

The enclosed permit application for Tennessee Gas Pipeline Company, LLC – Compressor Station 563, 7650 Whites Creek Pike, Joelton, Tennessee, is under review and has not been deemed complete by the Metro Public Health Department, Pollution Control Division. This application may be missing information or contain errors that will not be reflected in the final review or permit(s) issued by this office.

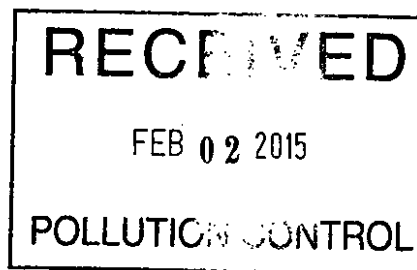


Tennessee Gas Pipeline
Company, L.L.C.
a Kinder Morgan company

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January 30, 2015

Metropolitan Health Department
Pollution Control Division
Attn. Blake McClain
2500 Charlotte Avenue
Nashville, TN 37209
Ph. (615) 340-5616



1140808
\$7,928.75

**Re: Tennessee Gas Pipeline Company, L.L.C.
Title V Permit Application for Compressor Station 563**

Dear Mr. Blake,

Tennessee Gas Pipeline Company, L.L.C. ("TGP") is submitting with this letter a Title V Permit application for a green field facility to be located in Davidson County, Tennessee. The proposed facility will be designated as Compressor Station 563 ("CS 563").

TGP has prepared the attached application to request approval for construction of CS 563 via a Construction Permit, as administered by the Metropolitan Government of Nashville and Davidson County, Tennessee ("MGNDCC") in accordance with Metropolitan Code of Laws ("MCL") 10.56.020: *Construction Permits*. The air permit application was prepared using Title V forms in order to reduce the effort to prepare the future operating permit, in accordance with MCL 10.56.040: *Operating Permits*, and Metropolitan Health Department - Division of Pollution Control ("MHDDPC") Regulation No. 13 *Part 70 Operating Permit Program*.

Enclosed is check, 1140808 in the amount of \$7,928.75 as a fee for the application filing and processing.

If you have any questions concerning this permit application, please contact me at (713) 420-6318 or Shrishti_Chhabra@kindermorgan.com.

Sincerely,

Shrishti Chhabra
Environmental Engineer III
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Enclosures

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Title V Permit Application

***Tennessee Gas Pipeline Company, L.L.C.
Broad Run Expansion Project (BRE)
Natural Gas Compressor Station 563***

Joelton, Davidson County, Tennessee

January 2015

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1.0 INTRODUCTION

TGP is a 13,900 mile pipeline that transports natural gas from Louisiana, the Gulf of Mexico and south Texas to the northeast section of the United States (U.S.), including New York City and Boston.

As part of the Broad Run Expansion Project (BRE), TGP is proposing to construct a new green field compressor station (Station 563) in Joelton, Davidson County, Tennessee (TN). Station 563 will consist of two new compressor turbines and additional auxiliary equipment, as described in detail in Section 1.1. The facility's carbon monoxide (CO) and nitrogen oxides (NO_x) potential to emit (PTE) post-project will exceed the applicable Title V major source threshold of 100 tons per year (tpy), and therefore the facility will be a major source with respect to the Title V Major Source Operating Permit Program (40 CFR Part 70). Therefore, TGP has prepared the application herein to request approval for BRE Project at Station 563 via a Construction Permit, as administered by the Metropolitan Government of Nashville and Davidson County, Tennessee (MGNDCC) in accordance with Metropolitan Code of Laws (MCL) 10.56.020: *Construction Permits*.

The application herein has been submitted on Title V forms in order to reduce the effort to prepare the future operating permit, in accordance with MCL 10.56.040: *Operating Permits*, and Metropolitan Health Department - Division of Pollution Control (MHDDPC) Regulation No. 13 *Part 70 Operating Permit Program*. The required MGNDCC Construction Permit application forms are provided in Appendix A.

PTE calculations for individual emission sources and a facility-wide emission summary are included in Appendix B, and manufacturer's data for the proposed emission sources is provided in Appendix C. Material Safety Data Sheets (MSDS) are included in Appendix D. A facility site location map, plot plan, and process flow diagram are included as Figures 1, 2, and 3, respectively.

1.1 PROJECT DESCRIPTION AND PROPOSED EMISSION SOURCES

Station 563 will be used to boost transmission pressures by compressing low pressure transmission gas and directing it into a high pressure transmission line. Natural gas will enter Station 563 from a transmission pipeline where two (2) new compressor turbines will increase the line pressure. Operations at Station 563 will be categorized under the Standard Industrial Classification (SIC) code 4922, *Natural Gas Transmission*, and under the North American Industry Classification System (NAICS) code 486210, *Pipeline Transportation of Natural Gas*.

As a part of BRE at Station 563, TGP is proposing to add the following:

- Two (2) new Solar Turbines Titan 250-30000S natural gas fired compressor turbines,
- One (1) new natural gas fired emergency generator;
- One (1) new natural gas fired heater; and
- One (1) new pipeline liquids storage tank.

All proposed combustion equipment at Station 563 will utilize only pipeline quality natural gas. Emissions of concern are products of combustion: NO_x, CO, and volatile organic compounds (VOC). TGP employs good combustion practices on well-maintained engines along with the exclusive use of natural gas in order to minimize air emissions.

1.1.1 Proposed Significant Emission Sources

Station 563 significant emission sources proposed as part of BRE are listed below in Table 1.

Table 1: Proposed Significant Emission Sources

Unit Designation	Manufacturer	Model	Type ¹	Rated Capacity
563-A-01	Solar Turbines	Titan 250-30000S	CT	29,766 ² hp
563-A-02	Solar Turbines	Titan 250-30000S	CT	29,766 ² hp
563-A-Aux-01	Caterpillar	G 3516C	4SLB	2,175 hp
563-Heater-01	Parker Boiler	T4600LR	–	4.6 MMBTU/hr

1. CT – combustion turbine, 4SLB – 4-stroke lean burn.
2. Maximum capacity and maximum heat input are based on operating load of 100.0% at a base elevation of 813 feet, relative humidity of 60.0%, and ambient temperature of 50.0 °F.

1.1.2 Proposed Exempt Emission Sources

In addition to the emission units listed in Section 1.1.1, Station 563 will operate several new emission sources that qualify for exemption from permitting under MCL 10.56.050. All exempt emission sources have been included in determination of major source status with respect to Title V and Prevention of Significant Deterioration (PSD) and in the determination of applicability of any other applicable requirements. The proposed exempt sources are listed in Table 2.

Table 2: Proposed Exempt Emission Sources

Unit Description	Designation	Rating/Capacity	Exemption
Pipeline Liquids Storage Tank	T-01	3,762 gallons	MCL 10.56.050.A.3 ¹
Fugitive Emissions	FUG	–	MCL 10.56.050.A.3 ¹

1. Any process emission source emitting less than 0.1 pounds per hour of non-hazardous particulate matter.

1.1.3 Potential Emissions Estimates

A summary of the PTE emissions for all new sources proposed as part of BRE, as described in the previous sections, as well as a facility-wide total, are included below in Table 3. PTE calculations for all sources proposed as part of this project are included in Appendix B. As noted in Section 1.0, the facility's CO and NO_x PTE emissions post-project will exceed the applicable Title V major source threshold of 100 tpy each. The facility will be a major source with respect to the Title V Major Source Operating Permit Program (40 CFR Part 70). Exempt emission sources have been included in the facility-wide PTE estimates per MCL 10.56.050: *Exemptions*, which requires that any exemption be included in determination of major source status.

Table 3: PTE Estimates

Emission Unit	Potential Emissions (tpy)						
	NO _x	CO	VOC	PM/PM ₁₀ / PM _{2.5}	SO ₂	Total HAP	CO _{2e}
563-A-01	83.65	53.85	5.76	6.01	3.09	0.94	107,381
563-A-02	83.65	53.85	5.76	6.01	3.09	0.94	107,381
563-A-Aux-01	2.40	4.80	1.20	0.04	<0.01	0.30	609
563-Heater-01	0.48	1.1	0.12	0.20	0.01	0.04	2,371
Fug	--	--	2.48	--	--	0.43	1,131
T-01	--	--	0.15	--	--	0.01	--
Facility-Wide Total	170.19	113.60	15.48	12.26	6.20	2.64	218,872
Title V Thresholds (tpy)	100 (each)					10/25	100,000
Title V Thresholds Exceeded?	<u>Yes</u>	<u>Yes</u>	No	No	No	No	<u>Yes</u>

Please note that Prevention of Significant Deterioration (PSD) applicability is addressed in Section 3.1.2.

2.0 EMISSIONS CALCULATION METHODOLOGY

Emissions from the sources proposed at Station 563 will consist primarily of natural gas combustion emissions from the two new Solar turbines, the new emergency generator and heater, and fugitive components.

Emissions have been calculated using the most appropriate information and the most current methodologies available in order to determine the facility's PTE, as described in the following sections. Emission calculations are included in Appendix B.

2.1 SOLAR TITAN 250-30000S TURBINES

Emission calculations have been based on a HHV of 1,020 British thermal units per standard cubic feet (BTU/scf). VOC and CH₄ emissions have been based on assumed composition percent values of total unburned hydrocarbons (UHC). UHC emissions are assumed to be composed of 20 percent VOC and 80 percent CH₄.

Both, 563-A-01 and 563-A-02 will be equipped with Solar's SoLoNO_x technology, which uses a *"lean-premixed combustion technology to ensure uniform air/fuel mixture and to prevent formation of regulated pollutants"*. The manufacturer states further that: *"Solar's gas turbine dry low NO_x emissions combustion system, known as SoLoNO_x, is designed to reduce NO_x, CO, and unburned UHC without penalizing stability or transient capabilities."* Solar Turbines guarantees that the following emission levels will be met for SoLoNO_x operation at 0°F ambient temperatures or above:

- 1) 25.0 ppm NO_x at 15 percent oxygen (O₂).
- 2) 25.0 ppm CO at 15 percent O₂.
- 3) 25.0 ppm UHC at 15 percent O₂.

Annual emissions for the turbines included in Appendix B take into consideration the emissions variations based on ambient temperatures. Annual emissions were based on a conservative annual average ambient temperature of 50.0°F.

Start-up and shutdown emissions for the two turbines have also been included in the annual emission totals. Emission totals for start-up and shut-down operations have been determined based on Solar Turbines' Product Information Letter 170 (see Appendix C). Typical start-up and shutdown times are expected to be less than 10 minutes per event. For the purpose of potential emission calculations it was assumed up to 150 startup and 150 shutdown events per year.

2.2 **CATERPILLAR G 3516C EMERGENCY GENERATOR**

The new lean-burn natural gas emergency generator (Caterpillar Model G 3516C), 563-A-Aux-01, will be used to provide electrical power during interruption of normal service. CO, NO_x, and VOC emissions from the new generator are based on applicable emission standards from 40 CFR 60 Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, Table 1* for emergency engines. TGP will either purchase a generator engine which will meet the NSPS JJJJ CO, NO_x, and VOC standards and perform emission testing as required, or will purchase an engine certified to meet these limits. CH₄, SO₂, and all PM emissions are based on AP-42, Table 3.2-2, *Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines*, and other GHG emissions are based on 40 CFR 98 Subpart C, Tables C-1 and C-2, *Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel and Default CH₄ and N₂O Emission Factors for Various Types of Fuel*. Annual emissions estimates are based on a maximum of 500 hours of total operation per year.

2.3 **PARKER INDUSTRIAL BOILER T4600LR**

Emissions from the hydronic heater, 563-Heater-01, are based on AP-42, Table 1.4-2, *Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion* and on vendor provided data. The heater will be used for fuel gas conditioning purposes.

2.4 **FUGITIVE EMISSIONS**

Fugitive emissions are expected from components and piping utilized at the station for the purposes of conveying natural gas and other materials into, within, and out of the facility. The fugitive component counts represented in the fugitive emission calculations included in Appendix B have been estimated based on component counts at a similar natural gas compressor station. The estimation of fugitive emissions is based on U.S. EPA document, EPA-453/R-95-017 (Protocol for Equipment Leak Emission Estimates, 1995).

2.5

STORAGE TANKS

One (1) condensate storage tank, T-01, will be installed at Station 563 as part of BRE. Tank emissions have been estimated using Tanks 4.09d software and E&P Tanks software. Emissions estimates account for both working losses and breathing losses, as well as flashing losses.

3.0 REGULATORY REVIEW

The following sections describe the regulatory applicability for each emission source proposed as part of this project, as well as for the facility itself.

3.1 FEDERAL REQUIREMENTS

3.1.1 *Title V Operating Permit Program*

Station 563 will be a major source with respect to the Title V Major Source Operating Permit Program (40 CFR Part 70), as administered by the MGNDC in accordance with MHDDPC Regulation No. 13 *Part 70 Operating Permit Program*. The facility's CO and NO_x PTE will exceed the applicable Title V major source threshold of 100 tpy. The facility's hazardous air pollutant (HAP) PTE emissions will not exceed 10 tpy per individual HAP, and will not exceed 25 tpy for combined HAP. Please refer to the facility-wide PTE totals in Table 3 of this report.

3.1.2 *New Source Review: Prevention of Significant Deterioration (PSD)*

Station 563 is located in Davidson County. The air quality of Davidson County is designated by the U.S. EPA as either "better than normal standards" or "unclassified/attainment" for all criteria pollutants. As such, new construction or modifications that result in emission increases are potentially subject to the PSD permitting regulations.

PSD applicability depends on the existing status of the facility (i.e. major or minor source) and the net emissions increase associated with the project. The major source threshold for PSD applicability is 250 tpy unless the source is included on a list of 28 specifically defined industrial source categories for which the PSD "major" source threshold is 100 tpy. As Station 563 is not on the U.S. EPA list, the PSD major source threshold is 250 tpy of any pollutant regulated by the Clean Air Act (CAA). Potential emissions of each criteria pollutant from the proposed facility will not exceed 250 tpy. Therefore, the Project are not subject to PSD review, as shown in Table 4.

Table 4: Facility PTE Estimates and Comparison to PSD Significant Emission Rates

Emission Unit	Potential Emissions (tpy)					
	NO _x	CO	VOC	PM/PM ₁₀ / PM _{2.5}	SO ₂	CO _{2e}
563-A-01	83.65	53.85	5.76	6.01	3.09	107,381
563-A-01	83.65	53.85	5.76	6.01	3.09	107,381
563-A-Aux-01	2.40	4.80	1.20	0.04	<0.01	609
563-Heater-01	0.48	1.11	0.12	0.20	0.01	2,371
Fug	--	--	2.48	--	--	1,131
T-01	--	--	0.15	--	--	--
Total	170.19	113.60	15.48	12.26	6.20	218,872
PSD Thresholds (tpy)	250 (each)					--
PSD Thresholds Exceeded?	No	No	No	No	No	No

3.1.3 New Source Performance Standards (NSPS)

New Source Performance Standards (NSPS) regulations require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. NSPS standards are developed for particular industrial source categories and applicable categories are described below.

3.1.3.1 40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

This regulation applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat capacity of 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. 563-Heater-01 will have a heat input of 4.6 MMBtu/hr and thus is not subject to this regulation.

3.1.3.2 *40 CFR 60 Subpart K - Standards of Performance for Storage Vessels for Petroleum Liquids*

This regulation applies to petroleum storage vessels with storage capacities greater than 40,000 gallons and therefore constructed, reconstructed, or modified after June 11, 1973, and prior to May 19, 1978. The Project will commence after May 19, 1978, and therefore, this regulation does not apply.

3.1.3.3 *40 CFR 60 Subpart Ka - Standards of Performance for Storage Vessels for Petroleum Liquids*

This regulation applies to petroleum storage vessels with storage capacities greater than 40,000 gallons and constructed, reconstructed, or modified after May 18, 1978, and prior to June 23, 1984. The Project will commence after June 23, 1984, and therefore, this regulation does not apply.

3.1.3.4 *40 CFR 60 Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels*

This regulation applies to volatile organic liquid storage vessels with storage capacities greater than or equal to 75 cubic meters (19,812 gallons) for which construction, reconstruction, or modification commenced after July 23, 1984. There are no petroleum storage vessels with capacities greater than 19,810 gallons planned at Station 563. Therefore, this regulation is not applicable to the facility.

3.1.3.5 *40 CFR 60 Subpart KKK-Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants*

Station 563 will not be a natural gas processing plant as defined in this Subpart, and the facility does not engage in extraction of natural gas liquids from field gas or fractionate mixed natural gas liquids to natural gas products. Therefore, this regulation is not applicable.

3.1.3.6 *40 CFR 60 Subpart LLL-Standards of Performance for Onshore Natural Gas Processing: SO₂ Emissions*

Station 563 will not be a natural gas processing plant. Therefore, this regulation is not applicable.

3.1.3.7 *40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*

This regulation is not applicable to Station 563 because compression ignition internal combustion engines are not proposed as part of the project.

3.1.3.8 *40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*

Subpart JJJJ applies to owners and operators of stationary spark ignition (SI) internal combustion engines (ICE) that commence construction after June 12, 2006, depending on engine power and date of manufacture, and to owners and operators of all stationary SI ICE that are modified or reconstructed after June 12, 2006. The new emergency generator engine 875-A-Aux-01 will be manufactured and installed between 2016 and 2017, will have maximum rating of 2,175 hp, and thus will be subject to Subpart JJJJ.

The new emergency generator will meet the following emission standards from Subpart JJJJ, Table 1 [§60.4233(e)]. Compliance will be demonstrated either via EPA certification or by emission testing:

1. NO_x limit of 2.0 g/HP-hr.
2. CO limit of 4.0 g/HP-hr.
3. VOC limit of 1.0 g/HP-hr.

The new emergency generator engine will be equipped with a non-resettable hour meter [§60.4237(a)]. As noted above, TGP will either 1) purchase an engine certified to meet the manufacturer and Subpart JJJJ emission limits/standards and will maintain documentation of the certification on site [§60.4245(a)(3)], or 2) purchase an engine which will meet these limits/standards, conduct an initial performance test, and conduct subsequent performance testing every 8,760 hours of operation or 3 years, whichever comes first, to demonstrate compliance in accordance with §60.4244 [§60.4243(b)(2)(ii)]. If the engine is not certified, TGP will develop a maintenance plan for the engine and will, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions [§60.4243(b)(2)(ii)].

The unit will be operated as follows in order to maintain its emergency unit status [§60.4243(d)]:

1. There is no time limit on the use of emergency stationary ICE in emergency situations.
2. Maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer,

the vendor, or the insurance company associated with the engine, will be limited to 100 hours per year unless records indicating that federal, state, or local standards require maintenance and testing of emergency ICE beyond 100 hours per calendar year are maintained.

3. For non-emergency situations, the emergency stationary ICE may be operated for up to 50 hours per calendar year. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing.

TGP will maintain all required records as follows [§60.4245]:

1. Maintenance conducted on the engine;
2. Documentation that the engine meets applicable emission standards; and
3. Hours of operation.

Reporting requirements include submittal of an initial notification and performance test results, as applicable, and TGP will comply with these requirements.

3.1.3.9 40 CFR 60 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines

Stationary combustion turbines with a heat input at peak load equal to or greater than 10 MMBtu per hour, based on the HHV of the fuel, which commenced construction, modification, or reconstruction after February 18, 2005, are subject to this Subpart. The new two turbines, 563-A-01 and 563-A-02, will each have a heat input greater than 10 MMBtu/hr. Therefore, the turbines will be subject to Subpart KKKK.

The new turbines will meet the following limits:

1. NO_x emission limit of 25 ppm at 15 percent O₂ or 150 nanograms per joule (ng/J) of useful output (1.2 pound per megawatt hour (lb/MWh)) [§60.4320]; and either
2. Total potential sulfur emissions limit of 110 ng SO₂/J (0.90 lb SO₂/MWh) [§60.4330(a)(2)], or
3. Fuel sulfur limit of 26 ng SO₂/J (0.060 lb SO₂/MMBtu) heat input

Appendix C includes manufacturer emissions and performance data, which guarantees that the NO_x limit above will be met on the ppm basis. TGP will perform an initial and subsequent periodic performance tests to demonstrate compliance with the applicable NO_x emission limit, with reduced subsequent performance tests as applicable [§60.4340(a)].

The sulfur limits will be met through the use of pipeline quality natural gas as fuel. For turbines 563-A-01 and 563-A-02, the fuel used for operation is derived from the natural gas transported through TGP's pipeline system. TGP gas tariff limits total sulfur content in the transported gas to 5 grains per 100 cubic feet.

3.1.3.10 40 CFR 60 Subpart GG – Standards of Performance for Stationary Gas Turbines

The provisions of this Subpart are applicable to the following affected facilities: all stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10 MMBtu/hr), based on the lower heating value of the fuel fired, which commences construction, modification, or reconstruction after October 3, 1977 [§60.330(a)-(b)].

However, 40 CFR 60 Subpart KKKK states that stationary combustion turbines regulated under Subpart KKKK are exempt from the requirements of Subpart GG [§60.4305(b)]. As the new compressor turbines will be subject to Subpart KKKK, they are exempt from the requirements of Subpart GG.

3.1.3.11 40 CFR 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

This Subpart establishes emission standards and compliance schedules for the control of VOC and SO₂ emissions for affected facilities producing, transmitting, or distributing natural gas. Compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment are subject to this Subpart. Custody transfer is defined as the transfer of natural gas after processing and/or treatment in the producing operations. Station 563 will be located after the point of custody transfer, and thus compressor turbines 563-A-01 and 563-A-02 will not be subject to this regulation. Storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy are also subject to this Subpart. The condensate storage vessel to be located at Station 563 is expected to emit less than this threshold, and thus will not be subject to this regulation.

3.1.4 *National Emission Standards for Hazardous Air Pollutants (NESHAP)*

The National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations established in 40 CFR Part 61 and Part 63 regulate emission of air toxics. NESHAP standards primarily apply to major sources of HAP, though some subparts of Part 63 have been revised to include area (non-major) sources. The

NESHAP regulations under 40 CFR Part 61 establish emission standards on the pollutant basis whereas 40 CFR Part 63 establishes the standards on a source category basis. Station 563 will not emit any individual HAP in excess of 10 tpy or combined HAP in excess of 25 tpy, and will therefore be designated an area source of HAP.

3.1.4.1 40 CFR 61 Subpart M – National Emissions Standards for Asbestos

Asbestos containing materials will not be used to construct Station 563. Therefore, this regulation will not apply.

3.1.4.2 40 CFR 63 Subpart HHH – National Emissions Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities

This regulation applies to certain affected facilities at major HAP sources. Station 563 will be an area HAP source. Therefore, this regulation is not applicable.

3.1.4.3 40 CFR 63 Subpart YYYY – National Emissions Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

Stationary combustion turbines located at major sources of HAP emissions are subject to this Subpart. Station 563 will not be a major source of HAP emissions. Therefore, this regulation does not apply.

3.1.4.4 40 CFR 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Stationary reciprocating internal combustion engines (RICE) located at area and major sources of HAP that are new, existing, or reconstructed are subject to this Subpart, depending on power rating and unit type. The new emergency generator (engine) 563-A-Aux-01 will be manufactured and installed between 2016 and 2017, the generator engine will have a rating of 2,175 hp. Therefore, this generator engine will be subject to Subpart ZZZZ as a new stationary RICE. However, a new RICE located at an area source must comply with this Subpart by meeting the requirements for 40 CFR 60 Subpart JJJJ, and no further requirements apply for such engines under this Subpart [§60.6590(c)].

3.1.4.5 40 CFR 63 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

Industrial, commercial, or institutional boilers or process heaters located at a major source of HAPs are subject to this Subpart. Station 563 will not be a major source of HAPs and therefore, this Subpart will not apply.

3.1.4.6 40 CFR 63 Subpart JJJJJ – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

This Subpart applies to area sources of HAP. Station 563 will be an area source of HAP. However, the proposed heater does not meet the definition of a boiler and therefore, this regulation does not apply.

3.1.5 *Compliance Assurance Monitoring (CAM)*

Enhanced monitoring requirements referred to as Compliance Assurance Monitoring (CAM) have been adopted into 40 CFR 64. These requirements are applicable to sources that have a potential to emit in excess of major source thresholds, not considering “tailpipe” emission controls, and use an “active” control device to achieve compliance with the emission limit.

An emission unit is subject to CAM if all of the following criteria are satisfied:

- a) The unit is located at a major source that is required to obtain a Part 70 or Part 71 permit;
- b) The unit is subject to an emission limitation or standard for a regulated air pollutant;
- c) The unit uses an active control device to achieve compliance with any such emission limit or standard; and
- d) The unit has potential pre-controlled emission of the applicable air pollutant above the major source threshold.

Station 563 will be a Title V major source under Part 70. Certain emission units at Station 563 will be subject to an emission limitation(s) or standard(s) for a regulated pollutant. However, none of the units will utilize an active control device to achieve compliance with the applicable limitation(s) or standard(s). Therefore, CAM regulations will not apply to the facility.

3.1.6 ***Maintenance Emissions and Federal Routine Maintenance, Repair and Replacement Provisions***

As part of normal operations of Station 563, TGP will routinely conduct activities associated with maintenance and repair of the facility equipment. These maintenance and repair activities will include, but will not be limited to, compressor engine startup/shutdowns, upsets, and emergencies, calibrating equipment, changing orifice plates, deadweight testing, emergency power generator run times, changing equipment filters (e.g., oil filters, separator filters), and use of portable gas/diesel engines for air compressors and lube guns.

Furthermore, in order to ensure the reliability of natural gas deliveries to their customers, TGP may conduct equipment and component replacement activities that conform to the currently applicable federal laws and regulations.

3.1.7 ***Acid Rain Regulations***

Station 563 will not sell electricity and will be a non-utility facility. Therefore, Station 563 will not be subject to the federal acid rain regulations found at 40 CFR Parts 72 through 77.

3.1.8 ***Chemical Accident Prevention and Risk Management Programs (RMP)***

Station 875 will not be subject to the Chemical Accident Prevention Provisions (40 CFR 68.1). The facility will not be considered a stationary source under 40 CFR 68.3, Chemical Accident Prevention, because it is regulated under 49 CFR 192, U.S. Department of Transportation (DOT). Subpart B of 40 CFR 68 outlines requirements for Risk Management Programs (RMP) pursuant to Section 112(r) of the CAA.

3.1.9 ***Stratospheric Ozone Protection Regulations***

Subpart F, *Recycling and Emissions Reductions*, of 40 CFR Part 82, *Protection of Stratospheric Ozone*, generally requires that all repairs, service, and disposal of appliances containing Class I or Class II ozone (O₃) depleting substances be conducted by properly certified technicians. The facility will comply with this regulation as applicable.

3.2 LOCAL REQUIREMENTS

3.2.1 *Metropolitan Code of Law Chapter 10.56 – Air Pollution Control*

This Chapter establishes administration, enforcement, and operational standards and rules for air pollution control in Nashville and Davidson County, Tennessee. Station 563 will be located in Davidson County and therefore must meet all applicable requirements of this Chapter.

3.2.1.1 *Section 10.56.020: Construction Permits*

This Section requires that any facility that will install, construct, reconstruct, or alter equipment which increases the amount of any air contaminant emitted submit an application for a construction permit with the MHD along with plans and specifications applicable to the Director. This application package serves to meet the requirements of this section for Station 563. TGP will not commence construction or modification until a permit has been issued.

Compliance testing required as a condition of a construction permit will be conducted in accordance with Section 10.56.290: *Measurement and Reporting Emissions* and Section 10.56.300: *Testing Procedures* of this Chapter. TGP will comply with all other requirements of this Section as applicable.

3.2.1.2 *Section 10.56.040: Operating Permit*

This Section requires that an application for an operating permit be submitted following completion of construction activities. TGP will submit all required application and notification documents required by the MHD and Director for Station 563.

3.2.1.3 *Section 10.56.080: Permit and Annual Emission Fees*

This Section establishes fees for construction permits, operating permits, and annual emissions for applicable facilities. TGP will submit the permit and annual emission fees required by the MHD for Station 563.

3.2.1.4 Section 10.56.160: Ambient Air Quality Standards

This Section sets ambient air quality standards applicable throughout Metropolitan Nashville and Davidson County to prevent significant deterioration of the existing air quality. There are no specific requirements applicable to Station 563 under this Section.

3.2.1.5 Section 10.56.210: Hazardous Air Pollutants

This Section requires that any operator of a HAP emission source comply with any emission standard or applicable requirement established by the EPA pursuant to Section 112 of the CAA. Federal NESHAP regulations have been previously covered in this report.

3.2.1.6 Section 10.56.220: Fuel Burning Equipment

This Section sets limitations on emission of PM resulting from the combustion of solid fuel, distillate oil, residual oil, or coal for new and existing sources in the Nashville Metropolitan and Davidson County areas. Combustion sources at Station 563 will utilize only pipeline quality natural gas and therefore, are not subject to this Section.

3.2.1.7 Section 10.56.240: Internal Combustion Engines

This Section requires that visible emissions from any internal combustion engine be lighter than shade No. 2 on the Ringlemann Smoke Chart or forty percent opacity. Station 563 will meet the applicable emission limits required by this Section by using pipeline quality natural gas as fuel in the proposed combustion sources.

3.2.1.8 Section 10.56.260: Process Emissions

This Section provides restrictions for sulfur oxides (SO_x) and PM emissions. SO_x emissions are limited to 500 ppm from all processes except the burning of fuel for indirect heating, and PM emissions are limited based on process weight. Station 563 will meet the applicable emission limits required by this Section by using pipeline quality natural gas as fuel in the proposed combustion sources.

3.2.1.9 *Section 10.56.270: Visible Emissions*

This Section requires that visible emissions from any air contaminant source be lighter than shade No. 1 on the Ringlemann Smoke Chart. This shade corresponds to twenty percent opacity. Station 563 will meet the applicable emission limits required by this Section by using pipeline quality natural gas as fuel in the proposed combustion sources.

3.2.1.10 *Section 10.56.280: Start-ups, Shutdowns and Malfunctions*

This Section addresses emissions occurring during start-ups, shutdowns, and malfunctions. A log of all start-ups, shutdowns, and malfunctions will be maintained by TGP, and emissions will be kept to a minimum during these time periods. Upon equipment breakdown causing emissions in violation of Metropolitan Code of Law Chapter 10.56, TGP will notify the Director of the failure and provide all needed information.

3.2.2 *Metropolitan Health Department Division of Pollution Control Regulation No. 3 – New Source Review*

This regulation establishes the review, reporting, and permitting requirements for new or modified stationary sources in Nashville and Davidson County, Tennessee. Any new or modified stationary source must meet the requirements of MCL 10.52.020: *Construction Permits* and all additional requirements of this regulation including PSD. MCL 10.52.020: *Construction Permits* and PSD have been previously discussed in this report. Thus, there are no further requirements of this regulation that apply to Station 563.

3.2.3 *Metropolitan Health Department Division of Pollution Control Regulation No. 4 – Regulation for Control of Hazardous Air Pollutants*

This regulation pertains to the emission standards for HAP and the permitting, testing, reporting requirements of any source emitting these hazardous pollutants in Metropolitan Nashville and Davidson County. TGP will meet all requirements of this regulation including notification and monitoring procedures.

Additional emissions standards are provided for asbestos, beryllium, mercury, and perchloroethylene dry cleaning facilities. Emission standards for beryllium, mercury, and perchloroethylene will not apply to Station 563. Asbestos containing materials will not be used to construct this facility.

3.2.4 *Metropolitan Health Department Division of Pollution Control Regulation No. 5 - Standards of Performance for New Stationary Sources*

This regulation pertains to the emission standards for new stationary sources and the permitting, testing, and reporting requirements of any affected facility in Metropolitan Nashville and Davidson County, Tennessee. The requirements within these regulations have been previously covered in this report, thus addressing Station 563 applicability.

3.2.5 *Metropolitan Health Department Division of Pollution Control Regulation No. 6 - Emissions Monitoring for Stationary Sources*

This regulation sets forth the minimum requirements for continuous emission monitoring, recording and reporting for stationary sources in Metropolitan Nashville and Davidson County. Station 563 will not have any emission sources falling within the listed source categories and thus will not be subject to this regulation.

3.2.6 *Metropolitan Health Department Division of Pollution Control Regulation No. 7 - Regulation for Control of Volatile Organic Compounds*

This Regulation establishes emission standards for stationary sources of volatile organic compounds located in Metropolitan Nashville and Davidson County, Tennessee. Station 563 will not emit VOC in excess of 25 tpy and will not have any emission sources listed as affected sources; therefore, this regulation will not apply.

3.2.7 *Metropolitan Health Department Division of Pollution Control Regulation No. 13 - Part 70 Operating Permit Program*

This regulation establishes requirements for the issuance of operating permits to stationary sources. Station 563's CO and NO_x PTE emissions post-project will exceed the applicable Title V major source threshold of 100 tpy each, and the facility will be designated as a major source with respect to the Title V Major Source Operating Permit Program (40 CFR Part 70). This application submittal serves to comply with all requirements of the Part 70 Operating Permit Program for Station 563 as a Title V Major Source.

3.2.8

***Metropolitan Health Department Division of Pollution Control Regulation No. 14
- Regulation for Control of Nitrogen Oxides***

This Regulation establishes emission standards for stationary sources of nitrogen oxides located in Metropolitan Nashville and Davidson County, Tennessee. Any facility which emits or has a PTE 100 tpy or more of NO_x must apply reasonably available control technology (RACT) to control NO_x emissions from that source. Station 563 has a PTE above the threshold value and is therefore subject to this regulation. TGP will meet all requirements of this regulation as they relate to Station 563.

Compressor turbines 563-A-01 and 563-A-02 will come standard with SoLoNO_x combustion technology and will not employ an air pollution control device; therefore, RACT can be expressed as a source design characteristic. Based on Solar's guarantee for NO_x emission rates and the emission limit specified in NSPS 40 CFR 60 Subpart KKKK for Combustion Turbines, the requested RACT requirement is:

Install a natural gas-fired compressor turbine that employs combustion technology designed to meet the 25.0 ppm NO_x emission limit at 15% oxygen specified in 40 CFR 60 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines.

List of Report Acronyms and Page Number of First Reference

BRE	Broad Run Expansion, 1
BTU/scf	British Thermal Units per standard cubic feet, 5
CAA	Clean Air Act, 8
CAM	Compliance Assurance Monitoring, 15
CO	carbon monoxide, 1
DOT	Department of Transportation, 16
HAP	hazardous air pollutant, 13
ICE	Internal combustion engines, 11
J	Joule, 12
MCL	Metropolitan Code of Laws, 1
MGNDCC	Metropolitan Government of Nashville and Davidson County, 1
MHDDPC	Metropolitan Health Department Division of Pollution Control, 1
MSDS	Material Safety Data Sheets, 1
MWh	megawatt-hour, 12
NAICS	North American Industry Classification System, 1
NESHAP	National Emission Standards for Hazardous Air Pollutants, 13
ng	nanogram, 12
NO _x	nitrogen oxides, 1
O ₂	oxygen, 5
O ₃	ozone, 16
PSD	Prevention of Significant Deterioration, 2, 4
PTE	potential to emit, 1

RACT
reasonable available control technology, 21

RICE
reciprocating internal combustion engines, 14

RMP
Risk Management Programs, 16

SER
Significant Emission Rate, 8

SI
Spark ignition, 11

SIC
Standard Industrial Classification, 1

SO_x
sulfur oxides, 18

TGP
Tennessee Gas Pipeline, 1

TN
Tennessee, 1

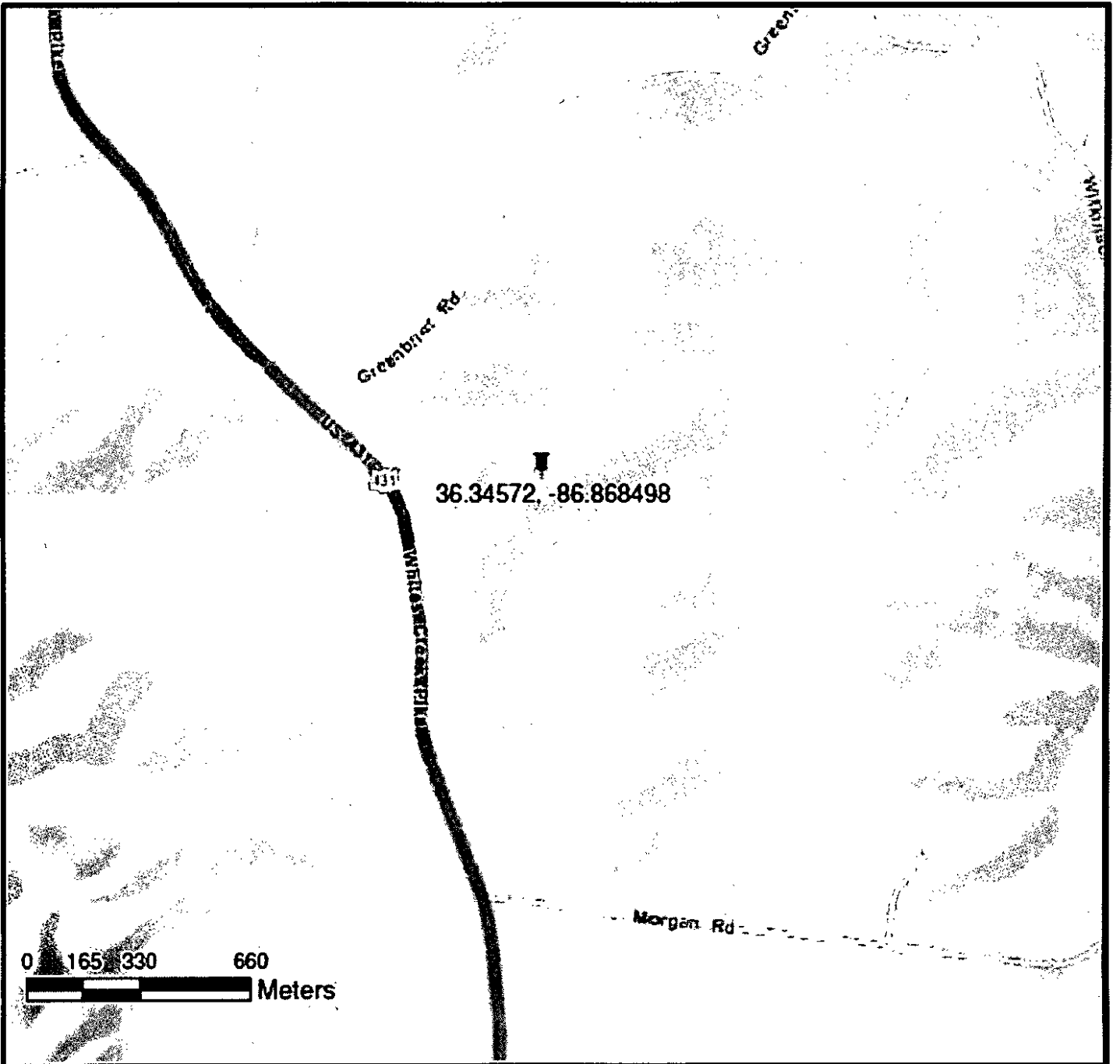
tpy
tons per year, 1

U.S.
United States, 1

UHC
Unburned hydrocarbons, 5

VOC
volatile organic compound, 2

Figures



ERM
 Environmental
 Resources
 Management

SITE LOCATION MAP

STATION 563 - BRE

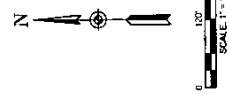
TENNESSEE GAS PIPELINE, L.L.C.

JOELTON, DAVIDSON COUNTY, TENNESSE

FIGURE

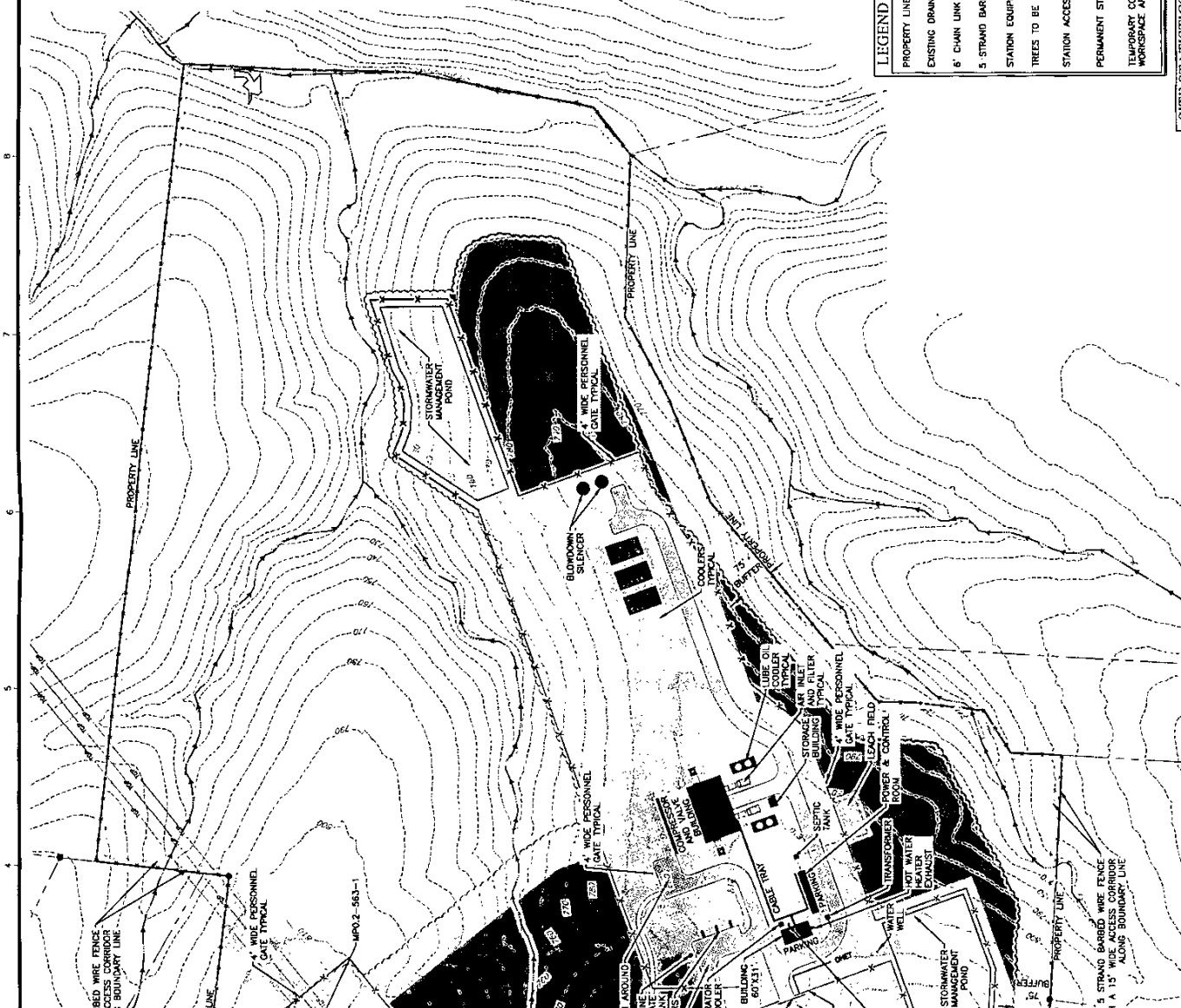
1

GENERAL NOTES



LEGEND

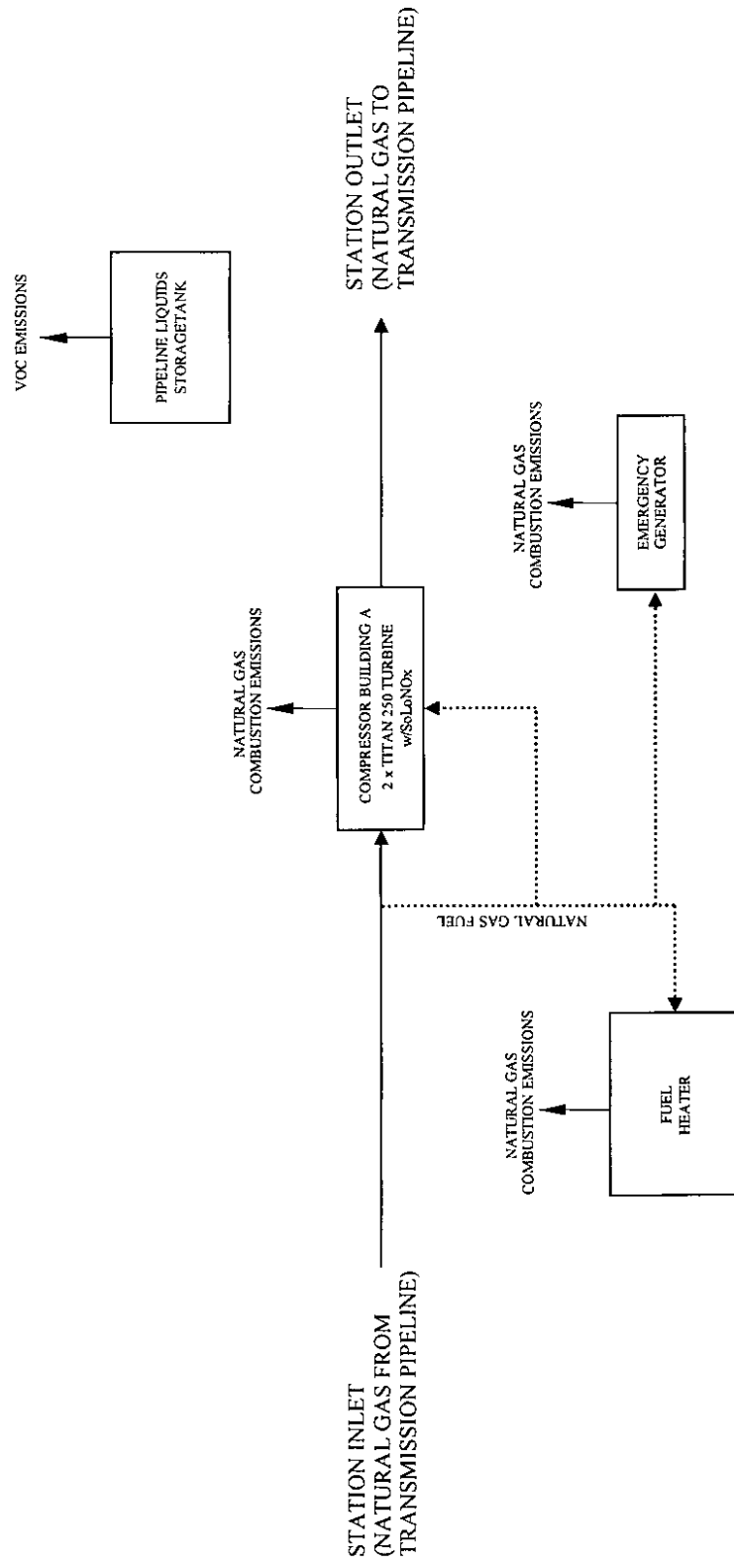
	PROPERTY LINE
	EXISTING DRAINAGE FEATURES
	6' CHAIN LINK FENCE
	5 STRAND BARBED WIRE
	STATION EQUIPMENT
	TREES TO BE REMOVED
	STATION ACCESS ROAD
	PERMANENT STATION AREA
	TEMPORARY CONSTRUCTION WORKSPACE AREA



NO.	DATE	BY	REVISIONS	PROJ. ID	LABOR
6	12/11	BL	ISSUED FOR REVIEW	48131	DBM
5	12/11	BL	ISSUED FOR PERMITS	48131	DBM
4	12/11	BL	PRELIMINARY	48131	DBM
3					
2					
1					

Compressor Station 563

Simplified Process Flow Diagram



Appendix A

MGNDC Permit Application Forms

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

*Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142*

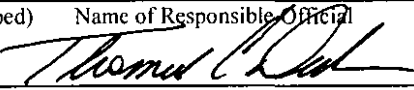
**PART 70 OPERATING PERMIT APPLICATION
 INDEX OF AIR POLLUTION PERMIT APPLICATION FORMS**

1. ADMINISTRATION	APC Form V.1, Facility Identification	
This application contains the following forms:	APC Form V.2, Operations and Flow Diagrams	
2. EMISSIONS SOURCE DESCRIPTION		TOTAL NUMBER OF THIS FORM
This application contains the following forms (one form for each facility incinerator, printing operation, etc.):	APC Form V.3, Stack or Fugitive Release Point Identification	3
	APC Form V.4, Fuel Burning Equipment (Non-Process)	1
	APC Form V.5, Stationary Gas Turbine or Internal Combustion Engine	2
	APC Form V.6A, Storage Tanks (except gasoline dispensing facilities)	1
	APC Form V.6B, Gasoline Dispensing Facility - Stage I and Stage II	
	APC Form V.7, Incineration	
	APC Form V.8, Printing Operations	
	APC Form V.9, Painting and Coating Operations	
APC Form V.10, Miscellaneous Process Emission Sources		
3. AIR POLLUTION CONTROL SYSTEM		TOTAL NUMBER OF THIS FORM
This application contains the following forms (one form for each control system in use at the facility)	APC Form V.11, Control Equipment - Miscellaneous	1
	APC Form V.12, Control Equipment - Condenser	
	APC Form V.13, Control Equipment - Adsorber	
	APC Form V.14, Control Equipment - Catalytic or Thermal Oxidation	
	APC Form V.15, Control Equipment - Cyclone/Settling Chamber	
	APC Form V.16, Control Equipment - Electrostatic Precipitator	
	APC Form V.17, Control Equipment - Wet Collection System	
	APC Form V.18, Control Equipment - Baghouse/Fabric Filter	

4. COMPLIANCE DEMONSTRATION		TOTAL NUMBER OF THIS FORM
This application contains the following forms (one form for each facility incinerator, printing operations, etc.):	APC Form V.19, Compliance Certification - Monitoring and Reporting - Description of Methods Used for Determining Compliance	1
	APC Form V.20, Compliance Demonstration by Continuous Emissions Monitoring	
	APC Form V.21, Compliance Demonstration by Portable Monitors	
	APC Form V.22, Compliance Demonstration by Monitoring Control System Parameters or Operating Parameters of an Emission Source	
	APC Form V.23, Compliance Demonstration by Monitoring Maintenance Procedures	
	APC Form V.24, Compliance Demonstration by Stack Testing	2
	APC Form V.25, Compliance Demonstration by Fuel Sampling and Analysis	
	APC Form V.26, Compliance Demonstration by Record Keeping	2
	APC Form V.27, Compliance Testing by Other Methods	
	APC Form V.28, Emission Source Hazardous Air Pollutant Summary	3
	APC Form V.29, Facility Wide Hazardous Air Pollutant Summary	1
	APC Form V.30, Emission Source Regulated Air Pollutant Summary	3
	APC Form V.31, Facility Wide Regulated Air Pollutant Summary	1
	APC Form V.32, Emission Source Air Pollution Requirements and Compliance Status	3
	APC Form V.33, Compliance Certification and Compliance Plan	1
APC Form V.34, Facility Wide Title VI Applicable Requirements		

5. STATEMENT OF COMPLETENESS AND CERTIFICATION OF COMPLIANCE

I have reviewed this application in its entirety and to the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I have provided all the information that is necessary for compliance purposes and this application consists of 28 pages and they are numbered from page 1 to 28. The status of this facility's compliance with all applicable air pollution control requirements, including the enhanced monitoring and compliance certification requirements of the Federal Clean Air Act, is reported in this application along with the methods to be used for compliance demonstration.

Thomas C. Dender	Vice-President, Operations
(Printed or Typed) Name of Responsible Official	Title
	1-26-15
Signature of Responsible Official	Date of Application

(FOR DEFINITION OF RESPONSIBLE OFFICIAL, SEE ITEM 5 OF INSTRUCTIONS FOR APC FORM V.)

INSTRUCTIONS FOR APC FORM V:

INDEX OF AIR POLLUTION PERMIT APPLICATION FORMS

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 170 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

ONE FORM MUST BE COMPLETED AND INCLUDED IN EACH APPLICATION

- Item 1 Each application must include at least one APC Form V.1 and V.2.
- Item 2 Please indicate the number of APC Forms V.3 through V.10 that are included in this application.
- Item 3 Please indicate the number of APC Forms V.11 through V.18 that are included in this application.
- Item 4 Please indicate the number of APC Forms V.19 through V.34 that are included in this application.
- Item 5 This application will be deemed incomplete unless Item 5 has been signed by the responsible official as defined below.

"Responsible Official" means one of the following:

- (A) For a corporation: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production or operating facilities applying for or subject to a permit and either:
 - (i) The facilities employ more than 250 persons or have gross annual sales or expenditures exceeding \$25 Million (in second quarter 1980 dollars); or
 - (ii) The delegation of authority to such representative is approved in advance by the permitting authority;
- (C) For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
- (D) For a municipality, state, federal, or other public agency: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a federal agency includes the chief executive officer having responsibility of the overall operations of a principal geographic unit of the agency (e.g., the EPA regional administrator); or

- (E) For affected sources:
- (i) The designated representative insofar as actions, standards, requirements, or prohibitions under Chapter 10.56, "Air Pollution Control" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee; and
 - (ii) The designated representative for any other purposes in accordance with the Metropolitan Health Department, Division of Pollution Control, Regulation No. 13, "Part 70 Operating Permit Program."

If the RESPONSIBLE OFFICIAL who signed the "Statement of Completeness and Certification of Compliance" feels that he is no longer the responsible person to represent and bind the facility, the new responsible official shall declare himself/herself to the Director by certified mail within 15 days of the change. This declaration shall also include a "Statement of Completeness and Certification of Compliance" signed by the new responsible official and a statement affirming that the information contained in the previous application is still true.

IF ANY ITEM ON THIS APPLICATION IS NOT APPLICABLE TO THIS FACILITY, THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 FACILITY IDENTIFICATION**

1. Facility Name Tennessee Gas Pipeline Company, L.L.C. - Compressor Station 563		FOR APC USE ONLY
Mailing Address (Street/Road/P.O. Box) 1001 Louisiana Street		Facility Identification No: _____
City, State, Zip Code: Houston, TX 77002		Application Log No: _____
2. Facility Location (Street/Road/Highway): 7650 Whites Creek Pike		County Name: Davidson
City, State Zip Code: Joelton, 37080		Phone Number:
3. Owner's Name, if different from facility: Tennessee Gas Pipeline Company, L.L.C.		
Owner's Address: 1001 Louisiana Street, #1000, Houston, TX 77002		Phone Number: (713) 420-7906
4. Facility's primary activity and corresponding 4 digit SIC Code(s): 4922		
5. Contact person's name for this permit: Katrina Chruscik	Title: Pipeline System Engineer	Phone Number with Area Code: (713) 420-7906
6. If facility is located in an area designated as "nonattainment", indicate the pollutant(s) for such designation(s) that are emitted by this facility: N/A		
7. List all valid air pollution permit(s) issued to the sources contained in this application (identify all previously issued permits with most recent permit numbers and emission source numbers listed on the permit(s): N/A		
8. Type of permit sought pursuant to this application: (check one) Initial Part 70 Operating Permit: _____ Part 70 Operating Permit Renewal: _____ Part 70 Operating Permit Modification: _____ or Revision (Administrative Amendment): _____ Construction Permit: <input checked="" type="checkbox"/> Other (specify): _____		
9. Owner's Registered agent's name and address for service of process:		Phone Number:
10. Is this facility subject to the provisions governing prevention of accidental releases of hazardous air contaminants contained in Section 112(r) of the Federal Clean Air Act or any Federal regulations promulgated thereunder? Yes: _____ No: _____ If the answer is yes, submit an accidental release plan in accordance with Section 112(r)(7) of the Clean Air Act.		
11. Page Number: <u>1</u> Revision Number: <u>0</u> Date of Revision <u>January 2015</u>		

INSTRUCTIONS FOR APC FORM V.1:

FACILITY IDENTIFICATION

Air contaminant sources that are required to obtain a permit in accordance with the Metropolitan Health Department, Division of Pollution Control, Regulation No. 13, "Part 70 Operating Permit Program" must complete and return this form. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

ONE FORM SHOULD BE INCLUDED WITH EACH APPLICATION.

UNLESS OTHERWISE INDICATED, CORRESPONDENCE WILL BE SENT TO THE CONTACT PERSON AT THE FACILITY LOCATION.

- Item 1** Provide full business name and address of corporation, company, association, society, firm, partnership, individual or political subdivision submitting the application.
- Item 2** Facility location should indicate the actual source location.
- Item 4** State the facility's primary activity and the first four digits of all applicable standard industrial classification (SIC) code(s) for the facility.
- Item 5** Individual to contact for additional information concerning the air pollution sources during the permitting process. Unless otherwise indicated, all correspondence regarding the application or the operating permit will be sent to the contact person at the facility location.
- Item 6** If applicable, indicate the nonattainment pollutant(s) emitted by this facility.
- Item 7** Identify all previously issued permits (most recent permit numbers) and emission source reference numbers listed on the permit(s).
- Item 8** Indicate the type of permit sought pursuant to this application. For better understanding of the word "modification or revision" used under this item, please refer to "Definitions" of Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee.
- Item 9** Provide the name and address of the owner's agent for service of process as registered with the Secretary of State.
- Item 10** Sources which are subject to the provisions of Section 112(r) of the Federal Clean Air Act or any federal regulations promulgated thereunder, must file a copy of any plan or submittal required therein with the Director. If such a source is subject to the permitting requirements of Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, and has failed to timely file their plan with the United States Environmental Protection Agency, the Director will place them on a schedule of compliance to develop and file the plan. If you have not filed a plan with the EPA and the Director, please prepare a schedule of compliance to develop and file the plan. Attach a list of all substances and activities at this facility that are regulated by Section 112(V) of the Clean Air Act. Sources that have filed an accidental release plan shall annually certify in writing to the Director that they are properly following their accidental release plan.
- Item 11** Page number must be filled in. Revision Number and date of revisions are to be filled in only if the information on this form is being revised.

Any terms not defined in the instruction sheets shall have the same meanings as given to them in Chapter 10.56, "Air Pollution Control" or Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee.

INSTRUCTIONS FOR APC FORM V.1:

FACILITY IDENTIFICATION

If the RESPONSIBLE OFFICIAL who signed the “Statement of Completeness and Certification of Compliance” finds that he is no longer the responsible person to represent and bind the facility, the new responsible official shall declare himself/herself to the Director by certified mail within 15 days of the change. This declaration shall also include a “Statement of Completeness and Certification of Compliance” signed by the new responsible official and a statement affirming that the information contained in the previous application(s) is still true.

If the REGISTERED AGENT changes, the new registered agent shall declare himself/herself to the Director by certified mail within 15 days of the change.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEM MUST BE FILLED IN WITH “NOT APPLICABLE” OR “N/A”.

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
Pollution Control Division
311 - 23rd Avenue North
Nashville, Tennessee 37203
Telephone: (615) 340-5653
FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
EMISSION SOURCES AND FLOW DIAGRAMS**

1. Please list by name and number and briefly describe the process emission sources, fuel burning installations, and incinerators that are covered by this application. Please attach a plot plan of this facility identifying each stack or fugitive release point described in this application

Two (2) new Solar Turbines Titan 250-30000S natural gas fired compressor turbines – 29,766 hp at 50 °F each

One (1) new Caterpillar G 3516C natural gas fired emergency generator – 2,175 hp

One (1) new Parker Boiler T4600LR natural gas fired hydronic heater – 4.6 MMBtu/hr (HHV basis)

2. List all insignificant activities which are exempted from permitting because of size or production rate and cite the applicable section of Chapter 10.56, "Air Pollution Control" of the Metropolitan Code of Laws.

Fugitive Emissions

One (1) pipeline liquids storage tank – 3,762 gallons

3. List the names of states that are within 50 miles of your facility

Kentucky

4. Page No.: 2 Revision No.: 0 Date of Revision: January 2015

INSTRUCTIONS FOR APC FORM V.2:

OPERATIONS AND FLOW DIAGRAMS

Air contaminant sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form. Applications are incomplete unless all applicable information requested herein is supplied. *Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application.* If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

ONE FORM SHOULD BE INCLUDED WITH EACH APPLICATION.

- Item 1** Please list, number and describe briefly each **EMISSION SOURCE THAT IS COVERED BY THIS APPLICATION**. Please attach a flow diagram for this application. A detailed flow diagram for each emission source is not required.
- Item 2** Insignificant sources that are exempted based on insignificant activities and emission levels are not required to be included in the permit application. However, insignificant activities which are exempted because of size or production rate are to be included in the permit application along with citation of the applicable requirements.
- Item 4** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this process is Being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.3:

STACK OR FUGITIVE RELEASE POINT IDENTIFICATION

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

**ONE FORM MUST BE COMPLETED FOR EACH STACK OR FUGITIVE RELEASE POINT
(e.i., ROOF VENT, WALL VENT, TANK VENT, STOCKPILE, etc.)
LOCATED AT THIS FACILITY.**

- Item 2** Assign a numerical identification number for this stack or fugitive release point (e.g., 1,2, etc.) and identify this stack or fugitive emission release point on the flow diagram by use of this identification number. This identification number shall agree with the AFS point number used to identify this stack or release point on any past or future emission statements submitted to this agency.
- Item 3** Identify the emission source and the specific equipment or process vented through this emission point.
- Item 4** Provide the height at which the stack discharges above grade in feet or the estimated plume height of the fugitive release point.
- Item 5** Actual velocity at exit conditions using exhaust flow rate at exit conditions.
- Item 7** Provide the exhaust rate in units of actual cubic feet per minute (ACFM).
- Item 8** Provide the normal exhaust rate in units of cubic feet per minute at dry standard conditions (DSCFM). Standard temperature is 68° F for sources subject to New Source Performance Standards, and 70 °F for the rest of the sources.
- Item 11** If the stack is required to be equipped with continuous emission monitoring equipment identify the pollutant monitored, such as TRS (total reduced sulfur), NO_x, SO₂, O₂, CO₂, or opacity.
- Item 12** Complete the appropriate APC Form V.4, V.5, V.6A, V.6B, V.7, V.8, V.9, or V.10 for each source which exhausts its emissions through this stack or release point.
- Item 13** Complete this section if you have a bypass stack associated with the process or control system vented through the stack identified in Item (2) above.
- Item 14** Provide the UTM coordinates of this stack or fugitive release point.
- Item 15** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

NOTE: Items (5), (6), (7), (8), (9), and (10) on APC Form V.3 apply only to stack emission points.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 STACK OR FUGITIVE RELEASE POINT IDENTIFICATION**

1. Facility Name: TGP Compressor Station 563	2. Stack or Fugitive Release Point Number(s): 563-A-Aux-01
3. Emission Source Identification: Emergency Generator 563-A-Aux-01	
4. Indicate type of release point (check one): Stack <input checked="" type="checkbox"/> Fugitive Release Point <input type="checkbox"/> Stack Height <u>20</u> (Feet Above Grade) Fugitive release plume height _____ (Feet Above Grade)	
5. Velocity (data at exit conditions): _____ (Actual Ft/Sec)	6. Inside dimensions at outlet: <u>1.0</u> (Feet)
7. Exhaust flow rate at exit conditions: <u>11,703</u> (ACFM)	8. Flow rate at dry standard conditions: _____ (DSCFM)
9. Exhaust temperature: <u>858</u> (°F)	10. Moisture content (data at exit conditions): _____ (% by volume)
11. If this stack is equipped with continuous emission monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., opacity, SO ₂ , NO _x , etc.): _____ N/A _____ _____ _____	
12. Complete the appropriate APC form(s): V.4, V.5, V.6A, V.6B, V.7, V.8, V.9, or V.10 for each source exhausting through this stack or fugitive release point.	
13. Do you have a bypass stack associated with the stack identified in Item (3) above? _____ Yes <input checked="" type="checkbox"/> No If yes, describe the conditions which require its use and complete a copy of this form for the bypass stack. Please assign a stack number to the bypass stack and use that number to identify the bypass stack on Form V.3 and on the plot plan required by Item 1 on Form APC V.2. _____ _____ _____	
14. Provide the location of this emission point in UTM vertical and UTM horizontal coordinates. Horizontal: <u>4,022,303 - TBD</u> Vertical: <u>511,800 - TBD</u>	
15. Page Number: <u>4</u> Revision Number: _____ Date of Revision: <u>January 2015</u>	

INSTRUCTIONS FOR APC FORM V.3:

STACK OR FUGITIVE RELEASE POINT IDENTIFICATION

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

**ONE FORM MUST BE COMPLETED FOR EACH STACK OR FUGITIVE RELEASE POINT
(e.i., ROOF VENT, WALL VENT, TANK VENT, STOCKPILE, etc.)
LOCATED AT THIS FACILITY.**

- Item 2** Assign a numerical identification number for this stack or fugitive release point (e.g., 1,2, etc.) and identify this stack or fugitive emission release point on the flow diagram by use of this identification number. This identification number shall agree with the AFS point number used to identify this stack or release point on any past or future emission statements submitted to this agency.
- Item 3** Identify the emission source and the specific equipment or process vented through this emission point.
- Item 4** Provide the height at which the stack discharges above grade in feet or the estimated plume height of the fugitive release point.
- Item 5** Actual velocity at exit conditions using exhaust flow rate at exit conditions.
- Item 7** Provide the exhaust rate in units of actual cubic feet per minute (ACFM).
- Item 8** Provide the normal exhaust rate in units of cubic feet per minute at dry standard conditions (DSCFM). Standard temperature is 68° F for sources subject to New Source Performance Standards, and 70 °F for the rest of the sources.
- Item 11** If the stack is required to be equipped with continuous emission monitoring equipment identify the pollutant monitored, such as TRS (total reduced sulfur), NO_x, SO₂, O₂, CO₂, or opacity.
- Item 12** Complete the appropriate APC Form V.4, V.5, V.6A, V.6B, V.7, V.8, V.9, or V.10 for each source which exhausts its emissions through this stack or release point.
- Item 13** Complete this section if you have a bypass stack associated with the process or control system vented through the stack identified in Item (2) above.
- Item 14** Provide the UTM coordinates of this stack or fugitive release point.
- Item 15** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

NOTE: Items (5), (6), (7), (8), (9), and (10) on APC Form V.3 apply only to stack emission points.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 STACK OR FUGITIVE RELEASE POINT IDENTIFICATION**

1. Facility Name: TGP Compressor Station 563	2. Stack or Fugitive Release Point Number(s): 563-Heater-01
3. Emission Source Identification: Hydronic Heater 563-Heater-01	
4. Indicate type of release point (check one): Stack <input checked="" type="checkbox"/> Fugitive Release Point <input type="checkbox"/> Stack Height <u>20</u> (Feet Above Grade) Fugitive release plume height _____ (Feet Above Grade)	
5. Velocity (data at exit conditions): _____ (Actual Ft/Sec)	6. Inside dimensions at outlet: <u>1' 6"</u> (Feet)
7. Exhaust flow rate at exit conditions: _____ (ACFM)	8. Flow rate at dry standard conditions: _____ (DSCFM)
9. Exhaust temperature: _____ (°F)	10. Moisture content (data at exit conditions): _____ (% by volume)
11. If this stack is equipped with continuous emission monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., opacity, SO ₂ , NO _x , etc.): _____ N/A _____ _____ _____	
12. Complete the appropriate APC form(s): V.4, V.5, V.6A, V.6B, V.7, V.8, V.9, or V.10 for each source exhausting through this stack or fugitive release point.	
13. Do you have a bypass stack associated with the stack identified in Item (3) above? _____ Yes <input checked="" type="checkbox"/> No If yes, describe the conditions which require its use and complete a copy of this form for the bypass stack. Please assign a stack number to the bypass stack and use that number to identify the bypass stack on Form V.3 and on the plot plan required by Item 1 on Form APC V.2. _____ _____ _____	
14. Provide the location of this emission point in UTM vertical and UTM horizontal coordinates. Horizontal: <u>TBD</u> Vertical: <u>TBD</u>	
15. Page Number: <u>5</u> Revision Number: _____ Date of Revision: <u>January 2015</u>	

INSTRUCTIONS FOR APC FORM V.3:

STACK OR FUGITIVE RELEASE POINT IDENTIFICATION

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

**ONE FORM MUST BE COMPLETED FOR EACH STACK OR FUGITIVE RELEASE POINT
(e.i., ROOF VENT, WALL VENT, TANK VENT, STOCKPILE, etc.)
LOCATED AT THIS FACILITY.**

- Item 2** Assign a numerical identification number for this stack or fugitive release point (e.g., 1,2, etc.) and identify this stack or fugitive emission release point on the flow diagram by use of this identification number. This identification number shall agree with the AFS point number used to identify this stack or release point on any past or future emission statements submitted to this agency.
- Item 3** Identify the emission source and the specific equipment or process vented through this emission point.
- Item 4** Provide the height at which the stack discharges above grade in feet or the estimated plume height of the fugitive release point.
- Item 5** Actual velocity at exit conditions using exhaust flow rate at exit conditions.
- Item 7** Provide the exhaust rate in units of actual cubic feet per minute (ACFM).
- Item 8** Provide the normal exhaust rate in units of cubic feet per minute at dry standard conditions (DSCFM). Standard temperature is 68° F for sources subject to New Source Performance Standards, and 70 °F for the rest of the sources.
- Item 11** If the stack is required to be equipped with continuous emission monitoring equipment identify the pollutant monitored, such as TRS (total reduced sulfur), NO_x, SO₂, O₂, CO₂, or opacity.
- Item 12** Complete the appropriate APC Form V.4, V.5, V.6A, V.6B, V.7, V.8, V.9, or V.10 for each source which exhausts its emissions through this stack or release point.
- Item 13** Complete this section if you have a bypass stack associated with the process or control system vented through the stack identified in Item (2) above.
- Item 14** Provide the UTM coordinates of this stack or fugitive release point.
- Item 15** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

NOTE: Items (5), (6), (7), (8), (9), and (10) on APC Form V.3 apply only to stack emission points.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142

PART 70 OPERATING PERMIT APPLICATION
FUEL BURNING EQUIPMENT
(NON-PROCESS EXCLUDING MUNICIPAL WASTE COMBUSTORS)

1. Facility Name: TGP Compressor Station 563	2. Stack Number(s): 563-HEATER-01																												
3. Emission source number, description and applicable source classification code(s): Hydronic Heater 563-Heater-01 Parker Boiler T4600LR																													
4. List all fuel burning equipment at this installation discharging flue gases to the stack(s) identified in Item (2) above:																													
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">Stack No.</th> <th style="width:15%;">Boiler No.</th> <th style="width:20%;">Rated Capacity 10⁶ BTU/Hr.</th> <th style="width:15%;">Type of Firing</th> <th style="width:15%;">Primary Fuel</th> <th style="width:15%;">Standby Fuel No. 1</th> <th style="width:15%;">Standby Fuel No. 2</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">563-HEATER-01</td> <td style="text-align: center;">1</td> <td style="text-align: center;">4.6</td> <td style="text-align: center;">Direct</td> <td style="text-align: center;">Natural gas</td> <td style="text-align: center;">NA</td> <td style="text-align: center;">NA</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Stack No.	Boiler No.	Rated Capacity 10 ⁶ BTU/Hr.	Type of Firing	Primary Fuel	Standby Fuel No. 1	Standby Fuel No. 2	563-HEATER-01	1	4.6	Direct	Natural gas	NA	NA														
Stack No.	Boiler No.	Rated Capacity 10 ⁶ BTU/Hr.	Type of Firing	Primary Fuel	Standby Fuel No. 1	Standby Fuel No. 2																							
563-HEATER-01	1	4.6	Direct	Natural gas	NA	NA																							
5.: Year of installation or last modification (each boiler): Future																													
6. Maximum operation schedule: Hrs./Day: <u>24</u> Hrs./Year: <u>8760</u>																													
7. Fuel usage rates used to calculate potential emissions reported on Application Form APC V.28 thru V.31:																													
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">Type of Fuel</th> <th style="width:15%;">Annual Quantity</th> <th style="width:15%;">Units</th> <th style="width:15%;">BTU Content</th> <th style="width:15%;">Sulfur Content (% by wt.)</th> <th style="width:15%;">% Ash (Coal Only)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Natural gas</td> <td style="text-align: center;">39.5</td> <td style="text-align: center;">MMscf/yr</td> <td style="text-align: center;">1,020 BTU/scf</td> <td style="text-align: center;">0.068</td> <td style="text-align: center;">NA</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Type of Fuel	Annual Quantity	Units	BTU Content	Sulfur Content (% by wt.)	% Ash (Coal Only)	Natural gas	39.5	MMscf/yr	1,020 BTU/scf	0.068	NA																
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Natural gas	39.5	MMscf/yr	1,020 BTU/scf	0.068	NA																								
8. Is this fuel burning installation equipped with air pollution control equipment for the purpose of achieving compliance with an applicable requirement? Yes: _____ No: <u>X</u> If yes, please attach the appropriate air pollution control equipment form(s): APC V.11 through APC V.18.																													
9. Are this source's emissions or operations monitored to demonstrate compliance with an applicable requirement? Yes: <u>X</u> No: _____ If yes, please attach the appropriate monitoring form(s): APC V.19 through V.27																													
10. Is this source subject to 40 CFR Part 64 - Enhanced Monitoring Program? Yes _____ No <u>X</u> . If yes, please identify the stack or fugitive release point(s) and pollutant(s) to be monitored for this purpose:																													
11. Page No.: <u>6</u> Revision No.: _____ Date of Revision: <u>January 2015</u>																													

INSTRUCTIONS FOR APC FORM V.4:

FUEL BURNING EQUIPMENT - NON-PROCESS

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH FUEL BURNING INSTALLATION LOCATED AT THIS FACILITY OTHER THAN MUNICIPAL WASTE COMBUSTORS.

A fuel burning installation consists of one or more pieces of fuel burning equipment located at a facility (i.e., each powerhouse). Fuel burning equipment is any furnace, boiler, apparatus, stack, and all appurtenances thereto, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer.

- Item 2** Assign a number to the stack(s) associated with this fuel burning installation. This should be the same number(s) used on Form APC V.3 used to identify each stack at this facility.
- Item 3** Give a brief description of each piece of fuel burning equipment located at this fuel burning installation along with the corresponding eight digit source classification code(s) (SCC) for each piece of equipment.
- Item 4** List each stack at this facility and each piece of fuel burning equipment vented through that stack.
- Item 6** Indicate the maximum operating schedule to be allowed on the operating permit.
- Item 7** Report the type and amount of fuels used to calculate the potential emissions reported on Forms APC V.28 through APC V.31 for this fuel burning installation. Attach an additional sheet outlining any alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally-enforceable emission cap to be established in the permit.
- Item 10** Indicate whether or not this source is subject to 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please indicate which stack(s) or fugitive release point(s) will require monitoring and indicate which pollutant(s) requires monitoring.
- Item 11** Page number must be filled in. Revision number and date of revision are to be filled in only if the information in this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEM
MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142

PART 70 OPERATING PERMIT APPLICATION
STATIONARY GAS TURBINE OR INTERNAL COMBUSTION ENGINE

1. Facility Name: TGP Compressor Station 563					
2. Emission source number, description and applicable source classification code(s): Compressor Turbines 563-A-01 and 563-A-02 (identical units)					
3. Manufacturer and Model Number: Solar Turbines Titan 250-30000S			4.: Stack Number 563-A-01 and 563-A-02		
5. Date of installation or last modification of equipment: future					
6. Rated heat input capacity and horsepower: Million BTU/Hr: <u>207.8 at 50 °F (each)</u> Horsepower: <u>29,766 at 50 °F (each)</u> State which heating value <u>X</u> Higher heating value Lower heating value			7. If equipment is gas turbine, list type: <u>X</u> Simple Cycle Regenerative Cycle Combined Cycle		
8. Fuel usage rate used to calculate potential emissions reported on Form APC V.28 through V.31:					
Type of Fuel	Annual Quantity	Units	Fuel Status	Sulfur Content %By Weight	Nitrogen Content Turbines Only % By Weight
Natural gas	1,785 (each)	MMscf/yr		0.068	N/A
9. Maximum operating schedule: Hours per day: <u>24</u> Hours per year: <u>8760</u>					
10. For NSPS Turbines Only: A. Manufacturer's rated heat rate input at manufacturer's rated peak load: _____ (Kilojoules per Watt Hour), or actual measured heat rate input based on lower heating value of the fuel as measured at actual peak load: <u>9,000</u> (Kilojoules per Watt Hour); and B. Is this turbine equipped with a device to measure and monitor fuel consumption and the water to fuel ratio? Yes <u> </u> No <u>X</u> If yes, please describe: _____					
11. Is this source equipped with air pollution control equipment for the purpose of achieving compliance with an applicable requirement? Yes: <u> </u> No <u>X</u> If yes, attach the appropriate air pollution control equipment form(s) APC V.11 through V.27.					
12. Are this source's emissions or operations monitored to demonstrate compliance with an applicable requirement? Yes <u>X</u> No <u> </u> If yes, please attach the appropriate monitoring forms V.19 through V.27.					
13. Is this source subject to 40 CFR Part 64 - Enhanced Monitoring Program? Yes <u> </u> No <u>X</u> If yes, please identify the stack or fugitive release point(s) to be monitored for this purpose:					
14. Page No.: 7		Revision No.:		Date of Revision: January 2015	

INSTRUCTIONS FOR APC FORM V.5:

STATIONARY GAS TURBINE OR INTERNAL COMBUSTION ENGINE

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH STATIONARY GAS TURBINE OR STATIONARY INTERNAL COMBUSTION ENGINE LOCATED AT THIS FACILITY.

- Item 2** Give a brief description of the stationary gas turbine or internal combustion engine and assign a unique identification number to this piece of equipment. This identification number should also appear on any other forms relating to this piece of equipment. If the piece of equipment is a gas turbine, state whether or not the equipment is subject to 40 CFR Subpart GG.
- Item 3** List the manufacturer and the manufacturer's model number for this piece of equipment.
- Item 4** Assign a stack number to the stack associated with this piece of equipment.
- Item 5** Record the year of installation or modification of each piece of equipment.
- Item 6** List the maximum heat input rate and horsepower of each piece of equipment. Denote whether the higher or lower heating value of the fuel is used to determine the heat input. Note, for gas turbines subject to the NSPS for gas turbines (see Item 2) use the lower heating value. For all other equipment use the higher heating value.
- Item 7** Indicate the type of gas turbine, if applicable.
- Item 8*** Complete the table for all fuels presently in use, plus all fuels desired for use in future operating scenarios and indicate the fuel status (i.e., Primary, Standby No. 1, Standby No. 2, etc.). Provide any additional information needed to define alternative operating scenarios or define permit terms and conditions allowing emissions trading under a federally-enforceable emissions cap to be established in the permit.
- Item 9*** Indicate the maximum operating schedules to be allowed in the operating permit.
- Item 10** If the equipment is a gas turbine that is subject to the NSPS for gas turbines, list either the rated or measured heat rate for the turbine. Please describe any type of monitoring equipment used to monitor fuel consumption and the water to fuel ratio.
- Item 13** Indicate whether or not this source is subject to 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please indicate which stack(s) or fugitive release point(s) will require monitoring and indicate which pollutant(s) requires monitoring.
- Item 14** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

***Items 8 and 9 must reflect the information used to calculate the potential emission rates projected on Forms APC V.28 through APC V.31.**

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

INSTRUCTIONS FOR APC FORM V.5:

STATIONARY GAS TURBINE OR INTERNAL COMBUSTION ENGINE

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH STATIONARY GAS TURBINE OR STATIONARY INTERNAL COMBUSTION ENGINE LOCATED AT THIS FACILITY.

- Item 2** Give a brief description of the stationary gas turbine or internal combustion engine and assign a unique identification number to this piece of equipment. This identification number should also appear on any other forms relating to this piece of equipment. If the piece of equipment is a gas turbine, state whether or not the equipment is subject to 40 CFR Subpart GG.
- Item 3** List the manufacturer and the manufacturer's model number for this piece of equipment.
- Item 4** Assign a stack number to the stack associated with this piece of equipment.
- Item 5** Record the year of installation or modification of each piece of equipment.
- Item 6** List the maximum heat input rate and horsepower of each piece of equipment. Denote whether the higher or lower heating value of the fuel is used to determine the heat input. Note, for gas turbines subject to the NSPS for gas turbines (see Item 2) use the lower heating value. For all other equipment use the higher heating value.
- Item 7** Indicate the type of gas turbine, if applicable.
- Item 8*** Complete the table for all fuels presently in use, plus all fuels desired for use in future operating scenarios and indicate the fuel status (i.e., Primary, Standby No. 1, Standby No. 2, etc.). Provide any additional information needed to define alternative operating scenarios or define permit terms and conditions allowing emissions trading under a federally-enforceable emissions cap to be established in the permit.
- Item 9*** Indicate the maximum operating schedules to be allowed in the operating permit.
- Item 10** If the equipment is a gas turbine that is subject to the NSPS for gas turbines, list either the rated or measured heat rate for the turbine. Please describe any type of monitoring equipment used to monitor fuel consumption and the water to fuel ratio.
- Item 13** Indicate whether or not this source is subject to 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please indicate which stack(s) or fugitive release point(s) will require monitoring and indicate which pollutant(s) requires monitoring.
- Item 14** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

***Items 8 and 9 must reflect the information used to calculate the potential emission rates projected on Forms APC V.28 through APC V.31.**

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142

**PART 70 OPERATING PERMIT APPLICATION
 STORAGE TANKS**

1. Facility Name: TGP Compressor Station 563	2. Storage Tank Number T-01	3. Stack or Fugitive Release Point No.: T-01
4. Emission source number, description and source classification code(s): Pipeline liquids storage tank		
5. Storage Tank Capacity 3,762 Gallons	6. Year of Installation future	7. Tank Height: 10 (Ft.)
		8. Tank Diameter: 8 (Ft.)
9. Tank Color: TBD ; Paint Condition: X Good: _____ Poor		
Roof Color: TBD ; Paint Condition: X Good: _____ Poor		
10. Is this tank equipped with submerged fill pipe? Yes _____ X No		
11. Is this tank equipped with pressure/vacuum conservation vent? Yes _____ X No		
If yes, at what pressure is it set? _____ (PSIG); at what vacuum is it set? _____ (PSIG)		
12. Type of storage tank (check one): X Fixed Roof; _____ External floating roof _____ Internal floating roof; _____ Other (specify) _____		
13. For fixed roof tanks:		
A. Tank configuration (check one): X Vertical (upright cylinder) _____ Horizontal		
B. Tank roof type (check one): _____ Flat; _____ X Cone roof, indicate tank roof height: 2 (Ft); or _____ Dome roof, indicate tank roof height: _____ (Ft); and _____ indicate shell radius: _____ (Ft).		
C. Maximum liquid height: _____ (Ft) D. Average liquid height: _____ (Ft).		
14. For floating roof tanks (both internal and external) - Shell condition (check one): _____ Light rust; _____ Dense rust; _____ Gunite lined		
15. For external floating roof tanks:		
A. Tank construction (check one): _____ Welded tank; _____ Riveted tank		
B. Rim seal system description:		
Primary (check one): _____ Vapor-mounted; _____ Liquid-mounted; _____ Mechanical shoe		
Secondary (check one): _____ Weather shield; _____ Rim-mounted; _____ None		
C. Roof type (check one): _____ Pontoon roof; _____ Double deck roof		
D. Roof fitting types:		
Access Hatch (24" Dia. Well)	Unslotted Guide-Pole Well (8" Diameter, Unslotted Pole, 21" Dia. Well)	Gauge-float Well (20" Dia.)
_____ Bolted cover, gasketed	_____ Ungasketed sliding cover	_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed	_____ Gasketed sliding cover	_____ Unbolted cover, gasketed
_____ Unbolted cover, ungasketed		_____ Bolted cover, gasketed

(Continued)

15. D. Roof fitting types (indicate the number of each type):

Gauge Hatch/Sample Well (8" Diameter)	Vacuum Breaker (10" Diameter Well)	Slotted Guide Pole/Sample Well (8" Diameter Slotted Pole) (2 1/2" Diameter Well)
<input type="checkbox"/> Weighted mechanical Actuation gasketed	<input type="checkbox"/> Weighted mechanical Actuation gasketed	<input type="checkbox"/> Ungasketed sliding cover, without float
<input type="checkbox"/> Weighted mechanical Actuation ungasketed	<input type="checkbox"/> Weighted mechanical Actuation ungasketed	<input type="checkbox"/> Ungasketed sliding cover, with float
		<input type="checkbox"/> Gasketed sliding cover, without float
		<input type="checkbox"/> Gasketed sliding cover, with float

Roof Drain	Roof Leg (3" Diameter)	Roof Leg (2 1/2" Diameter)
<input type="checkbox"/> Open	<input type="checkbox"/> Adjustable, Pontoon Area	<input type="checkbox"/> Adjustable, Pontoon Area
<input type="checkbox"/> 90% Closed	<input type="checkbox"/> Adjustable, Center Area	<input type="checkbox"/> Adjustable, Center Area
	<input type="checkbox"/> Adjustable, Double-Deck Roofs	<input type="checkbox"/> Adjustable, Double-Deck Roofs
	<input type="checkbox"/> Fixed	<input type="checkbox"/> Fixed

16. For internal floating roof tanks:

A. Rim seal system description: Primary (check one): _____ Liquid-mounted; _____ Vapor-mounted
 Secondary (check one): _____ Yes _____ No

B. Number of columns: _____

C. Effective column diameter: _____ (Ft.)

D. Deck type (check one): _____ Welded; _____ Bolted

E. If bolted, indicate the total deck seam length: _____ (Ft.)

F. Deck area _____ (Square Feet)

G. Deck fitting types (indicate the number of each type):

Access Hatch (24" Diameter Well)	Automatic Gauge/Float Well	Ladder Well
<input type="checkbox"/> Bolted cover, gasketed	<input type="checkbox"/> Bolted cover, gasketed	<input type="checkbox"/> Sliding cover, gasketed
<input type="checkbox"/> Unbolted cover, gasketed	<input type="checkbox"/> Unbolted cover, gasketed	<input type="checkbox"/> Sliding cover, ungasketed
<input type="checkbox"/> Unbolted cover, ungasketed	<input type="checkbox"/> Unbolted cover, ungasketed	

COLUMN WELL	SAMPLE PIPE OR WELL
<input type="checkbox"/> Built-up column-sliding cover, gasketed	<input type="checkbox"/> Slotted pipe-sliding cover, gasketed
<input type="checkbox"/> Built-up column-sliding cover, ungasketed	<input type="checkbox"/> Slotted pipe-sliding cover, ungasketed
<input type="checkbox"/> Pipe column-flexible fabric sleeve seal	<input type="checkbox"/> Sample well-slit fabric seal, 10% open area
<input type="checkbox"/> Pipe column-sliding cover, gasketed	<input type="checkbox"/> Stub drain, 1 inch diameter
<input type="checkbox"/> Pipe column-sliding cover, ungasketed	

Roof Leg or Hanger Well	Vacuum Breaker
<input type="checkbox"/> Adjustable _____ Fixed	<input type="checkbox"/> Weighted Mechanical actuation, gasketed
	<input type="checkbox"/> Weighted mechanical actuation, ungasketed

(Continued)

17. For variable vapor space tanks: Volume expansion capacity: _____ (gallons)

18. Complete the following table for products to be stored in this tank:

Part (1)

Product Stored	Storage Dates	Annual Thruput (Gal/Yr)	Liquid Molecular Weight (Lb/Lb Mole)	Vapor Molecular Weight (Lb/Lb Mole)
Pipeline Liquids	TBD	2,000	TBD	TBD

Part (2)

Product Stored	Vapor Pressure (PSIA)	Minimum Vapor Pressure (PSIA)	Maximum Vapor Pressure (PSIA)	Liquid Density (Lb/Gal)	Average Storage Temperature (°F)
Pipeline Liquids	TBD	TBD	TBD	TBD	TBD

19. List hazardous air pollutant constituents below (attach sheet if additional space needed):

Chemical Name	CAS Number	Percent of Total		Chemical Name	CAS Number	Percent of Total	
		Liquid Wt. (%)	Vapor Wt. (%)			Liquid Wt. (%)	Vapor Wt. (%)
1. VOC		TBD	TBD	6.			
2. Misc. HAP		TBD	TBD	7.			
3.				8.			
4.				9.			
5.				10.			

20. Is this tank equipped with air pollution control equipment for the purpose of achieving compliance with an applicable requirement? _____ Yes _____ X _____ No

If yes, attach the appropriate air pollution control equipment form(s) APC V.11 through APC V.18.

21. Is this source emissions or operations monitored to demonstrate compliance with an applicable requirement? _____ Yes _____ X _____ No

If yes, please attach the appropriate monitoring forms APC V.19 through APC V.27.

22. Is this source subject to 40 CFR Part 64 - Enhanced Monitoring Program? _____ Yes _____ X _____ No.

If yes, please identify the stack or fugitive release point(s) and pollutant(s) to be monitored for this purpose:

23 Page Number: _____ 9 _____ Revision Number: _____ Date of Revision: _____ January 2015 _____

INSTRUCTIONS FOR APC FORM V.6A:

STORAGE TANKS

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him to act on the application may result in denial of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH STORAGE TANK FOR WHICH AN AIR POLLUTION CONTROL PERMIT IS REQUIRED (Except for Gasoline Dispensing Facilities).

If you wish to have operating permit restrictions, please indicate this in writing. Otherwise, permit is based on 8,760 Hrs/Yr.

- Item 2** Assign an identification number to this storage tank (e.g., T1, T2, etc.).
- Item 7** If the tank roof is sloped, provide the average tank height.
- Item 10** A submerged fill pipe is any fill pipe with a discharge opening which is entirely submerged when the liquid level is six inches above the tank bottom.
- Item 13** Check the tank roof type which applies and supply the required information. the following equation can be used to calculate the tank roof height of a cone roof tank:
$$H = S \times R$$
Where H is the tank roof height, Ft.
S is the tank cone roof slope, if unknown a standard value of 0.0625 Ft/Ft can be used, Ft/Ft.
R is the tank shell radius, Ft.
- The following equation can be used to calculate the tank roof height of a dome roof tank:
$$H = \sqrt{RR - (RR^2 - Rs^2)^{0.5}}$$
Where H is the tank roof height, Ft.
RR is the tank dome roof radius, Ft.
Rs is the tank shell radius, Ft.
- Item 14** Check the shell condition which best applies if the storage tank is a floating roof type (either internal or external).
- Item 15B** Check the appropriate rim seal type if the storage tank is an external floating roof type.
- Item 15C** Check the appropriate roof type if the storage tank is an external floating roof type.
- Item 15D** Indicate the total number of each appropriate roof fitting type in the space provided if the storage tank is an external floating roof tank.
- Item 16A** Check the appropriate rim seal type if the storage tank is an internal floating roof type.
- Item 16B** Indicate the number of fixed roof support columns if the tank is an internal floating roof type. Indicate zero support columns if the fixed roof is self supported.

INSTRUCTIONS FOR APC FORM V.6A:

STORAGE TANKS

- Item 16C** Indicate the effective column diameter (Ft) if the storage tank is an internal floating roof type. Use the column perimeter (Ft)/3.14 or 1.1 Ft for a 9-inch by 7-inch built-up column, 0.7 Ft for 8-inch diameter pipe columns, and 1.0 if column construction details are not known.
- Item 16D** Check the appropriate deck type if the storage tank is an internal floating roof type.
- Item 16E** Indicate the total deck seam length if the storage tank is an internal floating roof type with a bolted deck.
- Item 16F** Indicate the deck area if the storage tank is the internal floating roof type.
- Item 16G** Indicate the total number of each appropriate deck fitting type in the space provided if the storage tank is an internal floating roof type.
- Item 17** Indicate the volume expansion capacity of the variable vapor space achieved by roof lifting or diaphragm flexing if the tank is a variable vapor space type.
- Item 18** If the tank is used for more than one product, clearly specify each separate product. Vapor pressures should be given as true vapor pressures at the reported tank conditions. The months of storage for each product must be indicated in the "Storage Dates" column. Attach additional sheet outlining any alternative operating scenarios, or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 19** For each hazardous air pollutant constituent indicate the CAS Number and the percent of total liquid weight. Do not list the percent emitted.
- Item 22** Indicate whether or not this source is subject to 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please indicate which stack(s) or fugitive release point(s) will require monitoring and indicate which pollutant(s) requires monitoring.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEM MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142

PART 70 OPERATING PERMIT APPLICATION
CONTROL EQUIPMENT - MISCELLANEOUS

1. Facility Name: TGP Compressor Station 563	2. Emission Source (Identify): 563-A-01 and 563-A-02	3. Stack Number(s) 563-A-01 and 563-A-02																														
4. Describe the control equipment and list the key operating parameters of this device (e.g., pressure drop, gas flow rate, temperature, etc.) and the operating range necessary to achieve the control efficiency reported in Item 7 below: <hr/> Solar's gas turbine dry low NO _x emissions combustion systems, known as SoLoNO _x , is designed to reduce NO _x , CO, and unburned hydrocarbons (UHC) without penalizing stability or transient capabilities. Units 563-A-01 and 563-A-02 are Titan 250-30000S compressor turbines. Solar's temperature range warranty for SoLoNO _x capabilities on the Titan 250-30000S model is greater than or equal to -20 degrees F (-29 degrees C). SoLoNO _x is standard on Solar Turbines and is not an add-on equipment. <hr/> <hr/> <hr/> <hr/>																																
5. Manufacturer and Model Number (if available): N/A	6. Year of Installation: N/A																															
7. List each pollutant controlled by this equipment and the expected control efficiencies:																																
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:20%;">Pollutant</th> <th style="width:20%;">Capture Efficiency (%)</th> <th style="width:20%;">Control Equipment Efficiency (%)</th> <th style="width:20%;">Overall Capture and control Efficiency (%)</th> <th style="width:20%;">Source of Data</th> </tr> </thead> <tbody> <tr> <td>NO_x</td> <td>NA</td> <td>NA</td> <td>NA</td> <td></td> </tr> <tr> <td>CO</td> <td>NA</td> <td>NA</td> <td>NA</td> <td></td> </tr> <tr> <td>UHC</td> <td>NA</td> <td>NA</td> <td>NA</td> <td></td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Pollutant	Capture Efficiency (%)	Control Equipment Efficiency (%)	Overall Capture and control Efficiency (%)	Source of Data	NO _x	NA	NA	NA		CO	NA	NA	NA		UHC	NA	NA	NA											
Pollutant	Capture Efficiency (%)	Control Equipment Efficiency (%)	Overall Capture and control Efficiency (%)	Source of Data																												
NO _x	NA	NA	NA																													
CO	NA	NA	NA																													
UHC	NA	NA	NA																													
8. Discuss how collected material is handled for reuse or disposal: N/A <hr/> <hr/>																																
9. Is this control equipment operated in series with some other control equipment? _____ Yes <u> X </u> No If yes, please describe the system and indicate the overall control efficiency.																																
10. Is this control device equipped to monitor any operating parameters? _____ Yes <u> X </u> No If yes, please describe the equipment and the parameter(s) being monitored: <hr/> <hr/>																																
11. Page No. <u> 10 </u> Revision No.: _____ Date of Revision: <u> January 2015 </u>																																

INSTRUCTIONS FOR APC FORM V.11:

CONTROL EQUIPMENT - MISCELLANEOUS

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH PIECE OF CONTROL EQUIPMENT AT A FACILITY NOT COVERED BY A SPECIFIC APPLICATION FORM

- Item 2** Identify the name and number of the source utilizing this control equipment.
- Item 3** Provide the identification number of the stack(s) exhausting this control equipment. This number should also appear on Form APC V.3.
- Item 7** Identify each regulated or hazardous air pollutant being controlled to meet an applicable requirement and indicate the capture efficiency, control equipment efficiency and the overall capture and control efficiency for each pollutant. Please indicate how the data was obtained, i.e., stack test, manufacturer's guarantee, engineering estimate, etc. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a *federally enforceable emissions cap to be established in the permit.*
- Item 10** Identify any control equipment operating parameters that are being monitored such as pressure drop, temperature, Ph, etc.
- Item 11** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A"**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 MONITORING AND REPORTING - DESCRIPTION OF METHODS
 USED FOR DETERMINING COMPLIANCE**

All sources that are subject to Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually, and may need to be more frequent if specified by the underlying applicable requirement or the Director.			
1.	Facility Name:	TGP Compressor Station 563	
2.	Emission Source Description:	Compressor Turbines 563-A-01 and 563-A-02	
3.	Stack or fugitive release point number(s):	563-A-01 and 563-A-02	
4.	This source as described in Item No. 2 above, will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form (s) to this form:		
	<input type="checkbox"/>	Continuous emissions monitoring (CEM) - APC Form V.20	
	<input type="checkbox"/>	Pollutant(s): _____	
	<input type="checkbox"/>	Emissions monitoring using portable monitors - APC Form V.21	
	<input type="checkbox"/>	Pollutant(s): _____	
	<input type="checkbox"/>	Monitoring control system parameters or operating parameters of a process - APC Form V.22	
	<input type="checkbox"/>	Pollutant(s): _____	
	<input type="checkbox"/>	Monitoring maintenance procedures - APC Form V.23	
	<input type="checkbox"/>	Pollutant(s): _____	
	<input checked="" type="checkbox"/>	Stack Testing - APC form V.24	
	<input type="checkbox"/>	Pollutant(s): <u>NOx</u>	
	<input type="checkbox"/>	Fuel sampling and analysis (FSA) – APC Form V.25	
	<input type="checkbox"/>	Pollutant(s): _____	
	<input checked="" type="checkbox"/>	Recordkeeping - APC Form V.26	
	<input type="checkbox"/>	Pollutant(s): <u>SO2</u>	
	<input type="checkbox"/>	Other (please describe) - APC Form V.27	
	<input type="checkbox"/>	Pollutant(s): _____	
5.	Compliance certification reports will be submitted to the Metropolitan Health Department, Pollution Control Division, according to the following schedule: Start Date: According to the schedule _____, and every 12 months thereafter. contained in the Title V operating permit upon issuance _____		
6.	Compliance monitoring reports will be submitted to the Metropolitan Health Department, Pollution Control Division, according to the following schedule: Start Date: According to the schedule _____, and every 6 months thereafter. contained in the Title V operating permit upon issuance _____		
7.	Page No.:	Revision No.:	Date of Revision:
	<u>11</u>	_____	<u>January 2015</u>

INSTRUCTIONS FOR APC FORM V.19:

COMPLIANCE CERTIFICATION MONITORING AND REPORTING **DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE**

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE LOCATE AT A FACILITY.

- Item 2** Identify the emission source by name and number.
- Item 3** Provide the identification number(s) of the stack(s) associated with this source.
- Item 4** Check the method(s) to be used for demonstrating compliance with any applicable emission standards or regulatory requirements. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 5** Compliance certification reports must be submitted to the Metropolitan Health Department, Pollution Control Division, annually or more frequently if specified by the underlying applicable requirement or by the Director.
- Item 6** Compliance monitoring reports must be submitted to the Metropolitan Health Department, Pollution Control Division, at least every six (6) months.
- Item 7** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 MONITORING AND REPORTING - DESCRIPTION OF METHODS
 USED FOR DETERMINING COMPLIANCE**

All sources that are subject to Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually, and may need to be more frequent if specified by the underlying applicable requirement or the Director.

1.	Facility Name: <u>TGP Compressor Station 563</u>
2.	Emission Source Description: <u>Emergency Generator 563-A-Aux-01</u>
3.	Stack or fugitive release point number(s): <u>563-A-Aux-01</u>
4.	<p>This source as described in Item No. 2 above, will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form (s) to this form:</p> <p><input type="checkbox"/> Continuous emissions monitoring (CEM) - APC Form V.20 Pollutant(s): _____</p> <p><input type="checkbox"/> Emissions monitoring using portable monitors - APC Form V.21 Pollutant(s): _____</p> <p><input checked="" type="checkbox"/> Monitoring control system parameters or operating parameters of a process - APC Form V.22 Pollutant(s): <u>Operating Hours</u></p> <p><input type="checkbox"/> Monitoring maintenance procedures - APC Form V.23 Pollutant(s): _____</p> <p><input checked="" type="checkbox"/> Stack Testing - APC form V.24 Pollutant(s): <u>NOx, CO, VOC</u></p> <p><input type="checkbox"/> Fuel sampling and analysis (FSA) – APC Form V.25 Pollutant(s): _____</p> <p><input checked="" type="checkbox"/> Recordkeeping - APC Form V.26 Pollutant(s): <u>Operating hours</u></p> <p><input type="checkbox"/> Other (please describe) - APC Form V.27 Pollutant(s): _____</p>
5.	Compliance certification reports will be submitted to the Metropolitan Health Department, Pollution Control Division, according to the following schedule: Start Date: <u>According to the schedule</u> , and every <u>12</u> months thereafter. contained in the Title V <u>operating permit upon issuance</u>
6.	Compliance monitoring reports will be submitted to the Metropolitan Health Department, Pollution Control Division, according to the following schedule: Start Date: <u>According to the schedule</u> , and every <u>6</u> months thereafter. contained in the Title V <u>operating permit upon issuance</u>
7.	Page No.: <u>12</u> Revision No.: _____ Date of Revision: <u>January 2015</u>

INSTRUCTIONS FOR APC FORM V.19:

COMPLIANCE CERTIFICATION MONITORING AND REPORTING **DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE**

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE LOCATE AT A FACILITY.

- Item 2** Identify the emission source by name and number.
- Item 3** Provide the identification number(s) of the stack(s) associated with this source.
- Item 4** Check the method(s) to be used for demonstrating compliance with any applicable emission standards or regulatory requirements. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 5** Compliance certification reports must be submitted to the Metropolitan Health Department, Pollution Control Division, annually or more frequently if specified by the underlying applicable requirement or by the Director.
- Item 6** Compliance monitoring reports must be submitted to the Metropolitan Health Department, Pollution Control Division, at least every six (6) months.
- Item 7** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-5665

**PART 70 OPERATING PERMIT APPLICATION
 COMPLIANCE DEMONSTRATION BY STACK TESTING**

1. Facility Name: TGP Compressor Station 563	2. Stack or Fugitive Release Point Number(s): 563-A-01 and 563-A-02
3. Emission Source Description: <u>Compressor Turbines 563-A-01 and 563-A-02</u>	
4. Identify the pollutant(s) to be tested and the applicable emission standard(s) : NOx <u>According to 40 CFR 60 Subpart KKKK, compressor turbines 563-A-01 and 563-A--02 must meet the following emission limits:</u> <u>1. NOx emission limit of 25 ppm at 15 percent O₂</u>	
5. Identify the EPA Reference Test Methods to be used to demonstrate compliance and indicate that all testing will be conducted in accordance with the reference methods, including all required quality assurance procedures: _____ Method 7E _____ _____	
6. Indicate the proposed frequency of demonstrating compliance by stack testing, i.e., monthly, yearly, etc. If performance testing is chosen for NOx: <u>Annual performance testing in accordance with §60.4400 must be completed to demonstrate continuous compliance. If the NOx emission result from the performance test is less than or equal to 75 percent of the NOX emission limit for the turbine, the frequency of subsequent performance tests can be reduced to once every 2 years.</u> _____ _____	
7. <input checked="" type="checkbox"/> The following information will be submitted to the Pollution Control Division 30 days prior to any compliance testing: (a) A statement outlining the purpose of the proposed test; (b) A description of the source and emission point to be tested; (c) A detailed description of the test protocol; and (d) A timetable setting forth the date on which the testing will be conducted and a date by which the test results will be submitted to the Pollution Control Division.	
8. Is the monitoring activity described above required by 40 CFR Part 60 - Enhanced Monitoring Program? Yes _____ No <u>X</u> If yes, please see Item 7 on the back of this form for further instructions.	
9. Page No. <u>13</u> Revision No.: _____ Date of Revision: <u>January 2015</u>	

INSTRUCTIONS FOR APC FORM V.24:

COMPLIANCE DEMONSTRATION BY STACK TESTING

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE WHERE COMPLIANCE WILL BE DEMONSTRATED BY STACK TESTING

- Item 2** Provide the identification number of the stack which exhausts the pollutant(s) to be tested. This number should also appear on the APC Form V.3.
- Item 3** Identify the emission source and the specific equipment vented through the stack identified in Item 2 above.
- Item 4** Identify the pollutant(s) to be tested and the applicable emission standard(s).
- Item 5** Identify the EPA Reference Test Methods to be used to demonstrate compliance and indicate that all testing will be conducted in accordance with the reference methods, including all required quality assurance procedures. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 6** Indicate the proposed frequency of demonstrating compliance by stack testing (i.e., monthly, yearly, etc.).
- Item 7** Place a check mark in the square provided to certify future submittal of the information required by Section 10.56.290, "Measurement and Reporting of Emissions" of Chapter 10.56, "Air Pollution Control" of the Metropolitan Code of Laws.
- Item 8** Indicate whether or not the monitoring activity described on this form is required by 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please attach a description of and justification for the proposed enhanced monitoring protocol to be used to demonstrate continuous compliance in accordance with 40 CFR Part 64.
- Item 9** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

Metropolitan Health Department
 Pollution Control Division
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 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-5665

**PART 70 OPERATING PERMIT APPLICATION
 COMPLIANCE DEMONSTRATION BY STACK TESTING**

1. Facility Name: TGP Compressor Station 563	2. Stack or Fugitive Release Point Number(s): 563-A-Aux-01
3. Emission Source Description: <u>Emergency Generator 563-A-Aux-01</u>	
4. Identify the pollutant(s) to be tested and the applicable emission standard(s) : NOx, CO, VOC According to 40 CFR 60 Subpart JJJJ Table 1 [§60.4233(e)], emergency generator 563-A-Aux-01 meet the following emission limits, either via EPA certification or by manufacturer guarantee: <u>1. NOx = 2.0 g/HP-hr.</u> <u>2. CO = 4.0 g/HP-hr.</u> <u>3. VOC = 1.0 g/HP-hr.</u>	
5. Identify the EPA Reference Test Methods to be used to demonstrate compliance and indicate that all testing will be conducted in accordance with the reference methods, including all required quality assurance procedures: TGP will either purchase an EPA certified engine or purchase a generator with a vendor emissions guarantee, conduct an initial performance test, and conduct subsequent performance testing every 8760 hours of operation or 3 years, whichever comes first, thereafter to demonstrate compliance in accordance with §60.4244. TGP will maintain all required records to demonstrate that emergency generator 563-A-Aux-01 meets all applicable emission standards.	
6. Indicate the proposed frequency of demonstrating compliance by stack testing, i.e., monthly, yearly, etc. <u>Every 8760 hours of operation or 3 years, whichever comes first</u>	
7. <input checked="" type="checkbox"/> The following information will be submitted to the Pollution Control Division 30 days prior to any compliance testing: (a) A statement outlining the purpose of the proposed test; (b) A description of the source and emission point to be tested; (c) A detailed description of the test protocol; and (d) A timetable setting forth the date on which the testing will be conducted and a date by which the test results will be submitted to the Pollution Control Division.	
8. Is the monitoring activity described above required by 40 CFR Part 60 - Enhanced Monitoring Program? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, please see Item 7 on the back of this form for further instructions.	
9. Page No. <u>14</u> Revision No.: _____ Date of Revision: <u>January 2015</u>	

INSTRUCTIONS FOR APC FORM V.24:

COMPLIANCE DEMONSTRATION BY STACK TESTING

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE WHERE COMPLIANCE WILL BE DEMONSTRATED BY STACK TESTING

- Item 2** Provide the identification number of the stack which exhausts the pollutant(s) to be tested. This number should also appear on the APC Form V.3.
- Item 3** Identify the emission source and the specific equipment vented through the stack identified in Item 2 above.
- Item 4** Identify the pollutant(s) to be tested and the applicable emission standard(s).
- Item 5** Identify the EPA Reference Test Methods to be used to demonstrate compliance and indicate that all testing will be conducted in accordance with the reference methods, including all required quality assurance procedures. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 6** Indicate the proposed frequency of demonstrating compliance by stack testing (i.e., monthly, yearly, etc.).
- Item 7** Place a check mark in the square provided to certify future submittal of the information required by Section 10.56.290, "Measurement and Reporting of Emissions" of Chapter 10.56, "Air Pollution Control" of the Metropolitan Code of Laws.
- Item 8** Indicate whether or not the monitoring activity described on this form is required by 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please attach a description of and justification for the proposed enhanced monitoring protocol to be used to demonstrate continuous compliance in accordance with 40 CFR Part 64.
- Item 9** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 COMPLIANCE DEMONSTRATION BY RECORDKEEPING**

1. Facility Name: TGP Compressor Station 563	2. Stack or Fugitive Release Point Number(s): 563-A-01 and 563-A-02
3. Emission Source Description: <u>Compressor Turbines 563-A-01 and 563-A-02</u>	
4. Identify the pollutant(s) to be monitored and the applicable emission standard(s): <u>SO₂ – Total sulfur content of fuel being fired in the turbine</u> <u>Compressor Turbines 563-A-01 and 563-A-02 are subject to 40 CFR 60 - Subpart KKKK, and therefore must comply with the following limits:</u> <u>Total potential sulfur emissions limit of 110 ng SO₂/J (0.90 lb SO₂/MWh) [§60.4330(a)(2)], or</u> <u>Fuel sulfur limit of 26 ng SO₂/J (0.060 lb SO₂/MMBtu) heat input.</u> <hr/> <hr/> <hr/>	
5. Describe the recordkeeping and reporting procedures to be used to demonstrate compliance with the standard(s) outlined in Item 4 above: <u>Sulfur content of the fuel being fired in compressor turbines 563-A-01 and 563-A-02 must be determined using total sulfur methods described in §60.4360. Total sulfur content of the fuel monitoring may be foregone if the fuel is demonstrated not to exceed potential sulfur emissions of 26 ng SO₂/J (0.060 lb SO₂/MMBtu) heat input. This can be demonstrated by fuel quality characteristics or representative fuel sampling data as specified in §60.4365.</u> <hr/> <u>Compressor Turbines 563-a-01 and 563-a-02 will utilize pipeline quality natural gas at all times to meet the requirements of Subpart KKKK. TGP will maintain records of gas tariff demonstrating the maximum allowable total sulfur content in turbine fuel.</u> <hr/>	
6. Indicate the frequency of demonstrating compliance by use of the recordkeeping and reporting procedures described in Item 5 above: <u>On-going</u> <hr/> <hr/> <hr/> <hr/>	
7. Is the monitoring activity described above required by 40 CFR Part 60 - Enhanced Monitoring Program? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> X If yes, please see Item 7 on the back of this form for further instructions.	
8. Page No. <u>15</u> Revision No.: _____ Date of Revision: <u>January 2015</u>	

INSTRUCTIONS FOR APC FORM V.26:

COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE WHERE COMPLIANCE WILL BE DEMONSTRATED BY RECORDKEEPING.

- Item 2** Provide the identification number of the stack(s) or fugitive release point(s) affected by this compliance demonstration. This number should also appear on the APC Form V.3.
- Item 3** Identify the emission source covered by this method of compliance demonstration.
- Item 4** Identify the pollutant(s) to be monitored and the applicable emission standard(s).
- Item 5** Describe the material or parameters to be monitored and the recordkeeping and reporting procedures to be used to demonstrate compliance with the standard(s) outlined in Item 4 above. Attach a copy of example calculations when applicable and a copy of any log sheet(s) to be used in the recordkeeping process. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 6** Indicate the frequency of demonstrating compliance by use of the recordkeeping and reporting procedures described in Item 5 above, i.e. daily, monthly, etc.
- Item 7** Indicate whether or not the monitoring activity described on this form is required by 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please attach a description of and justification for the proposed enhanced monitoring protocol to be used to demonstrate continuous compliance in accordance with 40 CFR Part 64.
- Item 8** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

*Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142*

**PART 70 OPERATING PERMIT APPLICATION
 COMPLIANCE DEMONSTRATION BY RECORDKEEPING**

1. Facility Name: TGP Compressor Station 563	2. Stack or Fugitive Release Point Number(s): 563-A-Aux-01
3. Emission Source Description: <u>Emergency Generator 563-A-Aux-01</u>	
4. Identify the pollutant(s) to be monitored and the applicable emission standard(s): NOx, CO, VOC According to 40 CFR 60 Subpart JJJJ Table 1 [§60.4233(e)], emergency generator 563-A-Aux-01 meet the following emission limits, either via EPA certification or by manufacturer guarantee: <u>1. NOx limit of 2.0 g/HP-hr.</u> <u>2. CO limit of 4.0 g/HP-hr.</u> <u>3. VOC limit of 1.0 g/HP-hr.</u>	
5. Describe the recordkeeping and reporting procedures to be used to demonstrate compliance with the standard(s) outlined in Item 4 above: <u>TGP will maintain all required records to demonstrate that emergency generator 563-A-Aux-01 meets the applicable emission Standards. TGP will also maintain records of operating hours.</u>	
6. Indicate the frequency of demonstrating compliance by use of the recordkeeping and reporting procedures described in Item 5 above: <u>Operating hours will be monitored and recorded on a monthly basis.</u>	
7. Is the monitoring activity described above required by 40 CFR Part 60 - Enhanced Monitoring Program? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, please see Item 7 on the back of this form for further instructions.	
8. Page No. <u>16</u> Revision No.: _____ Date of Revision: <u>January 2015</u>	

INSTRUCTIONS FOR APC FORM V.26:

COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE WHERE COMPLIANCE WILL BE DEMONSTRATED BY RECORDKEEPING.

- Item 2** Provide the identification number of the stack(s) or fugitive release point(s) affected by this compliance demonstration. This number should also appear on the APC Form V.3.
- Item 3** Identify the emission source covered by this method of compliance demonstration.
- Item 4** Identify the pollutant(s) to be monitored and the applicable emission standard(s).
- Item 5** Describe the material or parameters to be monitored and the recordkeeping and reporting procedures to be used to demonstrate compliance with the standard(s) outlined in Item 4 above. Attach a copy of example calculations when applicable and a copy of any log sheet(s) to be used in the recordkeeping process. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 6** Indicate the frequency of demonstrating compliance by use of the recordkeeping and reporting procedures described in Item 5 above, i.e. daily, monthly, etc.
- Item 7** Indicate whether or not the monitoring activity described on this form is required by 40 CFR Part 64 - Enhanced Monitoring Program. If the answer is yes, please attach a description of and justification for the proposed enhanced monitoring protocol to be used to demonstrate continuous compliance in accordance with 40 CFR Part 64.
- Item 8** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

INSTRUCTIONS FOR APC FORM V.28:

EMISSION SOURCE HAZARDOUS AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS HAZARDOUS AIR POLLUTANTS AS DEFINED IN SECTION 112(b) OF THE CLEAN AIR ACT. ATTACH ADDITIONAL SHEETS IF NEEDED TO DESCRIBE EACH EMISSION POINT IN THE PROCESS THAT EMITS HAZARDOUS AIR POLLUTANTS. A LIST OF ALL HAZARDOUS AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify the emission source by name and number.
- Item 3** List each stack or fugitive release point which exhausts hazardous air pollutants from the source identified in Item 2.
- Item 4** List each hazardous pollutant by name that is emitted by the emission point identified in Item 3. Use a separate line for each pollutant.
- Item 5** List the CAS number for each hazardous pollutant listed in Item 4.
- Items 6 & 7** Report the potential and allowable emission rates of each hazardous pollutant listed in Item 4. Attach copies of the calculations used to project the potential emission rates and the basis of the allowable emission rates. Attach additional sheets if necessary to define all alternative operation scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 8** Indicate whether or not each HAP (Hazardous Air Pollutants) listed in Item 4 is also reported as a regulated pollutant such as VOC or PM₁₀ on Form APC V.30.
- Item 9** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.28:

EMISSION SOURCE HAZARDOUS AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS HAZARDOUS AIR POLLUTANTS AS DEFINED IN SECTION 112(b) OF THE CLEAN AIR ACT. ATTACH ADDITIONAL SHEETS IF NEEDED TO DESCRIBE EACH EMISSION POINT IN THE PROCESS THAT EMITS HAZARDOUS AIR POLLUTANTS. A LIST OF ALL HAZARDOUS AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify the emission source by name and number.
- Item 3** List each stack or fugitive release point which exhausts hazardous air pollutants from the source identified in Item 2.
- Item 4** List each hazardous pollutant by name that is emitted by the emission point identified in Item 3. Use a separate line for each pollutant.
- Item 5** List the CAS number for each hazardous pollutant listed in Item 4.
- Items 6 & 7** Report the potential and allowable emission rates of each hazardous pollutant listed in Item 4. Attach copies of the calculations used to project the potential emission rates and the basis of the allowable emission rates. Attach additional sheets if necessary to define all alternative operation scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 8** Indicate whether or not each HAP (Hazardous Air Pollutants) listed in Item 4 is also reported as a regulated pollutant such as VOC or PM₁₀ on Form APC V.30.
- Item 9** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.28:

EMISSION SOURCE HAZARDOUS AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS HAZARDOUS AIR POLLUTANTS AS DEFINED IN SECTION 112(b) OF THE CLEAN AIR ACT. ATTACH ADDITIONAL SHEETS IF NEEDED TO DESCRIBE EACH EMISSION POINT IN THE PROCESS THAT EMITS HAZARDOUS AIR POLLUTANTS. A LIST OF ALL HAZARDOUS AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify the emission source by name and number.
- Item 3** List each stack or fugitive release point which exhausts hazardous air pollutants from the source identified in Item 2.
- Item 4** List each hazardous pollutant by name that is emitted by the emission point identified in Item 3. Use a separate line for each pollutant.
- Item 5** List the CAS number for each hazardous pollutant listed in Item 4.
- Items 6 & 7** Report the potential and allowable emission rates of each hazardous pollutant listed in Item 4. Attach copies of the calculations used to project the potential emission rates and the basis of the allowable emission rates. Attach additional sheets if necessary to define all alternative operation scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 8** Indicate whether or not each HAP (Hazardous Air Pollutants) listed in Item 4 is also reported as a regulated pollutant such as VOC or PM₁₀ on Form APC V.30.
- Item 9** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.29:

EMISSION SOURCE HAZARDOUS AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS HAZARDOUS AIR POLLUTANTS AS DEFINED IN SECTION 112(b) OF THE CLEAN AIR ACT. THIS INFORMATION IS A FACILITY WIDE SUMMARY OF THE INFORMATION REPORTED ON FORM APC V.27.

Item 2 List each hazardous air pollutant emitted by the facility.

Item 3 List the CAS (Chemical Abstract System) number of each pollutant listed in Item 2.

Items

4 & 5 Report the facility wide potential and allowable emission rates of each hazardous pollutant listed in Item 3. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.

Item 6 Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.30:

EMISSION SOURCE REGULATED AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS REGULATED AIR POLLUTANTS AS DEFINED BY SECTION 10.56.010, "DEFINITION" OF CHAPTER 10.56, "AIR POLLUTION CONTROL" OF THE CODE OF LAWS OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE. ATTACH ADDITIONAL SHEETS IF NEEDED. A LIST OF REGULATED AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify the emission source by name and number.
- Item 3** Provide the identification number of each stack or fugitive release point which exhausts regulated air pollutants from the source identified in Item 2 above. Attach additional sheets if necessary to identify each emission point.
- Item 4** Report each regulated pollutant emitted by each stack or fugitive release point listed in Item 3. This column should also be used to identify the stacks or fugitive release points having the potential to emit visible emissions (opacity).
- Item 5** Report the potential mass emission rates of all regulated pollutants as well as the potential visible emission rates. Concentrations must be reported in grains per dry standard cubic foot (particulate and PM₁₀) or parts per million by volume (ppmv) adjusted to the appropriate correction factor, such as 12% CO₂ or 7% O₂, stated in the applicable regulation. Visible emissions should be reported in percent (%) opacity.
- Item 6** Report the allowable mass emission rates of all regulated air pollutants as well as the allowable visible emission rates. The units would be the same as those identified in Item 7 above. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 7** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.30:

EMISSION SOURCE REGULATED AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS REGULATED AIR POLLUTANTS AS DEFINED BY SECTION 10.56.010, "DEFINITION" OF CHAPTER 10.56, "AIR POLLUTION CONTROL" OF THE CODE OF LAWS OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE. ATTACH ADDITIONAL SHEETS IF NEEDED. A LIST OF REGULATED AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify the emission source by name and number.
- Item 3** Provide the identification number of each stack or fugitive release point which exhausts regulated air pollutants from the source identified in Item 2 above. Attach additional sheets if necessary to identify each emission point.
- Item 4** Report each regulated pollutant emitted by each stack or fugitive release point listed in Item 3. This column should also be used to identify the stacks or fugitive release points having the potential to emit visible emissions (opacity).
- Item 5** Report the potential mass emission rates of all regulated pollutants as well as the potential visible emission rates. Concentrations must be reported in grains per dry standard cubic foot (particulate and PM_{10}) or parts per million by volume (ppmv) adjusted to the appropriate correction factor, such as 12% CO_2 or 7% O_2 , stated in the applicable regulation. Visible emissions should be reported in percent (%) opacity.
- Item 6** Report the allowable mass emission rates of all regulated air pollutants as well as the allowable visible emission rates. The units would be the same as those identified in Item 7 above. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 7** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.30:

EMISSION SOURCE REGULATED AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT EMITS REGULATED AIR POLLUTANTS AS DEFINED BY SECTION 10.56.010, "DEFINITION" OF CHAPTER 10.56, "AIR POLLUTION CONTROL" OF THE CODE OF LAWS OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE. ATTACH ADDITIONAL SHEETS IF NEEDED. A LIST OF REGULATED AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify the emission source by name and number.
- Item 3** Provide the identification number of each stack or fugitive release point which exhausts regulated air pollutants from the source identified in Item 2 above. Attach additional sheets if necessary to identify each emission point.
- Item 4** Report each regulated pollutant emitted by each stack or fugitive release point listed in Item 3. This column should also be used to identify the stacks or fugitive release points having the potential to emit visible emissions (opacity).
- Item 5** Report the potential mass emission rates of all regulated pollutants as well as the potential visible emission rates. Concentrations must be reported in grains per dry standard cubic foot (particulate and PM₁₀) or parts per million by volume (ppmv) adjusted to the appropriate correction factor, such as 12% CO₂ or 7% O₂, stated in the applicable regulation. Visible emissions should be reported in percent (%) opacity.
- Item 6** Report the allowable mass emission rates of all regulated air pollutants as well as the allowable visible emission rates. The units would be the same as those identified in Item 7 above. Attach additional sheets if necessary to define all alternative operating scenarios or to define permit terms and conditions allowing emissions trading under a federally enforceable emissions cap to be established in the permit.
- Item 7** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.31:

EMISSION SOURCE REGULATED AIR POLLUTANT SUMMARY

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH FACILITY THAT EMITS REGULATED AIR POLLUTANTS AS DEFINED BY SECTION 10.56.010, "DEFINITIONS" OF CHAPTER 10.56, "AIR POLLUTION CONTROL" OF THE CODE OF LAWS OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE. A LIST OF REGULATED AIR POLLUTANTS MAY BE OBTAINED BY CONTACTING THE METROPOLITAN HEALTH DEPARTMENT, POLLUTION CONTROL DIVISION.

- Item 2** Identify each regulated pollutant emitted by the facility. Do not address visible emissions on this form.
- Item 3** Report the facility wide potential emission rates of all regulated pollutants identified in Item 2.
- Item 4** Report the facility wide allowable emission rates of all regulated pollutants identified in Item 2.
- Item 5** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

**Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 EMISSION SOURCE REQUIREMENTS AND COMPLIANCE STATUSES**

1. Facility Name: TGP Compressor Station 563		2. Emission Source Description 563-A-01 and 563-A-02 (identical units)						
3. Stack or Fugitive Release Point Number	4. Regulated or Hazardous Air Pollutant	5. Applicable Requirement(s)	6. Allowable Emission Standard(s) or Work Practice Requirements	7. Potential Emission Rate	8. Reference Test Method(s)	9. Compliance Status		
						In	Out	
563-A-01 and 563-A-02 (each individually will meet the listed requirements)	NOx	40 CFR 60 Subpart KKKK	25 ppm @ 15% O ₂	<25 ppm @ 15% O ₂	7E	X		
	SO ₂	40 CFR 60 Subpart KKKK	110 ng/J or fuel sulfur content of 26 ng/J	<110 ng/J and fuel sulfur content <26 ng/J		X		
	NOx	Regulation No. 14	83.7 tons during any period of 12 consecutive months	<83.7 tons during any period of 12 consecutive months		X		
	SO ₂	MCL 10.56.260	0.73 lb/hr	<0.73 lb/hr		X		
	PM	MCL 10.56.260	1.41 lb/hr	<1.41 lb/hr		X		
	VOC	Regulation No. 7	5.76 tons during any period of 12 consecutive months	<5.76 tons during any period of 12 consecutive months		X		
	HAP	Regulation No. 4	0.22 lb/hr	<0.22 lb/hr		X		
Opacity	MCL 10.56.270	20%	<20%			X		
10. Page No.: 25	Revision No.:	Date of Revision: January 2015						

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

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 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142**

**PART 70 OPERATING PERMIT APPLICATION
 EMISSION SOURCE REQUIREMENTS AND COMPLIANCE STATUSES**

1. Facility Name: TGP Compressor Station 563		2. Emission Source Description 563-A-Aux-01		3.		4.		5.		6.		7.		8.		9.			
Stack or Fugitive Release Point Number	Regulated or Hazardous Air Pollutant	Applicable Requirement(s)	Emission Standard(s) or Work Practice Requirements	Potential Emission Rate	Reference Test Method(s)	Compliance Status		Compliance Status		Reference Test Method(s)	Potential Emission Rate	Emission Standard(s) or Work Practice Requirements	Applicable Requirement(s)	Regulated or Hazardous Air Pollutant	Stack or Fugitive Release Point Number	Compliance Status	Compliance Status		
						In	Out	In	Out										
563-A-Aux-01	NOx	40 CFR 60 Subpart JJJJ	2.0 g/hp-hr	< 2.0 g/hp-hr	7E													X	
	CO	40 CFR 60 Subpart JJJJ	4.0 g/hp-hr	< 4.0 g/hp-hr	10														X
	VOC	40 CFR 60 Subpart JJJJ	1.0 g/hp-hr	4.8 tons during any period of 12 consecutive months	ATSM D 6348														X
	NOx	Regulation No. 14	4.8 tons during any period of 12 consecutive months	< 4.8 tons during any period of 12 consecutive months															
	SO2	MCL 10.56.260	0.01 lb/hr	< 0.01 lb/hr															X
	PM	MCL 10.56.260	0.16 lb/hr	< 0.16 lb/hr															X
	VOC	Regulation No. 7	1.20 tons during any period of 12 consecutive months	< 1.20 tons during any period of 12 consecutive months															X
	HAP	Regulation No. 4	1.19 lb/hr	< 1.19 lb/hr															X
	Opacity	MCL 10.56.270	20%	< 20%															X

10. Page No.: 26 Revision No.: _____ Date of Revision: January 2015

INSTRUCTIONS FOR APC FORM V.32:

EMISSION SOURCE REQUIREMENTS AND COMPLIANCE STATUS

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT HAS ALLOWABLE EMISSION LIMITS ESTABLISHED BY FEDERAL OR LOCAL REGULATION OR BY PERMIT CONDITIONS.

- Item 2** Identify the emission source by name and number
- Item 3** Provide the identification of each stack or fugitive release point covered by a separate regulation, standard or existing permit conditions.
- Item 4** Identify each pollutant emitted by the stack(s) or fugitive release point(s) identified in Item 3 that are subject to a specific emission standard or permit condition including visible emissions.
- Item 5** Cite the current applicable air pollution regulation(s) or requirement(s), including any applicable section of a federal or local law or any applicable permit restriction, along with any known new regulations that will become applicable to any emission point in this source during the term of the operating permit. Please distinguish between current and new regulations on the form and provide information regarding limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated air pollutants emitted by this source. Please explain any proposed exemptions from otherwise applicable requirements and attach additional sheets if needed to adequately address the items outlined above.
- Item 6** Cite the allowable mass or visible emission standard, or permit restriction associated with each applicable current or new regulation identified in Item 5. The emission standards must include the proper units and correction factors where applicable.
- Item 7** Report the potential emission rate of each emission point covered by a separate regulation or standard in the same units used to describe the allowable emission standard.
- Item 8** Please indicate the applicable test method used to determine compliance with any mass or visible emission standards identified in Item 6.
- Item 9** Check the appropriate column to indicate the current compliance status of each emission point covered by a separate regulation or standard.
- Item 10** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

METROPOLITAN GOVERNMENT of NASHVILLE and DAVIDSON COUNTY TENNESSEE

*Metropolitan Health Department
 Pollution Control Division
 311 - 23rd Avenue North
 Nashville, Tennessee 37203
 Telephone: (615) 340-5653
 FAX: (615) 340-2142*

**PART 70 OPERATING PERMIT APPLICATION
 EMISSION SOURCE REQUIREMENTS AND COMPLIANCE STATUSES**

1. Facility Name: TGP Compressor Station 563		2. Emission Source Description 563-Heater-01					
3. Stack or Fugitive Release Point Number	4. Regulated or Hazardous Air Pollutant	5. Applicable Requirement(s)	6. Allowable Emission Standard(s) or Work Practice Requirements	7. Potential Emission Rate	8. Reference Test Method(s)	9. Compliance Status	
						In	Out
563-Heater-01	NOx	Regulation No. 14	0.48 tons during any period of 12 consecutive months	<0.48 tons during any period of 12 consecutive months		X	
	SO ₂	MCL 10.56.260	2.71E-03 lb/hr	< 2.71E-03 lb/hr		X	
	PM	MCL 10.56.260	0.05 lb/hr	< 0.05 lb/hr		X	
	VOC	Regulation No. 7	0.12 tons during any period of 12 consecutive months	< 0.12 tons during any period of 12 consecutive months		X	
	HAP	Regulation No. 4	8.51E-03 lb/hr	< 8.51E-03 lb/hr		X	
	Opacity	MCL 10.56.270	20%	<20%		X	

10. Page No.: 27 Revision No.: _____ Date of Revision: January 2015

INSTRUCTIONS FOR APC FORM V.32:

EMISSION SOURCE REQUIREMENTS AND COMPLIANCE STATUS

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COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT HAS ALLOWABLE EMISSION LIMITS ESTABLISHED BY FEDERAL OR LOCAL REGULATION OR BY PERMIT CONDITIONS.

- Item 2** Identify the emission source by name and number
- Item 3** Provide the identification of each stack or fugitive release point covered by a separate regulation, standard or existing permit conditions.
- Item 4** Identify each pollutant emitted by the stack(s) or fugitive release point(s) identified in Item 3 that are subject to a specific emission standard or permit condition including visible emissions.
- Item 5** Cite the current applicable air pollution regulation(s) or requirement(s), including any applicable section of a federal or local law or any applicable permit restriction, along with any known new regulations that will become applicable to any emission point in this source during the term of the operating permit. Please distinguish between current and new regulations on the form and provide information regarding limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated air pollutants emitted by this source. Please explain any proposed exemptions from otherwise applicable requirements and attach additional sheets if needed to adequately address the items outlined above.
- Item 6** Cite the allowable mass or visible emission standard, or permit restriction associated with each applicable current or new regulation identified in Item 5. The emission standards must include the proper units and correction factors where applicable.
- Item 7** Report the potential emission rate of each emission point covered by a separate regulation or standard in the same units used to describe the allowable emission standard.
- Item 8** Please indicate the applicable test method used to determine compliance with any mass or visible emission standards identified in Item 6.
- Item 9** Check the appropriate column to indicate the current compliance status of each emission point covered by a separate regulation or standard.
- Item 10** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

INSTRUCTIONS FOR APC FORM V.32:

EMISSION SOURCE REQUIREMENTS AND COMPLIANCE STATUS

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR EACH EMISSION SOURCE AT A FACILITY THAT HAS ALLOWABLE EMISSION LIMITS ESTABLISHED BY FEDERAL OR LOCAL REGULATION OR BY PERMIT CONDITIONS.

- Item 2** Identify the emission source by name and number
- Item 3** Provide the identification of each stack or fugitive release point covered by a separate regulation, standard or existing permit conditions.
- Item 4** Identify each pollutant emitted by the stack(s) or fugitive release point(s) identified in Item 3 that are subject to a specific emission standard or permit condition including visible emissions.
- Item 5** Cite the current applicable air pollution regulation(s) or requirement(s), including any applicable section of a federal or local law or any applicable permit restriction, along with any known new regulations that will become applicable to any emission point in this source during the term of the operating permit. Please distinguish between current and new regulations on the form and provide information regarding limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated air pollutants emitted by this source. Please explain any proposed exemptions from otherwise applicable requirements and attach additional sheets if needed to adequately address the items outlined above.
- Item 6** Cite the allowable mass or visible emission standard, or permit restriction associated with each applicable current or new regulation identified in Item 5. The emission standards must include the proper units and correction factors where applicable.
- Item 7** Report the potential emission rate of each emission point covered by a separate regulation or standard in the same units used to describe the allowable emission standard.
- Item 8** Please indicate the applicable test method used to determine compliance with any mass or visible emission standards identified in Item 6.
- Item 9** Check the appropriate column to indicate the current compliance status of each emission point covered by a separate regulation or standard.
- Item 10** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY, THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".

Metropolitan Health Department
Pollution Control Division
311 - 23rd Avenue North
Nashville, Tennessee 37203
Telephone: (615) 340-5653
FAX: (615) 340-2142

**PART 70 OPERATING PERMIT APPLICATION
COMPLIANCE CERTIFICATION AND COMPLIANCE PLAN**

1. Facility Name:	TGP Compressor Station 563
2. List all emission sources located at this facility that are covered by this application and are operating in full compliance with all applicable air pollution regulations:	<u>Compressor Turbines 563-A-01 and 563-A-02</u> <u>Emergency Generator 563-A-Aux-01</u> <u>Hydronic Heater 563-Heater-01</u>
3. For the emission sources listed in Item 2 above certify that compliance with all applicable regulations will be maintained by checking both of the following:	<input type="checkbox"/> I (the responsible official identified on Form APC V.1) certify that the facility described in this application will continue to operate in full compliance with all applicable requirements throughout the duration of the operating permit(s) issued for such facility. <input checked="" type="checkbox"/> I (the responsible official identified on Form APC V.1) certify that each emission source located at this facility will comply on a timely basis with any applicable requirements that become effective during the term of the operating permit.
4. List all emission sources located at this facility that are covered by this application and are not operating in full compliance with all applicable requirements:	
5. For the emission sources listed in Item 4 above, certify that compliance with the applicable requirements will be achieved in a timely fashion by checking both of the following:	<input type="checkbox"/> Attached is a list of non-complying emission sources along with the following information regarding each source: (a) The regulation or applicable requirement that is being violated; (b) The date that non-compliance was first determined; (c) A brief description of the reason for non-compliance; (d) A thorough narrative description of how the emission source will achieve compliance; and (e) A schedule of compliance consistent with Section 13-3, Paragraph (e)(9)(iii)(C) of Regulation No. 13, "Part 70 Operating Permit Program". <input type="checkbox"/> I (the responsible official identified on Form APC V.1) certify that compliance will be achieved in accordance with the schedule(s) outlined in Item 5(e) above and that certified progress reports will be submitted to the Metropolitan Health Department, Pollution Control Division, no less frequently than every six (6) months (180 days) until compliance is achieved.

6. List all emission sources located at this facility that are subject to any applicable enhanced monitoring and compliance certification requirements of Section 114(a)(3) of the 1990 Clean Air Act Amendment: _____

TGP Compressor Station 563 will comply with all federal and local compliance assurance monitoring and certification requirements required.

7. For the emission sources listed in Item 6 above certify compliance with the applicable requirements by checking both of the following:

Attached is a list of the emission sources subject to any enhanced monitoring and compliance certification requirements of Section 114(c)(3) of the 1990 Clean Air Act Amendment along with the following information regarding each affected source:

(a) Cite the applicable enhanced monitoring and/or compliance certification requirement for each stack or fugitive release point in the emission source; and

(b) Identify the means by which compliance with the applicable requirement will be achieved.

I (the responsible official identified on Form APC V.1) certify that each of the emission sources listed in Item 6 above is operating in compliance with the applicable enhanced monitoring and/or certification requirements of Section 114(a)(3) of the Clean Air Act Amendment.

8. Is this facility subject to the provisions of Section 112(r) of the 1990 Clean Air Act?

_____ Yes No, If yes, please check the following:

I (The responsible official identified on Form APC V.1) certify that a risk management plan or a schedule to implement such a plan has been submitted in accordance with Section 112(r)(7) of the Act.

9. Page No.: _____ 28 _____ Revision No.: _____ Date of Revision: _____ January _____

INSTRUCTIONS FOR APC FORM V.33:

COMPLIANCE CERTIFICATION AND COMPLIANCE PLAN

Sources that are required to obtain a permit in accordance with Regulation No. 13, "Part 70 Operating Permit Program" of the Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee, must complete and return this form, if applicable. Applications are incomplete unless all applicable information requested herein is supplied. Failure to supply any additional information requested by the Director to enable him/her to act on the application may result in return of this application. If there is additional information that will not fit on a form, please declare the information on additional sheet(s) and attach it to the back of the original.

COMPLETE ONE FORM FOR ANY PORTION OF A FACILITY COVERED BY THIS APPLICATION.

- Item 2** List all emission sources by name and number located at this facility that are operating in full compliance with all applicable air pollution regulations as noted on Form APC V.32 included in this application.
- Item 3** The responsible official identified on Form APC V.1 must certify that compliance with all applicable air pollution regulations will be maintained during the term of the permit by checking both of the spaces provided. Please read carefully before checking off on this item.
- Item 4** List all emission sources by name and number located at this facility that are not operating in full compliance with all applicable air pollution regulations as identified on Form APC V.32 included in this application.
- Item 5** The responsible official identified on Form APC V.1 included in this application must certify that the non-complying emission sources listed in Item 4 will achieve full compliance in a timely fashion by checking both of the spaces provided. Please read carefully and insure that the necessary information is provided before checking off on this item. Any compliance schedule submitted in accordance with this item must resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject.
- Item 6** List all emission sources located at this facility that are subject to any applicable enhanced monitoring and compliance certification requirement of Section 114(a)(3) of the 1990 Clean Air Act Amendment.
- Item 7** The responsible official identified on Form APC V.1 included in this application must certify compliance with the applicable requirements by checking both of the spaces provided. Please read carefully and insure that the necessary information is provided before checking off on this item.
- Item 8** The responsible official must certify that a risk management plan, if applicable, or a schedule to submit such a plan has been submitted in accordance with Section 112(r)(7) of the Clean Air Act.
- Item 9** Page number must be filled in. Revision number and date of revision are to be filled in only if the information on this form is being revised.

**IF ANY ITEM ON THIS APPLICATION FORM IS NOT APPLICABLE TO THIS FACILITY,
THE ITEMS MUST BE FILLED IN WITH "NOT APPLICABLE" OR "N/A".**

Appendix B
Emission Calculations

Table B-1 Equipment List - Significant Emission Sources

Emission Point ID	Source	Manufacturer	Model/Type	Rated Capacity ¹	Heat Input (MMBTU/Hr)
563-A-01	Turbine	Solar Turbines	Titan 250-30000S	29,766 hp	207.8
563-A-02	Turbine	Solar Turbines	Titan 250-30000S	29,766 hp	207.8
563-A-Aux-01	Emergency Generator	Caterpillar	3516C	2,175 hp	16.44
563-Heater-01	Heater	Parker Boiler	T4600LR	--	4.60

Table B-2 Equipment List - Exempt Emission Sources

Emission Point ID	Source Description	Rating/Capacity	Exemption
FUG	Fugitive Emissions	-	MCL 10.56.050.A.3 ²
T-01	Pipeline Liquids Storage Tank	-	MCL 10.56.050.A.3 ²

1. The rated capacity for the compressor turbines is listed at 50°F ambient temperature and 813 ft. elevation above sea level.

2. Metropolitan Code of Law 10.56.050.A.3 - Any process emission source emitting less than 0.1 pounds per hour of non-hazardous particulate matter.

Table B-3 Summary of Potential Emissions due to Significant Emission Sources

Emission Point ID	Source Description	CO	NO _x	PM	PM _{2.5}	PM ₁₀	SO ₂	VOC	Total HAP	CO _{2e}
		tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy
563-A-01	Turbine	53.85	83.65	6.01	6.01	6.01	3.09	5.76	0.94	107,381
563-A-02	Turbine	53.85	83.65	6.01	6.01	6.01	3.09	5.76	0.94	107,381
563-A-Aux-01	Emergency Generator	4.80	2.40	0.04	0.04	0.04	0.002	1.20	0.30	609
563-Heater-01	Heater	1.11	0.48	0.20	0.20	0.20	0.01	0.12	0.04	2,371
Total		113.60	170.19	12.26	12.26	12.26	6.20	12.85	2.20	217,741

Table B-4 Summary of Potential Emissions due to Exempt Emission Sources

Emission Point ID	Source Description	CO	NO _x	PM	PM _{2.5}	PM ₁₀	SO ₂	VOC	Total HAP	CO _{2e}
		tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy
FUG	Fugitive Emissions	-	-	-	-	-	-	2.48	0.43	1,131
T-01	Pipeline Liquids Storage Tank	-	-	-	-	-	-	0.15	0.01	-
Total		0.00	0.00	0.00	0.00	0.00	0.00	2.63	0.44	1,131

Facility-Wide:	CO	NO _x	PM	PM _{2.5}	PM ₁₀	SO ₂	VOC	Total HAP	CO _{2e}
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy
	113.60	170.19	12.26	12.26	12.26	6.20	15.48	2.64	218,872

**Solar Turbines Titan 250-30000S Compressor Turbines (563-A-01)
Potential to Emit Calculations**

Source Designation:	563-A-01
Manufacturer:	Solar Turbines
Model:	Titan 250-30000S
Fuel Used:	Natural Gas
Control Device:	N/A
Emission Point Names:	563-A-01

	Ambient Temperature (°F): 50.0
Power (hp):	29,766
Lower Heating Value (LHV) (Btu/scf):	942
Maximum Higher Heating Value (HHV) (Btu/scf):	1,020
Ratio HHV:LHV	1.08
Fuel Flow (lbm/hr):	9,031
Fuel Flow (scfm):	3,395
Fuel Flow (scf/hr):	203,721
Heat Input (HHV) (MMBtu/hr):	208

Based on Solar Turbines Emission and Performance Data Estimates for Titan 250-30000S at 0.0°F and 50.0 °F (16 Dec 2014 and 23 Dec 2014).

Operational Parameters:

Total Annual Hours of Operation (hr/yr):	8760.00
Number of Identical Units:	2
Annual Fuel Consumption (MMscf/yr):	1,785

Start-up and Shutdown Emissions:^[1]

Annual Number of Start-ups:	150.00
Annual Number of Shutdowns:	150.00

Pollutant	Start-up Emissions			Shutdown Emissions		
	lb/event	lb/hr	tpy	lb/event	lb/hr	tpy
CO	26.2	0.45	1.97	19.1	0.33	1.43
NO _x	2.60	0.04	0.20	2.90	0.05	0.22
VOC ^[2]	0.34	0.01	0.03	0.28	0.00	0.02
CO ₂	1,794	30.72	134.55	1,918	32.84	144
CH ₄ ^[2]	1.36	0.02	0.10	1.12	0.02	0.08
Total GHG		30.74	134.65		32.86	143.93
Total CO ₂ e		31.30	137.10		33.32	145.95

1. Start-up and Shutdown Emissions based on Solar Turbines Incorporated Product Information Letter 170: Emission Estimates at Start-up, Shutdown, and Commissioning for SoLoNO_x Combustion Products (13 June 2012). Emission Estimates do not include SO₂, PM, N₂O, or any HAPs.
2. VOCs assumed to be 20% of UHC and CH₄ assumed to be 80% of UHC.

Solar Turbines Titan 250-30000S Compressor Turbines (563-A-01) (Continued)

Criteria Pollutant & Greenhouse Gas Emissions Calculations during Normal Operation:

Emission Factors:

Pollutant	Emission Factor Basis			
	Value, 50°F			Reference
	Value	Units	LHV/HHV	
CO	0.060	lb/MMBtu	LHV	1
NO _x	0.099	lb/MMBtu	LHV	1
SO ₂	3.40E-03	lb/MMBtu	HHV	2
VOC	6.80E-03	lb/MMBtu	LHV	1
PM (Filterable + Condensable)	6.60E-03	lb/MMBtu	HHV	2
PM ₁₀ (Filterable + Condensable)	6.60E-03	lb/MMBtu	HHV	2
PM _{2.5} (Filterable + Condensable)	6.60E-03	lb/MMBtu	HHV	2
CO ₂	53.1	kg/MMBtu	HHV	3
CH ₄	0.027	lb/MMBtu	LHV	1
N ₂ O	1.00E-04	kg/MMBtu	HHV	4

References

1. Emission factors based on Performance Data for Solar Titan 250 at ambient temperatures of 50°F (16 Dec 2014 and 23 Dec 2014). VOCs assumed to be 20% of UHC and CH₄ assumed to be 80% of UHC.
2. AP-42, 5th ed., Section 3.1: Stationary Gas Turbines, Table 3.1-2a: Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Turbines (April 2000).
3. 40 CFR Part 98 Subpart C, Table C-1: Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel, for natural gas.
4. 40 CFR Part 98 Subpart C, Table C-2: Default CH₄ and N₂O Emission Factors and High Heat Values for Various Types of Fuel, for natural gas.

Potential Emissions:

Pollutant	Emission Factor (HHV) (lb/MMBtu)		Potential Emissions (Per Turbine, Excluding SU/SD)		Total Potential Emissions Per Turbine (Including SU/SD) ⁵
	Value, 50°F	Reference	lb/hr, 50°F	tpy ⁴	tpy
CO	0.055	2	11.52	50.46	53.86
NO _x	0.091	2	18.92	82.88	83.29
SO ₂	3.40E-03	1	0.71	3.09	3.09
VOC	6.28E-03	2	1.32	5.78	5.83
PM (Filterable + Condensable)	6.60E-03	1	1.37	6.01	6.01
PM ₁₀ (Filterable + Condensable)	6.60E-03	1	1.37	6.01	6.01
PM _{2.5} (Filterable + Condensable)	6.60E-03	1	1.37	6.01	6.01
Total CO ₂ e			24,453	107,098	107,381
Total GHG			24,313	106,489	106,768
CO ₂	117	1, 3	24,307	106,466	106,744
CH ₄	0.025	2	5.28	22.87	23.06
N ₂ O	2.20E-04	1, 3	0.05	0.20	0.20

References

1. Emission Factors based on HHV required no conversions or unit changes.
2. Converted emission factors based on LHV to HHV basis to summarize all emission factors using a consistent basis.
 $EF_{HHV\ Basis} = EF_{LHV\ Basis} / \text{Ratio HHV:LHV}$
 $0.051 \text{ (lb CO/MMBtu)} = 0.06 \text{ (lb CO/MMBtu)} / 1.08$
3. Converted emission factors from kg/ MMBtu to lb/ MMBtu to calculate all emissions on a consistent basis.
 $EF \text{ (lb/ MMBtu)} = EF \text{ (kg/ MMBtu)} * (2.20462 \text{ lb/ kg})$
 $2.2E-04 \text{ (lb N}_2\text{O/MMBtu)} = 1.E-04 \text{ (kg N}_2\text{O/MMBtu)} * 2.20462 \text{ (lb/kg)}$
4. The lb/hr emissions at 0°F represent the maximum lb/hr emissions for each pollutant during typical operation (i.e., operation at ambient temperatures of 0°F and above).
5. Annual (tpy) emissions of each pollutant assume 8760 hours per year of operation at 50°F.

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Heat Input_{HHV} (MMBtu/hr)
 $1.37 \text{ (lb PM/hr)} = 6.6E-03 \text{ (lb PM/MMBtu)} * 208 \text{ (MMBtu/hr)}$
 Potential Emissions (tons/yr) Excluding SU/SD = (lb/hr)_{Potential} * (Annual hours of operation) * (1 ton/2,000 lb)
 $50.46 \text{ (tons CO/yr)} = 11.52 \text{ (lb/hr)} * 8760 \text{ (hr/yr)} * (1 \text{ ton}/2,000 \text{ lb})$
 Potential Emissions (tons/yr) Including SU/SD = Potential Emissions Excluding SU/SD (tons/yr) + SU/SD Emissions (tons/yr)
 $53.86 \text{ (tons CO/yr)} = 50.46 \text{ (tons CO/yr)} + 1.97 \text{ SU Emissions (tons CO/yr)} + 1.43 \text{ SD Emissions (tons CO/yr)}$

Solar Turbines Titan 250-30000S Compressor Turbines (563-A-01) (Continued)

Normal Operation Hazardous Air Pollutant Emissions Calculations:

HAP	Emission Factor		Potential Emissions, 50°F	
	lb/MMBtu	Reference	lb/hr	tpy
1,3-Butadiene	4.30E-07	1	8.94E-05	3.91E-04
Acetaldehyde	4.00E-05	1	8.31E-03	3.64E-02
Acrolein	6.40E-06	1	1.33E-03	5.82E-03
Benzene	1.20E-05	1	2.49E-03	1.09E-02
Ethylbenzene	3.20E-05	1	6.65E-03	2.91E-02
Formaldehyde	7.10E-04	1	1.48E-01	6.46E-01
Naphthalene	1.30E-06	1	2.70E-04	1.18E-03
PAH	2.20E-06	1	4.57E-04	2.00E-03
Propylene Oxide	2.90E-05	1	6.03E-03	2.64E-02
Toluene	1.30E-04	1	2.70E-02	1.18E-01
Xylene	6.40E-05	1	1.33E-02	5.82E-02
Total HAP			0.21	0.94

References

1. AP-42, 5th ed., Section 3.1: Stationary Gas Turbines, Table 3.1-3: Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines (April 2000).

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Heat Input (MMBtu/hr)

$$1.33E-03 \text{ (lb Acrolein/hr)} = 6.4E-06 \text{ (lb Acrolein/MMBtu)} * 208 \text{ (MMBtu/hr)}$$

Potential Emissions (tons/yr) = (lb/hr)_{Potential} * (8,760 hr/yr) * (1 ton/2,000 lb).

$$5.82E-03 \text{ (tons Acrolein/yr)} = 1.33E-03 \text{ (lb Acrolein/hr)} * 8760 \text{ (hr/yr)} * (1 \text{ ton}/2,000 \text{ lb})$$

Solar Turbines Titan 250-30000S Compressor Turbines (563-A-01) (Continued)

Summary - Total Emissions, Both Turbines

Total Criteria Pollutant & Greenhouse Gas Emissions Calculations, Both Turbines:

Pollutant	Total Potential Emissions (Both Turbines, Excluding SU/SD)	Total Potential Emissions (Both Turbines, Including SU/SD)
	lb/hr	tpy
CO	23.04	107.7
NO _x	37.84	166.6
SO ₂	1.41	6.2
VOC	2.64	11.7
PM / PM ₁₀ / PM _{2.5} (Filterable + Condensable)	2.74	12.0
Total CO _{2e}	48905.93	214761.3
Total GHG	48625.28	213535.4
Non-Biogenic CO ₂	48614.63	213488.9
CH ₄	10.56	46.1
N ₂ O	0.09	0.4

Total Hazardous Air Pollutant Emissions Calculations, Both Turbines:

HAP	Total Potential Emissions, 50°F (Both Turbines, Including SU/SD)	
	lb/hr	tpy
1,3-Butadiene	1.79E-04	7.83E-04
Acetaldehyde	1.66E-02	7.28E-02
Acrolein	2.66E-03	1.16E-02
Benzene	4.99E-03	2.18E-02
Ethylbenzene	1.33E-02	5.82E-02
Formaldehyde	2.95E-01	1.29E+00
Naphthalene	5.40E-04	2.37E-03
PAH	9.14E-04	4.00E-03
Propylene Oxide	1.21E-02	5.28E-02
Toluene	5.40E-02	2.37E-01
Xylene	2.66E-02	1.16E-01
Total HAP	0.43	1.87

**Caterpillar 3516C Emergency Generator (563-A-Aux-01)
Potential to Emit Calculations**

Source Designation:	563-A-Aux-01
Manufacturer:	Caterpillar
Model:	3516C
Stroke Cycle:	4
Type of Burn:	Lean
Fuel Used:	Natural Gas
Lower Heating Value (LHV) (Btu/scf):	905
Higher Heating Value (HHV) (Btu/scf):	1,020
Ratio HHV:LHV	1.13
Engine Rating (bhp):	2,175
Fuel Flow (scfm):	269
Hourly Fuel Consumption (scf/hr):	16,114
Heat Input at 100% Load (MMBtu/hr) (LHV):	14.6
Heat Input at 100% Load (MMBtu/hr) (HHV):	16.4
Fuel Consumption (Btu/bhp-hr) (100% Load)	6,705
Control Device:	N/A

Operational Parameters:

Annual Hours of Operation (hr/yr):	500
Annual Fuel Consumption (MMscf/yr):	8.06
Number of Identical Units	1

Caterpillar 3516C Emergency Generator (563-A-Aux-01) (Continued)

Emission Factors:

Pollutant	Emission Factor Basis			
	Value	Units	LHV/HHV	Reference
CO	4.00	g/bhp-hr		1
NO _x	2.00	g/bhp-hr		1
SO ₂	5.88E-04	lb/MMBtu	HHV	2
VOC	1.00	g/bhp-hr		1
PM (Condensable)	9.91E-03	lb/MMBtu	HHV	2, 3
PM ₁₀ (Filterable + Condensable)	9.98E-03	lb/MMBtu	HHV	2, 3
PM _{2.5} (Filterable + Condensable)	9.98E-03	lb/MMBtu	HHV	2, 3
Non-Biogenic CO ₂	53.1	kg/MMBtu	HHV	4
CH ₄	1.25	lb/MMBtu	HHV	2
N ₂ O	1.00E-04	kg/MMBtu	HHV	5

References

1. NO_x, CO, and VOC emissions are based on 40 CFR 60 Subpart JJJJ emission limits, Table 1.
2. AP-42, 5th ed., Section 3.2: Natural Gas-fired Reciprocating Engines, Table 3.2-2: Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines (July 2000).
3. Conservatively assumes PM (Filterable + Condensable) = PM₁₀ = PM_{2.5}
4. 40 CFR Part 98 Subpart C, Table C-1: Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel, for natural gas.
5. 40 CFR Part 98 Subpart C, Table C-2: Default CH₄ and N₂O Emission Factors and High Heat Values for Various Types of Fuel, for natural gas.

Caterpillar 3516C Emergency Generator (563-A-Aux-01) (Continued)

Criteria Pollutant & Greenhouse Gas Emissions Calculations:

Pollutant	Emission Factor (HHV)		Potential Emissions	
	lb/MMBtu	Reference	lb/hr	tpy
CO	1.17	1	19.2	4.80
NO _x	0.58	1	9.59	2.40
SO ₂	5.88E-04	-	9.66E-03	2.42E-03
VOC	0.29	1	4.80	1.20
PM (Filterable + Condensable)	9.91E-03	-	0.16	0.04
PM ₁₀ (Filterable + Condensable)	9.98E-03	-	0.16	0.04
PM _{2.5} (Filterable + Condensable)	9.98E-03	-	0.16	0.04
Total CO ₂ e			2,437	609
Total GHG			1,943	486
Non-Biogenic CO ₂	117	2	1,923	481
CH ₄	1.25	-	20.5	5.14
N ₂ O	2.20E-04	2	3.62E-03	9.06E-04

References:

1. Converted emission factors from g/bhp-hr to lb/MMBtu to calculate all emissions on a consistent basis.
 $EF (lb/MMBtu) = EF (g/bhp-hr) * (1 lb/453.592g) * Engine Rating (hp) / Heat Input (MMBtu/hr)$
 $1.17 (lb CO/MMBtu) = 4 (g/hr-hr) * (1 lb/453.592g) * 2175 (bhp) / 16.44 (MMBtu/hr)$
2. Converted emission factors from kg/MMBtu to lb/MMBtu to calculate all emissions on a consistent basis.
 $EF (lb N2O/MMBtu) = EF (kg N2O/MMBtu) * (2.20462 lb/kg)$
 $2.2E-04 (lb N2O/MMBtu) = 1.E-04 (kg N2O/MMBtu) * 2.20462 (lb/kg)$

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Heat Input_{HHV} (MMBtu/hr)

$$19.18 (lb CO/hr) = 1.17 (lb CO/MMBtu) * 16.44 (MMBtu/hr)$$

Potential Emissions (tons/yr) = (lb/hr)_{Potential} × (Annual hours of operation) × (1 ton/2,000 lb)

$$4.8 (tons CO/yr) = 19.18 (lb/hr) * 500 (hr/yr) * (1 ton/2,000 lb)$$

Caterpillar 3516C Emergency Generator (563-A-Aux-01) (Continued)

Hazardous Air Pollutant Emissions Calculations:

HAP	Emission Factor (HHV)		Potential Emissions	
	lb/MMBtu	Reference	lb/hr	tpy
1,1,2,2-Tetrachloroethane	4.00E-05	1	6.57E-04	1.64E-04
1,1,2-Trichloroethane	3.18E-05	1	5.23E-04	1.31E-04
1,3-Butadiene	2.67E-04	1	4.39E-03	1.10E-03
1,3-Dichloropropene	2.64E-05	1	4.34E-04	1.08E-04
2-Methylnaphthalene	3.32E-05	1	5.46E-04	1.36E-04
2,2,4-Trimethylpentane	2.50E-04	1	4.11E-03	1.03E-03
Acenaphthene	1.25E-06	1	2.05E-05	5.14E-06
Acenaphthylene	5.53E-06	1	9.09E-05	2.27E-05
Acetaldehyde	8.36E-03	1	1.37E-01	3.44E-02
Acrolein	5.14E-03	1	8.45E-02	2.11E-02
Benzene	4.40E-04	1	7.23E-03	1.81E-03
Benzo(b)fluoranthene	1.66E-07	1	2.73E-06	6.82E-07
Benzo(e)pyrene	4.15E-07	1	6.82E-06	1.71E-06
Benzo(g,h,i)perylene	4.14E-07	1	6.80E-06	1.70E-06
Biphenyl	2.12E-04	1	3.48E-03	8.71E-04
Carbon Tetrachloride	3.67E-05	1	6.03E-04	1.51E-04
Chlorobenzene	3.04E-05	1	5.00E-04	1.25E-04
Chloroform	2.85E-05	1	4.68E-04	1.17E-04
Chrysene	6.93E-07	1	1.14E-05	2.85E-06
Ethylbenzene	3.97E-05	1	6.53E-04	1.63E-04
Ethylene Dibromide	4.43E-05	1	7.28E-04	1.82E-04
Flouranthene	1.11E-06	1	1.82E-05	4.56E-06
Flourene	5.67E-06	1	9.32E-05	2.33E-05
Formaldehyde	5.28E-02	1	8.68E-01	2.17E-01
Methanol	2.50E-03	1	4.11E-02	1.03E-02
Methylene Chloride	2.00E-05	1	3.29E-04	8.22E-05
n-Hexane	1.11E-03	1	1.82E-02	4.56E-03
Naphthalene	7.44E-05	1	1.22E-03	3.06E-04
PAH	2.69E-05	1	4.42E-04	1.11E-04
Phenanthrene	1.04E-05	1	1.71E-04	4.27E-05
Phenol	2.40E-05	1	3.94E-04	9.86E-05
Pyrene	1.36E-06	1	2.24E-05	5.59E-06
Styrene	2.36E-05	1	3.88E-04	9.70E-05
Tetrachloroethane	2.48E-06	1	4.08E-05	1.02E-05
Toluene	4.08E-04	1	6.71E-03	1.68E-03
Vinyl Chloride	1.49E-05	1	2.45E-04	6.12E-05
Xylene	1.84E-04	1	3.02E-03	7.56E-04
Total HAP			1.19	0.30

References:

1. AP-42, 5th ed., Section 3.2: Natural Gas-fired Reciprocating Engines, Table 3.2-2: Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines (July 2000).

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Heat Input_{HHV} (MMBtu/hr)

$$8.45E-02 \text{ (lb Acrolein/hr)} = 5.14E-03 \text{ (lb Acrolein/MMBtu)} * 16.44 \text{ (MMBtu/hr)}$$

Potential Emissions (tons/yr) = (lb/hr)_{Potential} * (500 hr/yr) * (1 ton/2,000 lb).

$$2.11E-02 \text{ (tons Acrolein/yr)} = 8.45E-02 \text{ (lb Acrolein/hr)} * 500 \text{ (hr/yr)} * (1 \text{ ton}/2,000 \text{ lb})$$

T4600LR Natural Gas Heater (563-Heater-01)
Potential to Emit Calculations

Source Designation:	563-Heater-01
Manufacturer:	Parker Boiler
Model:	T4600LR
Fuel Used:	Natural Gas
Lower Heating Value (LHV) (Btu/scf):	942
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr) (LHV):	4.25
Heat Input (MMBtu/hr) (HHV):	4.60
Hourly Fuel Consumption (scf/hr):	4,510
Fuel Flow (scfm):	75.2
Control Device:	N/A

Operational Parameters:

Annual Hours of Operation (hr/yr):	8,760
Annual Fuel Consumption (MMscf/yr):	39.5
Number of Identical Units:	1

Emission Factors:

Pollutant	Emission Factor Basis			
	Value	Units	LHV/HHV	Reference
CO	0.06	lb/MMBtu	HHV (Assumed)	1
NO _x	0.02	lb/MMBtu	HHV (Assumed)	1
SO ₂	0.60	lb/MMscf	HHV	2
VOC	6.20E-03	lb/MMBtu	HHV (Assumed)	1
PM (Condensable)	0.01	lb/MMBtu	HHV	1, 3
PM ₁₀ (Filterable + Condensable)	0.01	lb/MMBtu	HHV	1, 3
PM _{2.5} (Filterable + Condensable)	0.01	lb/MMBtu	HHV	1, 3
Non-Biogenic CO ₂	53.1	kg/MMBtu	HHV	4
CH ₄	0.02	lb/MMBtu	HHV	1
N ₂ O	1.00E-04	kg/MMBtu	HHV (Assumed)	5

References

1. Parker Industrial Boiler, Emission Data for Metal Fiber Premix Natural Gas Fired Burner Systems on Parker Boilers (September 27, 2013). VOCs assumed to be 20% of UHC and CH₄ assumed to be 80% of UHC.
2. AP-42, 5th ed., Section 1.4: Natural Gas Combustion, Table 1.4-2: Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion.
3. Conservatively assumed PM = PM₁₀ = PM_{2.5}
4. 40 CFR Part 98 Subpart C, Table C-1: Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel, for natural gas.
5. 40 CFR Part 98 Subpart C, Table C-2: Default CH₄ and N₂O Emission Factors and High Heat Values for Various Types of Fuel, for natural gas.

T4600LR Natural Gas Heater (563-Heater-01)(Continued)

Criteria Pollutant & Greenhouse Gas Emissions Calculations:

Pollutant	Emission Factor (HHV)		Potential Emissions	
	lb/MMBtu	Reference	lb/hr	tpy
CO	0.06	-	0.25	1.11
NO _x	0.02	-	0.11	0.48
SO ₂	5.88E-04	1	2.71E-03	0.01
VOC	6.20E-03	-	0.03	0.12
PM / PM ₁₀ / PM _{2.5} (Filterable + condensable)	0.01	-	0.05	0.20
Total CO ₂ e			541	2,371
Total GHG			538	2,357
Non-Biogenic CO ₂	117	2	538	2,357
CH ₄	0.02	-	0.11	0.50
N ₂ O	2.20E-04	2	1.01E-03	4.44E-03

References:

1. Converted emission factors from lb/MMscf to lb/MMBtu in order to calculate all emissions on a consistent basis.
 $EF (lb/MMBtu) = EF (lb/MMscf) / HHV (MMBtu/MMscf)$
 $5.88E-04 (lb SO_2/MMBtu) = 0.6 (lb SO_2/MMscf) / 1020 (MMBtu/MMscf)$
2. Converted emission factors from kg/MMBtu to lb/MMBtu in order to calculate all emissions on a consistent basis.
 $EF (lb/MMBtu) = EF (kg/MMBtu) * (2.20462 lb/kg)$
 $2.2E-04 (lb N_2O/MMBtu) = 1.E-04 (kg N_2O/MMBtu) * 2.20462 (lb/kg)$

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Heating Input (MMBtu/hr)

$$0.25 (lb CO/hr) = 0.06 (lb CO/MMBtu) * 4.6 (MMBtu/hr)$$

Potential Emissions (tons/yr) = (lb/hr)_{Potential} × (Annual hours of operation) × (1 ton/2,000 lb)

$$1.11 (tons CO/yr) = 0.25 (lb CO/hr) * 8760 (hr/yr) / 2,000 (lb/ton)$$

T4600LR Natural Gas Heater (563-Heater-01)(Continued)

Hazardous Air Pollutant Emissions Calculations:

HAP	Emission Factor		Potential Emissions	
	lb/MMBtu	Reference	lb/hr	tons/yr
2-Methylnaphthalene	2.35E-08	1	1.08E-07	4.74E-07
3-Methylchloranthrene	1.76E-09	1	8.12E-09	3.56E-08
7,12-Dimethylbenz(a)anthracene	1.57E-08	1	7.22E-08	3.16E-07
Acenaphthene	1.76E-09	1	8.12E-09	3.56E-08
Acenaphthylene	1.76E-09	1	8.12E-09	3.56E-08
Anthracene	2.35E-09	1	1.08E-08	4.74E-08
Arsenic	1.96E-07	2	9.02E-07	3.95E-06
Benz(a)anthracene	1.76E-09	1	8.12E-09	3.56E-08
Benzene	2.06E-06	1	9.47E-06	4.15E-05
Benzo(a)pyrene	1.18E-09	1	5.41E-09	2.37E-08
Benzo(b)fluoranthene	1.76E-09	1	8.12E-09	3.56E-08
Benzo(g,h,i)perylene	1.18E-09	1	5.41E-09	2.37E-08
Benzo(k)fluoranthene	1.76E-09	1	8.12E-09	3.56E-08
Beryllium	1.18E-08	2	5.41E-08	2.37E-07
Cadmium	1.08E-06	2	4.96E-06	2.17E-05
Chromium	1.37E-06	2	6.31E-06	2.77E-05
Chrysene	1.76E-09	1	8.12E-09	3.56E-08
Cobalt	8.24E-08	2	3.79E-07	1.66E-06
Dibenzo(a,h)anthracene	1.18E-09	1	5.41E-09	2.37E-08
Dichlorobenzene	1.18E-06	1	5.41E-06	2.37E-05
Fluoranthene	2.94E-09	1	1.35E-08	5.93E-08
Fluorene	2.75E-09	1	1.26E-08	5.53E-08
Formaldehyde	7.35E-05	1	3.38E-04	1.48E-03
Hexane	1.76E-03	1	8.12E-03	0.04
Indeno(1,2,3-cd)pyrene	1.76E-09	1	8.12E-09	3.56E-08
Manganese	3.73E-07	2	1.71E-06	7.51E-06
Mercury	2.55E-07	2	1.17E-06	5.14E-06
Napthalene	5.98E-07	1	2.75E-06	1.20E-05
Nickel	2.06E-06	2	9.47E-06	4.15E-05
Phenanthrene	1.67E-08	1	7.67E-08	3.36E-07
Pyrene	4.90E-09	1	2.25E-08	9.88E-08
Selenium	2.35E-08	2	1.08E-07	4.74E-07
Toluene	3.33E-06	1	1.53E-05	6.72E-05
Total HAP			8.51E-03	0.04

References

1. AP-42, 5th ed., Section 1.4: Natural Gas Combustion, Table 1.4-3: Emission Factors for Speciated Organic Compounds from Natural Gas Combustion.
2. AP-42, 5th ed., Section 1.4: Natural Gas Combustion, Table 1.4-4: Emission Factors for Metals from Natural Gas Combustion.

Sample Calculations:

Potential Emissions (tons/yr) = Emission Factor (lb/MMscf) * Annual Fuel Consumption (MMscf/yr)

$$9.47E-06 \text{ (lb Benzene/hr)} = 2.06E-06 \text{ (lb Benzene/MMscf)} * 39.51 \text{ (MMscf/yr)}$$

Potential Emissions (lb/hr) = Potential Emissions (tpy) * Hours of Operation (hr/yr) * (2000 lb/1 ton)

$$4.15E-05 \text{ (tons Benzene/yr)} = 9.47E-06 \text{ (lb Benzene/hr)} * 8760 \text{ (hr/yr)} * (1 \text{ ton}/2,000 \text{ lb})$$

**Fugitive Emissions (FUG)
Potential to Emit Calculations**

Source Designation:	FUG
---------------------	-----

Operational Parameters:

Annual Hours of Operation (hr/yr):	8,760
------------------------------------	-------

Fugitive Natural Gas Emissions:

Equipment	Service	Emission Factor		Source Count ^(a)	Total HC Potential Emissions		VOC Weight Fraction	VOC Emissions tpy	CH ₄ Weight Fraction	CH ₄ Emissions tpy	HAP Weight Fraction	HAP Emissions tpy
		lb/hr/source	Reference		lb/hr	tpy						
Connectors	Gas	4.41E-04	1	3,309	1.46	6.4	1.97E-03	0.01	0.95	6.05	1.90E-05	0.00012
Flanges	Gas	8.60E-04	1	676	0.58	2.5	1.97E-03	0.01	0.95	2.41	1.90E-05	0.00005
Others	Gas	1.94E-02	1	95.6	1.85	8.1	1.97E-03	0.02	0.95	7.69	1.90E-05	0.00015
Valves	Gas	9.92E-03	1	657	6.5	26.5	1.97E-03	0.06	0.95	27.02	1.90E-05	0.00054
Open Ended Lines	Gas	4.41E-03	1	25.6	0.11	0.49	1.97E-03	0.00	0.95	0.47	1.90E-05	0.00001
Connectors	Light Oil	4.63E-04	1	336	0.16	0.68	0.56	0.38	0.38	0.26	0.10	0.07
Flanges	Light Oil	2.43E-04	1	90	0.02	0.10	0.56	0.05	0.38	0.04	0.10	0.01
Others	Light Oil	1.65E-02	1	14	0.23	1.01	0.56	0.57	0.38	0.38	0.10	0.10
Valves	Light Oil	5.51E-03	1	97	0.53	2.34	0.56	1.31	0.38	0.88	0.10	0.23
Pump Seals	Light Oil	2.87E-02	1	1	0.03	0.13	0.56	0.07	0.38	0.05	0.10	0.01
Total					11.5	50	-	2.48	-	45.24	-	0.4

1. EPA Protocol for Equipment Leaks Emissions Estimate (EPA-453/R-95-017) Table 2-4: Oil and Gas Production Operations Average Emission Factor.

2. Component counts for flanges and valves in gas service are estimated based on design data. Counts for other components in gas service are each assumed to be equal to 20% of Station 106's existing gas service component counts. Component counts for equipment in light oil service are each assumed to be equal to the same Station 106 component counts.

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/hr/source) * Source Count

1.46 (lb HC from connectors in gas service/hr) = 4.41E-04 (lb/hr/source) * 3309 (source count)

Potential Emissions (tons/yr) = (lb/hr) * hours * (1 ton/2,000 lb)

6.39 (tons HC from connectors in gas service/yr) = 1.46 (lb HC/hr) * 8760 (hr/yr) * 1/2000 (lb/ton)

Gas Speciated Fugitive Natural Gas Emissions:

Pollutant	Wt. Fraction ⁽¹⁾ %
Non-VOC	
Methane	94.66%
Ethane	4.75%
VOC	
Propane	0.16%
i-Butane	0.01%
n-Butane	0.01%
i-Pentane	0.003%
n-Pentane	0.001%
C6 Plus	0.004%
Total VOC	0.20%
HAP	
Hexane	0.002%

1. Gas speciation based on a natural gas average hydrocarbon composition for a similar site.

Condensate Speciated Fugitive Natural Gas Emissions:

Pollutant	Wt. Fraction %
Non-VOC	
Methane	37.6%
Ethane	6.4%
VOC	
Propane	10.1%
i-Butane	0.4%
n-Butane	7.4%
Pentane	5.6%
C6 Plus	32.5%
Total VOC	56.0%
HAP	
Hexane	9.9%
Benzene	0.1%
Total HAP	10.0%

1. Condensate speciation based on November 2009 KY application submittal for Station 114.

```

*****
*      Project Setup Information      *
*****
Project File           : Z:\Eastern Pipelines\AIR\NEW\TGP\Broad Run & UMP\Broad Run Expansion\Tennessee Tank
Flowsheet Selection   : Oil Tank with Separator
Calculation Method    : AP42
Control Efficiency    : 100.0%
Known Separator Stream : Low Pressure Gas
Entering Air Composition : No

Filed Name            : Tennessee Gas Pipeline, Broad Run Expansion Project, Tennessee
Date                  : 2015.01.20
    
```

```

*****
*      Data Input                    *
*****
Separator Pressure    : 522.00[psig]
Separator Temperature : 77.00[F]
Molar GOR             : 0.0500
Ambient Pressure      : 14.62[psia]
Ambient Temperature   : 60.00[F]
C10+ SG               : 0.8990
C10+ MW               : 166.00
    
```

```

-- Low Pressure Gas -----

```

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0000
4	N2	0.0000
5	C1	69.4535
6	C2	6.3060
7	C3	6.7857
8	i-C4	0.2039
9	n-C4	3.7724
10	i-C5	2.2997
11	n-C5	0.0000
12	C6	7.7373
13	C7+	0.0000
14	Benzene	0.0379
15	Toluene	0.0000
16	E-Benzene	0.0000
17	Xylenes	0.0000
18	n-C6	3.4036
19	224Trimethylp	0.0000

```

C7+ Molar Ratio: C7 :      C8 :      C9 :      C10+
                  1.0000  1.0000  1.0000  1.0000
    
```

```

-- Sales Oil -----
Production Rate       : 0.4[bbbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity           : 46.0
Reid Vapor Pressure   : 7.70[psia]
Bulk Temperature      : 60.00[F]
    
```

```

-- Tank and Shell Data -----
Diameter              : 8.00[ft]
Shell Height          : 10.00[ft]
Cone Roof Slope       : 0.06
Average Liquid Height : 5.00[ft]
Vent Pressure Range   : 0.06[psi]
Solar Absorbance      : 0.17
    
```

```

-- Meteorological Data -----
City           : Memphis, TN
Ambient Pressure : 14.62[psia]
Ambient Temperature : 60.00[F]
Min Ambient Temperature : 51.90[F]
Max Ambient Temperature : 71.60[F]
Total Solar Insolation : 1366.00[Btu/ft^2*day]
    
```

```

*****
*      Calculation Results      *
*****
    
```

```

-- Emission Summary -----
Item           Uncontrolled   Uncontrolled
              [ton/yr]     [lb/hr]
Total HAPs     0.010         0.002
Total HC       0.187         0.043
VOCs, C2+     0.168         0.038
VOCs, C3+     0.154         0.035
    
```

```

Uncontrolled Recovery Info.
Vapor          9.2300 x1E-3  [MSCFD]
HC Vapor       8.7000 x1E-3  [MSCFD]
GOR            23.58         [SCF/bbl]
    
```

```

-- Emission Composition -----
No Component   Uncontrolled   Uncontrolled
              [ton/yr]     [lb/hr]
1  H2S         0.001         0.000
2  O2          0.000         0.000
3  CO2         0.010         0.002
4  N2          0.000         0.000
5  C1          0.020         0.005
6  C2          0.013         0.003
7  C3          0.028         0.006
8  i-C4        0.013         0.003
9  n-C4        0.045         0.010
10 i-C5        0.020         0.005
11 n-C5        0.024         0.005
12 C6          0.007         0.002
13 C7          0.007         0.002
14 C8          0.003         0.001
15 C9          0.001         0.000
16 C10+       0.000         0.000
17 Benzene    0.001         0.000
18 Toluene    0.000         0.000
19 E-Benzene  0.000         0.000
20 Xylenes    0.000         0.000
21 n-C6       0.005         0.001
22 224Trimethylp 0.000         0.000
Total        0.198         0.045
    
```

```

-- Stream Data -----
No. Component   MW      LP Oil   Flash Oil  Sale Oil  Flash Gas  W&S Gas  Total Emissions
              mol %   mol %   mol %   mol %   mol %   mol %   mol %
1  H2S         34.80   0.0508   0.0377   0.0000   0.6666   0.0001   0.4899
2  O2          32.00   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
3  CO2         44.01   0.2437   0.1043   0.0000   6.7830   0.0001   4.9848
4  N2          28.01   0.0102   0.0005   0.0000   0.4642   0.0001   0.3412
5  C1          16.04   0.9543   0.1726   0.0000   37.6248   0.0001   27.6501
6  C2          30.07   0.6701   0.3933   0.0000   13.6560   0.0001   10.0357
7  C3          44.10   2.1827   1.8542   0.0991   17.5943   5.6598   14.4303
8  i-C4        58.12   1.1269   1.0680   0.3714   3.8879   8.5955   5.1359
9  n-C4        58.12   4.6091   4.4752   2.2806   10.8928   35.5955   17.4418
10 i-C5        72.15   3.1066   3.1125   2.5851   2.8317   15.2233   6.1169
11 n-C5        72.15   5.0558   5.0932   4.6050   3.3020   19.3035   7.5441
12 C6          86.16   4.1726   4.2445   4.4573   0.7997   5.3468   2.0052
    
```

13	C7	100.20	10.3655	10.5727	11.5673	0.6456	4.4684	1.6590
14	C8	114.23	10.8426	11.0693	12.2753	0.2086	1.4526	0.5384
15	C9	128.28	5.5127	5.6294	6.2676	0.0357	0.2481	0.0920
16	C10+	166.00	45.9695	46.9493	52.3739	0.0064	0.0411	0.0156
17	Benzene	78.11	0.5685	0.5793	0.6250	0.0611	0.4126	0.1543
18	Toluene	92.13	0.2132	0.2176	0.2406	0.0062	0.0423	0.0158
19	E-Benzene	106.17	0.0711	0.0726	0.0808	0.0007	0.0045	0.0017
20	Xylenes	106.17	0.6802	0.6946	0.7730	0.0055	0.0373	0.0139
21	n-C6	86.18	3.5939	3.6593	3.8981	0.5273	3.5684	1.3335
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		123.89	125.75	131.21	36.36	67.39	44.58
	Stream Mole Ratio		1.0000	0.9791	0.9716	0.0209	0.0075	0.0284
	Heating Value	[BTU/SCF]				1910.81	3738.07	2395.24
	Gas Gravity	[Gas/Air]				1.26	2.33	1.54
	Bubble Pt. @ 100F	[psia]	56.28	21.33	4.48			
	RVP @ 100F	[psia]	126.75	82.65	28.92			
	Spec. Gravity @ 100F		0.800	0.803	0.813			

Appendix C

Manufacturer's Data

Solar Turbines Titan 250-30000S

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.15.1.17.10
JOB ID:

DATE RUN: 23-Dec-14
RUN BY: David Shekhtman

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 1

HP=31130, %Full Load=100.0, Elev= 813ft, %RH= 60.0, Temperature= 0.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: CHOICE GAS
29.06 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0006 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)
LHV (Btu/Scf) = 942.3 SG = 0.5808 W.I. @60F (Btu/Scf) = 1236.3

Methane (CH4)	= 94.7142
Ethane (C2H6)	= 4.7045
Propane (C3H8)	= 0.1616
I-Butane (C4H10)	= 0.0106
N-Butane (C4H10)	= 0.0139
I-Pentane (C5H12)	= 0.0028
N-Pentane (C5H12)	= 0.0013
Hexane (C6H14)	= 0.0019
Heptane (C7H16)	= 0.0014
Octane (C8H18)	= 0.0007
Carbon Dioxide (CO2)	= 0.0876
Nitrogen (N2)	= 0.2994
Sulfur Dioxide (SO2)	= 0.0001

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

9270.	lbm/hr	FUEL FLOW
3484.99	Scfm	FUEL FLOW
21254.	Btu/lbm	LOWER HEATING VALUE
942.	Btu/Scf	LOWER HEATING VALUE
128838.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
313711.	Acfm	ACTUAL EXHAUST FLOW CFm
582687.	lbm/hr	EXHAUST GAS FLOW
4666.7	deg R	ADIA STOICH FLAME TEMP, CHOICE GAS
4663.4	deg R	ADIA STOICH FLAME TEMP, SDNG
28.61	---	MOLECULAR WEIGHT OF EXHAUST GAS
62.68	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.91	2.83	5.55	75.88	14.83	VOLUME PERCENT WET
0.96	2.99	0.00	80.34	15.70	VOLUME PERCENT DRY
7384.	5353.	20348.	432929.	96661.	lbm/hr
0.80	2.74	2.20	46.70	10.43	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.15.1.17.10
JOB ID:

DATE RUN: 23-Dec-14
RUN BY: David Shekhtman

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 2

HP=29766, %Full Load=100.0, Elev= 813ft, %RH= 60.0, Temperature= 50.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: CHOICE GAS
29.06 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0047 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 942.3 SG = 0.5808 W.I. @60F (Btu/Scf) = 1236.3

Methane (CH4)	= 94.7142
Ethane (C2H6)	= 4.7045
Propane (C3H8)	= 0.1616
I-Butane (C4H10)	= 0.0106
N-Butane (C4H10)	= 0.0139
I-Pentane (C5H12)	= 0.0028
N-Pentane (C5H12)	= 0.0013
Hexane (C6H14)	= 0.0019
Heptane (C7H16)	= 0.0014
Octane (C8H18)	= 0.0007
Carbon Dioxide (CO2)	= 0.0876
Nitrogen (N2)	= 0.2994
Sulfur Dioxide (SO2)	= 0.0001

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

9031.	lbm/hr	FUEL FLOW
3395.35	Scfm	FUEL FLOW
21254.	Btu/lbm	LOWER HEATING VALUE
942.	Btu/Scf	LOWER HEATING VALUE
119526.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
312465.	Acfm	ACTUAL EXHAUST FLOW CFm
538940.	lbm/hr	EXHAUST GAS FLOW
4722.5	deg R	ADIA STOICH FLAME TEMP, CHOICE GAS
4719.2	deg R	ADIA STOICH FLAME TEMP, SDNG
28.52	---	MOLECULAR WEIGHT OF EXHAUST GAS
59.45	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.90	2.96	6.44	75.28	14.42	VOLUME PERCENT WET
0.96	3.16	0.00	80.46	15.41	VOLUME PERCENT DRY
6796.	4587.	21923.	398457.	87165.	lbm/hr
0.75	2.72	2.43	44.12	9.65	g/(g FUEL)

SOLAR TURBINES INCORPORATED
 ENGINE PERFORMANCE CODE REV. 4.15.1.17.10
 JOB ID:

DATE RUN: 23-Dec-14
 RUN BY: David Shekhtman

TITAN 250-30000S Phase 3
 CS/MD
 59F MATCH
 GAS
 TXA-2S REV. 1.1
 ES-2437
 ES-2437

DATA FOR NOMINAL PERFORMANCE

Fuel Type	CHOICE GAS		
Elevation	feet	813	
Inlet Loss	in H2O	4.0	
Exhaust Loss	in H2O	6.0	
Accessory on GP Shaft	HP	42.0	
Engine Inlet Temp.	deg F	0	50.0
Relative Humidity	%	60.0	60.0
Elevation Loss	HP	919	879
Inlet Loss	HP	463	448
Exhaust Loss	HP	232	230
Driven Equipment Speed	RPM	6359	6532
Optimum Equipment Speed	RPM	6359	6532
Gas Generator Speed	RPM	10530	10738
Specified Load	HP	FULL	FULL
Net Output	Power	HP	31130 29766
Fuel Flow		mmBtu/hr	197.02 191.96
Heat Rate		Btu/HP-hr	6329 6449
Therm Eff		%	40.203 39.456
Inlet Air Flow	lbm/hr	581029	536942
Engine Exhaust Flow	lbm/hr	582687	538940
PCD	psiG	349.6	332.1
Compensated PTIT	deg F	1307	1400
PT Exit Temperature	deg F	769	860
Exhaust Temperature	deg F	769	860

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 942.3 SG = 0.5808 W.I. @60F (Btu/Scf) = 1236.3

Methane (CH4)	= 94.7142
Ethane (C2H6)	= 4.7045
Propane (C3H8)	= 0.1616
I-Butane (C4H10)	= 0.0106
N-Butane (C4H10)	= 0.0139
I-Pentane (C5H12)	= 0.0028
N-Pentane (C5H12)	= 0.0013
Hexane (C6H14)	= 0.0019
Heptane (C7H16)	= 0.0014
Octane (C8H18)	= 0.0007
Carbon Dioxide (CO2)	= 0.0876

Nitrogen (N2) = 0.2994
Sulfur Dioxide (SO2) = 0.0001

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

This performance was calculated with a basic inlet and exhaust system.
Special equipment such as low noise silencers, special filters, heat
recovery systems or cooling devices will affect engine performance.
Performance shown is "Expected" performance at the pressure drops
stated, not guaranteed.

PIL 170

Emission Estimates at Start-up, Shutdown, and Commissioning for SoLoNOx Combustion Products

Leslie Witherspoon
Solar Turbines Incorporated

PURPOSE

The purpose of this Product Information Letter (PIL) is to provide emission estimates for start-up and shutdown events for *Solar*[®] gas turbines with *SoLoNOx*[™] dry low emissions combustion systems. The commissioning process is also discussed.

INTRODUCTION

The information presented in this document is representative for both generator set (GS) and compressor set/mechanical drive (CS/MD) combustion turbine applications. Operation of duct burners and/or any add-on control equipment is not accounted for in the emissions estimates. Emissions related to the start-up, shutdown, and commissioning of combustion turbines will not be guaranteed or warranted.

Combustion turbine start-up occurs in one of three modes: cold, warm, or hot. On large, utility size, combustion turbines, the start-up time varies by the "mode". The start-up duration for a hot, warm, or cold *Solar* turbine is less than 10 minutes in simple-cycle and most combined heat and power applications.

Heat recovery steam generator (HRSG) steam pressure is usually 250 psig or less. At 250 psig or less, thermal stress within the HRSG is minimized and, therefore, firing ramp-up is not limited. However, some combined heat and power plant applications will desire or dictate longer start-up times, therefore emissions assuming a 60-minute start are also estimated.

A typical shutdown for a *Solar* turbine is <10 minutes. Emissions estimates for an elongated shutdown, 30-minutes, are also included.

Start-up and shutdown emissions estimates for the *Mercury*[™] 50 engine are found in PIL 205.

For start-up and shutdown emissions estimates for conventional combustion turbines, landfill gas, digester gas, or other alternative fuel applications, contact Solar's Environmental Programs Department.

START-UP SEQUENCE

The start-up sequence, or getting to *SoLoNOx* combustion mode, takes three steps:

1. Purge-crank
2. Ignition and acceleration to idle
3. Loading / thermal stabilization

During the "purge-crank" step, rotation of the turbine shaft is accomplished with a starter motor to remove any residual fuel gas in the engine flow path and exhaust. During "igni-

tion and acceleration to idle,” fuel is introduced into the combustor and ignited in a diffusion flame mode and the engine rotor is accelerated to idle speed.

The third step consists of applying up to 50% load¹ while allowing the combustion flame to transition and stabilize. Once 50% load is achieved, the turbine transitions to *SoLoNOx* combustion mode and the engine control system begins to hold the combustion primary zone temperature and limit pilot fuel to achieve the targeted nitrogen oxides (NO_x), carbon monoxide (CO), and unburned hydrocarbons (UHC) emission levels.

Steps 2 and 3 are short-term transient conditions making up less than 10 minutes.

SHUTDOWN PROCESS

Normal, planned cool down/shutdown duration varies by engine model. The *Centaur*[®] 40, *Centaur* 50, *Taurus*[™] 60, and *Taurus* 65 engines take about 5 minutes. The *Taurus* 70, *Mars*[®] 90 and 100, *Titan*[™] 130 and *Titan* 250 engines take about 10 minutes. Typically, once the shutdown process starts, the emissions will remain in *SoLoNOx* mode for approximately 90 seconds and move into a transitional mode for the balance of the estimated shutdown time (assuming the unit was operating at full-load).

START-UP AND SHUTDOWN EMISSIONS ESTIMATES

Tables 1 through 5 summarize the estimated pounds of emissions per start-up and shutdown event for each product. Emissions estimates are presented for both GS and CS/MD applications on both natural gas and liquid fuel (diesel #2). The emissions estimates are calculated using empirical exhaust characteristics.

COMMISSIONING EMISSIONS

Commissioning generally takes place over a two-week period. Static testing, where no combustion occurs, usually requires one week and no emissions are expected. Dynamic testing, where combustion will occur, will see the engine start and shutdown a number of times and a variety of loads will be placed on the system. It is impossible to predict how long the turbine will run and in what combustion / emissions mode it will be running. The dynamic testing period is generally followed by one to two days of “tune-up” during which the turbine is running at various loads, most likely within low emissions mode (warranted emissions range).

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¹ 40% load for the *Titan* 250 engine on natural gas. 65% load for all engines on liquid fuel (except 80% load for the *Centaur* 40).

**Table 1. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set Applications
10 Minute Start-up and 10 Minute Shutdown
Natural Gas Fuel**

Data will NOT be warranted under any circumstances

	Centaur 40-4701S				Centaur 50-6201S				Taurus 60-7901S				Taurus 65-8401S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	0.6	58.1	3.3	359	0.8	75.0	4.3	454	0.8	78.5	4.5	482	0.9	85.8	4.9	523
Total Emissions per Shutdown (lbs)	0.3	25.5	1.5	160	0.4	31.1	1.8	194	0.4	34.7	2.0	217	0.4	38.2	2.2	237

	Taurus 70-10801S				Mars 90-13002S GSC				Mars 100-16002S GSC				Titan 130-20501S				Titan 250-30002S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	1.1	103.9	5.9	634	1.4	129.0	7.4	858	1.6	151.2	8.6	952	2.1	195.6	11.7	1,194	2.5	22.7	1.5	1,925
Total Emissions per Shutdown (lbs)	1.3	110.7	6.3	689	1.7	147.9	8.4	912	1.9	166.8	9.5	1,026	2.4	210.0	12.0	1,303	3.0	19.9	1.5	1,993

Assumes ISO conditions: 59F, 60% RH, sea level, no losses
Assumes unit is operating at full load prior to shutdown.
Assumes natural gas fuel; ES 9-98 compliant.

**Table 2. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set Applications
60 Minute Start-up and 30 Minute Shutdown
Natural Gas Fuel**

Data will NOT be warranted under any circumstances

	Centaur 40,4701S				Centaur 50,6201S				Taurus 60,7901S				Taurus 65,8401S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	4.1	219.4	13.0	3,420	5.0	272.4	16.1	4,219	5.7	299.8	17.8	4,780	6.1	326.5	19.3	5,074
Total Emissions per Shutdown (lbs)	1.8	121.1	7.1	1,442	2.3	163.3	9.5	1,834	2.5	163.5	9.6	1,994	2.6	177.2	10.4	2,119
	Taurus 70,10801S				Mars 90,13002S				Mars 100,16002S				Titan 250,30002S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	7.6	410.3	24.2	6,164	10.5	570.8	33.7	8,641	11.3	583.5	34.6	9,697	13.8	740.4	43.8	11,495
Total Emissions per Shutdown (lbs)	3.3	223.0	13.0	2,988	4.3	277.0	16.2	3,685	4.8	308.1	18.0	4,056	6.0	405.3	23.7	4,826
Total Emissions per Start (lbs)	11.9	630.3	37.2	15,152	15.8	1,147.8	50.9	12,326	16.1	891.6	52.6	13,753	19.8	1,145.7	67.5	16,320
Total Emissions per Shutdown (lbs)	5.1	346.0	20.2	4,676	6.3	454.1	24.8	5,771	6.8	516.2	26.8	6,112	8.8	620.6	37.4	7,722

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes natural gas fuel; ES 9-98 compliant.

**Table 3. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNox CS/MD Applications
10 Minute Start-up and 10 Minute Shutdown
Natural Gas Fuel**

Data will NOT be warranted under any circumstances

		Centaur 40 4702S				Centaur 50 6102S				Taurus 60 7802S			
		NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)		0.7	64.4	3.7	392	0.8	69.1	4.0	465	0.7	64.3	3.7	410
Total Emissions per Shutdown (lbs)		0.3	30.2	1.7	181	0.4	35.4	2.0	217	0.4	33.0	1.9	204

		Taurus 70 10302S				Mars 90 13802S C.S.M.D.				Mars 100 16002S C.S.M.D.				Titan 130 20902S				Titan 250 30002S			
		NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)		0.8	73.1	4.2	519	1.2	109.3	6.2	805	1.4	123.5	7.1	829	1.9	176.9	10.1	1,161	2.6	262	1.7	1,794
Total Emissions per Shutdown (lbs)		1.1	93.4	5.3	575	1.5	132.6	7.6	817	1.7	149.2	8.5	920	2.4	207.6	11.9	1,272	2.9	19.1	1.4	1,918

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes natural gas fuel; ES 9-98 compliant.

**Table 4. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set
10 Minute Start-up and 10 Minute Shutdown
Liquid Fuel (Diesel #2)**

Data will NOT be warranted under any circumstances

		Centaur, 40,4701S			Centaur, 50,6201S			Taurus, 60,7901S					
		NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)		1.3	44.5	7.4	473	1.7	59.0	9.8	601	1.7	59.8	9.9	636
Total Emissions per Shutdown (lbs)		0.6	17.3	2.8	211	0.7	21.2	3.4	256	0.8	23.5	3.8	286
		Taurus, 70,10801S			Mars, 100,16002S/GSC			Titan, 130,20501S					
		NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)		2.3	78.5	13.0	823	3.4	114.1	18.8	1239	4.3	147.5	24.4	1,547
Total Emissions per Shutdown (lbs)		2.5	73.6	12.0	889	3.8	111.4	18.1	1,331	4.7	139.1	22.6	1,677

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes #2 Diesel fuel; ES 9-98 compliant.

**Table 5. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set
60 Minute Start-up and 30 Minute Shutdown
Liquid Fuel (Diesel #2)**

Data will NOT be warranted under any circumstances

Centaur:40/4701S		Centaur:50/6201S			Taurus:60/7901S		
NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
11.7	194.7	30.9	4,255	15.2	271.9	43.3	5,302
Total Emissions per Start (lbs)							
4.4	84.7	13.6	1,816	6.7	164.3	27.0	2,334
Total Emissions per Shutdown (lbs)							
Taurus:70/10801S		Mars:100/16002S			Titan:130/20501S		
NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
18.4	360.3	57.4	7,375	29.1	552.0	87.7	11,685
Total Emissions per Start (lbs)							
18.0	207.8	34.1	3,156	12.3	302.6	49.4	4,970
Total Emissions per Shutdown (lbs)							
Taurus:60/7901S		Titan:130/20501S			Titan:130/20501S		
NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
14.7	282.6	45.0	5,962	34.4	677.0	108.0	13,731
Total Emissions per Start (lbs)							
6.3	159.0	26.0	2,515	15.0	388.5	63.7	5,876
Total Emissions per Shutdown (lbs)							

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes #2 Diesel fuel; ES 9-98 compliant.

Emission Estimates at Start-up, Shutdown, and Commissioning for SoLoNOx Combustion Products

Leslie Witherspoon
Solar Turbines Incorporated

PURPOSE

The purpose of this Product Information Letter (PIL) is to provide emission estimates for start-up and shutdown events for *Solar*[®] gas turbines with SoLoNOx[™] dry low emissions combustion systems. The commissioning process is also discussed.

INTRODUCTION

The information presented in this document is representative for both generator set (GS) and compressor set/mechanical drive (CS/MD) combustion turbine applications. Operation of duct burners and/or any add-on control equipment is not accounted for in the emissions estimates. Emissions related to the start-up, shutdown, and commissioning of combustion turbines will not be guaranteed or warranted.

Combustion turbine start-up occurs in one of three modes: cold, warm, or hot. On large, utility size, combustion turbines, the start-up time varies by the "mode". The start-up duration for a hot, warm, or cold *Solar* turbine is less than 10 minutes in simple-cycle and most combined heat and power applications.

Heat recovery steam generator (HRSG) steam pressure is usually 250 psig or less. At 250 psig or less, thermal stress within the HRSG is minimized and, therefore, firing ramp-up is not limited. However, some combined heat and power plant applications will desire or dictate longer start-up times, therefore emissions assuming a 60-minute start are also estimated.

A typical shutdown for a *Solar* turbine is <10 minutes. Emissions estimates for an elongated shutdown, 30-minutes, are also included.

Start-up and shutdown emissions estimates for the *Mercury*[™] 50 engine are found in PIL 205.

For start-up and shutdown emissions estimates for conventional combustion turbines, landfill gas, digester gas, or other alternative fuel applications, contact Solar's Environmental Programs Department.

START-UP SEQUENCE

The start-up sequence, or getting to SoLoNOx combustion mode, takes three steps:

1. Purge-crank
2. Ignition and acceleration to idle
3. Loading / thermal stabilization

During the "purge-crank" step, rotation of the turbine shaft is accomplished with a starter motor to remove any residual fuel gas in the engine flow path and exhaust. During "igni-

tion and acceleration to idle,” fuel is introduced into the combustor and ignited in a diffusion flame mode and the engine rotor is accelerated to idle speed.

The third step consists of applying up to 50% load¹ while allowing the combustion flame to transition and stabilize. Once 50% load is achieved, the turbine transitions to *SoLoNOx* combustion mode and the engine control system begins to hold the combustion primary zone temperature and limit pilot fuel to achieve the targeted nitrogen oxides (NO_x), carbon monoxide (CO), and unburned hydrocarbons (UHC) emission levels.

Steps 2 and 3 are short-term transient conditions making up less than 10 minutes.

SHUTDOWN PROCESS

Normal, planned cool down/shutdown duration varies by engine model. The *Centaur*[®] 40, *Centaur* 50, *Taurus*[™] 60, and *Taurus* 65 engines take about 5 minutes. The *Taurus* 70, *Mars*[®] 90 and 100, *Titan*[™] 130 and *Titan* 250 engines take about 10 minutes. Typically, once the shutdown process starts, the emissions will remain in *SoLoNOx* mode for approximately 90 seconds and move into a transitional mode for the balance of the estimated shutdown time (assuming the unit was operating at full-load).

START-UP AND SHUTDOWN EMISSIONS ESTIMATES

Tables 1 through 5 summarize the estimated pounds of emissions per start-up and shutdown event for each product. Emissions estimates are presented for both GS and CS/MD applications on both natural gas and liquid fuel (diesel #2). The emissions estimates are calculated using empirical exhaust characteristics.

COMMISSIONING EMISSIONS

Commissioning generally takes place over a two-week period. Static testing, where no combustion occurs, usually requires one week and no emissions are expected. Dynamic testing, where combustion will occur, will see the engine start and shutdown a number of times and a variety of loads will be placed on the system. It is impossible to predict how long the turbine will run and in what combustion / emissions mode it will be running. The dynamic testing period is generally followed by one to two days of “tune-up” during which the turbine is running at various loads, most likely within low emissions mode (warranted emissions range).

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¹ 40% load for the *Titan* 250 engine on natural gas. 65% load for all engines on liquid fuel (except 80% load for the *Centaur* 40).

**Table 1. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set Applications
10 Minute Start-up and 10 Minute Shutdown
Natural Gas Fuel**

Data will NOT be warranted under any circumstances

	Centaur 40-4701S				Centaur 50-6201S				Taurus 60-7901S				Taurus 65-8401S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	0.6	58.1	3.3	359	0.8	75.0	4.3	454	0.8	78.5	4.5	482	0.9	85.8	4.9	523
Total Emissions per Shutdown (lbs)	0.3	25.5	1.5	160	0.4	31.1	1.8	194	0.4	34.7	2.0	217	0.4	38.2	2.2	237

	Taurus 70-10801S				Mars 90-13002S GSC				Mars 100-16002S GSC				Titan 130-20501S				Titan 250-30802S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	1.1	103.9	5.9	634	1.4	129.0	7.4	868	1.6	151.2	8.6	952	2.1	195.6	11.2	1194	2.5	227	15	1925
Total Emissions per Shutdown (lbs)	1.3	110.7	6.3	689	1.7	147.9	8.4	912	1.9	166.8	9.5	1,026	2.4	210.0	12.0	1,303	3.0	29.9	15	1,993

Assumes ISO conditions: 59F, 60% RH, sea level, no losses
Assumes unit is operating at full load prior to shutdown.
Assumes natural gas fuel; ES 9-98 compliant.

**Table 2. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set Applications
60 Minute Start-up and 30 Minute Shutdown
Natural Gas Fuel**

Data will NOT be warranted under any circumstances

	Centaur 40-4701S				Centaur 50-6201S				Taurus 60-7901S				Taurus 65-8401S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	4.1	219.4	13.0	3,420	5.0	272.4	16.1	4,219	5.7	299.8	17.8	4,780	6.1	326.5	19.3	5,074
Total Emissions per Shutdown (lbs)	1.8	121.1	7.1	1,442	2.3	163.3	9.5	1,834	2.5	163.5	9.6	1,994	2.5	177.2	10.4	2,119

	Taurus 70-10801S				Mars 90-13002S				Mars 100-16002S				Titan 250-30002S			
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	7.6	410.3	24.2	6,164	10.5	570.8	33.7	8,641	11.3	583.5	34.5	9,691	13.8	740.4	43.8	11,495
Total Emissions per Shutdown (lbs)	3.3	223.0	13.0	2,588	4.3	277.0	16.2	3,685	4.9	308.1	18.0	4,056	6.0	405.3	23.7	4,826

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes natural gas fuel; ES 9-98 compliant.

**Table 3. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNox CS/MD Applications
10 Minute Start-up and 10 Minute Shutdown
Natural Gas Fuel**

Data will NOT be warranted under any circumstances

		Centaur 40-4702S				Centaur 50-6102S				Taurus 60-7802S			
		NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)		0.7	64.4	3.7	392	0.8	69.1	2.0	469	0.7	64.3	3.7	410
Total Emissions per Shutdown (lbs)		0.3	30.2	1.7	181	0.4	35.4	2.0	217	0.4	33.0	1.9	204

		Mars 90-13002S CS/MD				Mars 100-16002S CS/MD				Titan 130-20502S				Titan 250-30002S			
		NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)		0.6	73.1	4.2	519	1.2	109.3	6.2	805	1.4	123.5	7.1	829	1.9	176.9	10.1	1,163
Total Emissions per Shutdown (lbs)		1.1	93.4	5.3	575	1.5	132.6	7.6	817	1.7	149.2	8.5	920	2.4	207.6	11.9	1,272

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes natural gas fuel; ES 9-98 compliant.

**Table 4. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set
10 Minute Start-up and 10 Minute Shutdown
Liquid Fuel (Diesel #2)**

Data will NOT be warranted under any circumstances

		Centaur:40/4701S			Centaur:50/6201S			Taurus:60/7901S				
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	1.3	44.5	7.4	473	1.7	59.0	9.8	601	1.7	59.8	9.9	636
Total Emissions per Shutdown (lbs)	0.6	17.3	2.8	211	0.7	21.2	3.4	256	0.8	23.5	3.8	286
		Taurus:70/10801S			Mars:100/16002S/GSC			Titan:130/20501S				
	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
Total Emissions per Start (lbs)	2.3	78.5	13.0	823	3.4	114.1	18.8	1239	4.3	147.5	24.4	1,547
Total Emissions per Shutdown (lbs)	2.5	73.6	12.0	889	3.8	111.4	18.1	1331	4.7	139.1	22.6	1,677

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.
Assumes unit is operating at full load prior to shutdown.
Assumes #2 Diesel fuel; ES 9-98 compliant.

**Table 5. Estimation of Start-up and Shutdown Emissions (lbs/event) for SoLoNOx Generator Set
60 Minute Start-up and 30 Minute Shutdown
Liquid Fuel (Diesel #2)**

Data will NOT be warranted under any circumstances

		Centaur:40:4701S			Centaur:50:6201S			Taurus:60:7901S			
NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
11.7	194.7	30.9	4,255	15.2	271.9	43.3	5,302	14.7	282.6	45.0	5,962
Total Emissions per Start (lbs)											
4.4	84.7	13.6	1,816	6.7	164.3	27.0	2,334	6.3	159.0	26.0	2,515
Total Emissions per Shutdown (lbs)											
		Taurus:70:10801S			Mars:100:16002S			Titan:130:20501S			
NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)	NOx (lbs)	CO (lbs)	UHC (lbs)	CO2 (lbs)
18.4	360.3	57.4	7,375	29.1	552.0	87.7	11,685	34.4	677.0	108.0	13,731
Total Emissions per Start (lbs)											
8.0	207.8	34.1	3,156	12.3	302.6	49.4	4,970	15.0	388.5	63.7	5,876
Total Emissions per Shutdown (lbs)											

Assumes ISO conditions: 59F, 60% RH, sea level, no losses.

Assumes unit is operating at full load prior to shutdown.

Assumes #2 Diesel fuel; ES 9-98 compliant.

Caterpillar 3516C Emergency Generator

GENSET APPLICATION

ENGINE SPEED (rpm): 1800
 COMPRESSION RATIO: 11.3:1
 AFTERCOOLER TYPE: SCAC
 AFTERCOOLER - STAGE 2 INLET (°F): 130
 AFTERCOOLER - STAGE 1 INLET (°F): 198
 JACKET WATER OUTLET (°F): 210
 ASPIRATION: TA
 COOLING SYSTEM: JW+OC+1AC, 2AC
 CONTROL SYSTEM: ADEM3 W/ IM
 EXHAUST MANIFOLD: DRY
 COMBUSTION: LOW EMISSION
 NOx EMISSION LEVEL (g/bhp-hr NOx): 1.0
 ANCILLARY LOAD (ekW): 61
 SET POINT TIMING: 28

RATING STRATEGY: STANDARD
 RATING LEVEL: STANDBY
 FUEL SYSTEM: CAT LOW PRESSURE WITH AIR FUEL RATIO CONTROL

SITE CONDITIONS:
 FUEL: Nat Gas
 FUEL PRESSURE RANGE(psig): 0.5-5.0
 FUEL METHANE NUMBER: 84.8
 FUEL LHV (Btu/scf): 905
 ALTITUDE(ft): 800
 MAXIMUM INLET AIR TEMPERATURE(°F): 77
 STANDARD RATED POWER: 2175 bhp@1800rpm
 POWER FACTOR: 1.0
 VOLTAGE(V): 400-480

RATING	NOTES	LOAD	MAXIMUM SITE RATING AT MAXIMUM INLET AIR TEMPERATURE			
			100%	100%	75%	50%
GENSET POWER (WITH ANCILLARY LOAD)	(1)(2)	ekW	1506	1506	1129	753
GENSET POWER (WITH ANCILLARY LOAD)	(1)(2)	kVA	1506	1506	1129	753
ENGINE POWER (WITHOUT FAN)	(2)	bhp	2175	2175	1661	1150
INLET AIR TEMPERATURE		°F	77	77	77	77
GENERATOR EFFICIENCY	(1)	%	96.6	96.6	96.1	94.9
GENSET EFFICIENCY (ISO 3046/1)	(3)	%	36.1	36.1	34.6	31.1
THERMAL EFFICIENCY	(4)	%	48.3	48.3	48.9	50.9
TOTAL EFFICIENCY	(5)	%	84.4	84.4	83.5	82.0

ENGINE DATA							
GENSET FUEL CONSUMPTION (ISO 3046/1)	(6)	Btu/ekW-hr	9455	9455	9868	10956	
GENSET FUEL CONSUMPTION (NOMINAL)	(6)	Btu/ekW-hr	9686	9686	10109	11223	
ENGINE FUEL CONSUMPTION (NOMINAL)	(6)	Btu/bhp-hr	6705	6705	6875	7348	
AIR FLOW (@inlet air temp, 14.7 psia) (WET)	(7)	ft3/min	4414	4414	3473	2545	
AIR FLOW (WET)	(7)	lb/hr	19574	19574	15398	11283	
FUEL FLOW (60°F, 14.7 psia)		scfm	269	269	210	156	
INLET MANIFOLD PRESSURE	(8)	in Hg(abs)	79.7	79.7	62.2	46.2	
EXHAUST TEMPERATURE - ENGINE OUTLET	(9)	°F	858	858	914	937	
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(10)	ft3/min	11703	11703	9584	7149	
EXHAUST GAS MASS FLOW (WET)	(10)	lb/hr	20308	20308	15974	11710	
MAX INLET RESTRICTION	(11)	in H2O	10.04	10.04	10.04	10.04	
MAX EXHAUST RESTRICTION	(11)	in H2O	20.07	20.07	20.07	20.07	

EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)	(12)(13)	g/bhp-hr	1.00	1.00	1.00	1.00	
CO	(12)(13)	g/bhp-hr	2.16	2.16	2.73	2.70	
THC (mol. wt. of 15.84)	(12)(13)	g/bhp-hr	4.21	4.21	4.95	5.61	
NMHC (mol. wt. of 15.84)	(12)(13)	g/bhp-hr	0.63	0.63	0.74	0.84	
NMNEHC (VOCs) (mol. wt. of 15.84)	(12)(13)(14)	g/bhp-hr	0.42	0.42	0.50	0.56	
HCHO (Formaldehyde)	(12)(13)	g/bhp-hr	0.56	0.56	0.55	0.63	
CO2	(12)(13)	g/bhp-hr	449	449	462	488	
EXHAUST OXYGEN	(12)(15)	% DRY	9.9	9.9	9.8	9.6	

HEAT REJECTION							
LHV INPUT	(16)	Btu/min	243056	243056	190262	140822	
HEAT REJ. TO JACKET WATER (JW)	(17)	Btu/min	34857	34857	27698	25108	
HEAT REJ. TO ATMOSPHERE	(17)	Btu/min	7856	7856	6618	5389	
HEAT REJ. TO LUBE OIL (OC)	(17)	Btu/min	6273	6273	5629	4852	
HEAT REJECTION TO EXHAUST (LHV TO 248 °F)	(17)	Btu/min	55437	55437	47676	36269	
HEAT REJ. TO A/C - STAGE 1 (1AC)	(17)(19)	Btu/min	17462	17462	8685	2656	
HEAT REJ. TO A/C - STAGE 2 (2AC)	(17)(19)	Btu/min	6964	6964	5248	3599	
PUMP POWER	(18)	Btu/min	1964	1964	1964	1964	

COOLING SYSTEM SIZING CRITERIA					
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(20)	Btu/min	64527	64527	
TOTAL AFTERCOOLER CIRCUIT (2AC)	(20)	Btu/min	7341	7341	
HEAT REJECTION TO EXHAUST (LHV TO 248 °F)	(20)	Btu/min	60981	60981	

A cooling system safety factor of 0% has been added to the cooling system sizing criteria.

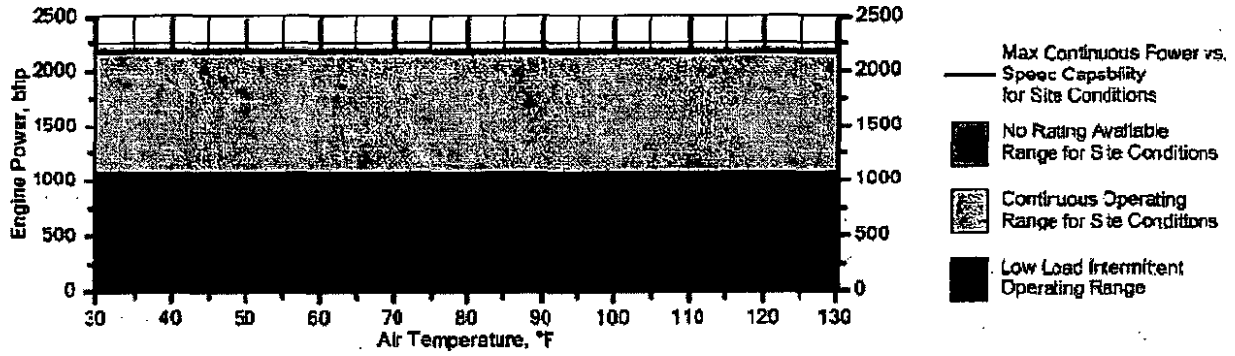
MINIMUM HEAT RECOVERY					
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(21)	Btu/min	52978	52978	
TOTAL AFTERCOOLER CIRCUIT (2AC)	(21)	Btu/min	6616	6616	
HEAT REJECTION TO EXHAUST (LHV TO 248 °F)	(21)	Btu/min	49583	49583	

CONDITIONS AND DEFINITIONS
 Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 800 ft and 1800 rpm



NOTES

1. Generator efficiencies, power factor, and voltage are based on standard generator. [Genset Power (ekW) is calculated as: (Engine Power (bkW) x Generator Efficiency) - Ancillary Load (ekW)], [Genset Power (kVA) is calculated as: ((Engine Power (bkW) x Generator Efficiency) - Ancillary Load (ekW))/ Power Factor]
2. Rating is with two engine driven water pumps. Tolerance is (+)3, (-)0% of full load.
3. ISO 3046/1 Genset efficiency tolerance is (+)0, (-)5% of full load % efficiency value.
4. Thermal Efficiency is calculated based on energy recovery from the jacket water, lube oil, 1st stage aftercooler, and exhaust to 248°F with engine operation at ISO 3046/1 Genset Efficiency, and assumes unburned fuel is converted in an oxidation catalyst.
5. Total efficiency is calculated as: Genset Efficiency + Thermal Efficiency. Tolerance is ±10% of full load data.
6. Fuel consumption tolerance is ± 2.5% of full load data.
7. Air flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 5 %.
8. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.
9. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
10. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.
11. Inlet and Exhaust Restrictions are maximum allowed values at the corresponding loads. Increasing restrictions beyond what is specified will result in a significant engine derate.
12. Emissions data is at engine exhaust flange prior to any after treatment.
13. Emission values are based on engine operating at steady state conditions, adjusted to the specified NOx level at 100% load. Fuel methane number cannot vary more than ± 3. NOx tolerances are ± 18 % of specified value. All other emission values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes.
14. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
15. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.
16. LHV rate tolerance is ± 2.5%.
17. Heat rejection values are representative of site conditions. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for atmosphere, ± 20% for lube oil circuit, ± 10% for exhaust, and ± 5% for aftercooler circuit.
18. Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.
19. Aftercooler heat rejection is nominal for site conditions and does not include an aftercooler heat rejection factor. Aftercooler heat rejection values at part load are for reference only.
20. Cooling system sizing criteria represent the expected maximum circuit heat rejection for the ratings at site, with applied plus tolerances. Total circuit heat rejection is calculated using formulas referenced in the notes on the standard tech data sheet with the following qualifications. Aftercooler heat rejection data (1AC & 2AC) is based on the standard rating. Jacket Water (JW) and Oil Cooler (OC) heat rejection values are based on the respective site or maximum column. Aftercooler heat rejection factors (ACHRF) are specific for the site elevation and inlet air temperature specified in the site or maximum column, referenced from the table on the standard data sheet
21. Minimum heat recovery values represent the expected minimum heat recovery for the site, with applied minus tolerances. Do not use these values for cooling system sizing.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	92.2700	92.2700
Ethane	C2H6	2.5000	2.5000
Propane	C3H8	0.5000	0.5000
Isobutane	iso-C4H10	0.0000	0.0000
Norbutane	nor-C4H10	0.2000	0.2000
Isopentane	iso-C5H12	0.0000	0.0000
Norpentane	nor-C5H12	0.1000	0.1000
Hexane	C6H14	0.0500	0.0500
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	3.4800	3.4800
Carbon Dioxide	CO2	0.9000	0.9000
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup: Nat Gas
Unit of Measure: English

Calculated Fuel Properties

Caterpillar Methane Number: 84.8
Lower Heating Value (Btu/scf): 905
Higher Heating Value (Btu/scf): 1004
WOBBE Index (Btu/scf): 1168
THC: Free Inert Ratio: 21.83
Total % Inerts (% N2, CO2, He): 4.38%
RPC (%) (To 905 Btu/scf Fuel): 100%
Compressibility Factor: 0.998
Stoich A/F Ratio (Vol/Vol): 9.45
Stoich A/F Ratio (Mass/Mass): 15.75
Specific Gravity (Relative to Air): 0.600
Specific Heat Constant (K): 1.313

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

Parker Boiler T-4600LR Heater

PARKER BOILER SUBMITTALS

2:28 pm, Sep 27, 2013

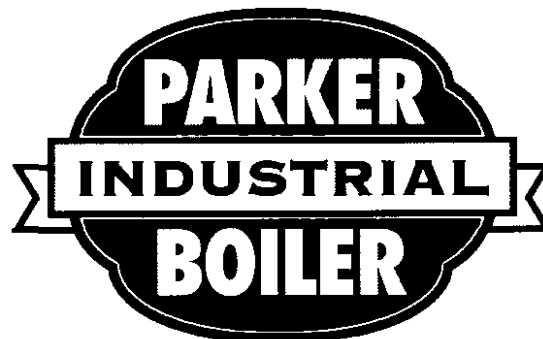
FDL

REVISED

2:34 pm, Nov 05, 2013

PO# 6501955-0-STAT
REFERENCE: AFE 62018 -TGP STATION 315 - ROSE LAKE
ACTIVITY: 620183680999999

ONE (1) PARKER BOILER T4600LR,
DIRECT FIRED HOT WATER GLYCOL BOILER SKID MOUNTED



BOILER MANUFACTURER

PARKER BOILER
5930 BANDINI BLVD
LOS ANGELES, CA 90040
TEL: 323-727-9800
FAX: 323-722-2848
www.parkerboiler.com

KINDER MORGAN, INC
1001 LOUISIANA ST, STE 1000
HOUSTON, TX 77002
TEL: 713-420-6105
CONTACT: BILL THOMAS
bill_a_thomas@kindermorgan.com



PARKER BOILER CO.

MANUFACTURER OF QUALITY INDUSTRIAL BOILERS
WEB SITE: www.parkerboiler.com • E-MAIL: sales@parkerboiler.com

5930 Bandini Blvd
Los Angeles, CA 90040
Ph. (323) 727-9800
Fax. (323) 722-2848

**EMISSION DATA FOR METAL FIBER PREMIX NATURAL GAS FIRED
BURNER SYSTEMS ON PARKER BOILERS**

The following is our approximation of the Emission Levels from our boilers. Emissions may vary, based on Boiler and Field Conditions.

	<u>PPM @ 3%O₂</u>	
1. HC (Hydrocarbons)	60	= .031 Lbs./ 1.0 Million BTU/HR
2. CO (Carbon Monoxide)	60	= .0552 Lbs./ 1.0 Million BTU/HR
3. SO ₂ (Sulfur Dioxide)	NIL	= NIL
4. NO _x (Nitrous Oxides)	20	= .024 Lbs./ 1.0 Million BTU/HR
5. PM-15 (Particulate Matter)		< .01 Lbs./ 1.0 Million BTU/HR

By multiplying these levels by the BTU input in millions, you can calculate the Lbs./Hr. Emissions based on full firing of the subject boiler.

Contact Parker Boiler should you have any questions.

GED/srl
GREG HORN EMISSION doc

Appendix D

Material Safety Data Sheets (MSDS)



1 PRODUCT AND COMPANY IDENTIFICATION

Kinder Morgan, Inc.
500 Dallas St., Suite 1000
Houston, TX 77002

Emergency Telephone Number
1-888-763-3690
CHEMTREC
1-800-424-9300

Product Name: Natural Gas Condensate
Synonyms: Condensate, Pipeline Drip, Gas Drip
CAS Number: 68919-39-1
Chemical Formula: mixture of aromatic and aliphatic hydrocarbons

2 HAZARDS IDENTIFICATION

Note: This product has not been tested by Kinder Morgan to determine its specific health hazards. The information provided in this section includes health hazard information on the product components.

EMERGENCY OVERVIEW: Flammable Liquid. Harmful or fatal if swallowed and may cause lung damage if aspirated. Causes skin and eye irritation. Keep away from children.

Potential Health Effects

EYE EFFECTS: May cause eye irritation.

SKIN EFFECTS: Contact may irritate skin.. Repeated contact may cause redness, drying of skin. When accessing equipment the product may be at elevated temperatures resulting in the potential to cause skin burns.

INHALATION EFFECTS: Irritating to mucos membrane and respiratory tract. Can act as a simple asphyxiant. Overexposure may cause weakness, headache, nausea, confusion, blurred vision, drowsiness and central nervous system depression.

INGESTION EFFECTS: Harmful if swallowed. Pulmonary aspiration hazard if swallowed and vomiting occurs.

3 COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS Number	% by Weight
Natural Gas Condensate	68919-39-1	70-99%
n-Butane	106-97-8	0-5%
Isopentane	78-78-4	0-30%
n-Pentane	109-66-0	0-30%
n-Hexane	110-54-3	0-35%
Heptanes-Decanes (C7-C10)	Not listed	0-40%
Benzene	71-43-2	0-3%
Hydrogen Sulfide (H ₂ S)	7783-06-4	0-1%

Note: Condensate is a complex mixture and these values are typical but may vary depending on the natural gas source and processing.



4 FIRST AID MEASURES

EYES: Flush immediately with water for at least 15 minutes. Seek medical attention promptly.

SKIN: Wash with soap and water. If redness or swelling develops, obtain medical attention. Immediately remove soaked clothing. Wash clothing before reuse.

INHALATION: Move person to fresh air. If not breathing, give artificial respiration and obtain medical assistance.

INGESTION: Obtain medical assistance immediately. Small amounts that accidentally enter mouth should be rinsed out until the taste is gone. Do not induce vomiting.

5 FIRE FIGHTING MEASURES

Flammable Properties

Auto-ignition temperature	495 °F
Flash Point	78-105 °F
Flammable Limits – Upper	40% v/v
Lower	5% v/v

NFPA Ratings;

Health	1
Flammability	3
Reactivity	0
Other	None

Flammability Classification: Flammable Liquid

Extinguishing Media: Foam, dry chemical powder, carbon dioxide

Special Fire Fighting Procedures: Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA). Use water spray to keep fire exposed containers cool.

Unusual Fire and Explosion Hazards: Extremely flammable, can be ignited by heat, spark, or flame. Material will float and may ignite on surface of water. Vapors may travel considerable distance to an ignition source and flash back. Containers may explode in fire.

6 ACCIDENTAL RELEASE MEASURES

Material is heavier than air and can accumulate in low-lying areas. Eliminate all ignition sources including internal combustion engines and power tools. Keep people away.

Stay upwind and warn of possible downwind explosion hazard. Avoid breathing vapor. Ventilate area.

Avoid contact with eyes, skin, and clothing. Wear respiratory protection and other personal protective equipment as appropriate for the potential exposure hazards.



7 HANDLING AND STORAGE

Handling and Storage

Ground and bond all transfer and storage equipment to prevent static sparks. Store away from heat, sparks, flame and other ignition sources. Outside or detached storage is preferred.

Use non-sparking tools and equipment. Empty containers may contain residue (liquid/vapor). Do not pressurize, cut, weld, braze, solder, grind or expose containers to heat, flame, sparks or other sources of ignition as potential for explosion.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Airborne Exposure Guidelines

COMPONENT	OSHA PEL		ACGIH TLV ⁽³⁾		NIOSH REL	
	TWA ⁽¹⁾	STEL	TWA ⁽¹⁾	STEL	TWA ⁽²⁾	STEL
N-Butane	n/a	n/a	1000 ppm	n/a	800 ppm	n/a
Isopentane	1000 ppm	n/a	600 ppm	n/a	120 ppm	n/a
N-Pentane	1000 ppm	n/a	600 ppm	n/a	120 ppm	n/a
n-Hexane	500 ppm	n/a	500 ppm	1000 ppm	50 ppm	n/a
Heptanes – Decanes (C7 – C10)	n/a	n/a	400 ppm	500 ppm	n/a	n/a
Benzene	1 ppm	5 ppm	0.5 ppm	2.5 ppm	0.1 ppm	1 ppm
Hydrogen Sulfide	n/a ⁽⁴⁾	n/a	1 ppm	5 ppm	n/a ⁽⁵⁾	n/a

⁽¹⁾ 8-hour time weighted average unless otherwise noted.

⁽²⁾ 10-hour time weighted average unless otherwise noted.

⁽³⁾ ACGIH 2010 Threshold Limit Values

⁽⁴⁾ OSHA 1010.1000, Table Z-2 lists a ceiling limit of 20 ppm

⁽⁵⁾ NIOSH REL lists a ceiling limit of 10 ppm

Engineering Controls: Assure adequate natural or mechanical ventilation. Eliminate all sources of ignition.

Eye / Face Protection: Use full-face shield and chemical goggles.

Skin Protection: Use impervious protective clothing including gloves, boots, and lab coat, apron or coveralls as appropriate when contact with liquids is possible.

Respiratory Protection: Approved respiratory protection must be used when vapors or mist concentrations are unknown or may exceed recommended exposure limits. Avoid prolonged or repeated breathing of vapors or mists.



9 PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Color	Colorless to Brownish-black
Odor	Hydrocarbon, slight rotten egg odor if H ₂ S is present
Boiling Point / Range	Variable
Evaporation Rate	> 1 (Ethyl Ether = 1)
Vapor Pressure	12-26 psia @ 100 F
Vapor Density (air=1)	> 1
Specific Gravity	0.50 – 0.75
pH	n/a
Solubility in Water	Negligible

10 STABILITY AND REACTIVITY

Stability: Stable under normal conditions of use.

Incompatible Materials and Conditions to Avoid: Strong oxidizing agents. Keep away from heat, sparks, flame, and static electricity.

Hazardous Decomposition Products: Incomplete burning can produce carbon monoxide and carbon dioxide.

11 TOXICOLOGICAL INFORMATION

Specified Substance(s)

Acute Toxicity:

Test Results:

Chemical Name	Test Results
Natural Gas Condensates (petroleum)	Dermal LD50 (Rabbit): > 3750 mg/kg
Natural Gas Condensates (petroleum)	Inhalation LC50 (Rat): > 5.2 mg/l
Natural Gas Condensates (petroleum)	Oral LD50 (Rat): > 5000 mg/kg

Chronic Toxicity: Contains benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans as not been fully established.

Listed Carcinogens:

Chemical Name	IARC	NTP	OSHA	ACGIH
Benzene	1	Listed	Listed	A1

IARC: 1 = Carcinogenic to Humans

ACGIH: A1 = Confirmed Human Carcinogen



Product Information:

Acute Toxicity:

Test Results: no test data available for the product

Other Acute: Harmful if inhaled or absorbed through skin. Harmful if swallowed – may enter lungs if swallowed or vomited. Causes skin and eye irritation. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract.

Chronic Toxicity: Exposures to light hydrocarbons as in this product have been associated with effects to the central nervous system, peripheral nervous system, liver, and kidneys in animal studies. It is unclear from these studies if humans may experience the same effects.

12 ECOLOGICAL INFORMATION

No data available.

13 DISPOSAL CONSIDERATIONS

Disposal of product or material contaminated with this product as per local, state or federal requirements.

14 TRANSPORT INFORMATION

DOT: (Department of Transportation)

PROPER SHIPPING NAME: Hydrocarbons, liquids, n.o.s.

HAZARD CLASS: 3

IDENTIFICATION NUMBER: UN 3295

PACKAGING GROUP: II

LABEL: Flammable Liquid

15 REGULATORY INFORMATION

Reportable Quantity (RQ) Under US EPA CERCLA Regulations:

Benzene, RQ = 10 pounds

SARA Title III

Section 302 Extremely Hazardous Substances (40 CFR 355, Appendix A): Not regulated

Section 311/312 40 CFR Part 370): Acute, Chronic, Fire

Section 313 Toxic Release Inventory (40 CFR 372): Benzene, CAS # 71-43-2

Reporting threshold for other users = 10,000 pounds

Reporting threshold for manufacturing or processing = 25,000 pounds

Hazardous Chemical(s) under OSHA Hazard Communication Standard: Yes



16 OTHER INFORMATION

Revision Information

Revision Date 01-Apr-2011
Supersedes Date 29-Mar-2006

Disclaimer

The information in this MSDS was obtained from sources that are believed to be reliable. However, the information is provided without warranty, expressed or implied, regarding its correctness.

This MSDS was prepared for and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.