

January 15, 2016

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

RE: Construction/Modification Application (45CSR13) and
Significant Modification Application (Revision to Title V)
Columbia Gas Transmission, LLC
Lost River Compressor Station (Facility ID#031-00002)



Dear Mr. Durham,

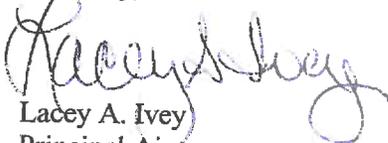
Columbia Gas Transmission, LLC (Columbia) owns and operates the Lost River Compressor Station, located in Hardy County, which operates under Permit Number R30-03100002-2012. With this application, Columbia is requesting a significant modification to the current air permit. The attachments consist of a Regulation 13 application package requesting the installation of two new natural gas-fired Solar Mars 100 turbines (15,067 hp each), one process heater (0.5 MMbtu/hr), 48 catalytic heaters, and the removal of six (6) of the existing Clark HRA-8T reciprocating engines. In addition, Columbia is requesting the removal of the synthetic minor limit on operation for the two existing Solar Taurus 70 turbines, which is contained in Condition 4.1.7 of Permit to Modify R14-0013D. As of July 24, 2014, the Tailoring Rule was rescinded, and PSD cannot be triggered solely because of GHG emissions; therefore, this limit is no longer needed. Lastly, Columbia requests the removal of Condition 4.2.5 requiring visible emission monitoring of the catalytic heaters.

Based on this change, the Station will continue to be classified as a major source under Title V regulations (annual potential emissions of NO_x and CO are more than 100 tons per year). The combined potential to emit from the proposed modifications plus contemporaneous emissions, when netted with baseline emissions from the RICE units that were retired in 2013 (for NO_x), is less than Prevention of Significant Deterioration (PSD) significant emission levels. This application package includes the description of changes, and any new specific applicable requirements, certification for the use of significant modification procedures, and a check in the amount of \$2,000 for application fees.

Although the proposed turbines are subject to 40 CFR 63, Subpart YYYYY – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Combustion Turbines, there is a stay of standards for gas-fired turbines, except for an initial notification. Therefore, the fee for NESHAP applicability is not included. This preconstruction permit application will satisfy the initial notification requirement.

Should you have any questions or need additional information, please feel free to contact me at (337) 241-0686 or via email at livey@cpg.com.

Sincerely,



Lacey A. Ivey
Principal Air
Columbia Pipeline Group

Attachments

REVISED APPLICATION FOR 45 CSR 13
CONSTRUCTION PERMIT
AND
TITLE V PERMIT MODIFICATION

Columbia Gas Transmission LLC
Lost River Compressor Station
Hardy County, West Virginia
Title V Permit No. R30-03100002-2012

January 2016

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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		2. Federal Employer ID No. (FEIN): 310802435	
3. Name of facility (if different from above): Lost River Compressor Station		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: Columbia Gas Transmission LLC 1700 MacCorkle Ave SE Charleston, WV 25314		5B. Facility's present physical address: 419 Upper Cove Road Mathias, WV 26812	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> 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: Columbia Pipeline Group, Inc.			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - If YES, please explain: Application is for construction of equipment at an existing natural gas compressor station which Columbia Gas owns and operates - 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 compressor station		10. North American Industry Classification System (NAICS) code for the facility: 486210	
11A. DAQ Plant ID No. (for existing facilities only): 031-00002		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): R14-0013D, R30-03100002-2012	
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.			

<p>12A.</p> <ul style="list-style-type: none"> For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road; For Construction or Relocation permits, please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a MAP as Attachment B. <p>Traveling on I-81 (in VA), take Exit 257 to US Route 11. Take left on US 11 to State Route 259. Travel North on SR 259 to Mathias, WV. Turn right on Upper Cove and travel 1/4 mile toward Basore. Entrance to facility is on the left.</p>		
12.B. New site address (if applicable):	12C. Nearest city or town: Mathias	12D. County: Hardy
12.E. UTM Northing (KM): 4,305.1	12F. UTM Easting (KM): 685.5	12G. UTM Zone: 17
<p>13. Briefly describe the proposed change(s) at the facility: Installation of two Solar Mars 100 turbines, one process heater, and forty-eight catalytic heaters, as well as retirement of the existing Clark HRA-8T RICE.</p>		
<p>14A. Provide the date of anticipated installation or change: 2/1/2017</p> <ul style="list-style-type: none"> If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: / / 		<p>14B. Date of anticipated Start-Up if a permit is granted: 10/1/2017</p>
<p>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).</p>		
<p>15. Provide maximum projected Operating Schedule of activity/activities outlined in this application:</p> <p>Hours Per Day 24 Days Per Week 7 Weeks Per Year 52</p>		
<p>16. Is demolition or physical renovation at an existing facility involved? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p>		
<p>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.</p>		
<p>18. Regulatory Discussion. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). 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 (<i>if known</i>). Provide this information as Attachment D.</p>		

Section II. Additional attachments and supporting documents.

<p>19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).</p>
<p>20. Include a Table of Contents as the first page of your application package.</p>
<p>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).</p> <ul style="list-style-type: none"> Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).
<p>22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F.</p>
<p>23. Provide a Process Description as Attachment G.</p> <ul style="list-style-type: none"> Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).
<p>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</p>

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: Two (2) natural gas-fired turbines, one (1) process heater, forty-eight (48) catalytic heaters.
 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: Delegation of Authority Letter provided in lieu of Authority Form.

<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership
<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> 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 *Steven A. Nelson*
(Please use blue ink)

DATE: 1-13-2016
(Please use blue ink)

35B. Printed name of signer: Steven A. Nelson		35C. Title: Manager of Operations
35D. E-mail: snelson@cpq.com	35E. Phone: 304-548-1630	35F. FAX:
36A. Printed name of contact person (if different from above): Lacey Ivey		36B. Title: Principal Air
36C. E-mail: livey@cpq.com	36D. Phone: 337-241-0686	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- | | |
|---|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Attachment A: Business Certificate <input checked="" type="checkbox"/> Attachment B: Map(s) <input checked="" type="checkbox"/> Attachment C: Installation and Start Up Schedule <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion <input checked="" type="checkbox"/> Attachment E: Plot Plan <input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s) <input checked="" type="checkbox"/> Attachment G: Process Description <input checked="" type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) <input checked="" type="checkbox"/> Attachment I: Emission Units Table <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet <input checked="" type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s) <input type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s) <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations <input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans <input checked="" type="checkbox"/> Attachment P: Public Notice <input type="checkbox"/> Attachment Q: Business Confidential Claims <input checked="" type="checkbox"/> Attachment R: Authority Forms <input checked="" type="checkbox"/> Attachment S: Title V Permit Revision Information <input checked="" type="checkbox"/> 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.

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

Attachment A

Business Certificate

**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.

Attachment B

Map



Traveling on I-81 (in VA), take Exit 257 to US Route 11. Take left on US 11 to State Route 259. Travel North on SR 259 to Mathias, WV. Turn right on Upper Cove and travel 1/4 mile toward Basore. Entrance to facility is on the left.

Attachment B

Date: December 2015

Facility Map
Lost River Compressor Station

Attachment C

Installation and Start Up Schedule

Installation and Start Up Schedule

Emission Point	Change	Effective Date of Change	Start Up Date
T03 – Solar Mars 100 Turbine	Installation	March 2017	October 2018
T04 – Solar Mars 100 Turbine	Installation	March 2017	October 2018
HTR4 – Process Heater	Installation	March 2017	October 2018
SH2 – (26) Catalytic Heaters	Installation	March 2017	October 2018
SH3 – (22) Catalytic Heaters	Addition to Permit	Upon Permit Issuance	2013
E01 – Clark HRA-8T Compressor Engine	Retirement	No later than October 2017	

Attachment D

Regulatory Discussion

1.0 INTRODUCTION

1.1 Summary and Conclusions

Columbia Gas Transmission, LLC (Columbia) operates the Lost River Compressor Station (the "Station") under Title V Permit No. R30-03100002-2012. These proposed equipment changes (the "Project") are scheduled to occur in 2017. This application package contains Columbia's application to:

- Add two (2) new Solar Mars 100 turbines (15,067 horsepower [hp] each at 32 °F);
- Add one (1) fuel gas heater (0.5 million British thermal units per hour [MMBtu/hr]);
- Add twenty-six (26) catalytic heaters (8 x 0.005 MMBtu/hr and 18 x 0.072 MMBtu/hr);
- Add twenty-two (22) previously installed catalytic heaters (0.03 MMBtu/hr each) to the Station's permit;
- Retire one (1) existing Clark HRA-8T compressor engine (1,320 hp); and
- Modify the Station's Title V permit to reflect these changes.

An analysis of federal and state regulations was performed to identify applicable air quality regulations. Federal and state regulations potentially applying to the proposed modifications are summarized in Section 3.

1.2 Report Organization

The existing Station and proposed Project are described in Section 2.0. An analysis of applicable regulations and proposed compliance procedures is presented in Section 3.0. Completed permit application forms, including emissions estimating basis, emission calculations, and supporting data are contained within this application package.

2.0 PROJECT DESCRIPTION

2.1 Description of Existing Facility

Columbia's Lost River Station is located in Hardy County, West Virginia, near the town of Mathias. The Station receives natural gas via pipeline from an upstream compressor station, compresses it using reciprocating internal combustion engines (RICE) and natural gas-fired turbines, and transmits it via pipeline to a downstream station. The Station is covered by Standard Industrial Classification (SIC) 4922 and operates under Title V Permit No. R30-03100002-2012. The Station has the potential to operate seven (7) days per week, twenty-four (24) hours per day.

The Station currently operates RICE-driven and combustion turbine-driven compressors, including:

- One (1) 1,320-hp natural gas-fired, Clark HRA-8T two-cycle, lean-burn RICE with installation date in 1953 (Emission Point ID E01);
- Three (3) 2,700-hp natural gas-fired, Clark TLA-8 four-cycle, lean-burn RICE with installation dates in 1969 (2 units – Emission Point ID E07 and E08) and 1970 (1 unit – Emission Point ID E09);
- One (1) 4,640-hp natural gas-fired, Clark TLAD-10 two-cycle, lean-burn RICE with installation date in 1991 (Emission Point ID E10);
- One (1) 4,735-hp natural gas-fired, Caterpillar G3616 four-cycle, lean-burn RICE with installation date in 2008 (Emission Point ID E11); and
- Two (2) 11,557-hp natural gas-fired Solar Taurus 70 turbines with installation dates in 2013 (Emission Point ID T01 and T02).

Auxiliary equipment at the Station includes a natural gas-fired emergency generator, fuel gas heaters, forty (40) catalytic space heaters, and numerous storage tanks for lubricating oils, glycol, and pipeline liquids. A plot plan of the Station is provided as Attachment E.

Based on the current annual potential to emit (PTE) oxides of nitrogen (NO_x) and carbon monoxide (CO), as presented in Table N-1 of Attachment N, the existing Station is classified as a major source under New Source Review (NSR) regulations. Also provided in Table N-1 are the current potential emissions of volatile organic compounds (VOC), greenhouse gases as carbon dioxide equivalents (CO₂e), sulfur dioxide (SO₂), particulate matter with an aerodynamic diameter of less than or equal to 10 microns (PM₁₀), particulate matter with an aerodynamic diameter of less than or equal to 2.5 microns (PM_{2.5}), formaldehyde [CH₂O, the primary hazardous air pollutant (HAP)], and total HAPs. The existing Station is a major source of HAPs.

Hardy County is classified as attainment or unclassifiable for all National Ambient Air Quality Standards. Nearby Class I Areas include the following:

- Dolly Sods Wilderness Area located approximately 26 miles (42 kilometers) WNW of the Station in Randolph and Tucker Counties, West Virginia;
- Otter Creek Wilderness Area located approximately 40 miles (65 kilometers) WNW of the Station in Randolph and Tucker Counties, West Virginia; and

- Shenandoah National Park located approximately 27 miles (44 kilometers) east and south of the Station in Warren, Page, Augusta, and Rockingham Counties, Virginia.

2.2 Proposed Modification

The proposed Solar Mars 100 turbines each have an output of 15,067 hp at 32 °F. These proposed turbines are designated Emission Point ID T03 and T04. Attachment F includes a process flow diagram showing the existing and Project equipment. The U.S. Environmental Protection Agency (USEPA) Source Classification Code (SCC) for the proposed turbines is 2-02-002-01.

The new turbines will be equipped with advanced dry-low-NO_x combustion controls, known by the manufacturer as SoLoNO_x. These controls reduce NO_x and peak combustion temperatures through the use of a lean, premixed air/fuel mixture and advanced combustion controls. The SoLoNO_x system is operational at turbine loads from approximately 50% to 100% of full load. During operation at low turbine loads (<50% of full load), low ambient temperatures (<0 °F), and during turbine startup and shutdown, supplemental pilot fuel is fired for flame stability and results in NO_x, CO, and VOC concentrations that are higher than during SoLoNO_x operation. Estimated emissions during each of the operating modes are summarized in Table N-4 of Attachment N. Additional turbine emission data and calculations are presented in Attachment N.

The new Solar Mars 100 turbines are expected to operate essentially the entire year, and emission estimates are based on 8,760 operating hours per year. Because the SoLoNO_x controls cannot operate properly at low ambient temperatures or below 50% of peak load, the potential emission estimates presented in Table N-4 include separate lines for operating hours at: (1) ambient temperatures less than or equal to 0 °F, (2) low load (less than 50% load), and (3) startup/shutdown cycles. Operation at low ambient temperatures is based on a total of 480 hours per year for the aggregate of the two turbines, while operation at low load is based on a total of 16 hours per year. Startup/shutdown cycles are limited to a total of 174 cycles per year for the aggregate of the two turbines. That is, the non-SoLoNO_x operation listed in Table N-4 is not intended to be a limitation per turbine; instead, the aggregate of non-SoLoNO_x operation is intended to be applicable to either or both turbines. Annual emissions from the proposed turbines during the rest of the year are conservatively based on an ambient temperature of 32 °F. Combustion turbine power varies with atmospheric conditions such that maximum heat input, maximum fuel consumption, and associated emissions generally increase as ambient temperature decreases. For the purpose of this application, turbine emissions have been characterized based on an ambient temperature of 32 °F. The annual average ambient temperature is approximately 51 °F.

The Project will include installation of one 0.50-MMBtu/hr fuel gas heater and 26 catalytic heaters with various heat inputs. Twenty-two additional catalytic heaters previously installed at the Station are also included in this application. Potential emissions from these units are based on AP-42 emission factors.

Potential annual emissions from all sources associated with the Project are provided in Table N-1 of Attachment N, and source-specific emissions calculations are also provided in Attachment N.

No other changes in station equipment are currently being proposed. The target date for starting construction is February 2017. Initial commercial operation is scheduled for October 2017.

2.3 Contemporaneous Equipment Changes

In 2008, two Clark HRA-8T RICE were retired, and one Caterpillar engine was installed. An emergency generator was installed in 2009. These changes were prior to the contemporaneous period for the Project. In 2013, three additional existing Clark HRA-8T RICE were retired, and two Solar Taurus 70 turbines, two fuel gas heaters, and 40 catalytic heaters were installed. Additionally, the wastewater evaporator boiler and one fuel gas heater were retired. In tabular form, the contemporaneous equipment changes are shown below in Table 2-1.

Table 2-1 Contemporaneous Equipment Changes

Equipment	Emission Point ID	Action	Date
Clark HRA-8T Engine	E02	Retired	2013
Clark HRA-8T Engine	E04	Retired	2013
Clark HRA-8T Engine	E05	Retired	2013
Fuel Gas Heater	HTR1	Retired	2013
Fuel Gas Heater	HTR2	Installed	2013
Fuel Gas Heater	HTR3	Installed	2013
40 Catalytic Heaters	SH1	Installed	2013
Solar Taurus 70 Turbine	T01	Installed	2013
Solar Taurus 70 Turbine	T02	Installed	2013
Clark HRA-8T Engine	E01	To be removed	2017
Solar Mars 100 Turbine	T03	To be installed	2017
Solar Mars 100 Turbine	T04	To be installed	2017
Fuel Gas Heater	HTR4	To be installed	2017
(26) Catalytic Heaters	SH2	To be installed	2017
(22) Catalytic Heaters	SH3	Installed	2013

3.0 REGULATORY ANALYSIS AND COMPLIANCE METHODS

This section reviews the applicability of state and federal regulations potentially affecting the new emission units and proposed compliance procedures. Supporting calculations are included in Attachment N.

3.1 Prevention of Significant Deterioration

West Virginia implements the Prevention of Significant Deterioration (PSD) permitting program pursuant to the USEPA-approved West Virginia State Implementation Plan and in accordance with Regulation 14 (a.k.a., Series 14) of Title 45 of the Code of State Rules (45 CSR 14). Regulation 14 closely mirrors federal PSD regulations at 40 CFR §52.21. The Station is a major source under PSD rules per §45-14-2.43. For a major stationary source such as the existing Station, PSD requirements apply to projects that have the potential to increase annual emissions beyond defined significance levels. This potential is evaluated as a two-step process. First, any emissions increase associated with the project itself is evaluated. If the project will result in a significant emissions increase (as defined at §45-14-2.74 and -2.75), then the net emissions increase, considering all contemporaneous equipment changes must be evaluated based on the definition of net emissions increase at §45-14-2.46.

Per §45-14-2.80.e.1, following July 1, 2011, new major stationary sources with the potential to emit greater than or equal to 100,000 tpy of CO₂e were required to meet the requirements set forth in the PSD program. The provisions of §45-14-2.80.f, however, clarify that this portion of the rule ceases to be effective under certain circumstances, including a federal court decision invalidating provisions of the rule. On June 23, 2014, the U.S. Supreme Court issued a decision that greenhouse gas emissions could not be a basis for PSD or Title V applicability, and this decision was followed by a July 24, 2014 memorandum from the USEPA that stated that the USEPA will comply with the Court's decision and will not apply or enforce regulations that would require a PSD permit where PSD would be applicable solely because of GHG emissions. Therefore, CO₂e emissions are no longer considered for PSD applicability.

Emissions calculations for the PSD applicability analysis are provided in Attachment N, and potential annual emissions associated with the Project are summarized in Table N-1. For PSD-regulated pollutants other than NO_x, the potential Project emissions are below the significant emissions increase thresholds; therefore, PSD is not applicable to emissions increases at Step 1 of the PSD applicability procedure. For NO_x emissions, the potential annual emissions from the new equipment exceed the PSD significance level; therefore, the net emissions change was determined following PSD Step 2 applicability procedures. All contemporaneous changes must be considered when determining the net emission increase. Baseline NO_x emissions from the three Clark HRA-8T engines retired in 2013 (E02, E04, & E05) are presented in Table N-24, which also includes the Project and net NO_x emissions increases associated with contemporaneous equipment changes.

The net change in NO_x emissions associated with the proposed Project is presented in Table 3-1 as the potential new emissions from the Project plus contemporaneous (potential) emission increases minus baseline (actual) emissions from the retired RICE compressors. This table provides a comparison of these net emission changes to the PSD significance level. As presented in Table 3-1, the net change in annual emissions is less than the PSD significance level for NO_x. Therefore, the proposed Project is not subject to PSD requirements.

To ensure that future emissions remain below the PSD significance levels, the Station will accept requirements to monitor turbine operating mode (e.g., low temperature, low load, startup/shutdown) and to monitor fuel usage to ensure that actual emissions, accounting for these non-SoLoNO_x conditions, do not exceed the proposed potential annual emission rates.

Table 3-1 Emissions Comparison for PSD Applicability (tpy)¹

Parameter	NO _x
Total Potential Emissions from the Project	65.59
Contemporaneous Emissions Increases	49.24
Baseline Emissions	82.22
Net Change ²	32.61
PSD Significance Level	40

¹See Attachment N for details.

²Total potential emissions from the Project plus contemporaneous emissions increases, minus baseline (past actual) emissions.

3.2 New Source Performance Standards

New Source Performance Standards (NSPS) apply to new, modified, or reconstructed stationary sources meeting criteria established in 40 CFR Part 60. This section describes requirements that apply to the proposed units at the Lost River Compressor Station.

Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units) applies to steam generating units with a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr, but less than or equal to 100 MMBtu/hr, which are constructed, modified or reconstructed after June 9, 1989 (per 40 CFR §60.40c(a)). Steam generating units are defined in 40 CFR §60.41c as devices that combust fuel and heat water or any heat transfer medium. Since the proposed heater will be rated at 0.50 MMBtu/hr, this NSPS is not applicable. The proposed catalytic heaters are not steam generating units.

Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution) is not applicable to the proposed new equipment (no affected facilities proposed) per 40 CFR §60.5365.

Columbia requests a permit shield for NSPS Subpart Dc and Subpart OOOO.

The USEPA has promulgated NSPS for stationary combustion turbines in 40 CFR 60 Subpart KKKK. New combustion turbines, such as the proposed Solar Mars 100 turbines, that have a peak heat input of 10 MMBtu/hr and greater, will be subject to the requirements of Subpart KKKK per 40 CFR §60.4305(a). Sources covered by Subpart KKKK are exempt from the requirements in Subpart GG (the previous combustion turbine NSPS) per 40 CFR §60.4305(b). The subcategory and corresponding NO_x emission standard as established in Table 1 to Subpart KKKK for each of the proposed turbines is presented in Table 3-2.

Table 3-2 Proposed Turbines and Corresponding Category and Emission Standard

Unit	Table 1 subcategory	Heat input	NO _x Emission Standard	Manufacturer's Warranty
Solar Mars 100 (T03 & T04)	New turbine firing natural gas	> 50 MMBtu/hr and ≤ 850 MMBtu/hr	25 ppm at 15 percent O ₂ or 150 ng/J of useful output (1.2 lb/MWh)	15 ppm at 15% O ₂

Table 1 to Subpart KKKK also establishes a NO_x emission limit of 150 ppm at 15% O₂ or 1,100 ng/J of useful output (8.7 lb/MWh) for turbines with a peak capacity equal to or less than 30 MW output which are operating at less than 75% of peak load or at temperatures less than 0 °F.

The fuel sulfur limit in Subpart KKKK is 0.060 lb SO₂/MMBtu. Under 40 CFR §60.4365, a source is exempt from monitoring fuel sulfur content if the source burns natural gas that is covered by a purchase or transportation agreement with maximum sulfur content of 20 grains per 100 scf, which is the case for the proposed turbine fuel.

The proposed NO_x emission rates and fuel sulfur levels comply with NSPS limits. To demonstrate compliance with Subpart KKKK, 40 CFR §60.4400 requires an initial NO_x performance test using EPA reference methods. The initial compliance test must be conducted within 60 days after achieving full-load operation or within 180 days of startup if the turbines are not operated at full load. Unless continuous parameter monitoring is implemented, annual performance testing using EPA reference methods must be conducted within 14 calendar months following the previous performance test. The test frequency can be reduced to biennial if measured NO_x emissions are less than 75% of limit. Columbia requests that portable emissions analyzers be approved for annual turbine testing. In addition, Columbia will continuously monitor the turbines to document any operating periods during which the SoLoNO_x system is not in service (e.g., during startup, shutdown, low-load, or a system malfunction). Records of turbine startup, shutdown, SoLoNO_x malfunction, and/or SoLoNO_x monitoring system malfunction will be recorded per Subpart KKKK and NSPS General Provisions in 40 CFR §60.7(b)&(c).

Compliance with the SO₂ and fuel sulfur limits can be demonstrated by monitoring natural gas sulfur content annually. However, per 40 CFR §60.4365(a), the turbines will be exempt from periodic monitoring by demonstrating compliance with the FERC tariff limit on total sulfur content of 20 grains of sulfur or less per 100 standard cubic feet.

3.3 National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) are promulgated under 40 CFR Part 63 for specific processes and HAP emissions. Lost River Compressor Station is classified as a major source of HAP emissions and will remain so after the Project.¹

3.3.1 Stationary Combustion Turbines (40 CFR 63 Subpart YYYY)

As a major source of HAPs, the proposed turbines are subject to the NESHAP for stationary combustion turbines promulgated under 40 CFR 63 Subpart YYYY. Per 40 CFR §63.6095(d), there is a stay of standards for lean premix gas-fired stationary combustion turbines until EPA takes final action to require compliance with this subpart. The only requirement for the new turbines at the Station is to comply with the initial notification requirements in 40 CFR §63.6145. This preconstruction permit application will satisfy the initial notification requirement.²

3.3.2 Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters (40 CFR 63 Subpart DDDDD)

The Station is also subject to NESHAP for Industrial, Commercial, and Institutional (ICI) Boilers and Process Heaters promulgated under 40 CFR 63 Subpart DDDDD, which applies to existing and new ICI boilers at major sources of HAPs. The new process heater is a new affected source (gas 1 subcategory) per Subpart DDDDD and is less than 5 MMBtu/hr heat input. As such, it is not subject to Subpart DDDDD

¹ Per 40 CFR §63.2, a major source of HAPs is defined as a stationary source or group of sources with the potential to emit 10 tpy or more of any HAP or 25 tpy or more of any combination of HAPs.

² Per 40 CFR §63.9(b)(1)(iii)

emissions limitations but is subject to tune-ups every five years (per 40 CFR §63.7500(e)). This preconstruction permit application will satisfy the initial notification requirement.³

3.4 Compliance Assurance Monitoring (40 CFR 64)

Compliance Assurance Monitoring (CAM) requirements in 40 CFR Part 64 are intended to assure that emission control equipment is properly operated and maintained. CAM applies to emissions units that:

1. have an emission limitation,
2. use a control device to comply with the emissions limit, and
3. have sufficient emissions to be classified as a major emission source under 40 CFR Part 70.

As defined in 40 CFR §64.1, "control device" means add-on control equipment other than inherent process equipment that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere. The definition also states that "a control device does not include use of combustion or other process design features or characteristics."

Exemptions specified in 40 CFR §64.2(b) include units complying with an emission limitation or standard proposed by the USEPA after November 15, 1990 pursuant to Section 111 or 112 of the Clean Air Act (NSPS or NESHAP).

Potential emissions from each turbine are less than the Part 70 major source threshold specified in 40 CFR §70.2. Additionally, the proposed turbines will not use any add-on emission controls and will be subject to a federal NSPS promulgated after 1990. As such, the proposed turbines are exempt from CAM requirements.

3.5 Prevention and Control of Emission of Smoke and Particulate Matter (45 CSR 2)

West Virginia Regulation 45 CSR 2 requires that smoke and particulate matter emissions from any fuel-burning unit (providing heat or power by indirect heat transfer) not exceed opacity levels of 10 percent based on a six-minute block average (per §45-2-3.1). The proposed equipment (e.g., process heater) is inherently compliant with this requirement by combusting only pipeline quality natural gas.

3.6 Prevention and Control of Emission of Sulfur Dioxide (45 CSR 10)

West Virginia Regulation 45 CSR 10 limits SO₂ emissions from fuel-burning units, manufacturing processes, and combustion of refinery or process gas streams. The turbines are not considered fuel-burning units per the definition in §45-10-2. Additionally, the Station is not defined as a manufacturing process and does not combust refinery or process gas streams. Additionally, fuel burning units less than 10 MMBtu/hr, including the proposed heater, are exempt from section 3 and sections 6 through 8 of this regulation. Therefore, 45 CSR 10 does not apply to the Project.

3.7 Pre-construction Permitting under West Virginia Air Regulation 13 (45 CSR 13)

Because the potential increase in emissions and net emissions increase from the Project do not both exceed PSD significance levels, the Project is not classified as major for PSD purposes and is subject to the permitting requirements in 45 CSR 13. This document contains the information required by this permitting program.

³ Per 40 CFR §63.9(b)(1)(iii)

3.8 Requirements for Operating Permits (45 CSR 30)

After this Project, the Lost River Compressor Station will continue to be classified as a major source under Title V regulations. A significant modification application to revise the Station's Title V permit is being submitted to WVDAQ as part of the application package.

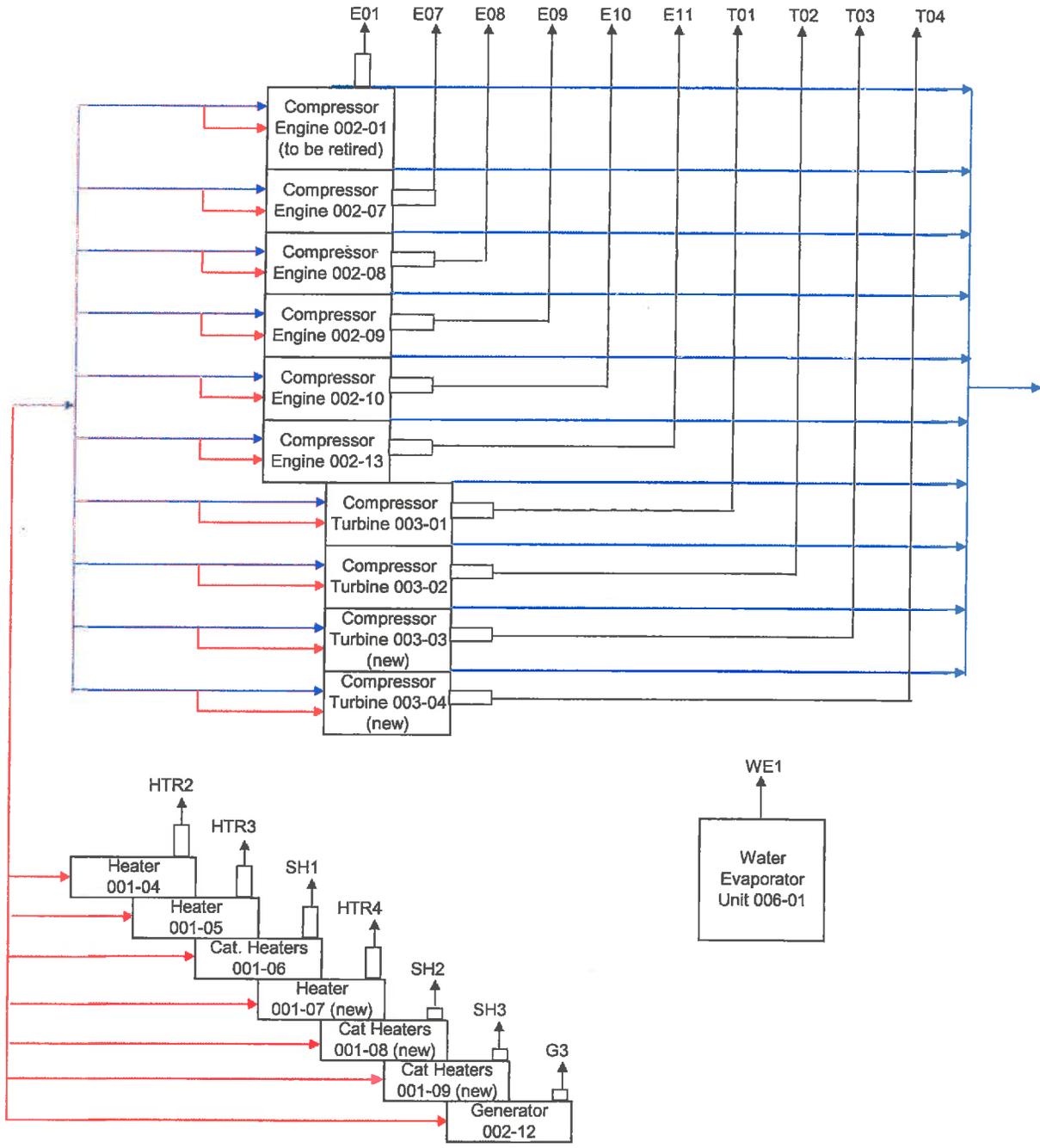
Attachment E

Plot Plan

Attachment F

Detailed Process Flow Diagram

ATTACHMENT F LOST RIVER COMPRESSOR STATION PROCESS FLOW DIAGRAM



→ Transmission Gas Stream
→ Fuel Gas
→ Emission Stream



Attachment G

Process Description

Process Description

Pipeline transmission of natural gas requires that the gas be compressed. At the Lost River Compressor Station, natural gas-fired reciprocating internal combustion engines (RICE) and turbines are used to drive centrifugal gas compressors. This Project includes the installation of two new Solar Mars 100 turbine-driven compressors, a fuel gas heater, and 26 catalytic heaters and the removal of the existing Clark HRA-8T RICE. Additionally, 22 previously installed catalytic heaters will be added to the permit through this modification. The remainder of this discussion is specific to the turbine technology.

The power output from a natural gas-fired turbine is directly related to the fuel input rate and to the ratio of combustion air to fuel. As ambient temperatures decrease, a turbine's maximum power output will increase due to the increased density of inlet air. The Solar dry-low-NO_x (DLN) combustion system (known as SoLoNO_x) limits formation of NO_x, CO, and VOC by pre-mixing air and fuel prior to combustion. When operating a Solar Mars 100 turbine at ambient temperatures ≥ 0 °F and at loads $\geq 50\%$, this DLN system is able to limit the exhaust gas concentration of these pollutants (corrected to 15% O₂) to 15 ppm NO_x, 25 ppm CO, and 25 ppm unburned hydrocarbons (UHC, containing at least 80% non-VOC methane and ethane; therefore, 5 ppm VOC). At ambient temperatures less than or equal to 0 °F, additional pilot fuel is required by the turbine to maintain flame stability, which increases estimated emission concentrations to 42 ppm NO_x, 100 ppm CO, and 50 ppm UHC (10 ppm VOC). At turbine loads $< 50\%$, additional pilot fuel and air flow are required to maintain flame stability and turbine responsiveness. These changes increase estimated emission concentrations to 66 ppm NO_x, 4,400 ppm CO, and 440 ppm UHC (88 ppm VOC). Should loads drop below 50%, Columbia will make every effort to either bring the load back above 50% or shut a turbine down (e.g., shut down other units and move that volume to the turbine, or shift the turbine volume to other units and shut down the turbine).

In addition, there are changes in NO_x, CO, and VOC emissions during the initial fuel light-off, turbine loading, and flame stabilization steps associated with turbine startup. There are also changes in emissions during the normal turbine shutdown sequence. Startup/shutdown cycles are limited to a total of 174 cycles per year for the aggregate of the two turbines. For a Solar Mars 100 turbine, the startup sequence takes less than 10 minutes to complete prior to engaging the DLN system. The shutdown sequence for a Solar Mars 100 turbine requires approximately 10 minutes. Emissions during each startup/shutdown cycle are estimated by Solar as provided in Attachment N.

Based on the manufacturer's estimated emission concentrations (ppm) and exhaust flow rates (scf), mass emissions rates (lb/hr) during the above operating modes are presented in Table N-4 within Attachment N. Additional information on turbine operating characteristics and emissions is provided in Attachment N to this application.

Attachment H

SDSs

No new processes or chemicals will be added to the compressor station as a result of this project. Therefore, the Department can continue to rely on the SDS package submitted with the prior application.

Attachment I

Emission Units Table

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
002-12	G3	Waukesha VGF-48GL Emergency Generator	2008	1,063 HP	Existing, remains in service	-
002-01	E01	Clark HRA-8T Reciprocating Engine	1953	1,320 HP	To be retired by October 2017	-
002-07	E07	Clark TLA-8 Reciprocating Engine	1969	2,700 HP	Existing, remains in service	-
002-08	E08	Clark TLA-8 Reciprocating Engine	1969	2,700 HP	Existing, remains in service	-
002-09	E09	Clark TLA-8 Reciprocating Engine	1970	2,700 HP	Existing, remains in service	-
002-10	E10	Clark TLAD-10 Reciprocating Engine	1991	4,640 HP	Existing, remains in service	-
002-13	E11	Caterpillar G3616 Reciprocating Engine	2008	4,735 HP	Existing, remains in service	OC1 (OxCat)
003-01	T01	Solar Taurus 70, Turbine #1	2013	9,236 HP @ 59°F 11,557 HP @ 0°F	Existing, remains in service	-
003-02	T02	Solar Taurus 70, Turbine #2	2013	9,236 HP @ 59°F 11,557 HP @ 0°F	Existing, remains in service	-
001-04	HTR2	Fuel Gas Heater #2	2013	0.75 MMBTU/hr	Existing, remains in service	-
001-05	HTR3	Fuel Gas Heater #3	2013	0.25 MMBTU/hr	Existing, remains in service	-
001-06	SH1	40 Catalytic Heaters	2013	40 x 0.072 MMBTU/hr	Existing, remains in service	-
006-01	WE1	Water Evaporator Unit	2009	50,000 gal/yr	Existing, remains in service	-
003-03	T03	Solar Mars 100, Turbine #3	2017	15,067 HP @ 32°F	New, 2017	-
003-04	T04	Solar Mars 100, Turbine #4	2017	15,067 HP @ 32°F	New, 2017	-
001-07	HTR4	Fuel Gas Heater	2017	0.50 MMBtu/hr	New, 2017	-

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
001-08	SH2	26 Catalytic Heaters	2017	18 x 0.072, 8 x 0.005 MMBtu/hr	New, 2017	-
001-09	SH3	22 Catalytic Heaters	2013	22 x 0.03 MMBtu/hr	New (previously unpermitted), 2017	-

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.

Attachment J

Emission Points Data Summary Sheet

**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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
G3		002-12						NO _x	4.68	1.17			Gas	EE	
								CO	3.04	0.76			Gas	EE	
								VOC	0.61	0.15			Gas	EE	
								SO ₂	0.39	0.0012			Gas	EE	
								PM	0.07	0.02			Solid	EE	
								CH ₂ O	0.36	0.09			Gas	EE	
E01		002-01						NO _x	23.57	103.20			Gas	EE	
								CO	6.40	28.10			Gas	EE	
								VOC	1.30	5.69			Gas	EE	
								SO ₂	0.62	0.03			Gas	EE	
								PM	0.52	2.29			Solid	EE	
								CH ₂ O	0.60	2.62			Gas	EE	
E07		002-07						NO _x	47.14	187.72			Gas	EE	
								CO	17.02	67.79			Gas	EE	
								VOC	2.59	10.33			Gas	EE	
								SO ₂	1.25	0.06			Gas	EE	
								PM	0.22	0.87			Solid	EE	
								CH ₂ O	1.16	4.62			Gas	EE	
E08		002-08						NO _x	47.14	187.72			Gas	EE	
								CO	17.02	67.79			Gas	EE	
								VOC	2.59	10.33			Gas	EE	
								SO ₂	1.25	0.06			Gas	EE	
								PM	0.22	0.87			Solid	EE	
								CH ₂ O	1.16	4.62			Gas	EE	

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		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
E09		002-09						NO _x	47.14	187.72			Gas	EE	
									17.02	67.79			Gas	EE	
									2.59	10.33			Gas	EE	
									1.25	0.06	-	-	Gas	EE	
									0.22	0.87			Solid	EE	
									1.16	4.62			Gas	EE	
E10		002-10					NO _x	22.50	89.60			Gas	EE		
								24.76	98.50			Gas	EE		
								5.21	35.80			Gas	EE		
								2.48	0.20	-	-	Gas	EE		
								2.10	8.30			Solid	EE		
								2.39	9.54			Gas	EE		
E11		002-13					NO _x	7.30	32.00			Gas	EE		
								6.52	28.60			Gas	EE		
								1.70	7.42			Gas	EE		
								1.90	0.11	-	-	Gas	EE		
								0.40	1.60			Solid	EE		
								1.19	5.22			Gas	EE		
T01		003-01					NO _x	5.04	23.79			Gas	EE		
								5.12	51.50			Gas	EE		
								0.73	3.68			Gas	EE		
								4.70	0.26	-	-	Gas	EE		
								0.61	2.69			Solid	EE		
								0.06	0.26			Gas	EE		
T02		003-02					NO _x	5.04	23.79			Gas	EE		
								5.12	51.50			Gas	EE		
								0.73	3.68			Gas	EE		
								4.70	0.26	-	-	Gas	EE		
								0.61	2.69			Solid	EE		
								0.06	0.26			Gas	EE		

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		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
HTR2		001-04						NO _x	0.07	0.32			Gas	EE	
								CO	0.06	0.27			Gas	EE	
								VOC	0.004	0.02			Gas	EE	
								SO ₂	0.04	0.002			Gas	EE	
								PM	0.01	0.02			Solid	EE	
								CH ₂ O	0.00006	0.0002			Gas	EE	
HTR3		001-05						NO _x	0.02	0.11			Gas	EE	
								CO	0.02	0.09			Gas	EE	
								VOC	0.001	0.01			Gas	EE	
								SO ₂	0.014	0.001			Gas	EE	
								PM	0.002	0.01			Solid	EE	
								CH ₂ O	0.00002	0.0001			Gas	EE	
SH1		001-06						NO _x	0.28	1.24			Gas	EE	
								CO	0.24	1.04			Gas	EE	
								VOC	0.02	0.07			Gas	EE	
								SO ₂	0.16	0.009			Gas	EE	
								PM	0.02	0.09			Solid	EE	
								CH ₂ O	0.0002	0.0009			Gas	EE	
T03		003-03						NO _x	6.96	32.26			Gas	EE	
								CO	7.07	48.14			Gas	EE	
								VOC	0.81	3.81			Gas	EE	
								SO ₂	7.36	0.40			Gas	EE	
								PM	0.85	3.72			Solid	EE	
								CH ₂ O	0.09	0.40			Gas	EE	
T04		003-04						NO _x	6.96	32.26			Gas	EE	
								CO	7.07	48.14			Gas	EE	
								VOC	0.81	3.81			Gas	EE	
								SO ₂	7.36	0.40			Gas	EE	
								PM	0.85	3.72			Solid	EE	
								CH ₂ O	0.09	0.40			Gas	EE	

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		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
SH3		001-09						NO _x	0.06	0.28			Gas	EE	
								CO	0.05	0.24			Gas	EE	
								VOC	0.004	0.02			Gas	EE	
								SO ₂	0.04	0.002			Gas	EE	
								PM	0.005	0.02			Solid	EE	
								CH ₂ O	0.00005	0.0002			Gas	EE	
HTR4		001-07						NO _x	0.05	0.21			Gas	EE	
								CO	0.04	0.18			Gas	EE	
								VOC	0.003	0.01			Gas	EE	
								SO ₂	0.03	0.002			Gas	EE	
								PM	0.004	0.02			Solid	EE	
								CH ₂ O	0.00004	0.0002			Gas	EE	
SH2		001-08						NO _x	0.13	0.57			Gas	EE	
								CO	0.11	0.48			Gas	EE	
								VOC	0.01	0.03			Gas	EE	
								SO ₂	0.08	0.004			Gas	EE	
								PM	0.01	0.04			Solid	EE	
								CH ₂ O	0.0001	0.0004			Gas	EE	

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, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, 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/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, 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. (°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
G3	1.0	800	11,522	244.6	1560	24.0	4,305.1	685.5
E01	1.50	590	8,126	76.6	1560	20.0	4,305.1	685.5
E07	3.0	660	19,783	46.7	1560	47.5	4,305.1	685.5
E08	3.0	660	19,783	46.7	1560	47.5	4,305.1	685.5
E09	3.0	660	19,783	46.7	1560	47.5	4,305.1	685.5
E10	3.33	512	33,891	64.9	1560	42.0	4,305.1	685.5
E11	3.33	1000	47,704	91.3	1560	42.0	4,305.1	685.5
T01	10.06	859	135,353	28.4	1560	78.0	4,305.1	685.5
T02	10.06	859	135,353	28.4	1560	78.0	4,305.1	685.5
HTR2					1560		4,305.1	685.5
HTR3					1560		4,305.1	685.5
SH1					1560		4,305.1	685.5
SH2					1560		4,305.1	685.5
T03	10.19	889	196,816	41.9	1560	70' ½"	4,305.1	685.5
T04	10.19	889	196,816	41.9	1560	70' ½"	4,305.1	685.5

¹ Give at operating conditions. Include inerts.

² Release height of emissions above ground level.

³ Based on 9' by 9' square duct.

Attachment K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process 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).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS	
1.) Will there be haul road activities?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Emissions are de minimus <input type="checkbox"/> If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."	

FUGITIVE EMISSIONS SUMMARY		All Regulated Pollutants - Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
			lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads							
Unpaved Haul Roads							
Storage Pile Emissions							
Loading/Unloading Operations	(Existing Sources Only)						
Wastewater Treatment Evaporation & Operations							
Equipment Leaks		Methane CO ₂ GHG (CO ₂ e)	Does not apply	10.32 0.30 258.29	Does not apply	10.32 0.30 258.29	EE EE EE
General Clean-up VOC Emissions							
Other							

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

² Give 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).

³ Give 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).

⁴ 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).

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}				
	heavy liquid VOC ⁸				
	Non-VOC ⁹				
Valves ¹⁰	Gas VOC	N/A - less than 10% VOC			
	Light Liquid VOC				
Safety Relief Valves ¹¹	Heavy Liquid VOC				
	Non-VOC	36	0	N/A	8,308 lb CH ₄ /yr
	Gas VOC	N/A - less than 10% VOC			
Open-ended Lines ¹²	Non VOC	16	0	N/A	167 lb CH ₄ /yr
	VOC	N/A - less than 10% VOC			
Sampling Connections ¹³	Non-VOC	77	0	N/A	6,509 lb CH ₄ /yr
	VOC	N/A - less than 10% VOC			
	Non-VOC	6	0	N/A	106 lb CH ₄ /yr
Compressors	VOC	N/A - less than 10% VOC			
	Non-VOC	2	0	N/A	N/A - emissions included in other component estimates
Flanges	VOC	N/A - less than 10% VOC			
	Non-VOC	314	0	N/A	5,529 lb CH ₄ /yr
Other	VOC	N/A - less than 10% VOC			
	Non-VOC	2 meters	0	N/A	20 lb CH ₄ /yr

1 - 13 See notes on the following page.

Attachment L

Emissions Unit Data Sheets

**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*): 003-03

<p>1. Name or type and model of proposed affected source:</p> <p>Solar Mars 100 turbine. Proposed emission point ID T03.</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>N/A</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>N/A</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Natural gas combustion products.</p>

* 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:			
1,106.5 million cubic feet per year (equivalent to 1,128,618 MMBtu/yr) for Turbine T03.			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
methane	93.25	All values in volume percent.	
ethane	3.68		
propane	0.88		
I-Butane	0.07		
N-Butane	0.19		
I-Pentane	0.03		
N-Pentane	0.003		
Hexane	0.012		
Carbon Dioxide	0.99	Nitrogen	0.89 Sulfur Dioxide 0.0001 ash - nil
(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:			
128.84 MMBtu/hr at 32 °F			
(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:			
N/A			
(g) Proposed maximum design heat input:		128.84	× 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:

@	32	°F and	Full Load	psia
a. NO _x	6.96	lb/hr		grains/ACF
b. SO ₂	7.36	lb/hr		grains/ACF
c. CO	7.07	lb/hr		grains/ACF
d. PM ₁₀	0.85	lb/hr		grains/ACF
e. Hydrocarbons	4.05	lb/hr		grains/ACF
f. VOCs	0.81	lb/hr		grains/ACF
g. Pb	0	lb/hr		grains/ACF
h. Specify other(s)				
CO _{2e}	15,087	lb/hr		grains/ACF
Formaldehyde	0.09	lb/hr		grains/ACF
		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.

<p>9. Proposed Monitoring, Recordkeeping, Reporting, and Testing</p> <p>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.</p>	
<p>MONITORING</p> <p>To demonstrate compliance with the turbine annual emission rates in the permit, Columbia proposes to maintain the following records:</p> <ol style="list-style-type: none"> 1) Monthly operating hours 2) Monthly operating hours at less than 50% load, 3) Monthly operating hours at less than or equal to 0 °F ambient temperature, and 4) Monthly number of startup and shutdown cycles. 	<p>RECORDKEEPING</p> <p>Maintain records of monitored parameters.</p>
<p>REPORTING</p> <p>Notification of start-up date will be submitted within 15 days of start-up. Facility will follow same reporting requirements as currently being conducted. Performance test report will be submitted before the close of business on the 60th day following the completion of testing.</p>	<p>TESTING</p> <p>Columbia will conduct an initial compliance test within 60 days after achieving full-load operation or within 180 days of startup if the turbines are not operated at full load. Unless continuous parameter monitoring is implemented by Columbia, annual performance testing using EPA reference methods will be conducted within 14 calendar months following the previous performance test. Columbia will reduce the test frequency to biennial if measured NOx emissions are less than 75% of limit. Columbia requests that portable emissions analyzers be allowed for annual turbine testing.</p>
<p>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.</p> <p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p> <p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p> <p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>Emissions warranted above ambient temperatures of -20° F and at loads between 50 and 100% of design. Solar provides guidance on estimating emission outside those conditions but does not warrant the rates. A complete maintenance manual is beyond the scope of this form but can be provided upon request.</p>	

**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*): 003-04

<p>1. Name or type and model of proposed affected source:</p> <p>Solar Mars 100 turbine. Proposed emission point ID T04.</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>N/A</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>N/A</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Natural gas combustion products.</p>

* 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:			
1,106.5 million cubic feet per year (equivalent to 1,128,618 MMBtu/yr) for Turbine T04.			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
methane	93.25	All values in volume percent.	
ethane	3.68		
propane	0.88		
I-Butane	0.07		
N-Butane	0.19		
I-Pentane	0.03		
N-Pentane	0.003		
Hexane	0.012		
Carbon Dioxide	0.99	Nitrogen 0.89	Sulfur Dioxide 0.0001 ash - nil
(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:			
128.84 MMBtu/hr at 32 °F			
(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:			
N/A			
(g) Proposed maximum design heat input:		128.84	× 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:

@	32	°F and	Full Load	psia
a. NO _x	6.96	lb/hr		grains/ACF
b. SO ₂	7.36	lb/hr		grains/ACF
c. CO	7.07	lb/hr		grains/ACF
d. PM ₁₀	0.85	lb/hr		grains/ACF
e. Hydrocarbons	4.05	lb/hr		grains/ACF
f. VOCs	0.81	lb/hr		grains/ACF
g. Pb	0	lb/hr		grains/ACF
h. Specify other(s)				
CO _{2e}	15,087	lb/hr		grains/ACF
Formaldehyde	0.09	lb/hr		grains/ACF
		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
 To demonstrate compliance with the turbine annual emission rates in the permit, Columbia proposes to maintain the following records:

- 1) Monthly operating hours
- 2) Monthly operating hours at less than 50% load,
- 3) Monthly operating hours at less than or equal to 0 °F ambient temperature, and
- 4) Monthly number of startup and shutdown cycles.

RECORDKEEPING
 Maintain records of monitored parameters.

REPORTING
 Notification of start-up date will be submitted within 15 days of start-up. Facility will follow same reporting requirements as currently being conducted. Performance test report will be submitted before the close of business on the 60th day following the completion of testing.

TESTING
 Columbia will conduct an initial compliance test within 60 days after achieving full-load operation or within 180 days of startup if the turbines are not operated at full load. Unless continuous parameter monitoring is implemented by Columbia, annual performance testing using EPA reference methods will be conducted within 14 calendar months following the previous performance test. Columbia will reduce the test frequency to biennial if measured NOx emissions are less than 75% of limit. Columbia requests that portable emissions analyzers be allowed for annual turbine testing.

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 warranted above ambient temperatures of -20° F and at loads between 50 and 100% of design. Solar provides guidance on estimating emission outside those conditions but does not warrant the rates. A complete maintenance manual is beyond the scope of this form but can be provided upon request.

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*): 001-07

<p>1. Name or type and model of proposed affected source:</p> <p>Process heater. Proposed emission point ID HTR4.</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>N/A</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>N/A</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Natural gas combustion products.</p>

* 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:			
Natural gas at a designed fuel usage of 490 ft ³ /hr.			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
methane	93.25	All values in volume percent.	
ethane	3.68		
propane	0.88		
I-Butane	0.07		
N-Butane	0.19		
I-Pentane	0.03		
N-Pentane	0.003		
Hexane	0.012		
Carbon Dioxide	0.99	Nitrogen 0.89	Sulfur Dioxide 0.0001 ash - nil
(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:			
0.50 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:			
N/A			
(g) Proposed maximum design heat input:			
	0.50	× 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	14.7	psia
a. NO _x	0.05	lb/hr	grains/ACF
b. SO ₂	0.03	lb/hr	grains/ACF
c. CO	0.04	lb/hr	grains/ACF
d. PM ₁₀	0.004	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	0.003	lb/hr	grains/ACF
g. Pb	0	lb/hr	grains/ACF
h. Specify other(s)			
CO _{2e}	59	lb/hr	grains/ACF
Formaldehyde	0.00004	lb/hr	grains/ACF
		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

Columbia assumes this unit will operate 8760 hours per year. No monitoring, recordkeeping, reporting, or testing is required for this unit.

RECORDKEEPING

REPORTING

TESTING

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
 N/A

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*): 001-08

<p>1. Name or type and model of proposed affected source:</p> <p>26 Catalytic heaters. Proposed emission point ID SH2.</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>N/A</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>N/A</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Natural gas combustion products.</p>

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

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

@	°F and	14.7	psia
a. NO _x	0.13	lb/hr	grains/ACF
b. SO ₂	0.08	lb/hr	grains/ACF
c. CO	0.11	lb/hr	grains/ACF
d. PM ₁₀	0.01	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	0.01	lb/hr	grains/ACF
g. Pb	0	lb/hr	grains/ACF
h. Specify other(s)			
CO _{2e}	156	lb/hr	grains/ACF
Formaldehyde	0.0001	lb/hr	grains/ACF
		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

Columbia assumes this unit will operate 8760 hours per year. No monitoring, recordkeeping, reporting, or testing is required for this unit.

RECORDKEEPING

REPORTING

TESTING

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

N/A

**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*): 001-09

<p>1. Name or type and model of proposed affected source:</p> <p>22 Catalytic heaters. Proposed emission point ID SH3.</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>N/A</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>N/A</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Natural gas combustion products.</p>

* 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:		
Natural gas at a designed maximum fuel usage of 647.1 ft ³ /hr for the combination of 22 heaters.		
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:		
methane 93.25 All values in volume percent.		
ethane 3.68		
propane 0.88		
I-Butane 0.07		
N-Butane 0.19		
I-Pentane 0.03		
N-Pentane 0.003		
Hexane 0.012		
Carbon Dioxide 0.99 Nitrogen 0.89 Sulfur Dioxide 0.0001 ash - nil		
(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:		
22 x 30,000 BTU/hour		
(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:		
N/A		
(g) Proposed maximum design heat input:		0.66 (combination of 22 heaters) × 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	14.7	psia
a. NO _x	0.06	lb/hr	grains/ACF
b. SO ₂	0.04	lb/hr	grains/ACF
c. CO	0.05	lb/hr	grains/ACF
d. PM ₁₀	0.005	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	0.004	lb/hr	grains/ACF
g. Pb	0	lb/hr	grains/ACF
h. Specify other(s)			
CO _{2e}	77	lb/hr	grains/ACF
Formaldehyde	0.00005	lb/hr	grains/ACF
		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

Columbia assumes this unit will operate 8760 hours per year. No monitoring, recordkeeping, reporting, or testing is required for this unit.

RECORDKEEPING

REPORTING

TESTING

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

N/A

Attachment N

Supporting Emissions Calculations

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-1 - Facility Total PTE

Source	Capacity	Annual Emissions (tpy)										
		NO _x	CO	CO ₂ e	PM ₁₀ /PM _{2.5}	VOC	SO ₂	CH ₂ O	Total HAP			
New Sources PTE¹		65.59	97.19	139,910	7.53	17.68	0.81	0.80	1.18			
T03 - Solar Mars 100 Turbine	15,067 hp (32 °F)	32.26	48.14	66,079	3.72	3.81	0.40	0.40	0.58			
T04 - Solar Mars 100 Turbine	15,067 hp (32 °F)	32.26	48.14	66,079	3.72	3.81	0.40	0.40	0.58			
HTR4 - Process Heater	0.50 MMBtu/hr	0.21	0.18	256	0.02	0.01	1.56E-03	1.61E-04	4.05E-03			
SH2 - (28) Catalytic Heaters	Various	0.57	0.48	685	0.04	0.03	4.18E-03	4.30E-04	0.01			
SH3 - (22) Catalytic Heaters	0.03 MMBtu/hr	0.28	0.24	339	0.02	0.02	2.06E-03	2.13E-04	0.01			
Equipment Leaks (fugitive emissions) ²				258		0.40						
Venting				6,471		9.99						
Current PTE¹		838.76	464.06	186,508	20.36	112.62	1.07	31.85	47.05			
T01 - Solar Taurus 70 Turbine #1	11,557 hp (0 °F)	23.79	51.50	47,759	2.69	3.68	0.26	0.26	0.42			
T02 - Solar Taurus 70 Turbine #2	11,557 hp (0 °F)	23.79	51.50	47,759	2.69	3.68	0.26	0.26	0.42			
HTR1 - Fuel Gas Heater	0.72 MMBtu/hr	0.31	0.26	369	0.02	0.02	2.25E-03	2.32E-04	5.84E-03			
HTR2 - Fuel Gas Heater	0.75 MMBtu/hr	0.32	0.27	385	0.02	0.02	2.36E-03	2.42E-04	6.08E-03			
HTR3 - Fuel Gas Heater	0.25 MMBtu/hr	0.11	0.09	128	0.01	0.01	7.82E-04	8.05E-05	2.03E-03			
G3 - Emergency Generator	1,063 hp	1.17	0.76	212	0.02	0.15	1.30E-03	0.10	0.13			
BL2 - Wastewater Evaporator Boiler	0.20 MMBtu/hr	0.09	0.07	103	0.01	4.72E-03	6.25E-04	6.44E-05	1.62E-03			
E07 - Clark TLA-8 Engine	2,700 hp	187.72	67.79	10,248	0.87	10.33	0.06	4.62	6.32			
E08 - Clark TLA-8 Engine	2,700 hp	187.72	67.79	10,248	0.87	10.33	0.06	4.62	6.32			
E09 - Clark TLA-8 Engine	2,700 hp	187.72	67.79	10,248	0.87	10.33	0.06	4.62	6.32			
E10 - Clark TLAD-10 Compressor Engine	4,640 hp	89.60	98.50	20,228	8.30	35.80	0.20	9.54	13.74			
E01 - Clark HRA-8T Compressor Engine	1,320 hp	103.20	28.10	5,552	2.29	5.69	0.03	2.62	3.77			
E11 - Caterpillar Compressor Engine	4,735 hp	32.00	28.60	15,543	1.60	7.42	0.11	5.22	9.58			
SH1 - (40) Catalytic Heaters	0.072 MMBtu/hr	1.24	1.04	1,477	0.09	0.07	9.01E-03	9.28E-04	0.02			
Equipment Leaks (fugitive emissions, Taurus 70) ²				258		0.40						
Venting, Taurus 70				16,250		25.10						
Changes to Current PTE		-103.51	-28.36	-5,921	-2.31	-5.71	-0.04	-2.62	-3.78			
E01 - Clark HRA-8T Compressor Engine	1,320 hp	-103.20	-28.10	-5,552	-2.29	-5.69	-0.03	-2.62	-3.77			
HTR1 - Fuel Gas Heater	0.72 MMBtu/hr	-0.31	-0.26	-369	-0.02	-0.02	-2.25E-03	-2.32E-04	-5.84E-03			
Proposed PTE¹		800.84	532.89	320,497	25.59	124.59	1.85	30.04	44.46			
Contemporaneous Increase ³		49.24										
Baseline (Past Actual) Emissions (E02, E04, E05)⁴		82.22										
Net Emissions Increase		32.61										
PSD Significance Threshold		40	100	n/a ⁵	15 / 10	40	40	n/a	n/a			

1. Excludes fugitive emissions (compressor stations are not one of the names source categories that include fugitive emissions).
 2. Fugitive emissions are not part of PSD applicability analysis.
 3. Includes 2 x Solar Taurus 70, Heaters HTR2 & HTR3, and 40 catalytic heaters; includes vented emissions for CO₂e and VOC
 4. Engines E02, E04, and E05 were retired in 2013.
 5. Per 6-23-2014 Supreme Court decisions, applicability of PSD permitting cannot be triggered by GHG emissions.

6. For the new Mars turbines, emissions are aggregated and based on 480 hours per year of low temperature, 16 hours of low load below 50% and 174 start up / shut down cycles

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-2 - Contemporaneous Facility Potential Emission Increases / Decreases from Modernization

Source	Annual Emissions (tpy)									
	NO _x	CO	CO ₂ e	PM ₁₀ /PM _{2.5}	VOC	SO ₂	CH ₂ O	Total HAP		
T01 - Solar Taurus 70 Turbine #1	23.79	51.50	47,759	2.69	3.68	0.26	0.26	0.42		
T02 - Solar Taurus 70 Turbine #2	23.79	51.50	47,759	2.69	3.68	0.26	0.26	0.42		
BL2 - Wastewater Evaporator Boiler	-0.09	-0.07	-103	-0.01	-4.72E-03	-6.25E-04	-6.44E-05	-1.62E-03		
HTR1 - Fuel Gas Heater	-0.31	-0.26	-369	-0.02	-0.02	-2.25E-03	-2.32E-04	-0.01		
HTR2 - Fuel Gas Heater	0.32	0.27	385	0.02	0.02	2.35E-03	2.42E-04	0.01		
HTR3 - Fuel Gas Heater	0.11	0.09	128	0.01	0.01	7.82E-04	8.05E-05	2.03E-03		
SH1 - (40) Catalytic Heaters	1.24	1.04	1,477	0.09	0.07	9.01E-03	9.28E-04	0.02		
E02, E04, E05 - (3) Clark HRA-8T Engines	-309.6	-84.3	-16,655	-6.87	-17.07	-0.10	-7.85	-11.31		
Total Change in Emissions	-260.8	19.8	80,382	-1.39	-9.64	0.43	-7.33	-10.45		

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-3 - Solar Mars 100 Turbines (T03 & T04)

Horsepower	15,067 hp (32 °F)
Brake Specific Fuel Consumption	7704 Btu/Bhp-hr (LHV, 32 °F)
Total Heat Input	116.07 MMBtu/hr (LHV, 32 °F) 128.84 MMBtu/hr (HHV, 32 °F) ³
Operating Hours	8760 hr/yr
Natural Gas Heat Content	1020 Btu/scf
Fuel Consumption	1106.49 MMscf/yr
Quantity	126,311.5 scf/yr (based on 32 °F)

2

Pollutant	Emission Factor		Emission Rate			Emission Factor Reference
	ppmvd@15%O ₂	lb/MMBtu	lb/hr ¹	ton/yr ²	ton/yr (2 turbines)	
NO _x	15.00	0.060 LHV	6.96	32.26	64.52	Vendor Data
CO	25.00	0.061 LHV	7.07	48.14	96.29	Vendor Data
CO ₂ e		117.1 HHV	15,087	66,079	132,159	40 CFR 98 Subpart C
PM ₁₀		0.0066 HHV	0.85	3.72	7.45	AP-42 Table 3.1-2a (4/00)
PM _{2.5}		0.0066 HHV	0.85	3.72	7.45	AP-42 Table 3.1-2a (4/00)
VOC	5.00	0.007 LHV	0.81	3.81	7.62	Vendor Data (20% of UHC) ⁴
SO ₂ (Maximum Hourly)		0.0571 HHV	7.36			20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714 HHV		0.40	0.81	0.25 grains S / 100 scf
Formaldehyde		0.00071 HHV	0.09	0.40	0.80	AP-42 Table 3.1-3 (4/00)
Total HAPs		0.00103 HHV	0.13	0.58	1.16	AP-42 Table 3.1-3 (4/00)

1. Maximum hourly emission rate based on normal operation at 32 °F. Heat input, fuel consumption, and emissions increase as temperature decreases, and for the purpose of this application, hourly emissions are characterized by Solar emissions data for 32 °F.
2. Annual emission rate based on combination of potential operating modes as provided on following page for NO_x, CO, and VOC.
3. HHV heat input based on HHV=1.11*LHV
4. VOC based on 20% of vendor data for unburned hydrocarbon (UHC).

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-4 - Solar Mars 100 (T03 & T04) - Emission Rates

Operating Mode	Units	NO _x	CO	VOC
Normal Load @ 32 °F ¹	lb/hr	6.96	7.07	0.81
Low Temp (<0 °F) ²	lb/hr	21.16	30.67	1.75
Low-Load (<50%) ³	lb/hr	16.10	653.41	7.47
Startup/ Shutdown ⁴	lb/event	3.10	272.70	3.12

- Based on data from Solar Mars 100 Compressor Set data sheet and the following concentrations:
15 ppm NO_x; 25 ppm CO; 5 ppm VOC
- Based on data from Solar Product Information Letter (PIL) 167
- For the purpose of calculating potential annual emissions, non-startup/shutdown operation at <50% load is based on emissions data provided by Solar for 40% load.
- Based on data from Solar PIL170

Potential Annual Emissions Per Turbine

Operating Mode	Operating Time		NO _x ton/yr	CO ton/yr	VOC ton/yr
	Cycles	hr/yr			
Normal Load @ 32 °F		8483	29.52	29.99	3.44
Low Temp (<0 °F)		240	2.54	3.68	0.21
Low-Load (<50%)		8	0.06	2.61	0.03
Startup/ Shutdown	87	29	0.13	11.86	0.14
Total		8,760	32.26	48.14	3.81

Emission Rates During Normal Operation (g/hp-hr)¹

Emission Point ID / Model	NO _x	CO	VOC ²	SO ₂ ³	PM ₁₀ / PM _{2.5}	CH ₂ O
T03, T04 / Solar Mars 100	0.21	0.21	0.02	0.22	0.03	0.003

- Based on vendor performance data; values in italics based on AP-42 emission factors.
- VOC is based on 20 percent of unburned hydrocarbons per Solar Product Information Letter 168.
- Conservatively based on 20 grains sulfur per 100 standard cubic feet of natural gas for maximum short-term emissions.

**Columbia Gas Transmission, LLC
Lost River Compressor Station**

Table N-5 - Emissions from Venting - Solar Mars 100 (T03 & T04)

Number of Pneumatic Actuators:	7	per turbine
Pneumatic Actuator Vent Rate:	3	scf/hr/actuator
Number of Startup/Shutdown Cycles:	87	per turbine per year
Electric Starter Emissions per Startup:	0	scf
Blowdown Emissions per Shutdown:	67,126	scf
Number of Turbines	2	
Number of Dry Seals:	2	per turbine
Dry Seal Vent Rate:	0.5	scf/min/seal
Annual Operating Hours:	8760	

Component	Emission Rate								
	Total	CH ₄ ² scf/hr	CO ₂ ² scf/hr	CH ₄ ³ lb/hr	CO ₂ ³ lb/hr	CH ₄ ton/yr	CO ₂ ton/yr	CO ₂ e ⁴ ton/yr	VOC ⁶ ton/yr
Continuous During Operation	scf/hr	scf/hr	scf/hr	lb/hr	lb/hr	ton/yr	ton/yr	ton/yr	ton/yr
Pneumatic Actuator (Total for number of units) ¹	42.00	39.17	0.42	1.66	0.05	7.26	0.21	181.74	0.28
Dry Sealss (Total for number of units)	120.00	111.90	1.19	4.74	0.14	20.75	0.60	519.26	0.80
Intermittent During Startup/Shutdown	scf/event	scf/event	scf/event	lb/event	lb/event	ton/yr	ton/yr	ton/yr	ton/yr
Pneumatic Starter (Total for number of units) ¹	0	0	0	0	0	0	0	0	0.00
Blowdowns (Total for number of units) ^{1,5}	134,252	125,190	1,329	5,299	154	231	7	5,770	8.91
Total:								6,471	9.99

1. Emission rates per event instead of per hour
2. CH₄ and CO₂ emission rates based on 93.25 vol% CH₄ and 0.99 vol% CO₂ in natural gas
3. Conversion based on densities of GHG as provided in 40 CFR 98.233(v)
4. Based on 40 CFR 98 Subpart A Global Warming Potentials
5. Conservative estimate based on 1 blowdown per shutdown. It is not expected that a blowdown will occur after each shutdown.
6. Based on a 0.039 ratio of VOC to methane as calculated from gas composition provided in Attachment L

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-6 - Fugitive Emissions from Leaks - Mars 100 (T03 & T04)

Number of Compressors: 2
Annual Operating Hours: 8760

Component	Average Number of Leaking Components ¹ / compressor	Emission Factor ² / scf/hr / component	Total Emission Rate (2 compressors)										
			Total	CH ₄ ³	CO ₂ ³	CH ₄ ⁴	CO ₂ ⁴	CH ₄	CO ₂	CO ₂ e ⁵	VOC ⁶		
			scf/hr	scf/hr	scf/hr	lb/hr	lb/hr	lb/hr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
Compressor Service													
Valve	0.55	14.84	16.32	15.22	0.16	0.64	0.02	2.82	0.08	70.64	1.09E-01		
Connector	0.62	5.59	6.93	6.46	0.07	0.27	0.01	1.20	0.03	29.99	4.63E-02		
Open-Ended Line	0.16	17.27	5.53	5.15	0.05	0.22	0.01	0.96	0.03	23.91	3.69E-02		
Pressure Relief	0.00	39.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00		
Meter	0.00	19.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00		
Non-Compressor Service													
Valve	0.60	6.42	7.70	7.18	0.08	0.30	0.01	1.33	0.04	33.34	5.15E-02		
Connector	0.82	5.71	9.36	8.73	0.09	0.37	0.01	1.62	0.05	40.52	6.26E-02		
Open-Ended Line	0.59	11.27	13.30	12.40	0.13	0.52	0.02	2.30	0.07	57.55	8.89E-02		
Pressure Relief	0.12	2.01	0.48	0.45	0.00	0.02	0.00	0.08	0.00	2.09	3.22E-03		
Meter	0.01	2.93	0.06	0.05	0.00	0.00	0.00	0.01	0.00	0.25	3.92E-04		
								Total:	10.32	0.30	258.29	0.40	

1. Estimated component leaks per compressor based on average measurements throughout the Columbia pipeline system

2. Emission factors from 40 CFR 98 Subpart W Table W-3

3. CH₄ and CO₂ emission rates based on 93.25 vol% CH₄ and 0.99 vol% CO₂ in natural gas

4. Conversion based on densities of GHG as provided in 40 CFR 98.233(v)

5. Based on 40 CFR 98 Subpart A Global Warming Potentials

6. Based on a 0.039 ratio of VOC to methane as calculated from gas composition

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-7 - Process Heater (HTR4)

Heat Input 0.50 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 4.29 MMscf/yr
 490.2 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.05	0.21	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.04	0.18	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	59	256	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.004	0.02	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.004	0.02	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.003	0.01	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.03		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		1.56E-03	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	3.68E-05	1.61E-04	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	9.26E-04	4.05E-03	AP-42 Table 1.4-3 & 4 (7/98)

Columbia Gas Transmission, LLC
Lost River Compressor Station

Table N-8 - Catalytic Heaters (SH2 - 8 x 0.005 MMBtu/hr, 18 x 0.072 MMBtu/hr)

Total Heat Input 1.34 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 11.47 MMscf/yr
 1309.8 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr (26 heaters)	ton/yr	
NO _x	100	0.098	0.13	0.57	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.11	0.48	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	156	685	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.01	0.04	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.01	0.04	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.01	0.03	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.08		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.004	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	9.82E-05	4.30E-04	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	2.47E-03	0.01	AP-42 Table 1.4-3 & 4 (7/98)

Columbia Gas Transmission, LLC
 Lost River Compressor Station

Table N-9 - Catalytic Heaters (SH3 - 22 x 0.03 MMBtu/hr)

Total Heat Input 0.66 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 5.67 MMscf/yr
 647.1 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr (22 heaters)	ton/yr	
NO _x	100	0.098	0.06	0.28	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.05	0.24	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	77	339	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.005	0.02	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.005	0.02	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.004	0.02	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.04		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.002	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	4.85E-05	2.13E-04	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	1.22E-03	0.01	AP-42 Table 1.4-3 & 4 (7/98)

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Table N-10 - Solar Taurus 70 Turbines (T01 & T02)

Horsepower	11,557 hp (at 0 °F)
Brake Specific Fuel Consumption	7258 Btu/Bhp-hr (LHV)
Total Heat Input	83.89 MMBtu/hr (LHV, 0 °F) 93.12 MMBtu/hr (HHV, 0 °F) ³ 83.89 MMBtu/hr (LHV, 0 °F) 93.12 MMBtu/hr (HHV, 0 °F) ³
Operating Hours	8760 hr/yr
Natural Gas Heat Content	1020 Btu/scf
Fuel Consumption	799.72 MMscf/yr 91,292.1 scf/hr (based on 0 °F)

2

Quantity

Pollutant	Emission Factor		Emission Rate			Emission Factor Reference
	ppmvd@15%O ₂	lb/MMBtu	lb/hr ¹	ton/yr ²	ton/yr (2 turbines)	
NO _x	15.00	0.060 LHV	5.04	23.79	47.57	Vendor Data
CO	25.00	0.061 LHV	5.12	51.50	103.01	Vendor Data
CO ₂ e		117.1 HHV	10,904	47,759	95,518	40 CFR 98 Subpart C
PM ₁₀		0.0066 HHV	0.61	2.69	5.38	AP-42 Table 3.1-2a (4/00)
PM _{2.5}		0.0066 HHV	0.61	2.69	5.38	AP-42 Table 3.1-2a (4/00)
VOC	5.00	0.007 LHV	0.73	3.68	7.36	Vendor Data (20% of UHC) ⁴
SO ₂ (Maximum Hourly)		0.0571 HHV	4.70			20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714 HHV		0.26	0.52	0.25 grains S / 100 scf
Formaldehyde		0.00071 HHV	0.06	0.26	0.52	AP-42 Table 3.1-3 (4/00)
Total HAPs		0.00103 HHV	0.10	0.42	0.84	AP-42 Table 3.1-3 (4/00)

1. Maximum hourly emission rate based on 0 °F.
2. Annual emission rate based on combination of potential operating modes as provided on following page for NO_x, CO, and VOC.
All other pollutants based on nominal HP and BSFC.
3. HHV heat input based on HHV=1.11*LHV
4. VOC based on 20% of vendor data for unburned hydrocarbon.

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Table N-11 - Solar Taurus 70 (T01 & T02) - Emission Rates

Operating Mode	Units	NO _x	CO	VOC
Normal Load @ 0 °F ¹	lb/hr	5.04	5.12	0.73
Low Temp (<0 to -20 °F) ²	lb/hr	15.00	21.73	1.55
Very Low Temp (<-20 °F) ²	lb/hr	42.84	32.60	1.55
Low-Load (<50%) ³	lb/hr	24.56	1708.23	24.40
Startup/ Shutdown ⁴	lb/event	2.4	214.6	3.1

1. Based on data from Solar taurus 70 Compressor Set data sheet and the following concentrations:
15 ppm NO_x; 25 ppm CO; 5 ppm VOC
2. Based on data from Solar Product Information Letter (PIL) 167
3. Based on data provided by Solar for 40% load
4. Based on data from Solar PIL 170

Potential Annual Emissions Per Turbine

Operating Mode	Operating Time		NO _x ton/yr	CO ton/yr	VOC ton/yr
	Cycles	hr/yr			
Normal Load @ 0 °F		8456	21.31	21.65	3.10
Low Temp (<0 to -20 °F)		240	1.80	2.61	0.19
Very Low Temp (<-20 °F)		16	0.34	0.26	0.01
Low-Load (<50%)		12	0.15	10.25	0.15
Startup/ Shutdown	156	36	0.19	16.74	0.24
Total		8,760	23.79	51.50	3.68

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Table N-12 - Emissions from Venting - Solar Taurus 70 (T01 & T02)

Number of Pneumatic Actuators: 15 per turbine
 Pneumatic Actuator Vent Rate: 3 scf/hr/actuator
 Number of Startup/Shutdown Cycles: 156 per turbine per year
 Pneumatic Starter Emissions per Startup: 14,688 scf
 Blowdown Emissions per Shutdown: 84,856 scf
 Number of Turbines 2
 Number of Dry Seals: 2 per turbine
 Dry Seal Vent Rate: 0.5 scf/min/seal
 Annual Operating Hours: 8760

Component	Emission Rate									
	Total	CH ₄ ² scf/hr	CO ₂ ² scf/hr	CH ₄ ³ lb/hr	CO ₂ ³ lb/hr	CH ₄ ton/yr	CO ₂ ton/yr	CO ₂ e ⁴ ton/yr	VOC ⁶ ton/yr	
Continuous During Operation	scf/hr	scf/hr	scf/hr	lb/hr	lb/hr	ton/yr	ton/yr	ton/yr	ton/yr	
Pneumatic Actuator (Total for number of units)	90.00	83.93	0.89	3.55	0.10	15.56	0.45	389.44	0.60	
Dry Seals (Total for number of units)	120.00	111.90	1.19	4.74	0.14	20.75	0.60	519.26	0.80	
Intermittent During Startup/Shutdown	scf/event	scf/event	scf/event	lb/event	lb/event	ton/yr	ton/yr	ton/yr	ton/yr	
Pneumatic Starter (Total for number of units) ¹	29376.0	27393.1	290.8	1159.5	33.7	90.4	2.6	2,264	3.50	
Blowdowns (Total for number of units) ^{1,5}	169712.0	158256.4	1680.1	6698.8	194.8	522.5	15.2	13,078	20.20	
							Total:	16,250	25.10	

1. Emission rates per event instead of per hour
2. CH₄ and CO₂ emission rates based on 93.25 vol% CH₄ and 0.99 vol% CO₂ in natural gas
3. Conversion based on densities of GHG as provided in 40 CFR 98.233(v)
4. Based on 40 CFR 98 Subpart A Global Warming Potentials
5. Conservative estimate based on 1 blowdown per shutdown. It is not expected that a blowdown will occur after each shutdown.
6. Based on a 0.039 ratio of VOC to methane as calculated from gas composition provided in Attachment L

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Table N-13 - Fugitive Emissions from Leaks - Taurus 70 (T01 & T02)

Number of Compressors: 2
Annual Operating Hours: 8760

Component	Average Number of Leaking Components ¹ / compressor	Emission Factor ² / component	Total Emission Rate (2 compressors)												
			Total	CH ₄ ³ / scf/hr	CO ₂ ³ / scf/hr	CH ₄ ⁴ / lb/hr	CO ₂ ⁴ / lb/hr	CH ₄ / ton/yr	CO ₂ / ton/yr	CO ₂ e ⁵ / ton/yr	VOC ⁵ / ton/yr				
Compressor Service															
Valve	0.55	14.84	16.32	15.22	0.16	0.64	0.02	2.82	0.08	70.64	1.09E-01				
Connector	0.62	5.59	6.93	6.46	0.07	0.27	0.01	1.20	0.03	29.99	4.63E-02				
Open-Ended Line	0.16	17.27	5.53	5.15	0.05	0.22	0.01	0.96	0.03	23.91	3.69E-02				
Pressure Relief	0.00	39.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00				
Meter	0.00	19.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00				
Non-Compressor Service															
Valve	0.60	6.42	7.70	7.18	0.08	0.30	0.01	1.33	0.04	33.34	5.15E-02				
Connector	0.82	5.71	9.36	8.73	0.09	0.37	0.01	1.62	0.05	40.52	6.26E-02				
Open-Ended Line	0.59	11.27	13.30	12.40	0.13	0.52	0.02	2.30	0.07	57.55	8.89E-02				
Pressure Relief	0.12	2.01	0.48	0.45	0.00	0.02	0.00	0.08	0.00	2.09	3.22E-03				
Meter	0.01	2.93	0.06	0.05	0.00	0.00	0.00	0.01	0.00	0.25	3.92E-04				
								Total:		10.32		0.30		258.29	0.40

1. Estimated component leaks per compressor based on average measurements throughout the Columbia pipeline system

2. Emission factors from 40 CFR 98 Subpart W Table W-3

3. CH₄ and CO₂ emission rates based on 93.25 vol% CH₄ and 0.99 vol% CO₂ in natural gas

4. Conversion based on densities of GHG as provided in 40 CFR 98.233(v)

5. Based on 40 CFR 98 Subpart A Global Warming Potentials

6. Based on a 0.039 ratio of VOC to methane as calculated from gas composition provided in Attachment L

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Lost River Compressor Station**

Table N-14 - Waukesha VGF-48GL Emergency Generator (G3)

Horsepower 1063 hp
 Brake Specific Fuel Consumption 6825 Btu/Bhp-hr
 Total Heat Input 7.25 MMBtu/hr
 Operating Hours 500 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 3.56 MMscf/yr
 7112.7 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	g/bhp-hr	lb/MMBtu	lb/hr	ton/yr	
NO _x	2.00	0.646	4.68	1.17	Permit Limit
CO	1.30	0.420	3.04	0.76	Permit Limit
CO _{2e}		117.1	850	212	40 CFR 98 Subpart C
PM ₁₀		0.010	0.07	0.02	AP-42 Table 3.2-2 (7/00) - 4SLB
PM _{2.5}		0.010	0.07	0.02	AP-42 Table 3.2-2 (7/00) - 4SLB
VOC	0.26	0.084	0.61	0.15	Permit Limit
SO ₂ (Maximum Hourly)		0.0571	0.41		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		1.30E-03	0.25 grains S / 100 scf
Formaldehyde		0.05280	0.38	0.10	AP-42 Table 3.2-2 (7/00) - 4SLB
Total HAPs		0.07220	0.52	0.13	AP-42 Table 3.2-2 (7/00) - 4SLB

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Table N-15 - Clark TLA-8 Compressor Engines (E07 - E09)

Horsepower 2700 hp
 Maximum Horsepower 2970 hp
 Brake Specific Fuel Consumption 7400 Btu/Bhp-hr
 Total Heat Input 19.98 MMBtu/hr
 Maximum Heat Input 21.98 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 171.59 MMscf/yr
 21,547.1 scf/hr

3

Quantity

Pollutant	Emission Factor		Emission Rate			Emission Factor Reference
	lb/bhp-hr	lb/MMBtu	lb/hr	ton/yr (1 engine)	ton/yr (3 engines)	
NO _x	1.59E-02		47.14	187.72	562.50	Permit Limit
CO	5.73E-03		17.02	67.79	203.40	Permit Limit
CO ₂ e		117.1	2,574	10,248	30,743	40 CFR 98 Subpart C
PM ₁₀		0.010	0.22	0.87	2.62	AP-42 Table 3.2-2 (700) - 4SLB
PM _{2.5}		0.010	0.22	0.87	2.62	AP-42 Table 3.2-2 (700) - 4SLB
VOC		0.118	2.59	10.33	30.98	AP-42 Table 3.2-2 (700) - 4SLB
SO ₂ (Maximum Hourly)		0.0571	1.25			20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.06	0.19	0.25 grains S / 100 scf
Formaldehyde		0.05280	1.16	4.62	13.86	AP-42 Table 3.2-2 (700) - 4SLB
Total HAPs		0.07220	1.59	6.32	18.95	AP-42 Table 3.2-2 (700) - 4SLB

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Table N-16 - Caterpillar G3616 Compressor Engine (E11)

Horsepower 4735 hp
 Maximum Horsepower 5208.5 hp
 Brake Specific Fuel Consumption 6400 Btu/Bhp-hr
 Total Heat Input 30.30 MMBtu/hr
 Maximum Heat Input 33.33 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 260.26 MMscf/yr
 32,680.8 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/bhp-hr	lb/MMBtu	lb/hr ¹	ton/yr	
NO _x	1.54E-03		7.30	32.00	Permit Limit
CO	1.39E-03		6.52	28.60	Permit Limit
CO ₂ e		117.1	3,903	15,543	40 CFR 98 Subpart C
PM ₁₀	7.50E-05	0.012	0.40	1.60	Permit Limit
PM _{2.5}	7.50E-05	0.012	0.40	1.60	Permit Limit
VOC	3.53E-04		1.70	7.42	Permit Limit
SO ₂ (Maximum Hourly)		0.0571	1.90		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.11	Permit Limit
Formaldehyde	2.51E-04		1.19	5.22	Permit Limit
Total HAPs		0.07220	2.41	9.58	AP-42 Table 3.2-2 (7/00) - 4SLB

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Table N-17 - Clark HRA-8T Compressor Engine (E01 - to be retired)

Horsepower	1320 hp
Brake Specific Fuel Consumption	8200 Btu/Bhp-hr
Total Heat Input	10.82 MMBtu/hr
Operating Hours	8760 hr/yr
Natural Gas Heat Content	1020 Btu/scf
Fuel Consumption	92.96 MMscf/yr
	10,612 scf/hr based on maximum heat input

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/bhp-hr	lb/MMBtu	lb/hr	ton/yr	
NO _x	1.79E-02		23.57	103.20	Permit Limit
CO	4.85E-03		6.40	28.10	Permit Limit
CO _{2e}		117.1	1,267	5,552	40 CFR 98 Subpart C
PM ₁₀		0.048	0.52	2.29	AP-42 Table 3.2-1 (7/00) - 2SLB
PM _{2.5}		0.048	0.52	2.29	AP-42 Table 3.2-1 (7/00) - 2SLB
VOC		0.120	1.30	5.69	AP-42 Table 3.2-1 (7/00) - 2SLB
SO ₂ (Maximum Hourly)		0.0571	0.62		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.03	0.25 grains S / 100 scf
Formaldehyde		0.05520	0.60	2.62	AP-42 Table 3.2-1 (7/00) - 2SLB
Total HAPs		0.07954	0.86	3.77	AP-42 Table 3.2-1 (7/00) - 2SLB

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Table N-18 - Clark TLAD-10 Compressor Engine (E10)

Horsepower	4640 hp
Maximum Horsepower	5104 hp
Brake Specific Fuel Consumption	8500 Btu/Bhp-hr
Total Heat Input	39.44 MMBtu/hr
Maximum Heat Input	43.38 MMBtu/hr
Operating Hours	8760 hr/yr
Natural Gas Heat Content	1020 Btu/scf
Fuel Consumption	338.72 MMscf/yr
	42,533 scf/hr based on maximum heat input

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/bhp-hr	lb/MMBtu	lb/hr ¹	ton/yr	
NO _x	4.41E-03		22.50	89.60	Permit Limit
CO	4.85E-03		24.76	98.50	Permit Limit
CO ₂ e		117.1	5,080	20,228	40 CFR 98 Subpart C
PM ₁₀		0.048	2.10	8.30	Permit Limit
PM _{2.5}		0.048	2.10	8.30	Permit Limit
VOC		0.120	5.21	35.80	Permit Limit
SO ₂ (Maximum Hourly)		0.0571	2.48		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.20	Permit Limit
Formaldehyde		0.05520	2.39	9.54	AP-42 Table 3.2-1 (7/00) - 2SLB
Total HAPs		0.07954	3.45	13.74	AP-42 Table 3.2-1 (7/00) - 2SLB

1. Maximum hourly emission rate based on maximum horsepower under optimum conditions (10% greater than site rating).

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Table N-19 - Fuel Gas Heater #1 (HTR1 - removed)

Heat Input 0.72 MMBtu/hr
Operating Hours 8760 hr/yr
Natural Gas Heat Content 1020 Btu/scf
Fuel Consumption 6.18 MMscf/yr
705.9 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.07	0.31	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.06	0.26	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	84	369	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.01	0.02	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.01	0.02	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.004	0.02	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.04		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714			0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	5.29E-05	2.32E-04	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	1.33E-03	5.84E-03	AP-42 Table 1.4-3 & 4 (7/98)

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Table N-20 - Fuel Gas Heater #2 (HTR2)

Heat Input 0.75 MMBtu/hr
Operating Hours 8760 hr/yr
Natural Gas Heat Content 1020 Btu/scf
Fuel Consumption 6.44 MMscf/yr
735.3 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.07	0.32	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.06	0.27	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	88	385	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.01	0.02	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.01	0.02	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.004	0.02	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.04		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		2.35E-03	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	5.51E-05	2.42E-04	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	1.39E-03	6.08E-03	AP-42 Table 1.4-3 & 4 (7/98)

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Table N-21 - Fuel Gas Heater #3 (HTR3)

Heat Input 0.25 MMBtu/hr
Operating Hours 8760 hr/yr
Natural Gas Heat Content 1020 Btu/scf
Fuel Consumption 2.15 MMscf/yr
245.1 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.02	0.11	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.02	0.09	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	29	128	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.002	0.01	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.002	0.01	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.001	0.01	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.014		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		7.82E-04	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	1.84E-05	8.05E-05	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	4.63E-04	2.03E-03	AP-42 Table 1.4-3 & 4 (7/98)

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Table N-22 - Wastewater Evaporator Boiler

Heat Input 0.20 MMBtu/hr
Operating Hours 8760 hr/yr
Natural Gas Heat Content 1020 Btu/scf
Fuel Consumption 1.72 MMscf/yr
196.1 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.02	0.09	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.02	0.07	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	23	103	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.001	0.01	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.001	0.01	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.001	0.005	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.01		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		6.25E-04	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	1.47E-05	6.44E-05	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	3.70E-04	1.62E-03	AP-42 Table 1.4-3 & 4 (7/98)

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Table N-23 - Catalytic Space Heaters (SH1)

Heat Input 0.072 MMBtu/hr
Quantity 40
Total Heat Input 2.88 MMBtu/hr
Operating Hours 8760 hr/yr
Natural Gas Heat Content 1020 Btu/scf
Fuel Consumption 24.73 MMscf/yr
 2823.5 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr (40 heaters)	ton/yr	
NO _x	100	0.098	0.28	1.24	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.24	1.04	AP-42 Table 1.4-1 (7/98)
CO ₂ e		117.1	337	1,477	40 CFR 98 Subpart C
PM ₁₀	7.6	0.007	0.02	0.09	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	7.6	0.007	0.02	0.09	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.02	0.07	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.0571	0.16		20 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		0.009	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	2.12E-04	9.28E-04	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	5.33E-03	0.02	AP-42 Table 1.4-3 & 4 (7/98)

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Table N-24 - Contemporaneous Emissions and Net Emissions Increase

Project Increases (potential emissions)		
Emission Source	NO _x Increase	PTE Basis
T03 - Solar Mars 100 Turbine	32.26	8,760 hr/yr
T04 - Solar Mars 100 Turbine	32.26	8,760 hr/yr
HTR4 - Process Heater	0.21	8,760 hr/yr
SH2 - (26) Catalytic Heaters	0.57	8,760 hr/yr
SH3 - (22) Catalytic Heaters	0.28	8,760 hr/yr
TOTAL	65.59	

Contemporaneous Increases (potential emissions)

Emission Source	NO _x Increase
T01 - Solar Taurus 70 Turbine #1	23.79
T02 - Solar Taurus 70 Turbine #2	23.79
HTR2 - Fuel Gas Heater	0.32
HTR3 - Fuel Gas Heater	0.11
SH1 - (40) Catalytic Heaters	1.24
TOTAL	49.24

Net Emissions Increase (tpy)

Parameter	NO _x
Total Potential Emissions from the Project	65.59
Contemporaneous Emissions Increases	49.24
Baseline Emissions	82.22
Net Change ¹	32.61
PSD Significance Level	40

Contemporaneous Decreases (actual emissions)¹

Emission Source	NO _x Decrease
Clark HRA-8T engine - E02	27.28
Clark HRA-8T engine - E04	25.71
Clark HRA-8T engine - E05	29.23
TOTAL	82.22

1. November 2010 to October 2012

Columbia Gas Transmission, LLC
 Lost River Compressor Station

Table N-25 - Contemporaneous Emissions - November 2010 to October 2012

NOx (ton/month)

Unit	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	24-Month Annual Average (tons/yr)
E02	5.13	6.98	7.12	4.92	3.75	0.93	0.14	0.01	0.85	0.00	0.00	0.00	0.00	3.92	5.85	4.93	2.27	2.04	1.82	0.36	1.28	0.45	0.66	1.12	27.28
E04	3.29	6.96	6.41	4.00	2.57	0.84	0.00	0.00	1.07	0.00	0.01	2.62	1.63	2.48	5.97	5.42	2.36	1.50	0.31	0.23	0.63	1.77	0.38	0.96	26.71
E05	4.56	7.54	6.77	4.33	3.34	0.84	0.00	0.12	0.03	0.00	0.00	1.04	2.27	5.33	5.12	4.89	2.86	2.18	1.64	1.18	1.55	2.14	0.22	0.52	29.23
Total	12.98	21.49	20.30	13.24	9.66	2.62	0.14	0.14	1.95	0.01	0.01	3.66	3.90	11.73	16.94	15.25	7.49	5.71	3.77	1.77	3.47	4.36	1.25	2.60	82.22

Attachment O

**Monitoring / Recordkeeping / Reporting /
Testing Plans**

Monitoring/Recordkeeping/Reporting/Testing Plans

Turbines T03 & T04

To demonstrate compliance with the turbine annual emission rates in the permit, Columbia proposes to maintain the following records:

- 1) Monthly operating hours,
- 2) Monthly operating hours at less than 50% load,
- 3) Monthly operating hours at less than 0 °F ambient temperature, and
- 4) Monthly number of startup and shutdown cycles.

These monthly records will be used in conjunction with the emission factors in Attachment N to calculate monthly emissions and 12-month rolling sums. Monthly emission (ME) for each regulated pollutant (P_x) will be calculated using the following equation:

$$ME_{P_x} = DLN_{P_x} * DLN \text{ hrs} + LL_{P_x} * LL \text{ hrs} + LT_{P_x} * LT \text{ hrs} + SS_{P_x} * SS \text{ cycles}$$

where:

DLN_{P_x} is the unit emission rates (lb/hr) for pollutant X during normal (DLN) operation,
 LL_{P_x} is the unit emission rates (lb/hr) for pollutant X during low-load (LL) operation,
 LT_{P_x} is the unit emission rates (lb/hr) for pollutant X during low-temperature (LT) operation, and
 SS_{P_x} is the unit emission rates (lb/cycle) for pollutant X during startup/shutdown (SS) operation.

The unit emission rates for each pollutant during DLN, LL, LT, and SS operation are summarized in Table N-4 within Attachment N.

At the end of each month, the monthly emissions will be summed for the preceding 12 months to determine compliance with the proposed annual emission limits. The 12-month rolling emissions will be reported to the state as part of the Station's semi-annual monitoring report.

To demonstrate compliance with Subpart KKKK, 40 CFR §60.4400, an initial NO_x performance test using EPA reference methods is required. Therefore, Columbia will conduct an initial compliance test within 60 days after achieving full-load operation or within 180 days of startup if the turbines are not operated at full load. Unless continuous parameter monitoring is implemented by Columbia, annual performance testing using EPA reference methods will be conducted within 14 calendar months following the previous performance test. Columbia will reduce the test frequency to biennial if measured NO_x emissions are less than 75% of limit. Columbia requests that portable emissions analyzers be approved for annual turbine testing. In addition, the Station will continuously monitor the turbine to document any periods during which the SoLoNO_x system is not in service (e.g., during startup, shutdown, low-load, or a system malfunction). Records of turbine startup, shutdown, SoLoNO_x malfunction, and/or SoLoNO_x monitoring system malfunction will be recorded per Subpart KKKK and NSPS General Provisions in 40 CFR §60.7(b)&(c). Compliance with the SO₂ and fuel sulfur content limits can be demonstrated by monitoring natural gas sulfur content annually. However, per 40 CFR §60.4365(a), Columbia will exempt the proposed turbines from periodic monitoring by demonstrating compliance with the FERC tariff limit on total sulfur content of 20 grains of sulfur per 100 standard cubic feet.

Columbia will submit the initial notification as per 40 CFR Part 63 to comply with Subpart YYYY. This preconstruction permit application will satisfy the initial notification requirement. Upon EPA final action requiring compliance with this subpart for lean premix gas-fired turbines, Columbia will comply with applicable requirements.

Fuel Gas Heater HTR4

Columbia will submit the initial notification as per 40 CFR Part 63 to comply with Subpart DDDDD for the fuel gas heater. This preconstruction permit application will satisfy the initial notification requirement. Records of tune-ups will be maintained, and compliance reports submitted every five years.

Attachment P

Public Notice

(To be provided as Supplemental Submittal)

Attachment R

Delegation of Authority



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. Huffinan, 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

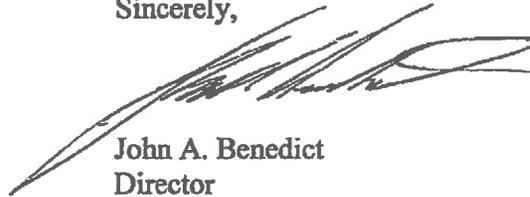
Promoting a healthy environment.

Letter to Victor M. Gaglio
July 27, 2011
Page 2

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

Attachment S
Title V Permit Revision Information

1. New Applicable Requirements Summary	
Mark all applicable requirements associated with the changes involved with this permit revision:	
<input type="checkbox"/> SIP	<input type="checkbox"/> FIP
<input checked="" type="checkbox"/> Minor source NSR (45CSR13)	<input type="checkbox"/> PSD (45CSR14)
<input type="checkbox"/> NESHAP (45CSR15)	<input type="checkbox"/> Nonattainment NSR (45CSR19)
<input checked="" type="checkbox"/> Section 111 NSPS (Subpart(s) <u>KKKK</u>)	<input checked="" type="checkbox"/> Section 112(d) MACT standards (Subpart(s) <u>YYYY, DDDD</u>)
<input type="checkbox"/> Section 112(g) Case-by-case MACT	<input type="checkbox"/> 112(r) RMP
<input type="checkbox"/> Section 112(i) Early reduction of HAP	<input type="checkbox"/> Consumer/commercial prod. reqts., section 183(e)
<input type="checkbox"/> Section 129 Standards/Reqts.	<input type="checkbox"/> Stratospheric ozone (Title VI)
<input type="checkbox"/> Tank vessel reqt., section 183(f)	<input type="checkbox"/> Emissions cap 45CSR§30-2.6.1
<input type="checkbox"/> NAAQS, increments or visibility (temp. sources)	<input type="checkbox"/> 45CSR27 State enforceable only rule
<input type="checkbox"/> 45CSR4 State enforceable only rule	<input type="checkbox"/> Acid Rain (Title IV, 45CSR33)
<input type="checkbox"/> Emissions Trading and Banking (45CSR28)	<input type="checkbox"/> Compliance Assurance Monitoring (40CFR64) ⁽¹⁾
<input type="checkbox"/> NO _x Budget Trading Program Non-EGUs (45CSR1)	<input type="checkbox"/> NO _x Budget Trading Program EGUs (45CSR26)
<p>⁽¹⁾ If this box is checked, please include Compliance Assurance Monitoring (CAM) Form(s) for each Pollutants Specific Emission Unit (PSEU) (See Attachment H to Title V Application). If this box is not checked, please explain why Compliance Assurance Monitoring is not applicable:</p> <p style="padding-left: 40px;">This regulation does not apply because none of the proposed equipment use add-on emission controls.</p>	

2. Non Applicability Determinations
<p>List all requirements, which the source has determined not applicable to this permit revision and for which a permit shield is requested. The listing shall also include the rule citation and a rationale for the determination.</p> <p>40 CFR 60 Subpart Dc – The proposed heaters are less than the 10 MMBtu/hr applicability threshold in 40 CFR §60.40c(a)</p> <p>40 CFR 60 Subpart OOOO – The proposed units are not affected facilities listed under 40 CFR §60.5365</p>
<p><input checked="" type="checkbox"/> Permit Shield Requested (<i>not applicable to Minor Modifications</i>)</p>

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

3. Suggested Title V Draft Permit Language

Are there any changes involved with this Title V Permit revision outside of the scope of the NSR Permit revision? Yes No If Yes, describe the changes below.

Also, please provide **Suggested Title V Draft Permit language** for the proposed Title V Permit revision (including all applicable requirements associated with the permit revision and any associated monitoring /recordkeeping/ reporting requirements), OR attach a marked up pages of current Title V Permit. Please include appropriate citations (Permit or Consent Order number, condition number and/or rule citation (e.g. 45CSR§7-4.1)) for those requirements being added / revised.

4. Active NSR Permits/Permit Determinations/Consent Orders Associated With This Permit Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
	MM/DD/YYYY	
	/ /	
	/ /	

5. Inactive NSR Permits/Obsolete Permit or Consent Orders Conditions Associated With This Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
	MM/DD/YYYY	
	/ /	
	/ /	

6. Change in Potential Emissions

Pollutant	Change in Potential Emissions (+ or -), TPY
CO	+97.19
NO _x	+65.59
PM ₁₀	+7.53
SO ₂	+0.81
VOC	+17.68
Formaldehyde	+0.80

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

7. Certification For Use Of Minor Modification Procedures (Required Only for Minor Modification Requests)

Note: This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete. The criteria for allowing the use of Minor Modification Procedures are as follows:

- i. Proposed changes do not violate any applicable requirement;
- ii. Proposed changes do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit;
- iii. Proposed changes do not require or change a case-by-case determination of an emission limitation or other standard, or a source-specific determination for temporary sources of ambient air quality impacts, or a visibility increment analysis;
- iv. Proposed changes do not seek to establish or change a permit term or condition for which there is no underlying applicable requirement and which permit or condition has been used to avoid an applicable requirement to which the source would otherwise be subject (synthetic minor). Such terms and conditions include, but are not limited to a federally enforceable emissions cap used to avoid classification as a modification under any provision of Title I or any alternative emissions limit approved pursuant to regulations promulgated under § 112(j)(5) of the Clean Air Act;
- v. Proposed changes do not involve preconstruction review under Title I of the Clean Air Act or 45CSR14 and 45CSR19;
- vi. Proposed changes are not required under any rule of the Director to be processed as a significant modification;

Notwithstanding subparagraph 45CSR§30-6.5.a.1.A. (items i through vi above), minor permit modification procedures may be used for permit modifications involving the use of economic incentives, marketable permits, emissions trading, and other similar approaches, to the extent that such minor permit modification procedures are explicitly provided for in rules of the Director which are approved by the U.S. EPA as a part of the State Implementation Plan under the Clean Air Act, or which may be otherwise provided for in the Title V operating permit issued under 45CSR30.

Pursuant to 45CSR§30-6.5.a.2.C., the proposed modification contained herein meets the criteria for use of Minor permit modification procedures as set forth in Section 45CSR§30-6.5.a.1.A. The use of Minor permit modification procedures are hereby requested for processing of this application.

(Signed): _____	Date: _____ / _____ / _____
<i>(Please use blue ink)</i>	<i>(Please use blue ink)</i>
Named (typed): Robert W. Conrad	Title: Manager of Operations

Note: Please check if the following included (if applicable):

- Compliance Assurance Monitoring Form(s)
- Suggested Title V Draft Permit Language

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