary basis. The resulting emission increases for the facility are reflected in the table below.

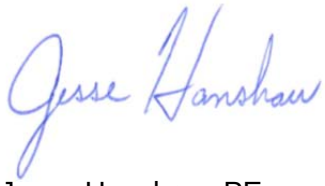
Pollutant	Tons/yr
NOx	0.10
CO	9.85
VOC	0.14
PM_{10}	0.06
$PM_{2.5}$	0.06
Total HAPs	0.01

SLR International Corporation 8 Capitol Street, Suite 300, Charleston, WV 25301
T: (681) 205-8949 **F:** (681) 205-8969 **www.slrconsulting.com**
Offices throughout USA, UK, Ireland, Canada, Australia, Namibia, and South Africa

The public notice was delivered to *The Glenville Pathfinder* for publication. The legal advertisement will be forwarded to your office as soon as SLR receives the original affidavit of publication.

If any additional information is needed, please contact me by telephone at (304) 545 8563 or by e-mail at jhanshaw@slrconsulting.com.

Sincerely,
SLR International Corporation



Jesse Hanshaw, PE
Principal Engineer

Cc: Ms. Kelly Taylor, CPG Environmental Manager

global environmental solutions

Columbia Gas Transmission, LLC

Glenville Compressor Station

Facility ID No. 021-00001

Truebada, West Virginia

Temporary Rule 13 Permit Application

SLR Ref: 116.01272.00026

July 2016

Temporary Rule 13 Permit Application

Prepared for:

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia 25314

This document has been prepared by SLR International Corporation. The material and data in this permit application were prepared under the supervision and direction of the undersigned.

Chris Boggess
Associate Engineer

Jesse Hanshaw P.E.
Principal Engineer

CONTENTS

ATTACHMENTS

Notes:

ATTACHMENT H – N/A – No change in materials processed at this facility occurred from this permit application
ATTACHMENT K – N/A – No change in fugitive emissions occurred from this permit application
ATTACHMENT M – N/A – No air pollution control devices are installed at this facility
ATTACHMENT Q – N/A – No information contained within this application claimed as confidential
ATTACHMENT S – N/A – No Title V revision necessary for temporary nature of operations change.

APPLICATION FOR PERMIT

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☒ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
Columbia Gas Transmission, LLC

2. Federal Employer ID No. ***(FEIN):***
31-0802435-30

3. Name of facility *(if different from above):*
Glenville Compressor Station

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
1700 MacCorkle Avenue, SE
Charleston WV 25314

5B. Facility's present physical address:
State Route 5
Truebada, WV 25314

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

- If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
- If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation:

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

- If **YES,** please explain: **The applicant owns the site.**
- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): **Natural Gas Transmission Station**

10. North American Industry Classification System **(NAICS)** code for the facility:
486210

11A. DAQ Plant ID No. (for existing facilities only):
021-00001

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R30-02100001-2012
R13-3110

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

Traveling I-79 North, Exit at Burnsville and turn left onto State Route 5. Proceed approximately 12 miles to the station that is located on the left

12B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
N/A	Truebada	Gilmer
12.E. UTM Northing (KM): 4,308.770	12F. UTM Easting (KM): 519.750	12G. UTM Zone: 17N

13. Briefly describe the proposed change(s) at the facility:
This permit application will account for the implementation of a temporary testing program on Emission Unit 013T2 to establish a new low load control algorithm to be used for better estimating emissions from the unit

14A. Provide the date of anticipated installation or change: **08/2016** – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen:	14B. Date of anticipated Start-Up if a permit is granted: **08/2016**

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**
– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**
– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☐ Bulk Liquid Transfer Operations	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☐ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify: **Turbine Engine**

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☐ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☐ Other Collectors, specify

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☒ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☐ **Responsible Official** / ☒ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ DATE: 6-28-16

(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: Steven A. Nelson		35C. Title: Manager of Operations
35D. E-mail: snelson@cpg.com	36E. Phone: 304-548-1630	36F. FAX 304-357-2770
36A. Printed name of contact person (if different from above): Jesse Hanshaw, P.E.		36B. Title: Principal Engineer, SLR International Corporation
36C. E-mail: jhanshaw@slrconsulting.com	36D. Phone: 681-205-8949	36E. FAX: 681-205-8969

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- ☒ **Attachment A: Business Certificate**
- ☒ **Attachment B: Map(s)**
- ☒ **Attachment C: Installation and Start Up Schedule**
- ☒ **Attachment D: Regulatory Discussion**
- ☒ **Attachment E: Plot Plan**
- ☒ **Attachment F: Detailed Process Flow Diagram(s)**
- ☒ **Attachment G: Process Description**
- ☐ **Attachment H: Material Safety Data Sheets (MSDS)**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☐ **Attachment K: Fugitive Emissions Data Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☐ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☐ **Attachment Q: Business Confidential Claims**
- ☒ **Attachment R: Authority Forms**
- ☐ **Attachment S: Title V Permit Revision Information**
- ☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ *Forward 1 copy of the application to the Title V Permitting Group and:*
- ☐ *For Title V Administrative Amendments:*
  - ☐ *NSR permit writer should notify Title V permit writer of draft permit,*
- ☐ *For Title V Minor Modifications:*
  - ☐ *Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,*
  - ☐ *NSR permit writer should notify Title V permit writer of draft permit.*
- ☐ *For Title V Significant Modifications processed in parallel with NSR Permit revision:*
  - ☐ *NSR permit writer should notify a Title V permit writer of draft permit,*
  - ☐ *Public notice should reference both 45CSR13 and Title V permits,*
  - ☐ *EPA has 45 day review period of a draft permit.*

ATTACHMENT A

BUSINESS CERTIFICATE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
COLUMBIA GAS TRANSMISSION LLC
5151 SAN FELIPE ST 2500
HOUSTON, TX 77056-3639

BUSINESS REGISTRATION ACCOUNT NUMBER: **1025-1555**

This certificate is issued on: 07/1/2011

This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them. CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

atL006 v.4
L1430813824

ATTACHMENT B

MAP

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

GPS Coordinates of Sites:
Lat: 38.92762, Long: -80.77216

UTM Coordinates of Sites:
Easting: 519.750 km, Northing: 4,308.770 km, Zone: 17

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, WV 25314

Report
Temporary Rule 13 Permit Application
Glenville Compressor Station (ID No. 021-00001)

Drawing
Attachment A - Area Map

Date: June 2016		
Drawn By: CLB	Project: 116.01272.00026	

SLR

ATTACHMENT C

INSTALLATION AND START-UP

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

INSTALLATION AND STARTUP SCHEDULE

This permit application is being prepared by Columbia Pipeline Group (CPG) to implement a temporary testing program on one of the emissions sources (Emission Unit 013T2 – Solar Taurus 60 Turbine Engine) at the Glenville station. This testing program is being conducted in an effort to establish a new low load control algorithm for the turbine engine. Testing is tentatively scheduled to begin in August of 2016. The estimated duration of time for the testing will be 4-5 days.

ATTACHMENT D

REGULATORY DISCUSSION

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

REGULATORY DISCUSSION

APPLICABLE REGULATIONS

The equipment at this facility is subject to the following applicable rules and regulations:

Federal and State:

45 CSR 4 – *To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors*

45 CSR 11 – *Prevention of Air Pollution Emergency Episodes*

45 CSR 13 – *Permits for Construction, Modification, Relocation, and Operation of Stationary Source of Air Pollutants*
The engine testing and mapping event is in an effort to enhance the stability of the unit under low load conditions and will ultimately reduce emissions. However, due to these testing efforts the amount of time previously allotted for low load operation, 12hrs/yr, will need to be extended to temporarily increase emissions beyond what is currently reflected by R13-3110. Therefore this pilot project is considered a change in method of operations not currently reflected by the existing permit. A total of 30 additional operating hours under low load conditions is being requested via a temporary permit as defined by this minor source NSR Rule.

45 CSR 17 – *To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage And Other Sources Of Particulate Matter*

40 CFR 60 Subpart KKKK – *Standards of Performance for Stationary Combustion Turbines*
Emission Unit 013T2 is a 7700 hp turbine engine that was installed in 2014 and therefore required to comply with NO_X emission limits/rates established by this subpart. One of the objectives of this testing is to assure the turbine continues to meet the requirements of this standard under non ideal operating conditions such as low load.

40 CFR 63 Subpart YYYY – *NESHAP for Stationary Combustion Turbines*
Emission Unit 013T2 is a 7700 hp turbine engine that was installed in 2014 at a major source of HAPs therefore triggering applicability under this subpart. However, because of a stay of standards for gas-fired turbines, the only requirement was to provide initial notification.

ATTACHMENT E

PLOT PLAN

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

TO BURNSVILLE

TO GLENVILLE

WEST VIRGINIA STATE ROUTE 5

CYCLONE FENCE

TELEMETERING BUILDING

SEPARATOR

UNDERGROUND MERCAPTAN TANK

SCRUBBER

MERCAPTAN TANK

ODORANT BUILDING

SCRUBBER

SLAG ROAD

METER BUILDING

SEPARATOR

OFFICE BUILDING

OFFICE

NEW BUILDING

SOLAR TURBINE

UNIT # 013T1 • T01

UNIT # 013T2 • T02

BUILDING #1

DRUM STORAGE BUILDING

UNDERGROUND LUBE OIL TANKS

CLARK COMPRESSOR BUILDING #2

UNIT #7 E07

UNIT #6 E06

UNIT #5 E05

GLYCOL TANK

CLARK COMPRESSOR

UNIT #2 E02

UNIT #1 E01

BUILDING #1

GLYCOL/WATER MIXTURE TANK

UNDERGROUND LUBE OIL TANK

WORKSHOP

NEW AUXILIARY BUILDING

•G3

AUXILIARY GENERATOR

NEW BUILDING

UNDERGROUND OIL WATER SEPARATOR

UNDERGROUND USED OIL STORAGE TANK

JACKET WATER COOLER

WATER INJECTION BUILDING

UNDERGROUND WATER TANK

PIPELINE LIQUIDS TANK

WAREHOUSE BUILDING

TOP OF RIVER BANK

LITTLE KANAWHA RIVER

TOP OF RIVER BANK

SIGNIFICANT EMISSION UNITS

Emission Point ID Number	Equipment Category
E01	Recip Engine/Integral Compressor No. 01301
E02	Recip Engine/Integral Compressor No. 01302
E05	Recip Engine/Integral Compressor No. 01305
E06	Recip Engine/Integral Compressor No. 01306
E07	Recip Engine/Integral Compressor No. 01307
G3	Recip Engine/Generator No. 013G3
T01	Turbine Engine/Centrifugal Compressor No. 013T1
T02	Turbine Engine/Centrifugal Compressor No. 013T2

KEY

—x— FENCE LINE

PROPERTY BOUNDARY

NATURAL GAS PIPE LINE

• EMISSION POINT

ELEVATION = 750 FEET
LAT. 38°56' LONG. 80°46'

50 0 50

SCALE IN FEET

SCALE: AS SHOWN	DESIGNED BY	DATE	DRAWING TITLE: Site Plan Columbia Gas Transmission Corp. Glenville Station	
	DRAWN BY: TSH	DATE: 22SEP10		
	CHECKED BY: DW	DATE: 22SEP10	CAD DRAWING FILE:	
	APPROVED BY: DW	DATE: 22SEP10	CONTRACT NO.: 31827062	DRAWING NO.: GLE-BM2 / REV.: 0

P:\Common_Projects\COLUMBIA\GENERAL\CADD\GLE-BM2.dwg September 27, 2010 - 1:45 PM

ATTACHMENT F

PROCESS FLOW DIAGRAM

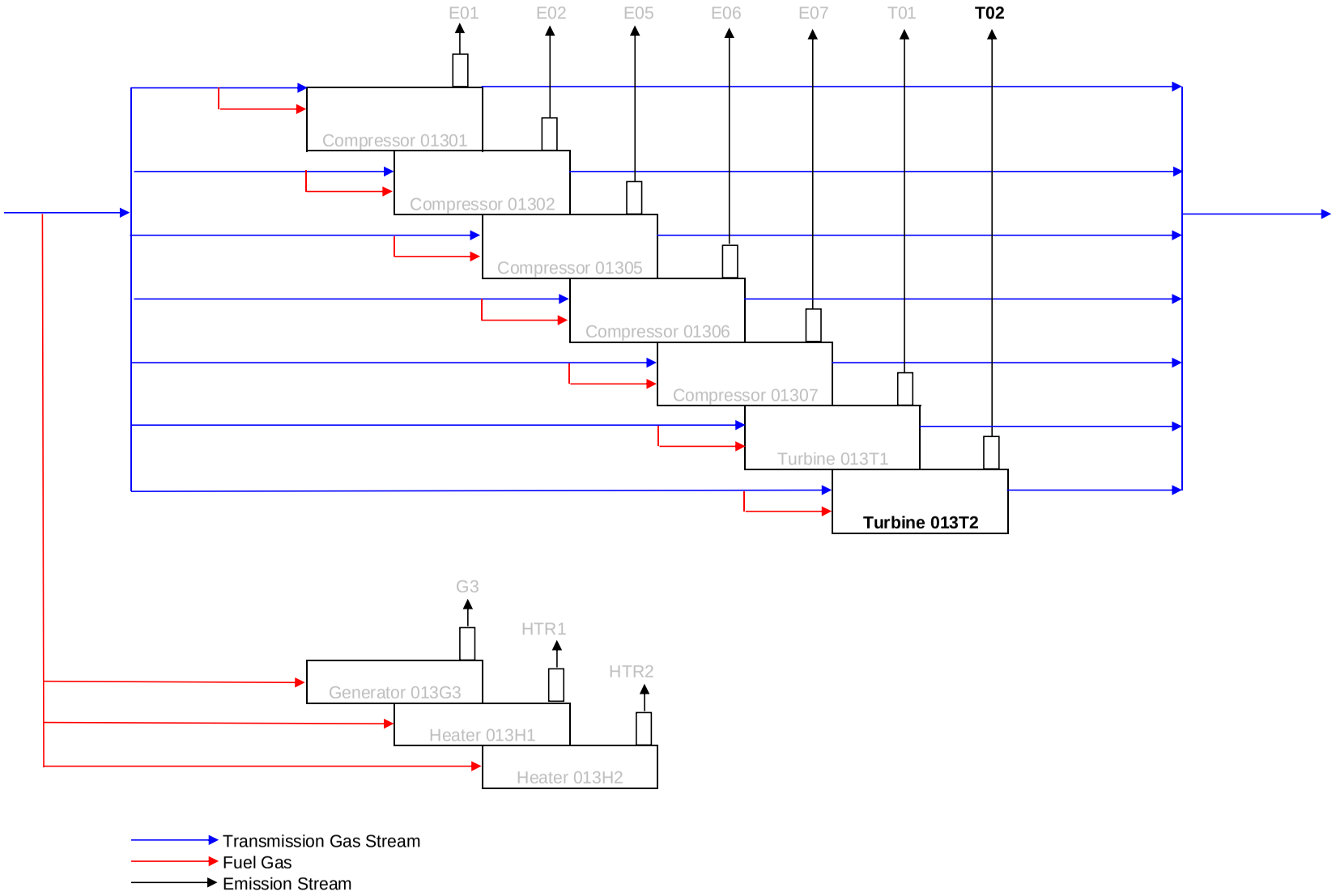
Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

ATTACHMENT F
GLENVILLE COMPRESSOR STATION PROCESS FLOW DIAGRAM



ATTACHMENT G

PROCESS DESCRIPTION

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

PROCESS DESCRIPTION

PROPOSED MODIFICATION

The Glenville Station is proposing to conduct a project to field qualify the Taurus 60 engine model with a new low load control algorithm. Columbia Gas Group (CGP) has agreed to host the field trial on one of their Unit #2, Taurus 60 7802S gas only compressor set package. The unit is permitted for 12 hours under low load conditions per year. Unit #2, (ESN2203T) was selected as the preferred test unit by Solar and CPG. The unit will be retrofitted with TPZ (Temperature Primary Zone) control logic, supplemental T2 (compressor discharge temperature) instrumentation probes and a Burner Acoustic Monitoring (BAM) 2.0 system.

The object of the testing is to reduce low load emissions of NOx, CO, and VOCs. Since the permit allows 12 hours/year of low load operation this testing has identified the need for a temporary allowance of additional low load hours, which will push the annual total to 42 hours/yr. All other normal load (> 50%) will be covered by the existing permit limits.

DESCRIPTION OF PROCESS

Site visits by Solar engineering staff and the Pittsburgh District Office are being planned. The initial site visit (referred to as **CGP Visit #1**) will be completed to baseline the current control system and install the new Low Load Controls (LLC) algorithm on Unit #2. This new control schedule changes the engine controls to bleed at loads outside of below current SoLoNOx mode operation to significantly reduce CO and UHC emissions. The BAM 2.0 system will be installed, which includes a new torch, to field qualify the new high temperature BAM dynamic pressure sensor along with an active control feature developed to quell high amplitude pressure oscillations by stepping up pilot fuel flow.

The data collection will be completed with; (1) Solar's Mobile Emissions Lab (MEL), (2) Remote Monitoring and Diagnostics (RM&D) for basic engine performance parameters, and (3) a (BAM) 2.0 module to monitor system acoustics simultaneously with the existing production BAM system. After system validation, the BAM 2.0 active control feature will be turned on. In the event of high BAM 2.0 readings, active control will step up pilot fuel flow to reduce amplitudes to safe levels and prevent damage. Active control will not trigger under normal circumstances. However, conditions such as fouled fuel injectors, loss of fuel skid edge pressure or extremely low ambient temperatures may drive higher combustor oscillations at which point active control would engage.

ATTACHMENT H

SAFETY DATA SHEETS (SDS)

NOT APPLICABLE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

ATTACHMENT I

EMISSION UNITS TABLE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
013T2*	T02	Turbine Engine/Centrifugal Compressor; Solar; Taurus 60 Turbine	2014	7700 hp 7943 hp (maximum worst case)	Mod	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

*This equipment burns pipeline quality natural gas only.

ATTACHMENT J

EMISSION POINTS DATA SUMMARY SHEET

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table-& Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
T02	Vertical Stack	013T2	Solar Taurus 60 Turbine Engine	NA	NA	NA	NA	NO_X CO VOC SO_2 PM_{10} CH_2O HAPs CO2e	4.16 10.72 0.67 0.04 0.42 0.05 0.07 7402.7	18.23 46.95 2.91 0.19 1.83 0.20 0.29 32424	4.16 10.72 0.67 0.04 0.42 0.05 0.07 7402.7	18.23 46.95 2.91 0.19 1.83 0.20 0.29 32424	Gas/ Vapor	EE	Can Supply Upon Request

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^{0}F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
T02	5.0	889	1033.75	0.88	735 ft	40 ft	4308.770	519.750

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

NOT APPLICABLE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

ATTACHMENT L

EMISSION UNIT DATA SHEET

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 013T2

1. Name or type and model of proposed affected source: Solar Taurus 60 Turbine Engine, Emission Unit (013T2)
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: NA
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Natural Gas Combustion Products

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

543,347,760 scf/yr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Methane: 92.65 %
Ethane: 6.33 %
Propane: 0.41 %
I-Butane: 0.04 %
N-Butane: 0.05 %
I-Pentane: 0.01 %
N-Pentane: 0.01 %
Hexane Plus: 0.00 %
Carbon Dioxide: 0.16 %
Nitrogen: 0.36 %
Sulfur Dioxide: 0.00 %
Ash: 0.00 %

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

63.27 mmBtu/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 63.27 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ °F and psia

a.	NO_X	4.16	lb/hr	grains/ACF
b.	SO_2	0.04	lb/hr	grains/ACF
c.	CO	10.72	lb/hr	grains/ACF
d.	PM_{10}	0.42	lb/hr	grains/ACF
e.	Hydrocarbons	2.68	lb/hr	grains/ACF
f.	VOCs	0.67	lb/hr	grains/ACF
g.	Pb	-	lb/hr	grains/ACF
h.	Specify other(s)			
	Formaldehyde	0.05	lb/hr	grains/ACF
	Total HAPs	0.07	lb/hr	grains/ACF
	CO2e	7402.7	lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
CPG plans to maintain the following records; Monthly operating hours at normal load operations Monthly operating hours at low load operations Monthly operating hours at low temperature operations Monthly operating hours at very low temperature operations Monthly number of startup and shutdown cycles	Maintain records of the monitored parameters
REPORTING	**TESTING**
CPG will continue to follow the same reporting requirements as currently being conducted with R13-3110	CPG will continue to conduct compliance testing as required by the NSPS.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Emissions certified above ambient temperatures of -20 degrees F and at loads greater than 50% of design. Solar provides guidance on estimating emissions outside those conditions but does not warrant the rates.

ATTACHMENT M

AIR POLLUTION CONTROL DEVICE SHEET(S)

NOT APPLICABLE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

Table 1. Annual Potential To Emit (PTE) Summary
Columbia Pipeline Group - Glenville Compressor Station

Criteria Pollutants

Current Permitted Emissions (45 CSR 13, R13-3110) - Criteria Pollutants

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	CO2e
Turbine (T02) Emissions (ton/yr)	1.770	1.770	1.770	0.190	18.130	37.100	2.770	31432.090
Total Emissions (ton/yr)	1.770	1.770	1.770	0.190	18.130	37.100	2.770	31432.090
Total Emissions (lb/hr)	0.404	0.404	0.404	0.043	4.139	8.470	0.632	7176.276

Hazardous Air Pollutants (HAPs)

Current Permitted Emissions (45 CSR 13, R13-3110) - HAPs

Source	Acetaldehyde	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs
Turbine (T02) Emissions (ton/yr)	0.011	0.003	0.035	0.009	0.017	-	0.191	0.276
Total Emissions (ton/yr)	0.011	0.003	0.035	0.009	0.017	0.000	0.191	0.276
Total Emissions (lb/hr)	0.002	0.001	0.008	0.002	0.004	0.000	0.044	0.063

Criteria Pollutants

Proposed New Temporary PTE - Criteria Pollutants

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	CO2e
Turbine (T02) Emissions (ton/yr)	1.829	1.829	1.829	0.194	18.234	46.948	2.912	32424.036
Total Emissions (ton/yr)	1.829	1.829	1.829	0.194	18.234	46.948	2.912	32424.036
Total Emissions (lb/hr)	0.418	0.418	0.418	0.044	4.163	10.719	0.665	7402.748

Hazardous Air Pollutants (HAPs)

Proposed New Temporary PTE - HAPs

Source	Acetaldehyde	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs
Turbine (T02) Emissions (ton/yr)	0.011	0.003	0.036	0.009	0.018	-	0.197	0.285
Total Emissions (ton/yr)	0.011	0.003	0.036	0.009	0.018	0.000	0.197	0.285
Total Emissions (lb/hr)	0.003	0.001	0.008	0.002	0.004	0.000	0.045	0.065

Proposed Difference Temporary Increase of Emissions

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	Total HAPs
Turbine (T02) Emissions (ton/yr)	0.06	0.06	0.06	0.00	0.10	9.85	0.14	0.01
Total Emissions (ton/yr)	0.06	0.06	0.06	0.00	0.10	9.85	0.14	0.01
Total Emissions (lb/hr)	0.01	0.01	0.01	0.00	0.02	2.25	0.03	0.00

Table 2. Turbine Engine / Centrifugal Compressor Emissions (T02)
Normal Load Operations (Load > 50% & Temp > 0° F)
Columbia Pipeline Group - Glenville Compressor Station

Pollutant	Hourly Emissions				Annual Emissions			
	Emission Factor		PTE per Engine (lb/hr)		Emission Factor		PTE per Engine (tons/yr)	
Criteria Pollutants								
PM/PM10/PM2.5	6.60E-03 lb/MMBtu	(1)	0.42	(a)	6.60E-03 lb/MMBtu	(1)	1.76	(c)
SO_2	20.0 grains S / 100 ft^3	(2)	3.54	(e)	0.25 grains S / 100 ft^3	(2)	0.19	(f)
NOx	4.86E-04 lb/hp-hr	(3)	3.86	(b)	4.86E-04 lb/hp-hr	(3)	16.26	(d)
CO	4.94E-04 lb/hp-hr	(3)	3.92	(b)	4.94E-04 lb/hp-hr	(3)	16.51	(d)
VOC	7.05E-05 lb/hp-hr	(4)	0.56	(b)	7.05E-05 lb/hp-hr	(4)	2.36	(c)
Hazardous Air Pollutants								
1,3-Butadiene	4.30E-07 lb/MMBtu	(5)	0.000	(a)	4.30E-07 lb/MMBtu	(5)	0.000	(c)
Acetaldehyde	4.00E-05 lb/MMBtu	(5)	0.003	(a)	4.00E-05 lb/MMBtu	(5)	0.011	(c)
Acrolein	6.40E-06 lb/MMBtu	(5)	0.000	(a)	6.40E-06 lb/MMBtu	(5)	0.002	(c)
Benzene	1.20E-05 lb/MMBtu	(5)	0.001	(a)	1.20E-05 lb/MMBtu	(5)	0.003	(c)
Ethylbenzene	3.20E-05 lb/MMBtu	(5)	0.002	(a)	3.20E-05 lb/MMBtu	(5)	0.009	(c)
Formaldehyde	7.10E-04 lb/MMBtu	(5)	0.045	(a)	7.10E-04 lb/MMBtu	(5)	0.189	(c)
Naphthalene	1.30E-06 lb/MMBtu	(5)	0.000	(a)	1.30E-06 lb/MMBtu	(5)	0.000	(c)
PAH (POM)	2.20E-06 lb/MMBtu	(5)	0.000	(a)	2.20E-06 lb/MMBtu	(5)	0.001	(c)
Phenol	2.90E-05 lb/MMBtu	(5)	0.002	(a)	2.90E-05 lb/MMBtu	(5)	0.008	(c)
Toluene	1.30E-04 lb/MMBtu	(5)	0.008	(a)	1.30E-04 lb/MMBtu	(5)	0.035	(c)
Xylenes	6.40E-05 lb/MMBtu	(5)	0.004	(a)	6.40E-05 lb/MMBtu	(5)	0.017	(c)
Total HAP			**0.065**				**0.274**	
Greenhouse Gas Emissions								
CO_2	116.89 lb/MMBtu	(6)	7395.10	(a)	116.89 lb/MMBtu	(6)	31155.58	(c)
CH_4	2.2E-03 lb/MMBtu	(6)	0.14	(a)	2.2E-03 lb/MMBtu	(6)	0.59	(c)
N_2O	2.2E-04 lb/MMBtu	(6)	0.01	(a)	2.2E-04 lb/MMBtu	(6)	0.06	(c)
CO_2e[(g)]	- -		7402.75				31187.78	

Calculations:

Hourly Emissions - If emission factor note 1, 5 or 6 is used, use calculation (a). If emission factor note 3 or 4 is used, use calculation (b).

(a) Hourly Emissions (lb/hr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000 Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr)

(b) Hourly Emissions (lb/hr) = Emission factor (lb/hp-hr) * Engine Power Output (hp)

Annual Emissions - If emission factor note 1, 5 or 6 is used, use calculation (c). If emission factor note 3 or 4 is used, use calculation (d).

(c) Annual emissions (tons/yr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

(d) Annual emissions (tons/yr) = Emission factor (lb/hp-hr) * Engine Power Output (hp) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

SO_2 Emissions - If emission factor note 2 is used, use calculations (e) and (f) for hourly and annual emissions, respectively.

(e) Hourly Emissions SO2 Caclulation (lb/hr) = (20 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2)

(f) Annual Emissions SO2 Caclulation (ton/yr) = (0.25 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2) * Annual hours of operation (hr/yr) * (1ton/2000lbs)

MAXIMUM HOURLY EMISSION INPUTS		
Engine Power Output (kW) =	5923	
Engine Power Output (hp) =	7,943	
Average BSFC (BTU/HP-hr) =	7,965	(7)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(8)
Fuel Throughput (ft3/hr) =	62,025.5	(9)
PTE Hours of Operation =	8,426	

(g) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]
Global Warming Potential (GWP)

CO_2	1	(10)
CH_4	25	(10)
N_2O	298	(10)

Notes:

(1) AP-42, Chapter 3.1, Table 3.1-2a - *Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Trubines* (4/00)

(2) AP-42, Chapter 5.3, Section 5.3.1

(3) Emissions supplied from vendor data @ anticipated worst case operating scenario of 7943 hp

(4) VOC emissions based on 25% of vendor data supplied for unburned hydrocarbons

(5) AP-42, Chapter 3.1, Table 3.1-3 - *Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Statonary Gas Turbines* (4/00)

(6) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(7) Fuel consumption from manufacturer's specification sheet.

(8) Value obtained from AP-42, Chapter 3.1, Table 3.1-2a, footnote c

(9) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(10) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 3. Turbine Engine / Centrifugal Compressor Emissions (T02)
Low Temperature Operations (10° F > Temp > -20° F)
Columbia Pipeline Group - Glenville Compressor Station

Pollutant	Hourly Emissions				Annual Emissions			
	Emission Factor		PTE per Engine (lb/hr)		Emission Factor		PTE per Engine (tons/yr)	
Criteria Pollutants								
PM/PM10/PM2.5	6.60E-03 lb/MMBtu	(1)	0.42	(a)	6.60E-03 lb/MMBtu	(1)	0.05	(c)
SO_2	20.0 grains S / 100 ft^3	(2)	3.54	(e)	0.25 grains S / 100 ft^3	(2)	0.01	(f)
NOx	1.40E-03 lb/hp-hr	(3)	11.12	(b)	1.40E-03 lb/hp-hr	(3)	1.33	(d)
CO	2.03E-03 lb/hp-hr	(3)	16.12	(b)	2.03E-03 lb/hp-hr	(3)	1.93	(d)
VOC	1.45E-04 lb/hp-hr	(4)	1.15	(b)	1.45E-04 lb/hp-hr	(4)	0.14	(c)
Hazardous Air Pollutants								
1,3-Butadiene	4.30E-07 lb/MMBtu	(5)	0.000	(a)	4.30E-07 lb/MMBtu	(5)	0.000	(c)
Acetaldehyde	4.00E-05 lb/MMBtu	(5)	0.003	(a)	4.00E-05 lb/MMBtu	(5)	0.000	(c)
Acrolein	6.40E-06 lb/MMBtu	(5)	0.000	(a)	6.40E-06 lb/MMBtu	(5)	0.000	(c)
Benzene	1.20E-05 lb/MMBtu	(5)	0.001	(a)	1.20E-05 lb/MMBtu	(5)	0.000	(c)
Ethylbenzene	3.20E-05 lb/MMBtu	(5)	0.002	(a)	3.20E-05 lb/MMBtu	(5)	0.000	(c)
Formaldehyde	7.10E-04 lb/MMBtu	(5)	0.045	(a)	7.10E-04 lb/MMBtu	(5)	0.005	(c)
Naphthalene	1.30E-06 lb/MMBtu	(5)	0.000	(a)	1.30E-06 lb/MMBtu	(5)	0.000	(c)
PAH (POM)	2.20E-06 lb/MMBtu	(5)	0.000	(a)	2.20E-06 lb/MMBtu	(5)	0.000	(c)
Phenol	2.90E-05 lb/MMBtu	(5)	0.002	(a)	2.90E-05 lb/MMBtu	(5)	0.000	(c)
Toluene	1.30E-04 lb/MMBtu	(5)	0.008	(a)	1.30E-04 lb/MMBtu	(5)	0.001	(c)
Xylenes	6.40E-05 lb/MMBtu	(5)	0.004	(a)	6.40E-05 lb/MMBtu	(5)	0.000	(c)
Total HAP			**0.065**				**0.008**	
Greenhouse Gas Emissions								
CO_2	116.89 lb/MMBtu	(6)	7395.10	(a)	116.89 lb/MMBtu	(6)	887.41	(c)
CH_4	2.2E-03 lb/MMBtu	(6)	0.14	(a)	2.2E-03 lb/MMBtu	(6)	0.02	(c)
N_2O	2.2E-04 lb/MMBtu	(6)	0.01	(a)	2.2E-04 lb/MMBtu	(6)	0.00	(c)
$CO_2e^{(g)}$	- -		7402.75				888.33	

Calculations:

Hourly Emissions - If emission factor note 1, 5 or 6 is used, use calculation (a). If emission factor note 3 or 4 is used, use calculation (b).

(a) Hourly Emissions (lb/hr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000 Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr)

(b) Hourly Emissions (lb/hr) = Emission factor (lb/hp-hr) * Engine Power Output (hp)

Annual Emissions - If emission factor note 1, 5 or 6 is used, use calculation (c). If emission factor note 3 or 4 is used, use calculation (d).

(c) Annual emissions (tons/yr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

(d) Annual emissions (tons/yr) = Emission factor (lb/hp-hr) * Engine Power Output (hp) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

SO_2 Emissions - If emission factor note 2 is used, use calculations (e) and (f) for hourly and annual emissions, respectively.

(e) Hourly Emissions SO2 Caclulation (lb/hr) = (20 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2)

(f) Annual Emissions SO2 Caclulation (ton/yr) = (0.25 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2) * Annual hours of operation (hr/yr) * (1ton/2000lbs)

MAXIMUM HOURLY EMISSION INPUTS		
Engine Power Output (kW) =	5923	
Engine Power Output (hp) =	7,943	
Average BSFC (BTU/HP-hr) =	7,965	(7)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(8)
Fuel Throughput (ft3/hr) =	62,025.5	(9)
PTE Hours of Operation =	240	

(g) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]
Global Warming Potential (GWP)

CO_2	1	(10)
CH_4	25	(10)
N_2O	298	(10)

Notes:

(1) AP-42, Chapter 3.1, Table 3.1-2a - *Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Trubines* (4/00)

(2) AP-42, Chapter 5.3, Section 5.3.1

(3) Emissions supplied from vendor data @ anticipated worst case operating scenario of 7943 hp

(4) VOC emissions based on 25% of vendor data supplied for unburned hydrocarbons

(5) AP-42, Chapter 3.1, Table 3.1-3 - *Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Statonary Gas Turbines* (4/00)

(6) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(7) Fuel consumption from manufacturer's specification sheet.

(8) Value obtained from AP-42, Chapter 3.1, Table 3.1-2a, footnote c

(9) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(10) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 4. Turbine Engine / Centrifugal Compressor Emissions (T02)
Very Low Temperature Operations (Temp < -20° F)
Columbia Pipeline Group - Glenville Compressor Station

Pollutant	Hourly Emissions				Annual Emissions			
	Emission Factor		PTE per Engine (lb/hr)		Emission Factor		PTE per Engine (tons/yr)	
Criteria Pollutants								
PM/PM10/PM2.5	6.60E-03 lb/MMBtu	(1)	0.42	(a)	6.60E-03 lb/MMBtu	(1)	0.00	(c)
SO_2	20.0 grains S / 100 ft^3	(2)	3.54	(e)	0.25 grains S / 100 ft^3	(2)	0.00	(f)
NOx	4.00E-03 lb/hp-hr	(3)	31.77	(b)	4.00E-03 lb/hp-hr	(3)	0.25	(d)
CO	3.04E-03 lb/hp-hr	(3)	24.18	(b)	3.04E-03 lb/hp-hr	(3)	0.19	(d)
VOC	1.45E-04 lb/hp-hr	(4)	1.15	(b)	1.45E-04 lb/hp-hr	(4)	0.01	(c)
Hazardous Air Pollutants								
1,3-Butadiene	4.30E-07 lb/MMBtu	(5)	0.000	(a)	4.30E-07 lb/MMBtu	(5)	0.000	(c)
Acetaldehyde	4.00E-05 lb/MMBtu	(5)	0.003	(a)	4.00E-05 lb/MMBtu	(5)	0.000	(c)
Acrolein	6.40E-06 lb/MMBtu	(5)	0.000	(a)	6.40E-06 lb/MMBtu	(5)	0.000	(c)
Benzene	1.20E-05 lb/MMBtu	(5)	0.001	(a)	1.20E-05 lb/MMBtu	(5)	0.000	(c)
Ethylbenzene	3.20E-05 lb/MMBtu	(5)	0.002	(a)	3.20E-05 lb/MMBtu	(5)	0.000	(c)
Formaldehyde	7.10E-04 lb/MMBtu	(5)	0.045	(a)	7.10E-04 lb/MMBtu	(5)	0.000	(c)
Naphthalene	1.30E-06 lb/MMBtu	(5)	0.000	(a)	1.30E-06 lb/MMBtu	(5)	0.000	(c)
PAH (POM)	2.20E-06 lb/MMBtu	(5)	0.000	(a)	2.20E-06 lb/MMBtu	(5)	0.000	(c)
Phenol	2.90E-05 lb/MMBtu	(5)	0.002	(a)	2.90E-05 lb/MMBtu	(5)	0.000	(c)
Toluene	1.30E-04 lb/MMBtu	(5)	0.008	(a)	1.30E-04 lb/MMBtu	(5)	0.000	(c)
Xylenes	6.40E-05 lb/MMBtu	(5)	0.004	(a)	6.40E-05 lb/MMBtu	(5)	0.000	(c)
Total HAP			**0.065**				**0.001**	
Greenhouse Gas Emissions								
CO_2	116.89 lb/MMBtu	(6)	7395.10	(a)	116.89 lb/MMBtu	(6)	59.16	(c)
CH_4	2.2E-03 lb/MMBtu	(6)	0.14	(a)	2.2E-03 lb/MMBtu	(6)	0.00	(c)
N_2O	2.2E-04 lb/MMBtu	(6)	0.01	(a)	2.2E-04 lb/MMBtu	(6)	0.00	(c)
$CO_2e^{(g)}$	- -		7402.75				59.22	

Calculations:

Hourly Emissions - If emission factor note 1, 5 or 6 is used, use calculation (a). If emission factor note 3 or 4 is used, use calculation (b).

(a) Hourly Emissions (lb/hr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000 Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr)

(b) Hourly Emissions (lb/hr) = Emission factor (lb/hp-hr) * Engine Power Output (hp)

Annual Emissions - If emission factor note 1, 5 or 6 is used, use calculation (c). If emission factor note 3 or 4 is used, use calculation (d).

(c) Annual emissions (tons/yr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

(d) Annual emissions (tons/yr) = Emission factor (lb/hp-hr) * Engine Power Output (hp) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

SO_2 Emissions - If emission factor note 2 is used, use calculations (e) and (f) for hourly and annual emissions, respectively.

(e) Hourly Emissions SO2 Caclulation (lb/hr) = (20 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2)

(f) Annual Emissions SO2 Caclulation (ton/yr) = (0.25 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2) * Annual hours of operation (hr/yr) * (1ton/2000lbs)

MAXIMUM HOURLY EMISSION INPUTS		
Engine Power Output (kW) =	5923	
Engine Power Output (hp) =	7,943	
Average BSFC (BTU/HP-hr) =	7,965	(7)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(8)
Fuel Throughput (ft3/hr) =	62,025.5	(9)
PTE Hours of Operation =	16	

(g) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]
Global Warming Potential (GWP)

CO_2	1	(10)
CH_4	25	(10)
N_2O	298	(10)

Notes:

(1) AP-42, Chapter 3.1, Table 3.1-2a - *Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Trubines* (4/00)

(2) AP-42, Chapter 5.3, Section 5.3.1

(3) Emissions supplied from vendor data @ anticipated worst case operating scenario of 7943 hp

(4) VOC emissions based on 25% of vendor data supplied for unburned hydrocarbons

(5) AP-42, Chapter 3.1, Table 3.1-3 - *Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Statonary Gas Turbines* (4/00)

(6) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(7) Fuel consumption from manufacturer's specification sheet.

(8) Value obtained from AP-42, Chapter 3.1, Table 3.1-2a, footnote c

(9) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(10) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 5. Turbine Engine / Centrifugal Compressor Emissions (T02)
Low Load Operations (Load < 50%)
Columbia Pipeline Group - Glenville Compressor Station

Pollutant	Hourly Emissions					Annual Emissions				
	Emission Factor			PTE per Engine (lb/hr)		Emission Factor			PTE per Engine (tons/yr)	
Criteria Pollutants										
PM/PM10/PM2.5	6.60E-03	lb/MMBtu	(1)	0.42	(a)	6.60E-03	lb/MMBtu	(1)	0.01	(c)
SO_2	20.0 grains S / 100 ft^3		(2)	3.54	(e)	0.25 grains S / 100 ft^3		(2)	0.00	(f)
NOx	1.79E-03	lb/hp-hr	(3)	14.18	(b)	1.79E-03	lb/hp-hr	(3)	0.30	(d)
CO	1.24E-01	lb/hp-hr	(3)	986.45	(b)	1.24E-01	lb/hp-hr	(3)	20.72	(d)
VOC	1.77E-03	lb/hp-hr	(4)	14.09	(b)	1.77E-03	lb/hp-hr	(4)	0.30	(c)
Hazardous Air Pollutants										
1,3-Butadiene	4.30E-07	lb/MMBtu	(5)	0.000	(a)	4.30E-07	lb/MMBtu	(5)	0.000	(c)
Acetaldehyde	4.00E-05	lb/MMBtu	(5)	0.003	(a)	4.00E-05	lb/MMBtu	(5)	0.000	(c)
Acrolein	6.40E-06	lb/MMBtu	(5)	0.000	(a)	6.40E-06	lb/MMBtu	(5)	0.000	(c)
Benzene	1.20E-05	lb/MMBtu	(5)	0.001	(a)	1.20E-05	lb/MMBtu	(5)	0.000	(c)
Ethylbenzene	3.20E-05	lb/MMBtu	(5)	0.002	(a)	3.20E-05	lb/MMBtu	(5)	0.000	(c)
Formaldehyde	7.10E-04	lb/MMBtu	(5)	0.045	(a)	7.10E-04	lb/MMBtu	(5)	0.001	(c)
Naphthalene	1.30E-06	lb/MMBtu	(5)	0.000	(a)	1.30E-06	lb/MMBtu	(5)	0.000	(c)
PAH (POM)	2.20E-06	lb/MMBtu	(5)	0.000	(a)	2.20E-06	lb/MMBtu	(5)	0.000	(c)
Phenol	2.90E-05	lb/MMBtu	(5)	0.002	(a)	2.90E-05	lb/MMBtu	(5)	0.000	(c)
Toluene	1.30E-04	lb/MMBtu	(5)	0.008	(a)	1.30E-04	lb/MMBtu	(5)	0.000	(c)
Xylenes	6.40E-05	lb/MMBtu	(5)	0.004	(a)	6.40E-05	lb/MMBtu	(5)	0.000	(c)
Total HAP				**0.065**					**0.001**	
Greenhouse Gas Emissions										
CO_2	116.89	lb/MMBtu	(6)	7395.10	(a)	116.89	lb/MMBtu	(6)	155.30	(c)
CH_4	2.2E-03	lb/MMBtu	(6)	0.14	(a)	2.2E-03	lb/MMBtu	(6)	0.00	(c)
N_2O	2.2E-04	lb/MMBtu	(6)	0.01	(a)	2.2E-04	lb/MMBtu	(6)	0.00	(c)
$CO_2e^{(g)}$	-	-		7402.75					155.46	

Calculations:

Hourly Emissions - If emission factor note 1, 5 or 6 is used, use calculation (a). If emission factor note 3 or 4 is used, use calculation (b).

(a) Hourly Emissions (lb/hr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000 Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr)

(b) Hourly Emissions (lb/hr) = Emission factor (lb/hp-hr) * Engine Power Output (hp)

Annual Emissions - If emission factor note 1, 5 or 6 is used, use calculation (c). If emission factor note 3 or 4 is used, use calculation (d).

(c) Annual emissions (tons/yr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

(d) Annual emissions (tons/yr) = Emission factor (lb/hp-hr) * Engine Power Output (hp) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

SO_2 Emissions - If emission factor note 2 is used, use calculations (e) and (f) for hourly and annual emissions, respectively.

(e) Hourly Emissions SO2 Caclulation (lb/hr) = (20 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2)

(f) Annual Emissions SO2 Caclulation (ton/yr) = (0.25 grain S/100ft3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO2/ lbmol S) *(64.07 lb SO2/lbmol SO2) * Annual hours of operation (hr/yr) * (1ton/2000lbs)

MAXIMUM HOURLY EMISSION INPUTS		
Engine Power Output (kW) =	5923	
Engine Power Output (hp) =	7,943	
Average BSFC (BTU/HP-hr) =	7,965	(7)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(8)
Fuel Throughput (ft3/hr) =	62,025.5	(9)
PTE Hours of Operation =	42	

(g) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]

Global Warming Potential (GWP)

CO_2	1	(10)
CH_4	25	(10)
N_2O	298	(10)

Notes:

(1) AP-42, Chapter 3.1, Table 3.1-2a - *Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Trubines* (4/00)

(2) AP-42, Chapter 5.3, Section 5.3.1

(3) Emissions supplied from vendor data @ anticipated worst case operating scenario of 7943 hp

(4) VOC emissions based on 25% of vendor data supplied for unburned hydrocarbons

(5) AP-42, Chapter 3.1, Table 3.1-3 - *Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Statonary Gas Turbines* (4/00)

(6) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(7) Fuel consumption from manufacturer's specification sheet.

(8) Value obtained from AP-42, Chapter 3.1, Table 3.1-2a, footnote c

(9) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(10) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 5. Turbine Engine / Centrifugal Compressor Emissions (T02)
Startup / Shutdown Operations
Columbia Pipeline Group - Glenville Compressor Station

Pollutant	Hourly Emissions					Annual Emissions				
	Emission Factor			PTE per Engine (lb/hr)		Emission Factor			PTE per Engine (tons/yr)	
Criteria Pollutants										
PM/PM10/PM2.5	6.60E-03	lb/MMBtu	(1)	0.42	(a)	6.60E-03	lb/MMBtu	(1)	0.01	(c)
SO_2	20.0 grains S / 100 ft^3		(2)	3.54	(e)	0.25 grains S / 100 ft^3		(2)	0.00	(f)
NOx	1.38E-04	lb/event	(3)	1.10	(b)	1.38E-04	lb/event	(3)	0.09	(d)
CO	1.22E-02	lb/event	(3)	97.30	(b)	1.22E-02	lb/event	(3)	7.59	(d)
VOC	1.76E-04	lb/event	(4)	1.40	(b)	1.76E-04	lb/event	(4)	0.11	(c)
Hazardous Air Pollutants										
1,3-Butadiene	4.30E-07	lb/MMBtu	(5)	0.000	(a)	4.30E-07	lb/MMBtu	(5)	0.000	(c)
Acetaldehyde	4.00E-05	lb/MMBtu	(5)	0.003	(a)	4.00E-05	lb/MMBtu	(5)	0.000	(c)
Acrolein	6.40E-06	lb/MMBtu	(5)	0.000	(a)	6.40E-06	lb/MMBtu	(5)	0.000	(c)
Benzene	1.20E-05	lb/MMBtu	(5)	0.001	(a)	1.20E-05	lb/MMBtu	(5)	0.000	(c)
Ethylbenzene	3.20E-05	lb/MMBtu	(5)	0.002	(a)	3.20E-05	lb/MMBtu	(5)	0.000	(c)
Formaldehyde	7.10E-04	lb/MMBtu	(5)	0.045	(a)	7.10E-04	lb/MMBtu	(5)	0.001	(c)
Naphthalene	1.30E-06	lb/MMBtu	(5)	0.000	(a)	1.30E-06	lb/MMBtu	(5)	0.000	(c)
PAH (POM)	2.20E-06	lb/MMBtu	(5)	0.000	(a)	2.20E-06	lb/MMBtu	(5)	0.000	(c)
Phenol	2.90E-05	lb/MMBtu	(5)	0.002	(a)	2.90E-05	lb/MMBtu	(5)	0.000	(c)
Toluene	1.30E-04	lb/MMBtu	(5)	0.008	(a)	1.30E-04	lb/MMBtu	(5)	0.000	(c)
Xylenes	6.40E-05	lb/MMBtu	(5)	0.004	(a)	6.40E-05	lb/MMBtu	(5)	0.000	(c)
Total HAP				**0.065**					**0.001**	
Greenhouse Gas Emissions										
CO_2	116.89	lb/MMBtu	(6)	7395.10	(a)	116.89	lb/MMBtu	(6)	133.11	(c)
CH_4	2.2E-03	lb/MMBtu	(6)	0.14	(a)	2.2E-03	lb/MMBtu	(6)	0.00	(c)
N_2O	2.2E-04	lb/MMBtu	(6)	0.01	(a)	2.2E-04	lb/MMBtu	(6)	0.00	(c)
CO_2e[(g)]	-	-		7402.75					133.25	

Calculations:

Hourly Emissions - If emission factor note 1, 5 or 6 is used, use calculation (a). If emission factor note 3 or 4 is used, use calculation (b).

(a) Hourly Emissions (lb/hr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000 Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr)

(b) Hourly Emissions (lb/hr) = Emission factor (lb/hp-hr) * Engine Power Output (hp)

Annual Emissions - If emission factor note 1, 5 or 6 is used, use calculation (c). If emission factor note 3 or 4 is used, use calculation (d).

(c) Annual emissions (tons/yr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

(d) Annual emissions (tons/yr) = Emission factor (lb/hp-hr) * Engine Power Output (hp) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

SO_2 Emissions - If emission factor note 2 is used, use calculations (e) and (f) for hourly and annual emissions, respectively.

(e) Hourly Emissions SO2 Calculation (lb/hr) = (20 grains S/100 ft^3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (1lbmol SO2/1lb S) * (1lbmol SO2/1lbmol SO2)

(f) Annual Emissions SO2 Calculation (tons/yr) = (0.25 grains S/100 ft^3) * Fuel throughput (ft3/hr) * (1lb/7000 grains) * (1lbmol SO2/1lb S) * (1lbmol SO2/1lbmol SO2) * Annual hours of operation (hr/yr) * (1ton/2000lbs)

MAXIMUM HOURLY EMISSION INPUTS		
Engine Power Output (kW) =	5923	
Number of Startup/Shutdown Cycles =	156	
Engine Power Output (hp) =	7,943	
Average BSFC (BTU/HP-hr) =	7,965	(7)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(8)
Fuel Throughput (ft3/hr) =	62,025.5	(9)
PTE Hours of Operation =	36	

(g) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]
Global Warming Potential (GWP)

CO_2	1	(10)
CH_4	25	(10)
N_2O	298	(10)

Notes:

(1) AP-42, Chapter 3.1, Table 3.1-2a - *Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Trubines* (4/00)

(2) AP-42, Chapter 5.3, Section 5.3.1

(3) Emissions supplied from vendor data @ anticipated worst case operating scenario of 7943 hp

(4) VOC emissions based on 25% of vendor data supplied for unburned hydrocarbons

(5) AP-42, Chapter 3.1, Table 3.1-3 - *Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Statonary Gas Turbines* (4/00)

(6) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(7) Fuel consumption from manufacturer's specification sheet.

(8) Value obtained from AP-42, Chapter 3.1, Table 3.1-2a, footnote c

(9) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(10) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

ATTACHMENT O

MONITORING/RECORDKEEPING/REPORTING/ TESTING PLANS

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

Monitoring

The T02 turbine will continue to monitor run hours in each mode of operation during the temporary pilot testing events as well as the number of startups and shutdown cycles. The monitoring will continue to mirror the site's existing permit R13-3110 requirements with respect to monitoring.

Recordkeeping

The following modes of operations will be tracked on an hourly basis and summarized monthly:

- Operating hours at less than 50% load,
- Operating hours at less than 0 to -20°F ambient temperature,
- Operating hours at less than -20°F, and
- The number of startups and shutdown (SS) cycles

The T02 emission unit will continue to utilize the applicable emission factors defined by the manufacture for each operating mode and SS cycle. It should be noted that the basis of this permitting action is to temporarily increase the number of hours per year in low load operation only. All emission factors will remain the same as previously permitted.

Reporting

The company will notify the Secretary within thirty (30) calendar days after the completion of the temporary pilot testing activities on T02.

Testing

The pilot testing encompassed by this temporary permit application is designed for evaluating control algorithms only. If the Solar turbine company wishes to define new emission factors for low load conditions in the future it will be addressed by a test protocol which incorporates EPA methods.

ATTACHMENT P

PUBLIC NOTICE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Columbia Gas Transmission LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Rule 13 Temporary Permit at the Glenville Compressor Station. The latitude and longitude coordinates are: 38.92762 and -80.77216.

The applicant estimates the increased potential to discharge of the following Regulated Air Pollutants will be:

Pollutant	Tons/yr
NOx	0.10
CO	9.85
VOC	0.14
PM_{10}	0.06
$PM_{2.5}$	0.06
Total HAPs	0.01

The temporary pilot testing activities listed in the application will take place upon issuance of permit. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 7th day of July, 2016.

By: Columbia Gas Transmission LLC
Steven A. Nelson
Manager of Operations
485 Industrial Road
St. Albans, WV 25177

ATTACHMENT Q

BUSINESS CONFIDENTIAL CLAIMS

NOT APPLICABLE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

ATTACHMENT R

AUTHORITY FORMS

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

west virginia department of environmental protection

Division of Air Quality
601 57th 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

July 27, 2011

CERTIFIED MAIL
91 7108 2133 3936 1583 6144

Mr. Victor M. Gaglio
Senior Vice-President of Operations
Columbia Gas Transmission
1700 MacCorkle Avenue, S.E.
Charleston, WV 25314

Re: Delegation of Authority Confirmation

Dear Mr. Gaglio:

Based on your letter, dated July 22, 2011, the Division of Air Quality (DAQ) hereby acknowledges the titles of Regional Director and Manager of Operations as delegated authorized representatives for the facilities listed below.

Company Name	Facility	Facility ID No.
Columbia Gas Transmission, LLC	Horse Creek Station	005-00039
Columbia Gas Transmission, LLC	Frametown Station	007-00100
Columbia Gas Transmission, LLC	Glenville Station	021-00001
Columbia Gas Transmission, LLC	Lost River Station	031-00002
Columbia Gas Transmission, LLC	Hardy Station	031-00031
Columbia Gas Transmission, LLC	Ripley Station	035-00003
Columbia Gas Transmission, LLC	Lanham Station	039-00047
Columbia Gas Transmission, LLC	Clendenin Station	039-00048
Columbia Gas Transmission, LLC	Coco Station	039-00049
Columbia Gas Transmission Corporation	Walgrove Station	039-00074
Columbia Gas Transmission Corporation	Cobb Station	039-00100
Columbia Gas Transmission Corporation	Hunt Station	039-00101
Columbia Gas Transmission Corporation	Charleston Office	039-00154
Columbia Gas Transmission Corporation	Clendenin Office	039-00546
Columbia Gas Transmission, LLC	Hubball Station	043-00002
Columbia Gas Transmission Corporation	Nye Station	043-00011
Columbia Gas Transmission, LLC	Hamlin Station	043-00027
Columbia Gas Transmission, LLC	Majorsville Station	051-00025
Columbia Gas Transmission, LLC	Adaline Station	051-00100

Company Name	Facility	Facility ID No.
Columbia Gas Transmission, LLC	Seneca Station	071-00008
Columbia Gas Transmission, LLC	Terra Alta Station	077-00017
Columbia Gas Transmission, LLC	Glady Station	083-00017
Columbia Gas Transmission, LLC	Files Creek Station	083-00019
Columbia Gas Transmission, LLC	Flat Top Station	089-00004
Columbia Gas Transmission, LLC	Cleveland Station	097-00009
Columbia Gas Transmission, LLC	Ceredo Station	099-00013
Columbia Gas Transmission, LLC	Kenova Station	099-00014
Columbia Gas Transmission, LLC	Smithfield Station	103-00010
Columbia Gas Transmission, LLC	Rockport Station	107-00100
Columbia Gas Transmission, LLC	Huff Creek Station	109-00021

Should you have any questions or comments, please feel free to contact our office at the address or telephone number listed above.

Sincerely,

John A. Benedict
Director

JAB/seh

c: Joe Morgan
Megan Murphy
File Room

ATTACHMENT S

TITLE V PERMIT REVISION INFORMATION

NOT APPLICABLE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

APPLICATION FEE

Temporary Rule 13 Permit Application

Glenville Compressor Station, Facility ID No. 021-00001
Truebada, West Virginia

Columbia Gas Transmission, LLC
1700 MacCorkle Avenue, SE
Charleston, West Virginia

July 2016

COLUMBIA GAS TRANSMISSION LLC
PO BOX 30130
COLLEGE STATION, TX 77842

S 000118 T1C7AP41 000118 E

00000118 01 SP 0.465 01 TR 00001 T1C7AP41 000000 001590

WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
601 57TH ST SE
DIVISION OF AIR QUALITY
CHARLESTON, WV 25304

PAGE: 1

PAYMENT SUMMARY

VENDOR NO: 2000001195
VOUCHER NO: 0351163582
PHONE NUMBER: 877-629-6286
VOUCHER DATE: 06/30/16

REF. DOC.	REFERENCE NUMBER	REF. DATE	DOCUMENT AMOUNT	DISCOUNT/ADJ AMOUNT	NET AMOUNT
SELLER INVCE	5141603 R30-02100001-2012R13-3110	06/28/16	2,000.00	0.00	2,000.00
		TOTALS:	2,000.00	0.00	2,000.00

(Detach Here)

DOCUMENT CONTAINS ANTI-COPY VOID PANTOGRAPH, MICRO PRINT BORDER, VERIFICATION BOX (TO RIGHT OF ARROW. HOLD BETWEEN THUMB AND FOREFINGER, OR BREATHE ON IT, COLOR WILL DISAPPEAR, THEN REAPPEAR), AND A SIMULATED WATERMARK ON THE BACK

COLUMBIA GAS TRANSMISSION LLC
PO BOX 30130
COLLEGE STATION, TX 77842

60-160/433

CHECK DATE 06/30/2016
CHECK NUMBER 0351163582

PAY...TWO THOUSAND DOLLARS 00 CENTS

VALID FOR 180 DAYS

$*****2,000.00

TO THE ORDER OF:
WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
601 57TH ST SE
DIVISION OF AIR QUALITY
CHARLESTON, WV 25304

Dean G. Bruso

THE BANK OF NEW YORK MELLON
PITTSBURGH, PENNSYLVANIA

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