Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

November 9, 2016

BY: OVERNIGHT MAIL

Karen Irons, Program Manager
Air Quality Permits Program
1800 Washington Boulevard
Baltimore, MD 21230-1720

Re: Dominion Cove Point, Eastern Market Access Project
Proposed Charles Compressor Station
Air Quality Permit to Construct Application

Ms. Irons;

Please find enclosed for your review an Air Quality Permit to Construct Application regarding the Dominion Cove Point LNG, LP (DCP) Eastern Market Access (EMA) Project at the proposed Charles Compressor Station located in Bryans Road, Charles County, Maryland. DCP is proposing to install one (1) Solar Mars 90 compressor turbine at 13,220 horsepower (HP) at ISO; one (1) Solar Taurus 70 compressor turbine at 11,150 HP at ISO; one (1) 1,070 HP Caterpillar G3512 emergency generator; and one (1) 5.25 MMBtu/hr utility boiler. Both of the proposed compressor turbines will be equipped with selective catalytic reduction (SCR) and oxidation catalysts to reduce air emissions and the proposed facility will also include a 13,000 gallon ammonia storage tank, a 2,500 gallon accumulator storage tank, and a 1,000 gallon hydrocarbon tank.

Please note that the air quality dispersion model electronic files (input and output files) for the Air Quality Impact Analysis will be submitted to you under separate cover for review by MDE staff upon your request. If you have any questions or further concerns regarding this submittal, please contact Gary Comerford any time at (804) 316-2188 or at gary.a.comerford@dom.com.

Sincerely,

Amanda B. Tornabene
Director, Energy Infrastructure Environmental Services

Enclosures: Air Permit to Construct Application

Dominion Cove Point LNG, LP
Charles Compressor Station
Eastern Market Access Project
Air Permit to Construct Application

Prepared for:

Dominion Cove Point LNG, LP

Prepared by:

TRC Environmental Corporation
1200 Wall Street West, 5th Floor
Lyndhurst, New Jersey 07071

November 2016

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1.0 INTRODUCTION

1.1 Project Overview

Dominion Cove Point LNG, LP (Dominion) is seeking authorization from the Federal Energy Regulatory Commission (FERC or Commission) pursuant to Section 7(c) of the Natural Gas Act to construct, install, operate, and maintain the Eastern Mark Access Project (EMA Project). The purpose of the EMA Project is to permit Dominion to transport an incremental volume of approximately 290,000 dekatherms per day of natural gas. As part of the Eastern Market Access Project and in order to boost pressures on Dominion's transmission pipeline system, Dominion is proposing to construct and operate one Solar Mars 90 compressor turbine (13,220 hp (ISO)) and one Solar Taurus 70 compressor turbine (11,150 hp (ISO)) at a new compressor Station in the census designated place of Bryans Road, Charles County, and known as the Charles Compressor Station. The Charles Compressor Station (CS) will be a new natural gas transmission facility covered by Standard Industrial Classification (SIC) 4922. Ancillary project emission sources include one (1) 1,070 hp (750 kW) Caterpillar G3512 emergency generator, one (1) 5.25 MMBtu/hr natural gas fired utility boiler, one (1) 13,000 gallon ammonia storage tank, one (1) 2,500 gallon accumulator storage tank, and a 1,000 gallon hydrocarbon tank.

1.2 Application Summary

The Charles Compressor Station (Project or Charles Station) is a proposed minor stationary source (as defined under the Prevention of Significant Deterioration of Air Quality (PSD) and Title V rules) located in Charles County, Maryland. As demonstrated in Section 3 of this application, the proposed project is not subject to major source air permitting requirements.

The Project will be located in census designated place of Bryans Road, Charles County, which is part of the National Capital Intrastate Air Quality Control Region in Maryland and Virginia. Charles County is considered attainment or unclassifiable for all criteria pollutants with the exception of ozone, which is considered marginal nonattainment for the 2008 8-hour ozone standard.

The proposed project involves the installation of new emission units and will be considered a minor source with respect to New Source Review (NSR) permitting requirements at COMAR 26.11.17 and Title V major source permitting requirements at COMAR 26.11.03. This Permit to Construct (PTC) Application package per COMAR

26.11.02.11 is designed to address the air regulatory requirements of Maryland Department of the Environment (MDE). As such, Dominion is submitting an initial minor source State Facility air permit application for the new Charles Compressor Station. The new Solar Mars 90 and Taurus 70 combustion turbines will be subject to 40 CFR 60 Subpart KKKK, New Source Performance Standards for Stationary Gas Turbines as well as the applicable state regulations as outlined in Section 3 of this application. The new emergency generator will be subject to 40 CFR 60, Subpart JJJJ, New Source Performance Standards for Stationary Spark-Ignition Internal Combustion Engines and 40 CFR 63, Subpart ZZZZ, and National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. The project will not trigger permitting requirements for non-attainment areas per COMAR 26.11.17.

Appendix A of this PTC application contains the MDE application forms. Emission calculation spreadsheets providing supporting calculations for the application forms are included as Appendix B of this application.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Surroundings

The proposed Charles Compressor Station, as shown in Figure 2-1, is located in a rural area in the census designated place of Bryans Road, Charles County. The site is currently undeveloped.

The approximate Universal Transverse Mercator (UTM) coordinates of the facility are: 319,700 meters east and 4,281,700 meters north in Zone 18 (North American Datum of 1983(NAD83)).

2.2 Facility Conceptual Design

As a part of the Eastern Market Access Project, Dominion is proposing to install the following equipment at the proposed Charles compressor station:

- One Solar Mars 90, 13,220 hp (ISO) natural gas fired turbine-driven compressor unit;
- One Solar Taurus 70, 11,150 hp (ISO) natural gas fired turbine-driven compressor unit;
- One Caterpillar G3512 (1,070 hp) natural gas fired emergency generator;
- One 5.25 MMBtu/hr utility boiler;
- One 2,500 gallon accumulator storage tank;
- One 13,000 aqueous ammonia storage tank; and
- One 1,000 gallon hydrocarbon storage tank.

In addition to the four significant emission sources consisting of the Solar Mars 90 and Taurus 70 combustion turbines, the Caterpillar emergency generator and the 5.25 MMBtu/hr utility boiler, several exempt emission units will be located at the Charles compressor station. These sources include the proposed natural gas liquids filter/separators and associated hydrocarbon storage tank (1,000 gallon), which are typical for natural gas compressor stations that may receive small amounts of condensate from upstream natural gas supply and where pipeline cleaning activities may result in residual condensate collection. In addition, the 2,500 gallon accumulator storage tank and 13,000 gallon aqueous ammonia tank are exempt sources.

Lastly, emissions include trivial station blowdowns consisting of two types of gas blowdown events that could occur at the Station: (1) a type of maintenance gas

blowdown that could occur when a compressor is stopped and gas between the suction/discharge valves and compressors is vented to the atmosphere via a blowdown vent, and (2) an emergency shutdown (ESD) that would only occur at required U.S. Department of Transportation (DOT) test intervals or in an emergency situation.

The installation of the above equipment will include a number of piping components at the station which could result in additional fugitive emissions due to equipment leaks.

Dominion has provided fugitive emissions estimates for VOC and greenhouse gas (GHG) emissions. Estimates of fugitive emissions are required to be included for Title V applicability assessments, per COMAR 26.11.02. Typical sources of fugitive emissions from natural gas compressor stations include leaks from piping components (valves, flanges, connectors and open-ended lines) as well as potential gas release events.

2.2.1 Compressor Turbines

The proposed Solar Mars 90 and Taurus 70 natural gas-fired turbines to be installed at the Charles Compressor Station will be equipped with Solar's SoLoNOx dry low NOx combustor technology for NOx control as well as selective catalytic reduction (SCR) for NOx control and oxidation catalyst for CO and VOC control. Emissions for the Solar Turbines assume that the units will operate up to 8,760 hours per year and up to 100% rated output. The vendor provided emission rates for normal operating conditions are as follows (all emissions rates are in terms of parts per million dry volume (ppmvd) @ 15% O2):

- 15 ppmvd NOx (Solar Mars 90), 9 ppmvd NOx (Solar Taurus 70);
- 25 ppmvd CO;
- 25 ppmvd unburned hydrocarbons (UHC); and
- 2.5 ppmvd VOC.

The proposed SCR will further reduce NOx during normal operation to 3.75 ppm at 15% O2. The oxidation catalyst will provide 80% control for CO to achieve 5 ppmvd CO at 15% O2 and will also provide 50% control for VOC. Vendor estimates for SCR and oxidation catalyst performance are provided in Appendix B.

Depending upon demand, the turbines may operate at loads ranging from 50% to 100% of full capacity. Because of the different emission rates and exhaust characteristics that occur at different loads and ambient temperatures, a matrix of operating modes is presented in this air permit application. Emission parameters for three turbine loads (50%, 75%, and 100%) and three ambient temperatures (0°F, 59°F, and 100°F) are

accounted for in this air permit application to cover the range of steady-state turbine operations.

At very low load and cold temperature extremes, the turbine system must be controlled differently in order to assure stable operation. The required adjustments to the turbine controls at these conditions cause emissions of NOx, CO and VOC to increase (emission rates of other pollutants are unchanged). Low-load operation (non-normal SoLoNOx operation) of the turbines is expected to occur only during periods of startup and shutdown and for maintenance or unforeseen emergency events. Solar has provided emissions estimates during start-up and shutdown and low load operation (see Solar Product Information Letter (PIL) 170, included as part of the vendor attachments in Appendix B).

Similarly, Solar has provided emission estimates for low temperature operation (inlet combustion air temperature less than 0° F and greater than -20° F) in Solar PIL 167 (SoLoNOx Products: Emissions in Non-SoLoNOx Modes). Solar PIL 167 provides estimated pre-control emissions from the turbines at low temperature conditions.

- 120 ppmvd NOx (Mars 90), 42 ppmvd NOx (Taurus 70);
- 150 ppmvd CO;
- 50 ppmvd unburned hydrocarbons (UHC); and
- 5 ppmvd VOC.

Dominion reviewed historic meteorological data from the previous five years for the region to estimate the worst case number of hours per year under sub-zero (less than 0° F) conditions. The annual hours of operation during sub-zero conditions was assumed to be not more than 30 hours per year.

Turbine emission rates during start-up and shutdown events increase for NOx, CO and VOC as compared to operating above 50% load. The start-up process for the Solar Mars 90 and Taurus 70 turbines takes approximately 10 minutes from the initiation of start-up to normal operation (equal to or greater than 50% load). Shutdown takes approximately 10 minutes. Dominion has estimated there would be 100 start-up/shutdown events per year. Emissions per start- up and shutdown event for the turbine were estimated based on Table 3 from the Solar PIL 170 entitled "Emission Estimates at Start-up, Shutdown, and Commissioning for SoLoNOx Combustion Products". Appendix B contains these per-event emission calculations for start- up and shutdown and the associated Solar PIL 170.

2.2.2 Ancillary Equipment

Dominion is proposing to install a new Caterpillar G3512 (1,070 hp) four stroke lean burn natural gas fired emergency generator. The emergency generator will operate for no more than 500 hours/year and will not operate to generate electricity for sale or load shaving, and therefore meets the definition of an emergency power generating stationary internal combustion engine. Maximum hourly and annual emission rates for the emergency generator are provided in Appendix B. Emissions of NOx, CO, and VOC are based on regulatory limits under New Source Performance Standard (NSPS) Subpart JJJJ. Emission rates for SO_2, particulates, and HAPs are based on US EPA AP-42 emission factors (Table 3.2-2). GHG emissions are based on 40 CFR Part 98 Tables A-1, C-1, and C-2. The emission rates are based on the emergency generator operating at peak load.

Dominion is proposing to install one new 5.25 MMBtu/hr (heat input) utility boiler. Appendix B provides information on the emission factors used to calculate emissions from the boiler.

2.3 Fuel

The Charles Station will utilize pipeline natural gas as the sole fuel for all proposed equipment. The natural gas is assumed to have a higher heating value (HHV) of approximately 1,020 Btu/standard cubic foot (SCF) and will contain no more than 2.0 grains of sulfur per 100 SCF of gas on an annual average basis.

2.4 Fugitive Emissions and Tanks

Fugitive emissions are defined as those emissions which do not pass through a stack, vent, or other functionally equivalent opening, and include natural gas leaks from valves, flanges, pumps, compressors, seals, connections, etc. Vented emissions are defined as those emissions which pass through a stack, vent, or equivalent opening. A compressor may be vented for startup, shutdown, maintenance, or for protection of gas seals from contamination. An individual compressor or the entire station may be blown down (i.e., vented) for testing, or in the event of an emergency.

Fugitive emissions at natural gas compressor stations include leaks from piping components (valves, flanges, connectors and open-ended lines) as well as potential gas release events. The vast majority of gas release events are associated with startup,

shutdown, or maintenance activities. Dominion has provided fugitive emissions estimates for VOC and greenhouse gas (GHG) emissions in Appendix B. The calculations in Appendix B are based on a methodology described in Interstate Natural Gas Association of America guidelines and a recent analysis of a Dominion Pipeline natural gas sample, which is also included in Appendix B. The calculations for operational vented natural gas conservatively assume that the Charles Station will conduct two full-station blowdowns per year.

Proposed tanks at the Charles Station may have associated emissions, such as the flashing losses that occur when the pressure of a liquid is decreased or the temperature is increased. At Charles Station, flashing losses will occur at the 1,000 gallon hydrocarbon storage tank and include VOCs as provided in Appendix B. Lastly, Dominion is proposing to install a new 2,500 gallon accumulator tank. The 2,500 gallon accumulator storage tank is considered an exempt activity per COMAR 26.11.02.10. Emissions were calculated using the Tanks 4.09d estimation tool for storage tank working and standing losses as provided in Appendix B.

2.5 Proposed Project Emission Potential

Table 2-1 presents project emission potentials from the new units to be installed as a part of the proposed Charles Compressor Station. For new units, project emission potential is equal to potentials to emit. Detailed emission calculations and supporting vendor data can be found in Appendix B of this permit application.

Table 2-1: Proposed Facility Emissions

Pollutant	Solar Mars 90 Turbine	Solar Taurus 70 Turbine	Caterpillar G3512 Emergency Generator	Utility Boiler	Hydrocarbon and Accumulator Tanks	Station Blowdowns	Station Fugitives	Proposed Project Total
NO_x	7.74	5.78	1.18	2.25	-	-	-	16.95
VOC	1.00	0.77	0.59	0.12	0.35	4.89	5.99	13.71
CO	18.22	14.30	2.36	1.89	-	-	-	36.78
SO_2	3.09	2.38	0.001	0.13	-	-	-	5.60
$PM_{10}/PM_{2.5}$	8.25	6.35	0.02	0.17	-	-	-	14.79
CO_2e[1]	64,342	49,570	226	2,693	-	10,836	13,268	140,935
HAPs	0.40	0.31	0.14	0.04	-	0.23	0.28	1.40
Maximum Individual HAP[2]	0.28	0.22	0.10	0.002	-	-	-	0.60

(1) Greenhouse gases calculated as CO_2e.

(2) The individual HAP with the highest total annual emission rate is formaldehyde.

Legend

- Site Boundary
- Operational LOD

N

0 500 1,000

Feet

Dominion

Eastern Market Access Project

Figure 2-1

Site Location Map

Charles Station

Mount Vernon quadrangle

Charles County, Maryland

Created: 9/15/2016

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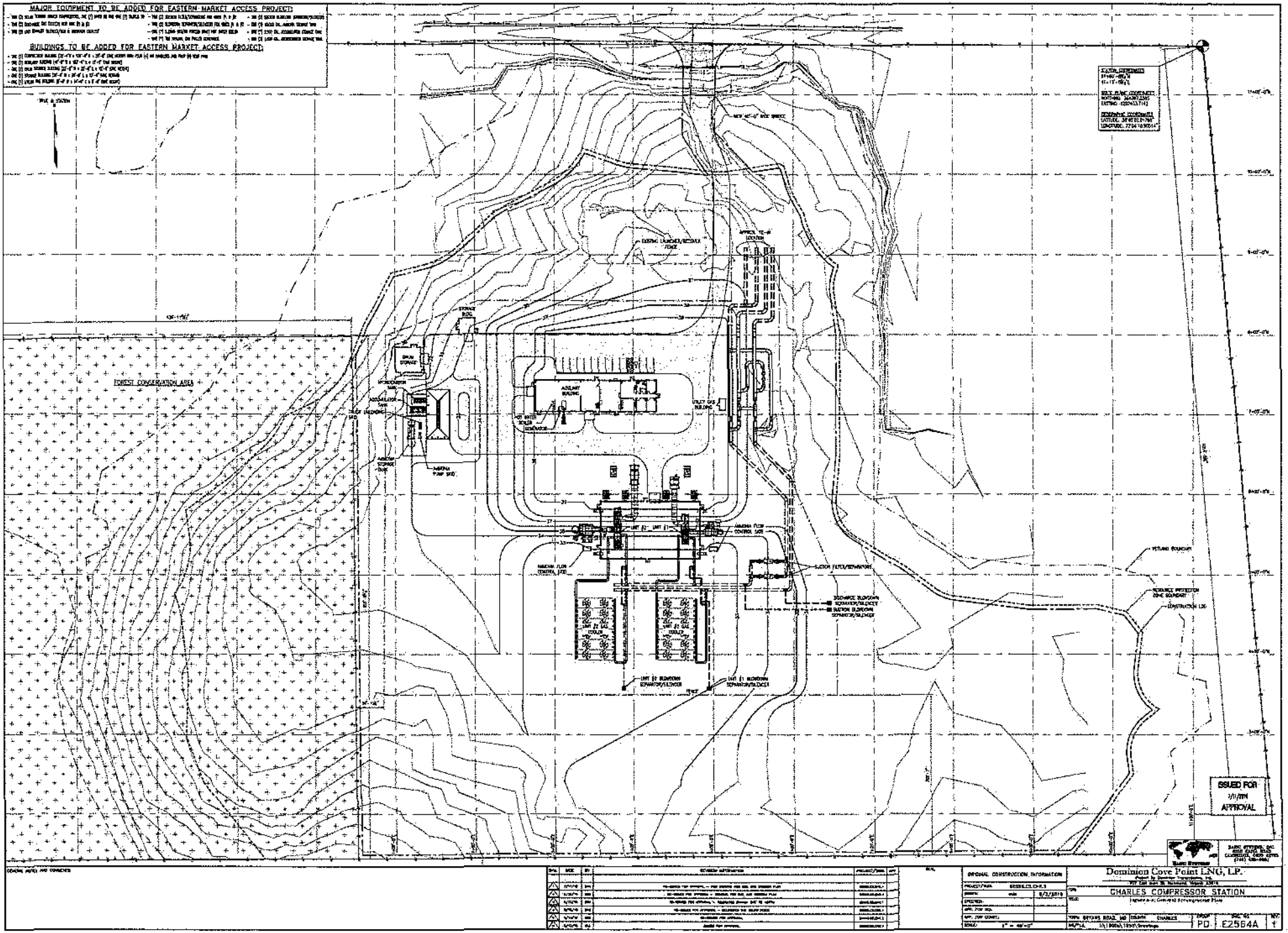
MAJOR EQUIPMENT TO BE ADDED FOR EASTERN MARKET ACCESS PROJECT:
BUILDINGS TO BE ADDED FOR EASTERN MARKET ACCESS PROJECT:
FOREST CONSERVATION LAND
ISSUED FOR
APPROVAL

3.0 APPLICABLE REQUIREMENTS AND REQUIRED ANALYSES

This section contains an analysis of the applicability of federal and state air quality regulations to the proposed project. The specific regulations included in this applicability review are the Federal New Source Performance Standards (NSPS), Prevention of Significant Deterioration (PSD) and Non-Attainment New Source Review (NNSR) requirements, Maximum Achievable Control Technology (MACT) requirements for HAPs, and MDE Regulations and Policy.

3.1 Federal New Source Performance Standards

The 40 CFR 60 NSPS are technology-based standards that apply to new and modified stationary sources. The 40 CFR 60 NSPS requirements have been established for approximately 70 source categories. The proposed project is subject to the following four subparts: General Provisions (40 CFR Part 60, Subpart A), Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40 CFR Part 60, Subpart JJJJ), Standards of Performance for Stationary Combustion Turbines (40 CFR Part 60, Subpart KKKK), and the Standards of Performance for Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources (40 CFR Part 60, Subpart OOOOa).

3.1.1 40 CFR Part 60, Subpart A – General Provisions

The new Mars 90 and Taurus 70 turbines are subject to the general provisions for NSPS units in 40 CFR Part 60 Subpart A. These include the requirements for notification, record keeping, and performance testing contained in 40 CFR Parts 60.7 and 60.8.

3.1.2 40 CFR Part 60 Subpart Kb - Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels)

Subpart Kb potentially applies to storage vessels with a capacity greater than 75 cubic meters (m^3) (19,813 gallons) that will store volatile organic liquids. Tanks with a capacity greater than 75 m^3 are not proposed to be constructed, reconstructed, or modified at Charles Station. Therefore, this subpart will not apply.

3.1.3 40 CFR Part 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines

On January 18, 2008, the USEPA promulgated NSPS Subpart JJJJ for new stationary spark-ignited (SI) internal combustion engines (ICE). Under NSPS Subpart JJJJ, all new, modified, and reconstructed stationary SI engines, both emergency and non-emergency, are covered regardless of size and fuel type. Owners/operators have several options to demonstrate compliance with Subpart JJJJ. The rule allows compliance to be demonstrated by purchase of a certified engine or a non-certified engine and an initial performance test. The performance test for a non-certified engine must show compliance with applicable emission limits of:

- NOx – 2.0 g/bhp-hr or 160 ppmvd @ 15% O2;
- CO – 4.0 g/bhp-hr or 540 ppmvd @ 15% O2 ; and
- VOC (not including formaldehyde) – 1.0 g/bhp-hr or 86 ppmvd @ 15% O2.

If the spark-ignition engine is a non-certified engine, the owner/operator has the option of complying with the emissions standards in either set of units.

3.1.4 40 CFR Part 60, Subpart KKKK – Stationary Combustion Turbines

On July 6, 2006, the USEPA promulgated Subpart KKKK to establish emission standards and compliance schedules for the control of emissions from new stationary combustion turbines that commence construction, modification, or reconstruction after February 18, 2005. Note that stationary combustion turbines regulated under Subpart KKKK are exempt from Subpart GG requirements, which are applicable to units constructed, modified, or reconstructed prior to February 18, 2005.

Pursuant to 40 CFR 60.4305(a), the new Solar gas turbines are subject to requirements of 40 CFR 60 Subpart KKKK, because the heat input at peak load will be greater than or equal to 10 MMBtu/hr (HHV) and Dominion will have commenced the construction or modification of the turbines after February 18, 2005. Pursuant to 40 CFR 60.4320(a) and Table 1 to Subpart KKKK of Part 60 – Nitrogen Oxide Emission Limits for New Stationary Combustion Turbines, the new gas turbine, which will have HHV heat inputs of between 50 and 850 MMBtu/hr, will comply with a NOx emission standard of 25 ppm at 15 percent O_2 or 1.2 lb/MWh useful output as indicated by the vendor guarantee shown in Appendix B. Subpart KKKK also includes a NOx limit of 150 ppmvd at 15% O2 or 8.7 lb/MWh for turbine operation at temperatures less than 0°F and turbine operation at loads less than 75 % of peak load which the new turbine will meet as

indicated by the vendor guarantee shown in Appendix B. The new turbines will not burn any fuel that has the potential to emit in excess of 0.060 lb/MMBtu SO_2 heat input, pursuant to 40 CFR 60.4330(a)(1) and (2), respectively.

3.1.5 40 CFR 60, Subparts OOOO and OOOOa – Crude Oil and Natural Gas Production, Transmission and Distribution

Subpart OOOO currently applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. Subpart OOOO establishes emissions standards and compliance schedules for the control of VOCs 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. Charles Station is located after the point of custody transfer, and therefore centrifugal compressors driven by the proposed turbines are not currently 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. All storage vessels at Charles Station will emit less than this threshold, and thus will not be subject to this regulation. On August 18, 2015, EPA proposed amendments to 40 CFR 60, Subpart OOOO and proposed an entirely new Subpart OOOOa.

Based on the effective date of August 2, 2016 for the new Subpart, this project will be required to comply with the requirements of NSPS Subpart OOOOa. While storage tanks remain covered, Subpart OOOOa also includes provisions intended to reduce emissions from compressors and equipment leaks at compressor stations. For equipment leaks, Subpart OOOOa proposes requiring periodic surveys using optical gas imaging (OGI) technology and subsequent repair of any identified leaks. The project will comply with all applicable leak detection provisions of proposed Subpart OOOOa.

3.2 Nonattainment New Source Review

Because the project will be located in an area designated as non-attainment for the federal 8-hour ozone ambient air quality standard, the applicability of the Non-Attainment NSR requirements of 26 COMAR 11.17 must also be considered. In this case, the requirements of Non-Attainment NSR apply to new major stationary sources and major modifications that are major for emissions of ozone precursor pollutants (NOx and VOC).

Pursuant to COMAR 11.17.01.B(17)(a)(i), any stationary source of air pollution located in Charles County which emits or has the potential to emit 25 tons or more per year of VOC or NOx is a major stationary source. Pursuant to COMAR 11.17.02.A, a new major stationary source would be subject to the requirements of Non-Attainment NSR under COMAR 11.17.03 which includes the use of Lowest Achievable Emission Rate (LAER) and emission offset requirements. The proposed Project will not trigger nonattainment NSR because potential emissions are less than the applicable emissions thresholds as shown in Table 3-1. As the facility will be a minor source for all nonattainment pollutants, offsets and the application of the Lowest Achievable Emission Rate (LAER) are not necessary.

Table 3-1: PSD/NNSR Applicability Assessment

Pollutant	PSD/NNSR Major Source Threshold (tons/year)	Total Facility Emissions (tons/year)	Emissions Exceed PSD/NNSR Major Source Threshold
Carbon Monoxide (CO)	250	36.78	No
Sulfur Dioxide (SO_2)	250	5.60	No
TSP	250	14.79	No
PM10	250	14.79	No
PM2.5	250	14.79	No
Nitrogen Oxides (NOx)	25	16.95	No
VOC	25	13.71	No
Greenhouse Gases (CO_2e)	100,000	140,935	Yes
Total HAP	25	1.4	No
Individual HAP - Formaldehyde	10	0.6	No

3.3 Prevention of Significant Deterioration (PSD)

Preconstruction air permitting programs that regulate the construction of new stationary sources of air pollution and the modification of existing stationary sources are commonly referred to as NSR. NSR can be divided into major NSR and minor NSR. Major NSR is comprised of the Prevention of Significant Deterioration (PSD). Major NSR requirements are established on a federal level but may be implemented by state or local permitting authorities under either a delegation agreement with USEPA or as a SIP program approved by USEPA. MDE has adopted the federal PSD permitting program in COMAR 26.11.06.14. The Charles Compressor Station is not classified as one of the 28 named source categories listed in Section 169 of the Clean Air Act. Therefore, to be considered a "major stationary source" subject to PSD, the facility would need to have potential emissions of 250 tons per year or more of any regulated pollutant (except CO_2). The final PSD and Title V GHG Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014

by the US Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tons per year (tpy) carbon dioxide equivalents (CO_2e) or more. However, the June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.

As shown in Table 3-1, the proposed Charles Compressor Station is a minor stationary source with respect to NSR as all pollutants with the exception of CO_2e are below the PSD and NNSR major source thresholds.

3.4 Title V Operating Permit and State Preconstruction and Operating Permit Programs

The Title V permit program in 40 CFR Part 70 requires major sources of air pollutants to obtain federal operating permits. The major source thresholds under the Title V program, as defined in 40 CFR 70.2 and which are different from the federal NSR major source thresholds, are 100 tpy of any air pollutant, 10 tpy of any single hazardous air pollutant (HAP), or 25 tpy of total HAPs. More stringent Title V major source thresholds apply for VOC and NOx in ozone nonattainment areas, namely 50 tpy of VOC or NOx in areas defined as serious, 25 tpy in areas defined as severe, and 10 tpy in areas classified as extreme. For Title V applicability, the major source thresholds for NOx and VOC are 25 tpy in Charles County per COMAR 26.11.03.01.

Maryland's Title V Operating Permit Program is administered through a USEPA-approved program at COMAR 26.11.03. MDE also administers a state operating permit program through COMAR 26.11.02.13 for certain non-Title V facilities. The Charles Station will have two Solar turbines with heat inputs greater than 50 MMBtu/hr and as a such, is required to obtain a State Permit to Operate. Emission sources or activities listed under COMAR 26.11.02.10 are exempt from the registration and permitting provisions of COMAR 26.11.02.13 and COMAR 26.11.02.03.

As shown in Table 3-1, potential emissions of all regulated pollutants are below the Title V major source thresholds. As such, the facility is not subject to Title V permitting requirements for these pollutants and is required to obtain a State Permit to Operate per COMAR 26.11.02.13.

The MDE requires certain sources to obtain a preconstruction air quality permit known as a Permit to Construct per COMAR 26.11.09. The Charles Compressor Station includes two Solar combustion turbines, an emergency generator, and a small utility

boiler that are subject to NSPS and NESHAPs requirements. Thus, this application for a permit to construct per COMAR 26.11.09 includes the relevant MDE application forms in Appendix A

3.5 National Emission Standards for Hazardous Air Pollutants

The USEPA has established National Emission Standards for Hazardous Air Pollutants (NESHAP) for specific pollutants and industries in 40 CFR Part 61. The Project does not include any of the specific sources for which NESHAP have been established in Part 61. Therefore, Part 61 NESHAP requirements will not apply to the Project. The USEPA has also established NESHAP requirements in 40 CFR Part 63 for various source categories. The Part 63 NESHAP apply to certain emission units at facilities that are major sources of HAP. The applicability to the Project of several NESHAP rules is discussed below.

3.5.1 40 CFR Part 63 Subpart HHH (National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities)

Subpart HHH applies to natural gas transmission and storage facilities that are major sources of HAPs and that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company). The Charles Station is an area source (i.e., not major source) of HAPs. Therefore, this subpart will not apply because it only applies to major sources.

3.5.2 40 CFR Part 63 Subpart YYYY (National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines)

Subpart YYYY applies to stationary combustion turbines at major sources of HAPs. Emissions and operating limitations under Subpart YYYY apply to new and reconstructed stationary combustion turbine. The Charles Station is an area source (i.e., not major source) of HAPs. Therefore, this subpart will not apply because it only applies to major sources.

3.5.3 40 CFR Part 63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

Subpart ZZZZ, applies to existing, new, and reconstructed stationary reciprocating internal combustion engines (ICE) depending on size, use, and whether the engine is

located at a major or area source of HAP. The Project includes the installation of one new emergency stationary RICE with a site rating greater than 500 hp at the Charles Station. New stationary ICE located at area sources of HAP, such as the emergency engine proposed for the Project, must meet the requirements of Subpart ZZZZ by meeting the NSPS. As discussed above, the new emergency engine is subject to the NSPS at 40 CFR Part 60, Subpart JJJJ, therefore the requirements of Subpart ZZZZ will be met.

3.5.4 40 CFR Part 63 Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters)

Subpart DDDDD applies to certain new and existing boilers and process heaters at major HAP sources. The Charles Station is an area source (i.e., not major source) of HAPs. Therefore, this subpart will not apply because it only applies to major sources.

3.6 Maryland Regulations

Potentially applicable regulations from Title 26, Subtitle 11 of Code of Maryland Regulations (COMAR) are identified below:

- 26 COMAR 11.09.05 "Visible Emissions" requires that the facility may not cause or permit the discharge of emissions from any fuel burning equipment, other than water in an uncombined form, which is visible to human observers. This limit does not apply to emissions during load changing, soot blowing, startup, or adjustments or occasional cleaning of control equipment if: (a) The visible emissions are not greater than 40 percent opacity; and (b) The visible emissions do not occur for more than 6 consecutive minutes in any sixty minute period. Pursuant to 26 COMAR 11.09.05E, emissions from stationary internal combustion engine powered equipment shall not exceed 10 percent opacity while operating at idle and 40 percent opacity while operating during non-idle conditions.
- 26 COMAR 11.09.06 "Control of Particulate Matter" limits emissions of particulate matter for fuel burning equipment and requires dust-collector devices. The requirements in this chapter do not apply to natural gas-burning or distillate oil-burning equipment. Since natural gas is proposed to be the sole sources of fuel for the equipment being installed for this project, these requirements do not apply to the project.
- 26 COMAR 11.09.08 "Control of NOx Emissions for Major Stationary Sources" applies to installations that cause emissions of NOx located at a facility that has a potential to emit of NOx of 25 tons per year or more located in Charles county. The

proposed Charles Station is not a major stationary source for NOx emissions since the potential to emit of NOx is limited to less than 25 tons per year. Therefore, this rule does not apply.

- 26 COMAR 11.15.03 "Toxic Air Pollution: Applicability and Exemptions" exempts fuel burning equipment other than equipment burning refuse-derived fuel from conducting an analysis of Best Available Control Technology for Toxics (TBACT). As per COMAR 26.11.15.03B, the combustion turbines, emergency generator, and utility boiler are exempt from TBACT requirements.
- 26 COMAR 11.36.03 "Distribution Generation" limits the operation of the emergency generator for testing and engine maintenance purposes between 12:01 am and 2:00 pm on any day on which the MDE forecasts that the air quality will be a code red, orange, or purple unless the engine fails a test and engine maintenance and then a re-test are necessary.

4.0 AIR QUALITY MODELING ANALYSIS

At the federal level, because the emission increases from the Charles Station equipment are less than applicable major source thresholds, Dominion will not trigger federal NSR requirements for any regulated air pollutant under either PSD or NNSR permitting programs. At the state level, the Project triggers air permitting through the MDE as a minor source of air emissions subject to State Permit to Construct and Operate permitting. If the agency considers that any project triggering minor NSR permitting could threaten attainment with the National Ambient Air Quality Standards (NAAQSs), MDE can require air dispersion modeling for the Project. A site wide modeling analysis for criteria pollutants has been performed to demonstrate that the Proposed Project will comply with the NAAQS. This section details the NAAQS modeling assessment for the proposed Charles Station.

4.1 Background Ambient Air Quality

Background ambient air quality data was obtained from various existing monitoring locations. Based on a review of the locations of Maryland and Virginia ambient air quality monitoring sites, the closest representative monitoring sites were used to represent the current background air quality in the site area.

Background data for CO, and NO2, was obtained from a monitoring station located in Arlington County, Virginia (USEPA AIRData # 51-013-0020). This monitor is located at the Aurora Hills Visitor Center in the City of Arlington, which has a higher population density and higher density of industrial facilities than the Charles Station area in Charles County. Further, this monitor is located in an area with a greater amount of mobile and point sources of air emissions as compared to the project area. Thus, this monitor is considered to conservatively represent the ambient air quality within the project area.

Background data for SO2 and PM2.5 was obtained from a monitoring station located in Fairfax County, Virginia (USEPA AIRData # 51059-0030). This monitor is located at Lee District Park in the census designated place of Groveton, VA that has a higher population density and higher density of industrial facilities than the area around the Charles Station. Further, this monitor is located in an area with a greater amount of mobile and point sources of air emissions as compared to the project area. Thus, this monitor is also considered to conservatively represent the ambient air quality within the project study area.

Background data for PM10 was obtained from a monitoring station located in Alexandria County, Virginia (USEPA AIRData # 51-510-0020). This monitor is located at Tucker Elementary School in Alexandria City that has a higher population density and higher density of industrial facilities than the area around the Charles Station. Further, this monitor is located in an area with a greater amount of mobile and point sources of air emissions as compared to the project area. Thus, this monitor is also considered to conservatively represent the ambient air quality within the project study area.

The monitoring data for the most recent three years (2013 – 2015) are presented and compared to the NAAQS in Table 4-1. The maximum measured concentrations for each of these pollutants during the last three years are all below applicable standards and are proposed to be used as representative background values for comparison of facility concentrations to the NAAQS.

Table 4-1: Maximum Measured Ambient Air Quality Concentrations

Pollutant	Averaging Period	Maximum Ambient Concentrations ($\mu g/m^3$)			NAAQS ($\mu g/m^3$)
		2013	2014	2015	
SO_2	1-Hour[a]	NA	28.8	24.1	196
	3-Hour	NA	**26.5**	18.9	1,300
NO_2	1-Hour[b]	81.0	93.8	91.9	188
	Annual	20.3	**21.1**	20.3	100
CO	1-Hour	1,380	1,840	**2,185**	40,000
	8-Hour	1,265	1,495	**2,070**	10,000
PM10	24-Hour	**28**	23	27	150
PM2.5[c]	24-Hour	21.0	18.0	19.7	35
	Annual	8.3	8.2	8.0	12

[a]1-hour 3-year average 99th percentile value for SO_2 is **26.5** $\mu g/m^3$.

[b]1-hour 3-year average 98th percentile value for NO_2 is **88.9** $\mu g/m^3$.

[c]24-hour 3-year average 98th percentile value for PM-2.5 is **19.6** $\mu g/m^3$; Annual 3-year average value for PM2.5 is **8.2** $\mu g/m^3$.

High second-high short term (1-, 3-, 8-, and 24-hour) and maximum annual average concentrations presented for all pollutants other than PM2.5 and 1-hour SO_2 and NO_2.

Bold values represent the proposed background values for use in any necessary NAAQS/NYAAQS analyses.

Monitored background concentrations obtained from the USEPA AirData website (https://www3.epa.gov/airdata/).

4.2 Modeling Methodology

An air quality modeling analysis was performed consistent with the procedures found in the following documents: Guideline on Air Quality Models (Revised) (USEPA, 2005), New Source Review Workshop Manual (USEPA, 1990), and Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (USEPA, 1992)

4.2.1 Model Selection

The USEPA has compiled a set of preferred and alternative computer models for the calculation of pollutant impacts. The selection of a model depends on the characteristics of the source, as well as the nature of the surrounding study area. Of the four classes of models available, the Gaussian type model is the most widely used technique for estimating the impacts of nonreactive pollutants.

The AERMOD model was designed for assessing pollutant concentrations from a wide variety of sources (point, area, and volume). AERMOD is currently recommended by the USEPA for modeling studies in rural or urban areas, flat or complex terrain, and transport distances less than 50 kilometers, with one hour to annual averaging times.

The latest version of USEPA's AERMOD model (Version 15181) was used in the analysis. AERMOD was applied with the regulatory default options and 5-years (2011-2015) of hourly meteorological data consisting of surface data observed at the Reagan National Airport meteorological station (WBAN #13743) and upper air data collected from Sterling, Virginia upper air sounding station (WBAN #93734).

4.2.2 Urban/Rural Area Analysis

A land cover classification analysis was performed to determine whether the URBAN option in the AERMOD model should be used in quantifying ground-level concentrations. The methodology utilized to determine whether the project is located in an urban or rural area is described below.

The following classifications relate the colors on a United States Geological Survey (USGS) topographic quadrangle map to the land use type that they represent:

- Blue – water (rural);
- Green – wooded areas (rural);

- White – parks, unwooded, non-densely packed structures (rural);
- Purple – industrial; identified by large buildings, tanks, sewage disposal or filtration plants, rail yards, roadways, and, intersections (urban);
- Pink – densely packed structures (urban); and,
- Red – roadways and intersections (urban)

The USGS map covering the area within a 3-kilometer radius of the facility was reviewed and indicated that the vast majority of the surrounding area is denoted as blue, green, or white, which represent water, wooded areas, parks, and non-densely packed structures (all designated as rural land uses). Although a small percent of the surrounding area is designated as urban land use, the "AERMOD Implementation Guide" published on August 3, 2015 cautions users against applying the Land Use Procedure on a source-by-source basis and instead to consider the potential for urban heat island influences across the full modeling domain. This approach is consistent with the fact that the urban heat island is not a localized effect, but is more regional in character.

Because the urban heat island is more of a regional effect, the Urban Source option in AERMOD was not utilized since the area within 3 kilometers of the facility as well as the full modeling domain (20 kilometers by 20 kilometers) is predominantly rural.

4.2.3 Good Engineering Practice Stack Height

Section 123 of the Clean Air Act (CAA) required the USEPA to promulgate regulations to assure that the degree of emission limitation for the control of any air pollutant under an applicable State Implementation Plan (SIP) was not affected by (1) stack heights that exceed Good Engineering Practice (GEP) or (2) any other dispersion technique. The USEPA provides specific guidance for determining GEP stack height and for determining whether building downwash will occur in the Guidance for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations), (USEPA, 1985). GEP is defined as "...the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes that may be created by the source itself, or nearby structures, or nearby terrain "obstacles"."

The GEP definition is based on the observed phenomenon of atmospheric flow in the immediate vicinity of a structure. It identifies the minimum stack height at which significant adverse aerodynamics (downwash) are avoided. The USEPA GEP stack

height regulations (40 CFR 51.100) specify that the GEP stack height (H_{GEP}) be calculated in the following manner:

$$H_{GEP} = H_B + 1.5L$$

Where: H_B = the height of adjacent or nearby structures, and
L = the lesser dimension (height or projected width of the adjacent or nearby structures).

A detailed plot plan of the proposed facility is shown in Figure 2-2. A GEP stack height analysis has been conducted using the USEPA approved Building Profile Input Program with PRIME (BPIPPRM, version 04274). The maximum calculated GEP stack height for the new emission sources is 83 feet; the controlling structure is the proposed compressor building (33 feet). As such, all of the exhaust stacks are subject to downwash and the downwash parameters from the BPIP program were included in the AERMOD analysis. Electronic input and output files for the BPIPPRM model have been provided on the DVD-ROM contained in Appendix C.

4.2.4 Meteorological Data

If at least one year of hourly on-site meteorological data is not available, the application of the AERMOD dispersion model requires five years of hourly meteorological data that are representative of the project site. In addition to being representative, the data must meet quality and completeness requirements per USEPA guidelines. The closest source of representative hourly surface meteorological data is Reagan National Airport located in Arlington, VA located approximately 12 miles to the north of the Charles Compressor Station.

The meteorological data at the Reagan National Airport is recorded by an Automated Surface Observing System (ASOS) that records 1-minute measurements of wind direction and wind speed along with hourly surface observations necessary. The USEPA AERMINUTE program was used by the MDE to process 1-minute ASOS wind data (2011 – 2015) from the Reagan National Airport surface station in order to generate hourly averaged wind speed and wind direction data to supplement the standard hourly ASOS observations. The hourly averaged wind speed and direction data generated by AERMINUTE was merged with the aforementioned hourly surface data.

The AERMOD assessment utilized five (5) years (2011–2015) of concurrent meteorological data collected from a meteorological tower at the Reagan National Airport and from radiosondes launched from Sterling, Virginia. Both the surface and

upper air sounding data were processed by the MDE using AERMOD's meteorological processor, AERMET (version 15181). The output from AERMET was used as the meteorological database for the modeling analysis and consists of a surface data file and a vertical profile data file. These data, which were prepared and processed to AERMOD format by the MDE, was provided for use in the modeling analyses for the proposed facility.

4.3 Receptor Grid

4.3.1 Basic Grid

The AERMOD model requires receptor data consisting of location coordinates and ground-level elevations. The receptor generating program, AERMAP (Version 11103), was used to develop a complete receptor grid to a distance of 10 kilometers from the proposed facility. AERMAP uses digital elevation model (DEM) or the National Elevation Dataset (NED) data obtained from the USGS. The preferred elevation dataset based on NED data was used in AERMAP to process the receptor grid. This is currently the preferred data to be used with AERMAP as indicated in the USEPA AERMOD Implementation Guide published August 3, 2015. AERMAP was run to determine the representative elevation for each receptor using 1/3 arc second NED files that were obtained for an area covering at least 10 kilometers in all directions from the proposed facility. The NED data was obtained through the USGS Seamless Data Server (http://seamless.usgs.gov/index.php).

The following rectangular (i.e. Cartesian) receptors were used to assess the air quality impact of the proposed facility:

- Fine grid receptors (100 meter spacing) for a 20 km (east-west) x 20 km (north-south) grid centered on the proposed facility site.

4.3.2 Property Line Receptors

The facility has a fenced property line that precludes public access to the site. Ambient air is therefore defined as the area at and beyond the fence. The modeling receptor grid includes receptors spaced at 25-meter intervals along the entire fence line. Any Cartesian receptors located within the fence line were removed.

4.4 Selection of Sources for Modeling

The emission sources responsible for most of the potential emissions from the Charles Compressor Station are the two Solar combustion turbines. These units were included in and are the main focus of the modeling analyses. The modeling includes consideration of operation over a range of turbine loads, ambient temperatures, and operating scenarios.

Ancillary sources (emergency generator and utility boiler) were included in the modeling for appropriate pollutants and averaging periods. The emergency equipment may operate for up to 30 minutes in any day for readiness testing and maintenance purposes. Operation of the emergency equipment for longer periods of time in an emergency mode will not be expected to occur when the turbines are operating.

Although only limited operation is expected from the emergency equipment, initial modeling to assess short-term facility impacts assumed concurrent operation of the emergency equipment for readiness testing (i.e., up to 30 minutes per day) with the combustion turbine.

4.4.1 Emission Rates and Exhaust Parameters

The dispersion modeling analysis was conducted with emission rates and flue gas exhaust characteristics (flow rate and temperature) that are expected to represent the range of possible values for the proposed natural gas fired turbines. Because emission rates and flue gas characteristics for a given turbine load vary as a function of ambient temperature and fuel use, data were derived for a number of ambient temperature cases for natural gas fuel at 100%, 75% and 50% operating loads. The temperatures were:

- <0°F, 0°F, 59°F, and 100°F.

To be conservative and limit the number of cases to be modeled, the modeling analyses were conducted using the lowest stack exhaust temperature and exit velocity coupled with the maximum emission rate over all ambient temperature cases for each operating load (with the exception of 1-hour NO_2 modeling which excluded the <0°F data as discussed below). Annual modeling was based on the 100% load, 59°F case. Tables 4-2 and 4-3 summarize the stack parameters and emission rates that were used in the modeling for the compressor turbines.

Note that the modeling for 1-hour NO2 excluded the emergency generator for which normal operations (maintenance purposes only) will be limited to no more than 30 minutes per day with an annual limit of 100 hours per year for testing and maintenance purposes. The 1-hour NO2 modeling also did not consider combustion turbine operations under sub-zero ambient temperature conditions as these conditions are extremely limited annually. The exclusion of the emergency generator and sub-zero operations for the combustion turbines for the 1-hour NO2 modeling is based on USEPA guidance provided in the March 1, 2011 memorandum, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard" for intermittent sources such as emergency generators. In the memo, US EPA states the following:

> *"Given the implications of the probabilistic form of the 1-hour NO2 NAAQS discussed above, we are concerned that assuming continuous operation of intermittent emissions would effectively impose an additional level of stringency beyond that level intended by the standard itself. As a result, we feel it would be inappropriate to implement the 1-hour NO2 standard in such a manner and recommend that compliance demonstrations for the 1-hour NO2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations."*

The emergency generator and sub-zero operation of the combustion turbine are considered as intermittent emissions, and thus, were excluded from the 1-hour NO2 modeling assessment.

Table 4-2: Stack Parameters and Emission Rates – Proposed Solar Mars 90 Compressor Turbine

Parameter		Values			
Load		50%	75	100%	Annual(1)
Stack Height (m)		15.24	15.24	15.24	15.24
Stack Diameter (m)(1)		2.24	2.24	2.24	2.24
Exhaust Velocity (m/s)		15.84	17.23	19.44	21.56
Exhaust Temperature (K)		709.3	699.8	707.6	743.2
Pollutant Emissions (g/s)	NOx	0.158	0.186	0.214	0.223
	CO	0.806	0.932	1.084	-
	SO2	0.069	0.081	0.092	0.089
	PM10/PM2.5	0.183	0.216	0.245	0.237

(1) Based on conservative annual average exhaust parameters for 59°F and annual potential to emit discussed in Section 2.

Table 4-3: Stack Parameters and Emission Rates – Proposed Solar Taurus 70 Compressor Turbine

Parameter		Values			
Load		50%	75	100%	Annual(1)
Stack Height (m)		15.24	15.24	15.24	15.24
Stack Diameter (m)(1)		1.42	1.42	1.42	1.42
Exhaust Velocity (m/s)		28.84	31.44	34.39	37.90
Exhaust Temperature (K)		745.9	744.3	745.4	779.8
Pollutant Emissions (g/s)	NOx	0.121	0.147	0.163	0.166
	CO	0.605	0.731	0.832	-
	SO_2	0.051	0.062	0.070	0.068
	PM10/PM2.5	0.137	0.166	0.188	0.183

(1) Based on conservative annual average exhaust parameters for 59°F and annual potential to emit discussed in Section 2.

Tables 4-4 and 4-5 present the stack parameters and emission rates for the emergency generator and utility boiler. The emergency generator was included in the modeling analysis for appropriate pollutants and averaging periods when used for readiness testing (i.e., up to 30 minutes per day).

Table 4-4: Stack Parameters and Emission Rates – Proposed Emergency Generator

Parameter		Values				
Stack Height (m)		7.62				
Stack Diameter (m)		0.30				
Exhaust Velocity (m/s)		45.4				
Exhaust Temperature (K)		809.3				
Averaging Period		**1-hr**	**3-hr**	**8-hr**	**24-hr**	**Annual**
Pollutant Emissions (g/sec)	NOx	0.30	--	--	--	0.034
	CO	0.59	--	0.074	--	-
	SO_2	2.87E-04	9.55E-05	--	1.19E-05	3.27E-05
	PM10/PM2.5	--	--	--	2.02E-04	5.55E-04

Notes:
Hourly emission rate divided by 2 to simulate limit of 30 minutes testing per day. For the 3-, 8- and 24-hour period the hourly emission rate is further divided by the number of hours in the period.

Table 4-5: Stack Parameters and Emission Rates – Proposed Utility Boiler

Parameter		Values
Stack Height (m)		7.62
Stack Diameter (m)		0.36
Exhaust Velocity (m/s)		8.74
Exhaust Temperature (K)		449.8
Pollutant Emissions (g/sec)	NOx	0.065
	CO	0.054
	SO_2	0.004
	PM10/PM2.5	0.0049

4.5 Maximum Modeled Facility Concentrations

Table 4-6 presents the maximum modeled air quality concentrations of the proposed facility calculated by AERMOD. As shown in this table, the maximum modeled concentrations when combined with a representative background concentration, are less than the applicable NAAQS for all pollutants.

Table 4-6: Facility Maximum Modeled Concentrations Compared to NAAQS

Pollutant	Averaging Period	NAAQS (µg/m³)	Maximum Modeled Concentration (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)
CO	1-Hour	40,000	535	2,185	2,720
	8-Hour	10,000	116	2,070	2,186
SO_2	1-Hour	196	7.5	26.5	34.0
	3-Hour	1,300	6.8	26.5	33.3
PM-10	24-Hour	150	6.2	28.0	34.2
PM-2.5	24-Hour	35	3.4[a]	19.6	23.0
	Annual	12	0.8	8.2	9.0
NO_2	1-Hour	188	88.6[b]	88.9	177.5
	Annual	100	7.8[c]	21.1	28.9

[a]Conservatively based upon maximum 98% percentile daily maximum modeled concentrations.
[b]Assumed 80% of NO_x is NO_2 per USEPA guidance.
[c]Assumed 75% of NO_x is NO_2 per USEPA guidance.

4.6 Modeling Data Files

All modeling data files to determine the maximum ambient ground-level concentrations from the proposed facility are included on DVD-ROM in Appendix C.

4.7 References

USEPA, 2015. AERMOD Implementation Guide. AERMOD Implementation Workgroup, Office of Air Quality Planning and Standards, Air Quality Assessment Division, Research Triangle Park, North Carolina. August 3, 2015.

USEPA, 2014. Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard. USEPA. September 30, 2014.

USEPA, 2011. Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS. USEPA. March 1, 2011.

USEPA, 2005. Guideline on Air Quality Models (Revised). Appendix W to Title 40 U.S. Code of Federal Regulations (CFR) Parts 51 and 52, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency. Research Triangle Park, North Carolina. November 6, 2005.

USEPA, 1992. "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised". EPA Document 454/R-92-019, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

USEPA, 1990. "New Source Review Workshop Manual, Draft". Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency. Research Triangle Park, North Carolina.

USEPA, 1985. Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations-Revised). EPA-450/4-80-023R. U.S. Environmental Protection Agency.

APPENDIX A
MDE APPLICATION FORMS

AIR QUALITY PERMIT TO CONSTRUCT APPLICATION CHECKLIST

OWNER OF EQUIPMENT/PROCESS	
COMPANY NAME:	Dominion Cove Point LNG, LP
COMPANY ADDRESS:	707 E. Main Street, Richmond, VA 23219
LOCATION OF EQUIPMENT/PROCESS	
PREMISES NAME:	Charles Station
PREMISES ADDRESS:	6855 Barrys Hill Road, Bryans Road, MD, 20616
CONTACT INFORMATION FOR THIS PERMIT APPLICATION	
CONTACT NAME:	Cristie D. Neller
JOB TITLE:	Vice President, Systems Engineering
PHONE NUMBER:	804-771-4190
EMAIL ADDRESS:	Cristie.D.Neller@dom.com
DESCRIPTION OF EQUIPMENT OR PROCESS	
Natural Gas Compressor Station	

Application is hereby made to the Department of the Environment for a Permit to Construct for the following equipment or process as required by the State of Maryland Air Quality Regulation, COMAR 26.11.02.09.

Check each item that you have submitted as part of your application package.

☒ Application package cover letter describing the proposed project

☒ Complete application forms (Note the number of forms included or NA if not applicable.)

No. NA Form 5
No. NA Form 5T
No. NA Form 5EP
No. 4 Form 6
No. NA Form 10
No. 2 Form 11
No. NA Form 41
No. 1 Form 42
No. 1 Form 44

☒ Vendor/manufacturer specifications/guarantees

☒ Evidence of Workman's Compensation Insurance

☐ Process flow diagrams with emission points

☒ Site plan including the location of the proposed source and property boundary

☒ Material balance data and all emissions calculations

☐ Material Safety Data Sheets (MSDS) or equivalent information for materials processed and manufactured.

☐ Certificate of Public Convenience and Necessity (CPCN) waiver documentation from the Public Service Commission (1)

☐ Documentation that the proposed installation complies with local zoning and land use requirements (2)

(1) Required for emergency and non-emergency generators installed on or after October 1, 2001 and rated at 2001 kW or more.

(2) Required for applications subject to Expanded Public Participation Requirements.

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪ 1-800-633-6101 ▪ www.mde.state.md.us

Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR FUEL BURNING EQUIPMENT

Permit to Construct ☒ Registration Update ☐ Initial Registration ☐

1A. Owner of Equipment/Company Name
Dominion Cove Point LNG, LP

Mailing Address/Street
707 E. Main Street

City Richmond State VA Zip Code 23219

Telephone Number 804-771-4190

Print Name/Title
Cristie D. Neller - Vice President, System Engineering

Signature: [signature] Date: 11/7/16

DO NOT WRITE IN THIS BOX
2. Registration Number
County No. (1-2) Premises No. (3-6)
Registration Class (7) Equipment No. (8-11)
Data Year (12-13) Application Date

1B. Equipment Location (if different from above give Street Number and Name, City, State, Zip and Telephone Number):
6855 Barrys Hill Road, Bryans Road, MD 20616

Premises Name (if different from above): Charles Station

3. Status

A= New Equipment B= Modification to Existing Equipment C= Existing Equipment	Status	New Construction Began (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)
	A			
	15	16-19	20-23	20-23

4. Describe this Equipment (Make, Model, Features, Manufacturer, etc.):
Solar Taurus 70 Combustion Turbine

5. Workmen's Compensation Coverage: Binder/Policy Number: 68D-004097-216

Company Name: Liberty Mutual Expiration Date

NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6. Number of Pieces of Identical Equipment to be Registered/Permitted at this Time:

7. Person Installing this Equipment (if different from above give Name/Title, Company Name, Mailing Address and Telephone Number):

8. Major Activity, Product or Service of Company at this Location:
Natural Gas Compressor Station

9. Control Devices Associated with this Equipment

None	Simple/Multiple Cyclones	Spray/Adsorb Tower	Venturi Scrubber	Carbon Adsorber	Electrostatic Precipitator	Bag-house
☐	☐	☐	☐	☐	☐	☐
24-0	24-1	24-2	24-3	24-4	24-5	24-6

Thermal/Catalytic Afterburner	Dry Scrubber	Other	Describe
☐	☐	☐	SCR and Oxidation Catalyst
24-7	24-8	24-9	

10. Annual Fuel Consumption for this Equipment Only

OIL-1000 GALLONS	SULFUR %	GRADE	NATURAL GAS-1000 FT^3	LP GAS-100 GALLONS	GRADE
			7 9 2 4 3 6		
26-31	32-33	34	35-41	42-45	

COAL- TONS	SULFUR %	ASH%	WOOD-TONS	MOISTURE %
46-52	53-55	56-58	59-63	64-65

OTHER FUELS _____ (Specify Type) ☐ 66-1 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

OTHER FUEL _____ (Specify Type) ☐ 66-2 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this equipment)

Comfort/Space Heating Only ☐ 67-1 Process Heat Only ☐ 67-2 Percent Process Heat ☐☐ 68-69 Oil Burner Type ☐ 70 (1=Pressure Gun 2=Air Atomizer 3=Steam Atomizer 4=Rotary Cup) Coal Burner Type ☐ 71 (1=Cyclone 2=Stoker 3=Pulverized 4=Hand Fired)

Days Per Week [7] 72 Days Per Year [3 6 5] 73-75

SEASONAL VARIATION IN OPERATION (PERCENT):

None [X] 76 Winter ☐☐ 77-78 Spring ☐☐ 79-80 Summer ☐☐ 81-82 Fall ☐☐ 83-84

12. Exhaust Stack Information

Height Above Ground (ft)	Inside Diameter at Top (inches)	Exit Temperature (°F)	Exit Velocity (ft/sec)
5 0	5 6	9 4 4	1 2 4
86-88	89-91	92-95	96-98

13. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day Refer to Appendix B

Particulate Matter ☐☐☐☐☐☐ 99-104 Oxides of Sulfur ☐☐☐☐☐☐ 105-110 Oxides of Nitrogen ☐☐☐☐☐☐ 111-116

Carbon Monoxide ☐☐☐☐☐☐ 117-122 Volatile Organic Compounds ☐☐☐☐☐☐ 123-128 PM-10 ☐☐☐☐☐☐ 129-134

14. Method Used to Determine Emissions (1=Estimate, 2=AP42, 3=Stack Test, 4=Other Emission Factor)

TSP [4] 165 SOx [4] 166 NOx [4] 167 CO [4] 168 VOC [4] 169 PM10 [4] 170

15. What is the Maximum Rated Heat Input of this Unit (Million Btu/hr)? 99.27 MMBtu/Hr

Air and Radiation Management Administration Use Only

16. Date Rec'd Local _____ Date Rec'd State _____

Return to Local Jurisdiction Date _____ By _____

Rev'd by Local Jurisdiction: Date _____ By _____ Rev'd by State: Date _____ By _____

Acknowledgement Sent by State: Date _____ By _____

17. Inventory Date (MM/YY)	SCC Code	18. Annual Operating Rate	Maximum Design Hourly Rate
171-174	178-185	186-192	193-199

Permit to Operate Month	Transaction Date	Staff Code	VOC	SIP Code
200-201	202-207	208-210	211 212	213 214

Regulation Code ☐☐☐☐ 215-218 Confidentiality ☐ 219

Point Description ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ 220-238 Action ☐ 239 (A: Add C: Change)

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd • Baltimore, Maryland 21230
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Air and Radiation Management Administration • Air Quality Permits Program

APPLICATION FOR FUEL BURNING EQUIPMENT

Permit to Construct ☒ Registration Update ☐ Initial Registration ☐

1A. Owner of Equipment/Company Name
Dominion Cove Point LNG, LP

Mailing Address/Street
707 E. Main Street, Richmond, VA 23219

City Richmond State VA Zip Code 23219

Telephone Number 804-771-4190

Print Name/Title
Cristie D. Neller, Vice President, Systems Engineering

Signature: [signature] Date: 11/7/16

DO NOT WRITE IN THIS BOX
2. Registration Number
County No. (1-2) Premises No. (3-6)
Registration Class (7) Equipment No. (8-11)
Data Year (12-13) Application Date

1B. Equipment Location (if different from above give Street Number and Name, City, State, Zip and Telephone Number):
6855 Barrys Hill Road, Bryans Road, MD, 20616

Premises Name (if different from above): Charles Station

3. Status

A= New Equipment B= Modification to Existing Equipment C= Existing Equipment	Status (15)	New Construction Began (MM/YY) (16-19)	New Construction Completed (MM/YY) (20-23)	Existing Initial Operation (MM/YY) (20-23)
	A			

4. Describe this Equipment (Make, Model, Features, Manufacturer, etc.):
Solar Mars 90 Combustion Turbine

5. Workmen's Compensation Coverage: Binder/Policy Number: 68D-004097-216

Company Name: Liberty Mutual Expiration Date

NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6. Number of Pieces of Identical Equipment to be Registered/Permitted at this Time:

7. Person Installing this Equipment (if different from above give Name/Title, Company Name, Mailing Address and Telephone Number):

8. Major Activity, Product or Service of Company at this Location:
Natural Gas Compressor Station

9. Control Devices Associated with this Equipment

None ☐ (24-0) Simple/Multiple Cyclones ☐ (24-1) Spray/Adsorb Tower ☐ (24-2) Venturi Scrubber ☐ (24-3) Carbon Adsorber ☐ (24-4) Electrostatic Precipitator ☐ (24-5) Bag-house ☐ (24-6)

Thermal/Catalytic Afterburner ☐ (24-7) Dry Scrubber ☐ (24-8) Other ☐ (24-9) Describe SCR and Oxidation Catalyst

10. Annual Fuel Consumption for this Equipment Only

OIL-1000 GALLONS [ ] (26-31) SULFUR % [ ] (32-33) GRADE [ ] (34) NATURAL GAS-1000 FT^3 [1 0 7 8 2 5 3] (35-41) LP GAS-100 GALLONS [ ] (42-45) GRADE [ ]

COAL- TONS [ ] (46-52) SULFUR % [ ] (53-55) ASH% [ ] (56-58) WOOD-TONS [ ] (59-63) MOISTURE % [ ] (64-65)

OTHER FUELS _____ (Specify Type) [ ] (66-1) ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure) OTHER FUEL _____ (Specify Type) [ ] (66-2) ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this equipment)

Comfort/Space Heating Only [ ] (67-1) Process Heat Only [ ] (67-2) Percent Process Heat [ ] (68-69) Oil Burner Type [ ] (70) 1=Pressure Gun 2=Air Atomizer 3=Steam Atomizer 4=Rotary Cup Coal Burner Type [ ] (71) 1=Cyclone 2=Stoker 3=Pulverized 4=Hand Fired

SEASONAL VARIATION IN OPERATION (PERCENT):

Days Per Week [7] (72) Days Per Year [3 6 5] (73-75) None [X] (76) Winter [ ] (77-78) Spring [ ] (79-80) Summer [ ] (81-82) Fall [ ] (83-84)

12. Exhaust Stack Information

Height Above Ground (ft) [5 0] (86-88) Inside Diameter at Top (inches) [8 8] (89-91) Exit Temperature (°F) [8 7 8] (92-95) Exit Velocity (ft/sec) [7 1] (96-98)

13. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day Refer to Appendix B

Particulate Matter [ ] (99-104) Oxides of Sulfur [ ] (105-110) Oxides of Nitrogen [ ] (111-116)

Carbon Monoxide [ ] (117-122) Volatile Organic Compounds [ ] (123-128) PM-10 [ ] (129-134)

14. Method Used to Determine Emissions (1=Estimate, 2=AP42, 3=Stack Test, 4=Other Emission Factor)

TSP [4] (165) SOx [4] (166) NOx [4] (167) CO [4] (168) VOC [4] (169) PM10 [4] (170)

15. What is the Maximum Rated Heat Input of this Unit (Million Btu/hr)? 129.56 MMBtu/Hr

Air and Radiation Management Administration Use Only

16. Date Rec'd Local _____ Date Rec'd State _____

Return to Local Jurisdiction Date _____ By _____

Rev'd by Local Jurisdiction: Date _____ By _____ Rev'd by State: Date _____ By _____

Acknowledgement Sent by State: Date _____ By _____

17. Inventory Date (MM/YY) [ ] (171-174) SCC Code [ ] (178-185)

18. Annual Operating Rate [ ] (186-192) Maximum Design Hourly Rate [ ] (193-199)

Permit to Operate Month [ ] (200-201) Transaction Date [ ] (202-207) Staff Code [ ] (208-210) VOC [ ] (211 212) SIP Code [ ] (213 214)

Regulation Code [ ] (215-218) Confidentiality [ ] (219)

Point Description [ ] (220-238) Action [ ] (239) A: Add C: Change

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration • Air Quality Permits Program
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(410)537-3230 • 1-800-633-6101• www.mde.maryland.gov

Mail application and payment to the following address:
MDE/ARMA, PO Box 2037
Baltimore, MD 21203-2037
Don't forget to sign the application!

Make checks payable to the following:
MDE Clean Air Fund

$400 per piece of equipment

Request for Coverage: Air Quality General Permit to Construct

SMALL FUEL BURNING (BOILER/HEATER) EQUIPMENT

1) Business/Institution/Facility where the equipment will be located ☐ **Check if this is a federal facility**
Business/Institution/Facility Name: Charles Station Phone:
Contact Person's Name: Cristie D. Neller Email Address: Cristie.D.Neller@dom.com
Street Address: 6855 Barrys Hill Road
City: Bryans Road State: MD Zip Code: 20616 County: Charles

2) Owner ☑ **Check if different from above. If checked, complete the following:**
Name: Dominion Cove Point LNG, LP Phone: 804-771-4190
Mailing Address: 707 E. Main Street Email: Cristie.D.Neller@dom.com
City: Richmond State: VA Zip Code: 23219

3) Installer
Contact Name: TBD Phone:

4) Equipment Information
Manufacturer / Model: Hurst LPW Series Installation Date: TBD
Number Installed: 1 Number Removed: _____ (Attach a list of removed equipment)
Maximum Rated Heat Input (from boiler plate): 125 Horsepower or _____ Million Btu per Hour

5) Fuel Information
Indicate the type and quantity of fuel burned. You must be able to check ONE AND ONLY ONE of the following fuel types to qualify for this permit:
A. ☑ Natural Gas Only _____ cubic feet of Natural Gas burned per year
B. ☐ Liquid Petroleum Gas (Propane) Only _____ gallons of Liquid Petroleum Gas (Propane) burned per year
C. ☐ Natural Gas with Distillate Oil as backup fuel only during natural gas curtailment or supply interruption
_____ cubic feet of Natural Gas burned per year **AND** _____ gallons of Distillate Oil burned per year as backup

ATTENTION! Natural gas curtailment or supply interruption means any period during which the supply of natural gas is halted for reasons beyond the control of the facility. An increase in the cost or unit price of natural gas does not constitute a period of natural gas curtailment or interruption. If you plan to burn distillate oil at times OTHER THAN natural gas curtailment or supply interruption, DO NOT SELECT THIS FUEL TYPE. See the fuel types listed under D and E below.

D. ☐ Natural Gas or Distillate Oil with NO RESTRICTIONS on use of either fuel
_____ cubic feet of Natural Gas burned per year **AND** _____ gallons of Distillate Oil burned per year
E. ☐ Distillate Oil Only _____ gallons of Distillate Oil burned per year

6) Business Operational Information
% comfort heat: _____ % process heat: _____
24 hours per day 7 days per week 365 days per year

7) Workers Compensation Information (Environmental Article §1-202)
Workers insurance policy or binder number: 68D-004097-216
☐ Check is self-employed or otherwise exempt from this requirement

"I CERTIFY UNDER PENALTY OF LAW THAT THE INFORMATION SUBMITTED IN THIS REQUEST FOR COVERAGE IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS."

C D Neller — Cristie D. Neller, Vice President — 11/7/16
Owners Signature **Printed Name and Title** **Date**

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(410)537-3230 • 1-800-633-6101 • www.mde.state.md.us

Mail application to

MDE/ARMA
1800 Washington Blvd, Suite 720
Baltimore, MD 21230-1720

Air Quality Permit to Construct & Registration Application for

EMERGENCY GENERATOR

You must check off all of the following items to be able to use this application form

☒ This generator is a dedicated emergency backup generator, and will not be used for peak or load shaving.
☒ This generator is powered by an internal combustion engine, not a turbine
☒ This generator's engine is at least 500 brake horsepower (373 kilowatts)
(Smaller emergency engines do not need a permit)

AND

You must check off one of the following items to be able to use this application form

☒ I do not need a CPCN Exemption because the generator is rated at 2000 kW or less
☐ I do not need a CPCN Exemption because the generator was installed before October 1, 2001
☐ I have a CPCN Exemption from the Public Service Commission for this generator
(Contact the Public Service Commission at 410.767.8131)

1) Business/Institution/Facility where the equipment will be located ☐ **Check if this is a federal facility**

Business/Institution/Facility Name: Charles Station — Phone:

Contact Person's Name: Cristie D. Neller — Email Address: Cristie.D.Neller@dom.com

Street Address: 6855 Barrys Hill Road

City: Bryans Road | State: MD | Zip Code: 20616 | County: Charles

2) Owner ☒ **Check if different from above. If checked, complete the following:**

Name: Dominion Cove Point LNG, LP — Phone:

Mailing Address: 707 E. Main Street

City: Richmond | State: VA | Zip Code: 23219

3) Installer ☐ **Check if different from above. If checked, complete the following:**

Contact Name: | Contact Company: | Phone:

4) Equipment Information

Manufacturer / Model: CAT G3512 — Installation Date: TBD

☐ Yes ☒ No — This generator will be operated as part of an emergency demand response program.

Number Installed: 1	Number Removed:	Stack Height (feet, estimated): 25	Stack Diameter (inches, estimated): 12	
Engine Make / Model:	**EPA Tier Certified:**	**Engine Horsepower:**	**Engine Manufacture Date:**	**Fuel Type:**
CAT G3512	Tier 2	1,070	TBD	Natural Gas

5) Required Attachments (check that you've included them)

☒ Vendor literature

☐ CPCN Exemption from the Public Service Commission
(not needed for generators installed before October 1, 2001, or rated at 1500 kW or less)

6) Workers Compensation Information (Environmental Article §1-202)

Workers insurance policy or binder number: 68D-004097-216

☐ Check if self-employed or otherwise exempt from this requirement

"I CERTIFY UNDER PENALTY OF LAW THAT THE INFORMATION SUBMITTED IN THIS REQUEST FOR COVERAGE IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS."

Owner's Signature	Cristie D. Neller Printed Name and Title	11/2/16 Date

LEAVE BLANK
MDE USE ONLY

☐ Permit
☐ Registration (Less than 1,000 brake horsepower & installed prior to 11/24/03)

Permit/Registration Number: _____ - _____ - _____ - _____

AI: _____

Emissions

	Sox	Nox	CO	VOC	PM	PM-10
Stack						
Fugitive						

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PERMIT TO CONSTRUCT
GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation	Telephone No.	Date of Application
Dominion Cove Point LNG, LP	804-771-4190	11/7/16

2. Mailing Address	City	Zip Code	County
707 E. Main Street	Richmond	23219	

3. Equipment Location	City/Town or P.O.	County
6855 Barrys Hill Road	Bryans Road, MD	Charles

4. Signature of Owner or Operator	Title	Print or Type Name
Cristie D. Neller	Vice President, System Engineering	Cristie D. Neller

5. Application Type: Alteration ☐ New Construction ☒

6. Date Construction is to Start: Completion Date (Estimate):

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ Multiple Cyclone ☐ Afterburner ☐ Electrostatic Precipitator ☐

Scrubber ☐ _____ (type) Other ☒ Oxidation Catalyst (type)

8. Gas Cleaning Equipment Manufacturer	Model No.	Collection Efficiency (Design Criteria)
TBD	TBD	80% (CO)

9. Type of Equipment which Control Equipment is to Service:
Solar Taurus 70 Combustion Turbine

10. Stack Test to be Conducted:

Yes ☐ No ■ _____ (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	N/A	GRAINS/ACFD**	N/A	GRAINS/ACFD**
Moisture Content	TBD	%	TBD	%
OR				
Wet Bulb Temperature		°F		°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	N/A	N/A
10 to 44 Microns	N/A	N/A
Larger than 44 Microns	N/A	N/A

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat _____

Combustion Chamber _____ (diameter) _____ (length) Operating Temperature at Afterburner _____ °F

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

CO prior to control device - 25 ppmvd at 15% Oxygen
CO post to control device - 5 ppmvd at 15% Oxygen

Oxidation Catalyst is located downstream of combustion chamber

Date Received: Local _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date _____

By _____

Application Returned to Applicant:

Date _____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: ☐ ☐☐☐☐

PREMISES NUMBER: ☐☐ ☐☐☐☐

Emission Calculations Revised By _____ Date _____

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APPLICATION FOR PERMIT TO CONSTRUCT
GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation	Telephone No.	Date of Application
Dominion Cove Point LNG, LP	804-771-4190	11/7/16

2. Mailing Address	City	Zip Code	County
707 E. Main Street	Richmond	23219	

3. Equipment Location	City/Town or P.O.	County
6855 Barrys Hill Road	Bryans Road, MD	Charles

4. Signature of Owner or Operator	Title	Print or Type Name
	Vice President, System Engineering	Cristie D. Neller

5. Application Type: Alteration ☐ New Construction ☒ X

6. Date Construction is to Start: Completion Date (Estimate):

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ Multiple Cyclone ☐ Afterburner ☐ Electrostatic Precipitator ☐

Scrubber ☐ _____ (type) Other ☒ X Oxidation Catalyst (type)

8. Gas Cleaning Equipment Manufacturer	Model No.	Collection Efficiency (Design Criteria)
TBD	TBD	80% (CO)

9. Type of Equipment which Control Equipment is to Service:
Solar Mars 90 Combustion Turbine

10. Stack Test to be Conducted:

Yes ☐ No ☒ _____ (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP TBD			
Dust Loading	N/A	GRAINS/ACFD**	N/A	GRAINS/ACFD**
Moisture Content	TBD	%	TBD	%
OR				
Wet Bulb Temperature		°F		°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	N/A	N/A
10 to 44 Microns	N/A	N/A
Larger than 44 Microns	N/A	N/A

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat _____

Combustion Chamber _____ (diameter) _____ (length) Operating Temperature at Afterburner _____ °F

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

CO prior to control device - 25 ppmvd at 15% Oxygen
CO post to control device - 5 ppmvd at 15% Oxygen

Oxidation Catalyst is located downstream of combustion chamber

Date Received: Local _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date_____

By _____

Application Returned to Applicant:

Date_____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

PREMISES NUMBER: | | | | | | | |

Emission Calculations Revised By _____ Date _____

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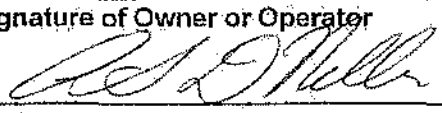
Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PERMIT TO CONSTRUCT
GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation Dominion Cove Point LNG, LP	Telephone No. 804-771-4190		Date of Application 11/7/16
2. Mailing Address 707 E. Main Street	City Richmond	Zip Code 23219	County
3. Equipment Location 6855 Barrys Hill Road	City/Town or P.O. Bryans Road, MD		County Charles
4. Signature of Owner or Operator 	Title Vice President, System Engineering		Print or Type Name Cristie D. Neller

5. Application Type: Alteration ☐ New Construction ☒

6. Date Construction is to Start: Completion Date (Estimate):

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ Multiple Cyclone ☐ Afterburner ☐ Electrostatic Precipitator ☐

Scrubber ☐ _____ (type) Other ☒ Selective Catalytic Reduction (SCR) (type)

8. Gas Cleaning Equipment Manufacturer	Model No.	Collection Efficiency (Design Criteria)
TBD	TBD	41.7% (NOx)

9. Type of Equipment which Control Equipment is to Service:
Solar Taurus 70 Combustion Turbine

10. Stack Test to be Conducted:

Yes ☐ No ■ _____ (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP TBD			
Dust Loading	N/A	GRAINS/ACFD**	N/A	GRAINS/ACFD**
Moisture Content OR Wet Bulb Temperature	TBD	%	TBD	%
		°F		°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	N/A	N/A
10 to 44 Microns	N/A	N/A
Larger than 44 Microns	N/A	N/A

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat _____

Combustion Chamber _____ (diameter) _____ (length) Operating Temperature at Afterburner _____ °F

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

NOx prior to control device - 9 ppmvd at 15% Oxygen
NOx post to control device - 3.75 ppmvd at 15% Oxygen

SCR is located downstream of combustion chamber

Date Received: Local _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date_____

By _____

Application Returned to Applicant:

Date_____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: ☐ ☐☐☐☐

PREMISES NUMBER: ☐☐ ☐☐☐☐

Emission Calculations Revised By _____ Date _____

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PERMIT TO CONSTRUCT
GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation	Telephone No.	Date of Application
Dominion Cove Point LNG, LP	804-777-4190	11/7/16

2. Mailing Address	City	Zip Code	County
707 E. Main Street	Richmond	23219	

3. Equipment Location	City/Town or P.O.	County
6855 Barrys Hill Road	Bryans Road, MD	Charles

4. Signature of Owner or Operator	Title	Print or Type Name
[signature]	Vice President, System Engineering	Cristie D. Neller

5. Application Type: Alteration ☐ New Construction ☒

6. Date Construction is to Start: Completion Date (Estimate):

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ Multiple Cyclone ☐ Afterburner ☐ Electrostatic Precipitator ☐

Scrubber ☐ _____ (type) Other ☒ Selective Catalytic Reduction (SCR) (type)

8. Gas Cleaning Equipment Manufacturer	Model No.	Collection Efficiency (Design Criteria)
TBD	TBD	75% (NOx)

9. Type of Equipment which Control Equipment is to Service:
Solar Mars 90 Combustion Turbine

10. Stack Test to be Conducted:

Yes ☐ No ■ _____ (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP TBD			
Dust Loading	N/A	GRAINS/ACFD**	N/A	GRAINS/ACFD**
Moisture Content	TBD	%	TBD	%
OR				
Wet Bulb Temperature		°F		°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	N/A	N/A
10 to 44 Microns	N/A	N/A
Larger than 44 Microns	N/A	N/A

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat _____

Combustion Chamber _____ (diameter) _____ (length) Operating Temperature at Afterburner _____ °F

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

NOx prior to control device - 15 ppmvd at 15% Oxygen
NOx post to control device - 3.75 ppmvd at 15% Oxygen

SCR is located downstream of combustion chamber

Date Received: Local _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date _____

By _____

Application Returned to Applicant:

Date _____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | |

PREMISES NUMBER: | | | | | | |

Emission Calculations Revised By _____ Date _____

APPENDIX B
EMISSION CALCULATIONS AND VENDOR DATA

Dominion
Charles Compressor Station

Table B-1. Total Facility Potential Emissions Summary

Proposed Sources	NOx	CO	VOC	SO2	PM/PM-10/ PM-2.5	CO2	Total HAPS	CH4	N2O	CO2e
Solar Mars 90	7.74	18.22	1.00	3.09	8.25	64,276.0	0.40	1.21	0.12	64,342
Solar Taurus 70	5.78	14.30	0.77	2.38	6.35	49,518.5	0.31	0.93	0.09	49,570
Caterpillar Emergency Engine	1.18	2.36	0.59	0.0011	0.02	226.2	0.14	0.00	0.000	226.4
Utility Boiler	2.25	1.89	0.12	0.13	0.17	2,690.0	0.04	0.05	0.005	2,693
Hydrocarbon Tank	-	-	3.5E-01	-	-	-	-	-	-	-
Accumulator Storage Tank	-	-	5.3E-04	-	-	-	-	-	-	-
Blowdowns	-	-	4.89	-	-	2.44	0.23	433.36	-	10,836
Station Fugitives	-	-	5.99	-	-	2.94	0.28	530.59	-	13,268
Totals (ton/year)	**16.95**	**36.78**	**13.71**	**5.60**	**14.79**	**116,716.0**	**1.40**	**966.15**	**0.22**	**140,935**

Dominion
Charles Compressor Station

Table B-2. Solar Taurus 70 Specifications

Fuel	Natural Gas											
Load	50	50	50	50	75	75	75	75	100	100	100	100
Hp Output (Net)	5,901	5,874	5,366	4,286	8,852	8,811	8,050	6,429	11,803	11,748	10,733	8,573
Ambient Temperature (F)	below 0	0	59	100	below 0	0	59	100	below 0	0	59	100
Fuel LHV (Btu/scf)	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85
Heat Input LHV (MMBtu/hr) by volume	65.01	63.40	56.70	49.46	78.73	76.66	68.24	58.80	89.23	86.94	78.04	68.14
Heat Input HHV (MMBtu/hr) (=LHV*1.025)	72.32	70.53	63.18	55.02	87.59	85.28	75.92	65.52	99.27	96.72	87.82	75.81
Exhaust lb/hr	208,357	198,809	160,873	149,098	231,309	223,049	193,991	166,294	243,339	236,659	212,488	185,146
Exhaust ACFM	119,032	116,150	105,508	97,099	134,140	129,828	117,828	105,870	139,164	135,260	127,022	115,798
Stack Height (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Stack Height (m)	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24
Stack Equiv Diameter (ft)	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Stack Exhaust (m/s)	35.35	34.50	31.24	28.84	39.51	38.56	35.00	31.44	41.33	40.47	37.90	34.39
Exhaust M.W.	28.55	28.55	28.47	28.29	28.55	28.55	28.47	28.29	28.55	28.55	28.47	28.29
Exhaust Temperature (F)	883	913	994	1048	880	901	961	1022	882	890	944	1002
Exhaust Temperature (K)	745.9	762.6	807.6	837.6	744.3	755.9	780.3	823.2	745.4	749.8	779.8	812.0
Precontrol NOx ppm@ 15% O2	42	9	9	9	42	9	9	9	42	9	9	9
Postcontrol NOx ppm@ 15% O2	10.5	3.75	3.75	3.75	10.50	3.75	3.75	3.75	10.50	3.75	3.75	3.75
SCR Control %	75	42	42	42	75	42	42	42	75	42	42	42
Precontrol NOx lb/hr	11.099	2.360	2.060	1.726	13.419	2.806	2.500	2.100	14.848	3.100	2.860	2.400
Postcontrol NOx lb/hr	2.751	0.958	0.833	0.708	3.355	1.167	1.042	0.875	3.712	1.292	1.167	1.000
NOx g/s	0.347	0.121	0.105	0.089	0.423	0.147	0.131	0.110	0.468	0.163	0.147	0.126
Oxidation Catalyst CO Control %	80	80	80	80	80	80	80	80	80	80	80	80
Precontrol CO ppm@ 15% O2	150	25	25	25	150	25	25	25	150	25	25	25
Postcontrol CO ppm@ 15% O2	30	5	5	5	30	5	5	5	30	5	5	5
Precontrol CO lb/hr	24.0	3.900	3.400	2.900	29.000	4.700	4.100	3.500	33.000	5.300	4.800	4.100
Postcontrol CO lb/hr	4.800	0.780	0.680	0.580	5.800	0.940	0.820	0.700	6.600	1.060	0.960	0.820
CO g/s	0.605	0.098	0.086	0.073	0.731	0.118	0.103	0.088	0.832	0.134	0.121	0.103
UHC ppm@ 15% O2	50	25	25	25	50	25	25	25	50	25	25	25
UHC lb/hr	4.500	2.200	2.000	1.700	6.000	2.700	2.400	2.000	6.200	3.000	2.700	2.300
Oxidation Catalyst VOC Control %	50	50	50	50	50	50	50	50	50	50	50	50
Precontrol VOC ppm@ 15% O2 (10% of UHC)	5	2.5	2.5	2.5	5	2.5	2.5	2.5	5	2.5	2.5	2.5
Postcontrol VOC ppm@ 15% O2 (10% of UHC)	2.5	1.25	1.25	1.25	2.5	1.25	1.25	1.25	2.5	1.25	1.25	1.25
Postcontrol VOC lb/hr	0.225	0.110	0.100	0.085	0.300	0.135	0.120	0.100	0.310	0.150	0.135	0.115
sulfur gr/100 scf	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
SO2 lb/hr	0.466	0.306	0.255	0.200	0.402	0.479	0.426	0.368	0.552	0.543	0.493	0.426
SO2 g/s	0.061	0.050	0.045	0.039	0.062	0.060	0.054	0.046	0.070	0.068	0.062	0.054
Particulates lb/MMBtu	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
PM10/2.5 lb/hr	1.08	1.06	0.95	0.83	1.31	1.28	1.14	0.98	1.49	1.45	1.32	1.14
PM10/2.5 g/s	0.137	0.133	0.119	0.104	0.166	0.161	0.143	0.124	0.188	0.183	0.166	0.143
CO2 lb/mmBtu	117	117	117	117	117	117	117	117	117	117	117	117
CO2 lb/hr	8,454	8,244	7,385	6,433	10,238	9,969	8,874	7,658	11,603	11,306	10,265	8,861
CH4 lb/mmBtu	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
CH4 lb/hr	0.3504	0.3555	0.1393	0.1213	0.1931	0.1880	0.1674	0.1444	0.2188	0.2132	0.1936	0.1671
N2O lb/mmBtu	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
N2O lb/hr	0.0159	0.0155	0.0130	0.0121	0.0193	0.0188	0.0167	0.0144	0.0249	0.0241	0.0194	0.0167
CO2e lb/mmBtu	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0
CO2e lb/hr	8,463	8,253	7,393	6,438	10,249	9,970	8,883	7,666	11,615	11,317	10,276	8,870

Notes

Data from Solar: net output power, fuel flow (MMBtu/hr, LHV), exhaust flow (lb/hr), exhaust temperature, NOx/CO/UHC/VOC concentrations and lb/hr.

1. Control efficiencies for oxidation catalyst and SCR per data from Dominion engineering.

2. Below zero operation uses -20°F for operating parameters and uses concentrations from Solar PTI, 07.

3. Greenhouse gases are calculated using emission factors from Part 98, Tables C-1 and C-2 and global warming potentials from Table A-1 (CO_2 = 1, CH_4 = 25, N_2O = 298).

Dominion
Charles Compressor Station

Table B-3. Solar Mars 90 Specifications

Fuel	Natural Gas											
Load	50	50	50	50	75	75	75	75	100	100	100	100
Hp Output (Net)	7,102	7,562	6,353	5,939	11,044	11,044	9,547	7,559	14,725	14,725	12,703	10,079
Ambient Temperature (F)	below 0	0	59	100	below 0	0	59	100	below 0	0	59	100
Fuel LHV (Btu/scf)	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85	916.85
Heat Input LHV (MMBtu/hr) by Volume	87.25	83.30	71.68	62.36	102.68	97.08	87.24	71.73	116.40	112.85	99.77	85.62
Heat Input HHV (MMBtu/hr) (=LHV*1.125)	97.97	92.67	79.74	69.18	114.23	109.00	92.60	79.80	129.56	125.55	110.99	95.25
Exhaust lb/hr	317,002	299,477	251,814	215,557	349,832	334,559	283,220	242,350	391,225	351,740	313,668	269,220
Exhaust ACFM	172,055	165,339	146,191	131,793	187,425	180,847	159,146	145,218	195,910	192,787	170,241	161,692
Stack Height (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Stack Height (m)	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24	15.24
Stack Equiv Diameter (ft)	7.33	7.33	7.33	7.33	7.33	7.33	7.33	7.33	7.33	7.33	7.33	7.33
Stack Exhaust (m/s)	20.69	19.89	17.61	15.84	22.64	21.75	19.14	17.23	23.56	23.19	21.56	19.44
Exhaust M.W.	28.55	28.57	28.47	28.29	28.55	28.55	28.47	28.29	28.55	28.55	28.47	28.29
Exhaust Temperature (F)	817	913	903	1048	800	811	857	910	814	809	878	1002
Exhaust Temperature (K)	709.3	762.0	757.0	837.6	699.8	705.9	731.5	760.9	707.6	703.8	743.2	812.0
Precontrol NOx ppm@ 15% O_2	120	15	15	15	120	15	15	15	120	15	15	15
Postcontrol NOx ppm@ 15% O_2	30	3.75	3.75	3.75	30	3.75	3.75	3.75	30	3.75	3.75	3.75
SCR Control %	75	75	75	75	75	75	75	75	75	75	75	75
Precontrol NOx lb/hr	31.807	5.000	4.300	3.700	49.464	5.911	5.000	4.200	56.140	6.300	6.000	5.000
Postcontrol NOx lb/hr	10.474	1.250	1.075	0.925	12.366	1.475	1.250	1.050	14.035	1.700	1.500	1.250
NOx g/s	1.320	0.158	0.135	0.117	1.558	0.186	0.158	0.132	1.768	0.214	0.189	0.158
Oxidation Catalyst CO Control %	80	80	80	80	80	80	80	80	80	80	80	80
Precontrol CO ppm@ 15% O_2	150	25	25	25	150	25	25	25	150	25	25	25
Postcontrol CO ppm@ 15% O_2	30	5	5	5	30	5	5	5	30	5	5	5
Precontrol CO lb/hr	32.000	5.100	4.350	3.700	37.000	6.000	5.000	4.300	43.000	6.900	6.080	5.100
Postcontrol CO lb/hr	6.400	1.020	0.860	0.740	7.460	1.200	1.000	0.860	8.600	1.380	1.200	1.020
CO g/s	0.806	0.129	0.108	0.093	0.937	0.151	0.126	0.108	1.084	0.174	0.151	0.129
UHC ppm@ 15% O_2	50	25	25	25	50	25	25	25	50	25	25	25
UHC lb/hr	5.000	2.500	2.500	2.500	7.000	3.400	2.900	2.400	8.100	3.900	3.500	2.900
Oxidation Catalyst VOC Control %	50	50	50	50	50	50	50	50	50	50	50	50
Precontrol VOC ppm@ 15% O_2 (10% of UHC)	5	2.5	2.5	2.5	5	2.5	2.5	2.5	5	2.5	2.5	2.5
Postcontrol VOC ppm@ 15% O_2 (10% of UHC)	2.5	1.25	1.25	1.25	2.5	1.25	1.25	1.25	2.5	1.25	1.25	1.25
Postcontrol VOC lb/hr	0.500	0.465	0.425	0.405	0.350	0.170	0.145	0.120	0.405	0.195	0.175	0.145
sulfur gr/100 scf	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
SO2 lb/hr	0.545	0.520	0.448	0.390	0.641	0.612	0.520	0.448	0.727	0.705	0.623	0.515
SO2 g/s	0.069	0.066	0.056	0.049	0.081	0.077	0.066	0.056	0.092	0.089	0.079	0.065
Particulates lb/MMBtu	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
PM10,2.5 lb/hr	1.46	1.39	1.20	1.04	1.71	1.64	1.39	1.20	1.94	1.88	1.66	1.43
PM10,2.5 g/s	0.183	0.175	0.151	0.131	0.216	0.206	0.175	0.151	0.245	0.237	0.210	0.180
CO2 lb/mmBtu	117	117	117	117	117	117	117	117	117	117	117	117
CO_2 lb/hr	11,346	10,832	9,321	8,109	13,352	12,741	10,824	9,328	15,144	14,675	12,974	11,134
CH4 lb/mmBtu	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
CH_4 lb/hr	0.2140	0.2043	0.1758	0.1529	0.2518	0.2403	0.2042	0.1759	0.2856	0.2768	0.2447	0.2100
N2O lb/mmBtu	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
N2O lb/hr	0.0214	0.0204	0.0176	0.0153	0.0252	0.0240	0.0204	0.0176	0.0286	0.0277	0.0245	0.0210
CO2e lb/mmBtu	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0
CO2e lb/hr	11,358	10,843	9,331	8,118	13,366	12,754	10,836	9,337	15,160	14,690	12,987	11,145

Notes

Data from Solar: net output power, fuel flow (MMBtu/hr, LHV), exhaust flow (lb/hr), exhaust temperature, SO_2/CO/UHC/VOC concentrations and lb/hr.

1. Control efficiencies for oxidation catalyst and SCR per data from Dominion engineering.
2. Below zero operation uses 0°F for operating parameters and uses concentrations from Solar PIL 167.
3. Greenhouse gases are calculated using emission factors from Part 98, Tables C-1 and C-2 and global warming potentials from Table A-1 (CO_2 = 1, CH_4 = 25, N_2O = 298).

Dominion
Charles Compressor Station

Table B-4. Solar Taurus 70 Potential to Emit

Operations	Normal Ambient Temperatures (>0 degrees F)		Startup		Shutdown		Potential to Emit Including Startup/Shutdown during Normal Temperature Operation	Low Ambient Temperatures (<0 degrees F)		Maximum Yearly Potential to Emit
Maximum Annual Combined Event Frequency	8,760 hrs/yr		100 Events/Yr (10 Minute Event Duration)		100 Events/Year (10 Minute Event Duration)		8,760 hrs/yr	30 hrs/yr		8,760 hrs/yr
Pollutant	Hourly (lb/hr)	Maximum Annual (tpy)	Event (lb/event)	Maximum Annual (tpy)	Event (lb/event)	Maximum Annual (tpy)	Maximum Annual (tpy)	Hourly (lb/hr)	Maximum Annual (tpy)	Maximum Annual (tpy)
NO_X	1.29	5.66	0.90	0.05	1.30	0.07	5.75	3.71	0.06	5.78
CO	1.06	4.64	83.60	4.18	108.20	5.41	14.22	6.60	0.10	14.30
SO2	0.54	2.38	0	0	0	0	2.38	0.56	0.01	2.38
PM10/2.5	1.45	6.35	0	0	0	0	6.35	1.49	0.02	6.35
CO2e	11,317	49,570	0	0	0	0	49,570	11,615	174.23	49,570
CO_2	11,306	49,518	0	0	0	0	49,518	11,603	174.05	49,518
N2O	0.02	0.09	0	0	0	0	0.09	0.02	0.0003	0.09
TOC (Total)	3.00	13.14	4.80	0.24	6.20	0.31	13.64	6.20	0.09	13.69
CH_4	0.21	0.93	0	0	0	0	0.93	0.22	0.003	0.93
VOC (Total)	0.15	0.66	0.96	0.05	1.24	0.06	0.76	0.31	0.005	0.77

Dominion
Charles Compressor Station

Table B-5. Solar Mars 90 Potential to Emit

Operations	Normal Ambient Temperatures (>0 degrees F)		Startup		Shutdown		Potential to Emit Including Startup/Shutdown during Normal Temperature Operation	Low Ambient Temperatures (<0 degrees F)		Maximum Yearly Potential to Emit
Maximum Annual Combined Event Frequency	8,760 hrs/yr		100 Events/Yr (10 Minute Event Duration)		100 Events/Year (10 Minute Event Duration)		8,760 hrs/yr	30 hrs/yr		8,760 hrs/yr
Pollutant	Hourly (lb/hr)	Maximum Annual (tpy)	Event (lb/event)	Maximum Annual (tpy)	Event (lb/event)	Maximum Annual (tpy)	Maximum Annual (tpy)	Hourly (lb/hr)	Maximum Annual (tpy)	Maximum Annual (tpy)
NO_x	1.70	7.45	1.20	0.06	1.50	0.08	7.55	14.04	0.21	7.74
CO	1.38	6.04	109.30	5.47	132.60	6.63	18.12	8.60	0.13	18.22
SO_2	0.70	3.09	0	0	0	0	3.09	0.73	0.01	3.09
PM10/2.5	1.88	8.25	0	0	0	0	8.25	1.94	0.03	8.25
CO_2e	14,690	64,342	0	0	0	0	64,342	15,160	227.40	64,342
CO_2	14,675	64,276	0	0	0	0	64,276	15,144	227.17	64,276
N_2O	0.03	0.12	0	0	0	0	0.12	0.03	0.0004	0.12
TOC (Total)	3.90	17.08	6.20	0.31	7.60	0.38	17.71	8.10	0.12	17.77
CH_4	0.28	1.21	0	0	0	0	1.21	0.29	0.004	1.21
VOC (Total)	0.20	0.85	1.40	0.07	1.52	0.08	1.00	0.41	0.006	1.00

Dominion
Charles Compressor Station

Table B-6. Auxiliary Generator Potential Emissions Summary

Engine parameters

Power output base load	750	kW
Power output base load	1,070	Hp
Heat Rate	10,312	Btu/Kw-hr
Heat Input Capacity (HHV)	7.734	MMBtu/hr
Maximum Annual Operation	500	hr/yr

	Potential Emissions			
Pollutant	**g/bhp-hr[1]**	**lb/MMBtu[2]**	**lb/hr**	**Total Annual (ton/yr)[3]**
NO_x	2.00		4.72	1.18
CO	4.00		9.44	2.36
VOC	1.00		2.36	0.59
PM10/2.5		0.00999	0.08	0.019
SO2		5.88E-04	0.005	0.0011
CO2e		117.10	905.657	226.41
CO2		116.9800	904.723	226.18
CH4		0.0022	0.017	0.00
N2O		0.0002	0.002	0.000

Notes:

[1] NOx, CO, VOC based on NSPS Subpart JJJJ, Table 1

[2] Emissions for PM10/PM2.5 and SO2 calculated using AP-42 emission factors (Table 3.2-2). Emission for GHGs based upon 40 CFR Part 98, Subpart C

[3] Auxiliary Generator is Limited to 500 hours / year.

Dominion
Charles Compressor Station

Table B-7. Gas-Fired Boiler Potential Emissions Summary

Boiler parameters

Heat Input Capacity (HHV)	5.25	MMBtu/hr
Fuel Firing Rate	5,147	SCF/hr
Maximum Annual Operation	8,760	hr/yr

	Potential Emissions		
Pollutant	**lb/mmscf**	**lb/hr**	**Total Annual (ton/yr)**
NO_x	100	0.51	2.25
CO	84	0.43	1.89
VOC	5.5	0.028	0.12
PM/PM-10/PM-2.5	7.6	0.04	0.17
SO_2 [2]	5.71	0.0294	0.13
CO2e	119,443	614.78	2692.73
CO2	119,320	614.15	2689.96
CH4	2.25	0.0116	0.05
N2O	0.22	0.00116	0.0051

[1] NO_x, CO, VOC and PM emissions are based upon AP-42 Emission Factors

[2] Emissions of SO_2 from based on mass balance of sulfur in fuel:

Sulfur Content	2.0	grains/100 SCF
Higher Heating Value	1,020	Btu/SCF
Molecular Weight of S =	32	lb/lbmol
Molecular Weight of SO_2 =	64	lb/lbmol

[3] GHG Emissions are based upon 40 CFR Part 98, Subpart C

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Table B-8. Fugitive Blowdowns Potential Emissions Summary

Natural Gas Specifications

Constituent	Mol Percent	Molecular Weight	Lb/Lb-Mol NG	Mass Percent	VOC
CO_2	0.19	44.01	0.084	0.49%	No
Nitrogen	0.37	28.01	0.104	0.60%	No
Methane	92.58	16.04	14.852	86.53%	No
Ethane	6.51	30.07	1.958	11.40%	No
Propane	0.28	44.10	0.123	0.72%	Yes
n-Butane	0.03	58.12	0.017	0.10%	Yes
IsoButane	0.02	58.12	0.012	0.07%	Yes
n-Hexane	0.01	78.11	0.008	0.05%	Yes
IsoPentane	0.01	72.15	0.007	0.04%	Yes

Natural Gas Properties	
Molecular Weight	17.16
Specific Gravity	0.59
lb/Scf	0.0451
Scf/lb	22.16

Parameter	Blowdown Events	
	Turbine SU/SD	Emergency Station Shutdown
Gas Blowdown (scf/event)	101,000	1,000,000
Blowdowns per Year	200	2
VOC Emissions (lb/event)	44.5	440.4
HAP Emissions (lb/event)	2.1	20.5
CO_2 Emissions (lb/event)	22.2	219.8
CH_4 Emissions (lb/event)	3,943.1	39,041.1
CO_2e Emissions (lb/event)	98,600.9	976,247.0
VOC Emissions (tpy)	4.4484	0.4404
HAP Emissions (tpy)	0.2074	0.0205
CO_2 Emissions (tpy)	2.2200	0.2198
CH_4 Emissions (tpy)	394.3	39.0
CO_2e Emissions (tpy)	9860.1	976.2

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Table B-9. Potential Fugitive Emissions Summary

Component	CH_4 Emission Factor[1,2]	CO_2 Emission Factor[1,2]	Units
Compressor Station Fugitives	135,260.0	7,813.1	lb/station-yr
Centrifugal Compressor Fugitives	467,660.0	27,013.7	lb/compressor-yr

[1]Greenhouse Gas Emission Estimation Guidelines for Natural Gas Transmission and Storage, Volume 1 - GHG Emission Estimation Methodologies and Procedures, Interstate Natural Gas Association of America, September 28, 2005. See Table 4.4.

[2]Based on 93.4 vol% CH_4 and 2 vol% CO_2 in natural gas, per INGAA Guideline

Natural Gas Specifications

Constituent	Mol Percent	Molecular Weight	Lb/Lb-Mol NG	Mass Percent	VOC
CO2	0.19	44.01	0.084	0.49%	No
Nitrogen	0.37	28.01	0.104	0.60%	No
Methane	92.58	16.04	14.852	86.53%	No
Ethane	6.51	30.07	1.958	11.40%	No
Propane	0.28	44.10	0.123	0.72%	Yes
n-Butane	0.03	58.12	0.017	0.10%	Yes
IsoButane	0.02	58.12	0.012	0.07%	Yes
n-Hexane	0.01	78.11	0.008	0.05%	Yes
IsoPentane	0.01	72.15	0.007	0.04%	Yes

Segment	CO_2 Emissions[3] (tpy)	CH_4 Emissions[3] (tpy)	CO_2e Emissions[3,4] (tpy)	VOC Emissions[3] (tpy)	HAP Emissions (tpy)
Compressor Station Fugitives	0.37	67.0	1,676.3	0.8	0.04
Mars 90 Fugitives	1.3	231.8	5,795.7	2.6	0.12
Taurus 70 Fugitives	1.3	231.8	5,795.7	2.6	0.12
Total	2.9	530.6	13,267.7	6.0	0.28

[3]Based upon natural gas specifications and INGAA factors above.

[4]Calculated using global warming potentials from Part 98, Table A-1 (CO2 = 1, CH4 = 25)

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Table B-10. Proposed Project Potential HAP Emissions Summary

	Solar Mars 90			Solar Taurus 70			Utility Boiler			Auxiliary Generator			
Hazardous Air Pollutants (HAPs)	Emission Factor Basis[1] lb/MMBtu	Max Hourly lb/hr	Annual Potential tons/year	Emission Factor Basis[1] lb/MMBtu	Max Hourly lb/hr	Annual Potential tons/year	Emission Factor Basis[2] lb/MMBtu	Max Hourly lb/hr	Annual Potential tons/year	EF Basis[3] lb/MMBtu	Max Hourly lb/hr	Annual Potential tons/year	Project PTE tons/yr
VOC-HAP													
Acetaldehyde	2.86E-05	3.59E-03	1.57E-02	2.86E-05	2.76E-03	1.21E-02				8.36E-03	6.47E-02	1.62E-02	4.40E-02
Acrolein	4.57E-06	5.74E-04	2.51E-03	4.57E-06	4.42E-04	1.94E-03				5.14E-03	3.98E-02	9.94E-03	1.44E-02
Benzene	8.57E-06	1.08E-03	4.71E-03	8.57E-06	8.29E-04	3.63E-03	2.06E-06	1.08E-05	4.73E-05	4.40E-04	3.40E-03	8.51E-04	9.24E-03
1,3-Butadiene	3.07E-07	3.86E-05	1.69E-04	3.07E-07	2.97E-05	1.30E-04				2.67E-04	2.06E-03	5.16E-04	8.15E-04
Carbon Tetrachloride		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				3.67E-05	2.84E-04	7.10E-05	7.10E-05
Chlorobenzene		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				3.04E-05	2.35E-04	5.88E-05	5.88E-05
Chloroform		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				2.85E-05	2.20E-04	5.51E-05	5.51E-05
Dichlorobenzene		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06	6.18E-06	2.71E-05				2.71E-05
1,3-Dichloropropene		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				2.64E-05	2.04E-04	5.10E-05	5.10E-05
Ethylbenzene	2.29E-05	2.87E-03	1.26E-02	2.29E-05	2.21E-03	9.68E-03				3.97E-05	3.07E-04	7.68E-05	2.23E-02
Ethylene Dibromide		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				4.43E-05	3.43E-04	8.57E-05	8.57E-05
Formaldehyde	5.07E-04	6.37E-02	2.79E-01	5.07E-04	4.91E-02	2.15E-01	7.35E-05	3.86E-04	1.69E-03	5.28E-02	4.08E-01	1.02E-01	5.97E-01
Hexane		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-03	9.26E-03	4.06E-02	1.11E-03	8.58E-03	2.15E-03	4.27E-02
Methanol		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				2.50E-03	1.93E-02	4.83E-03	4.83E-03
Methylene Chloride		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				2.00E-05	1.55E-04	3.87E-05	3.87E-05
Naphthalene	9.29E-07	1.17E-04	5.11E-04	9.29E-07	8.98E-05	3.93E-04	5.98E-07	3.14E-06	1.38E-05	7.44E-05	5.75E-04	1.44E-04	1.06E-03
PAH	1.57E-06	1.97E-04	8.64E-04	1.57E-06	1.52E-04	6.66E-04				2.59E-05	2.08E-04	5.20E-05	1.58E-03
Propylene Oxide	2.07E-05	2.60E-03	1.14E-02	2.07E-05	2.00E-03	8.78E-03							2.02E-02
1,1,2,2-Tetrachloroethane		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				4.00E-05	3.09E-04	7.73E-05	7.73E-05
1,1,2-Trichloroethane		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				3.18E-05	2.46E-04	6.15E-05	6.15E-05
2,2,4 Trimethylpentane		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				2.50E-04	1.93E-03	4.83E-04	4.83E-04
Toluene	9.29E-05	1.17E-02	5.11E-02	9.29E-05	8.98E-03	3.93E-02	3.33E-06	1.75E-05	7.67E-05	4.08E-04	3.16E-03	7.89E-04	9.13E-02
Vinyl Chloride		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				1.49E-05	1.15E-04	2.88E-05	2.88E-05
Xylenes	4.57E-05	5.74E-03	2.51E-02	4.57E-05	4.42E-03	1.94E-02				1.84E-04	1.42E-03	3.56E-04	4.49E-02
Polycyclic Organic Compounds (POM)													
Acenaphthene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08	1.25E-06	9.67E-06	2.42E-06	4.18E-06
Acenaphthylene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08	5.53E-06	4.28E-05	1.07E-05	1.25E-05
Anthracene	2.35E-09	2.95E-07	1.29E-06	2.35E-09	2.28E-07	9.97E-07	2.35E-09	1.24E-08	5.41E-08				2.34E-06
Benz(a)anthracene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08				1.76E-06
Benzo(a)pyrene	1.18E-09	1.48E-07	6.47E-07	1.18E-09	1.14E-07	4.98E-07	1.18E-09	6.18E-09	2.71E-08	4.25E-07	3.21E-06	8.02E-07	1.97E-06
Benzo(b)fluoranthene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08	1.66E-07	1.28E-06	3.21E-07	2.08E-06
Benzo(g,h,i)perylene	1.18E-09	1.48E-07	6.47E-07	1.18E-09	1.14E-07	4.98E-07	1.18E-09	6.18E-09	2.71E-08	4.14E-07	3.20E-06	8.00E-07	1.97E-06
Benzo(k)fluoranthene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08	1.66E-07	1.28E-06	3.21E-07	2.08E-06
Biphenyl										2.12E-04	1.64E-03	4.10E-04	4.10E-04
Chrysene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08	6.93E-07	5.36E-06	1.34E-06	3.10E-06
Dibenzo(a,h)anthracene	1.18E-09	1.48E-07	6.47E-07	1.18E-09	1.14E-07	4.98E-07	1.18E-09	6.18E-09	2.71E-08				1.17E-06
7,12-Dimethylbenz(a)anthracene	1.57E-08	1.97E-06	8.63E-06	1.57E-08	1.52E-06	6.65E-06	1.57E-08	8.24E-08	3.61E-07				1.56E-05
Fluoranthene	2.94E-09	3.69E-07	1.62E-06	2.94E-09	2.84E-07	1.25E-06	2.94E-09	1.54E-08	6.76E-08	1.11E-06	8.58E-06	2.15E-06	5.08E-06
Fluorene	2.75E-09	3.45E-07	1.51E-06	2.75E-09	2.66E-07	1.16E-06	2.75E-09	1.44E-08	6.31E-08	5.67E-06	4.39E-05	1.10E-05	1.37E-03
3-Methylchloranthrene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08				1.76E-06
2-Methylnaphthalene	2.35E-08	2.95E-06	1.29E-05	2.35E-08	2.28E-06	9.97E-06	2.35E-08	1.24E-07	5.41E-07	3.32E-05	2.57E-04	6.42E-05	8.76E-05
Indeno(1,2,3-cd)pyrene	1.76E-09	2.22E-07	9.70E-07	1.76E-09	1.71E-07	7.48E-07	1.76E-09	9.26E-09	4.06E-08				1.76E-06
Phenanthrene	1.67E-08	2.09E-06	9.16E-06	1.67E-08	1.61E-06	7.06E-06	1.67E-08	8.75E-08	3.83E-07	1.04E-05	8.04E-05	2.01E-05	3.67E-05
Phenol		0.00E+00		0.00E+00	0.00E+00					2.40E-05	1.86E-04	4.64E-05	4.64E-05
Pyrene	4.90E-09	6.15E-07	2.70E-06	4.90E-09	4.74E-07	2.08E-06	4.90E-09	2.57E-08	1.13E-07	1.36E-06	1.05E-05	2.63E-06	7.51E-06
Styrene		0.00E+00		0.00E+00	0.00E+00					2.36E-05	1.83E-04	4.56E-05	4.56E-05
Total POM	8.65E-08	1.09E-05	4.75E-05	8.65E-08	8.36E-06	3.66E-05	8.65E-08	4.54E-07	1.99E-06	3.20E-04	2.47E-03	6.19E-04	7.05E-04
Total HAPs													
												Maximum Individual HAP:	0.6
												Total Project HAPs:	0.9

[1] Emissions based on AP-42 5th Edition, Section 3.1. Emissions based on scaling of AP-42 values using Vendor Guarantee for TOC.

[2] Emissions based on AP-42 5th Edition, Section 1.4.

[3] Emissions based on AP-42 5th Edition, Section 3.2.

Solar Turbines Emissions Estimates

Taurus 70-10802S

Assumptions: pipeline nat gas, 37' elevation, 5" inlet/8" outlet losses,

50% load

Ambient Temp, F	HP	MMBTU/HR (LHV)	NOx (ppm)	NOx (lb/hr)	NOx (TPY)	CO (ppm)	CO (lb/hr)	CO (TPY)	UHC (ppm)	UHC (lb/hr)	UHC (TPY)	VOC (ppm)	VOC (lb/hr)	VOC (TPY)	PM lb/mmbtu (HHV)	PM (lb/hr)	PM (TPY)	Exhaust Temp (F)	Exhaust Flow (ACFM)	Exhaust Flow (lb/hr)
0	5874	63.40	9	2.3	10.0	25	3.9	17.1	25	2.2	9.6	2.5	0.2	1.0	0.015	1.0	4.6	913	116150	198,809
32	5801	60.74	9	2.2	9.5	25	3.7	16.2	25	2.1	9.2	2.5	0.2	0.9	0.015	1.0	4.4	956	111531	184,859
59	5366	56.79	9	2.0	8.9	25	3.4	14.9	25	2.0	8.8	2.5	0.2	0.9	0.015	0.9	4.1	994	105508	169,813
100	4286	49.46	9	1.7	7.6	25	2.9	12.7	25	1.7	7.4	2.5	0.2	0.7	0.015	0.8	3.6	1048	97099	149098
-20	5901	65.01	42	10.8	47.3	150	24	105	50	4.5	19.7	5	0.5	2.0	0.015	1.1	4.7	883	119032	208357

75% load

Ambient Temp, F	HP	MMBTU/HR (LHV)	NOx (ppm)	NOx (lb/hr)	NOx (TPY)	CO (ppm)	CO (lb/hr)	CO (TPY)	UHC (ppm)	UHC (lb/hr)	UHC (TPY)	VOC (ppm)	VOC (lb/hr)	VOC (TPY)	PM lb/mmbtu (HHV)	PM (lb/hr)	PM (TPY)	Exhaust Temp (F)	Exhaust Flow (ACFM)	Exhaust Flow (lb/hr)
0	8811	76.66	9	2.8	12.1	25	4.7	20.6	25	2.7	11.8	2.5	0.3	1.2	0.015	1.3	5.5	901	129628	223,949
32	8701	73.27	9	2.6	11.6	25	4.5	19.7	25	2.6	11.4	2.5	0.3	1.1	0.015	1.2	5.3	930	124586	210,112
59	8050	68.24	9	2.5	10.8	25	4.1	18.0	25	2.4	10.5	2.5	0.2	1.1	0.015	1.1	4.9	961	117828	193,991
100	6429	58.89	9	2.1	9.2	25	3.5	15.3	25	2.0	8.8	2.5	0.2	0.9	0.015	1.0	4.3	1022	105870	165294
-20	8852	78.73	42	15.0	65.7	150	29	127	50	5.4	23.7	5	0.5	2.4	0.015	1.3	5.7	880	133140	233309

100% load

Ambient Temp, F	HP	MMBTU/HR (LHV)	NOx (ppm)	NOx (lb/hr)	NOx (TPY)	CO (ppm)	CO (lb/hr)	CO (TPY)	UHC (ppm)	UHC (lb/hr)	UHC (TPY)	VOC (ppm)	VOC (lb/hr)	VOC (TPY)	PM lb/mmbtu (HHV)	PM (lb/hr)	PM (TPY)	Exhaust Temp (F)	Exhaust Flow (ACFM)	Exhaust Flow (lb/hr)
0	11748	86.94	9	3.1	13.7	25	5.3	23.2	25	3.0	13.1	2.5	0.3	1.3	0.015	1.4	6.3	890	136260	236,659
32	11602	83.47	9	3.0	13.1	25	5.1	22.3	25	2.9	12.7	2.5	0.3	1.3	0.015	1.4	6.0	908	131908	225,919
59	10733	78.94	9	2.8	12.4	25	4.8	21.0	25	2.7	11.8	2.5	0.3	1.2	0.015	1.3	5.7	944	127622	212,488
100	8573	68.14	9	2.4	10.5	25	4.1	18.0	25	2.3	10.1	2.5	0.2	1.0	0.015	1.1	4.9	1002	115798	183146
-20	11803	89.23	42	15.0	65.7	150	33	145	50	6.2	27.2	5	0.6	2.7	0.015	1.5	6.4	882	139164	243339

Solar Turbines Emissions Estimates

Mars 90-13000S

Assumptions: pipeline nat gas, 37' elevation, 5" inlet/8" outlet losses,

50% load

Ambient Temp, F	HP	MMBTU/HR (LHV)	NOx (ppm)	NOx (lb/hr)	NOx (TPY)	CO (ppm)	CO (lb/hr)	CO (TPY)	UHC (ppm)	UHC (lb/hr)	UHC (TPY)	VOC (ppm)	VOC (lb/hr)	VOC (TPY)	PM lb/mmbtu (HHV)	PM (lb/hr)	PM (TPY)	Exhaust Temp (F)	Exhaust Flow (ACFM)	Exhaust Flow (lb/hr)
-20	7598	87.25	42	14.6	63.9	150	32	140	50	6.0	26.3	5	0.6	2.6	0.015	1.4	6.3	817	172055	317002
0	7362	83.30	15	5.0	21.9	25	5.1	22.3	25	2.9	12.7	2.5	0.3	1.3	0.015	1.4	6.0	913	165339	299,477
32	6955	77.40	15	4.6	20.1	25	4.7	20.6	25	2.7	11.8	2.5	0.3	1.2	0.015	1.3	5.6	873	155513	274,263
59	6352	71.68	15	4.3	18.8	25	4.3	18.8	25	2.5	11.0	2.5	0.3	1.1	0.015	1.2	5.2	903	146391	251,814
100	5039	62.36	15	3.7	16.2	25	3.7	16.2	25	2.1	9.2	2.5	0.2	0.9	0.015	1.0	4.5	1048	131723	215557

75% load

Ambient Temp, F	HP	MMBTU/HR (LHV)	NOx (ppm)	NOx (lb/hr)	NOx (TPY)	CO (ppm)	CO (lb/hr)	CO (TPY)	UHC (ppm)	UHC (lb/hr)	UHC (TPY)	VOC (ppm)	VOC (lb/hr)	VOC (TPY)	PM lb/mmbtu (HHV)	PM (lb/hr)	PM (TPY)	Exhaust Temp (F)	Exhaust Flow (ACFM)	Exhaust Flow (lb/hr)
-20	11396	102.68	42	17.1	74.9	150	37	162	50	7.0	30.7	5	0.7	3.1	0.015	1.7	7.4	800	187425	349832
0	11044	97.98	15	5.9	25.8	25	6.0	26.3	25	3.4	14.9	2.5	0.3	1.5	0.015	1.6	7.1	811	180847	334,559
32	10432	90.56	15	5.4	23.7	25	5.5	24.1	25	3.2	14.0	2.5	0.3	1.4	0.015	1.5	6.5	834	169834	308,347
59	9527	83.24	15	5.0	21.9	25	5.0	21.9	25	2.9	12.7	2.5	0.3	1.3	0.015	1.4	6.0	857	159146	283,220
100	7559	71.73	15	4.2	18.4	25	4.3	18.8	25	2.4	10.5	2.5	0.2	1.1	0.015	1.2	5.2	910	143218	242350

100% load

Ambient Temp, F	HP	MMBTU/HR (LHV)	NOx (ppm)	NOx (lb/hr)	NOx (TPY)	CO (ppm)	CO (lb/hr)	CO (TPY)	UHC (ppm)	UHC (lb/hr)	UHC (TPY)	VOC (ppm)	VOC (lb/hr)	VOC (TPY)	PM lb/mmbtu (HHV)	PM (lb/hr)	PM (TPY)	Exhaust Temp (F)	Exhaust Flow (ACFM)	Exhaust Flow (lb/hr)
-20	15195	116.46	42	19.6	85.8	150	43	188	50	8.1	35.5	5	0.8	3.5	0.015	1.9	8.4	814	195910	381225
0	14725	112.85	15	6.8	29.8	25	6.9	30.2	25	3.9	17.1	2.5	0.4	1.7	0.015	1.9	8.2	890	192787	351,740
32	13909	107.18	15	6.4	28.0	25	6.5	28.5	25	3.7	16.2	2.5	0.4	1.6	0.015	1.8	7.7	856	187485	334,467
59	12703	99.77	15	6.0	26.3	25	6.0	26.3	25	3.5	15.3	2.5	0.4	1.5	0.015	1.6	7.2	878	179241	313,668
100	10079	85.62	15	5.0	21.9	25	5.1	22.3	25	2.9	12.7	2.5	0.3	1.3	0.015	1.4	6.2	1002	161592	269220

Hurst BOILER & WELDING COMPANY, INC

THREE PASS FIRETUBE HOT WATER BOILER

HURST "PERFORMANCE" BOILERS

LPW SERIES

THROUGH THE DOOR DESIGN!

UL Approved Forced Draft Burners

Hot Water Applications

- Specifiable using the attributes of the LPE design.
- Remains classified as a modified scotch, firetube type boiler.
- Efficiencies tested at >83% on natural gas.
- Smaller foot print, can be installed in tighter places.
- Semi wet-back construction.

Capacities From

30 to 125 HP

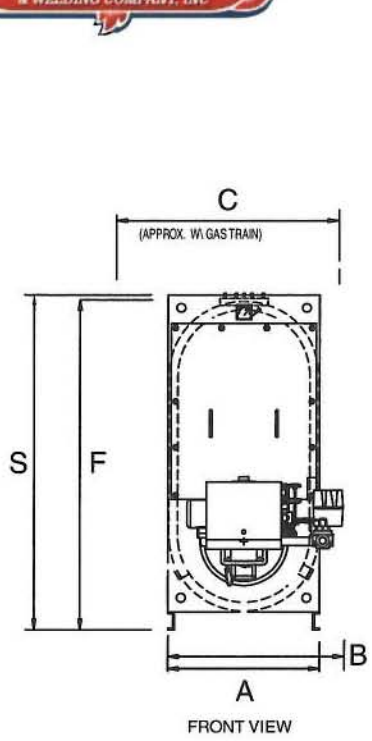
30 PSI Water

[60 PSI Water Optional]

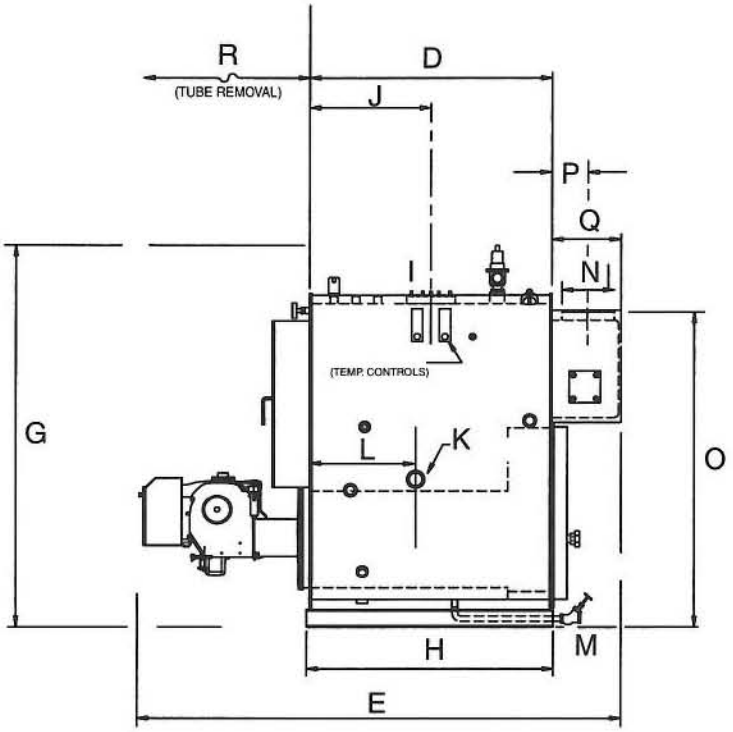
HEAVIEST DESIGNED BOILER IN ITS CLASS

Designed, constructed and stamped in accordance with the requirements of the ASME Boiler Codes.

Inspected and registered with the National Board of Boiler & Pressure Vessel Inspectors.



FRONT VIEW



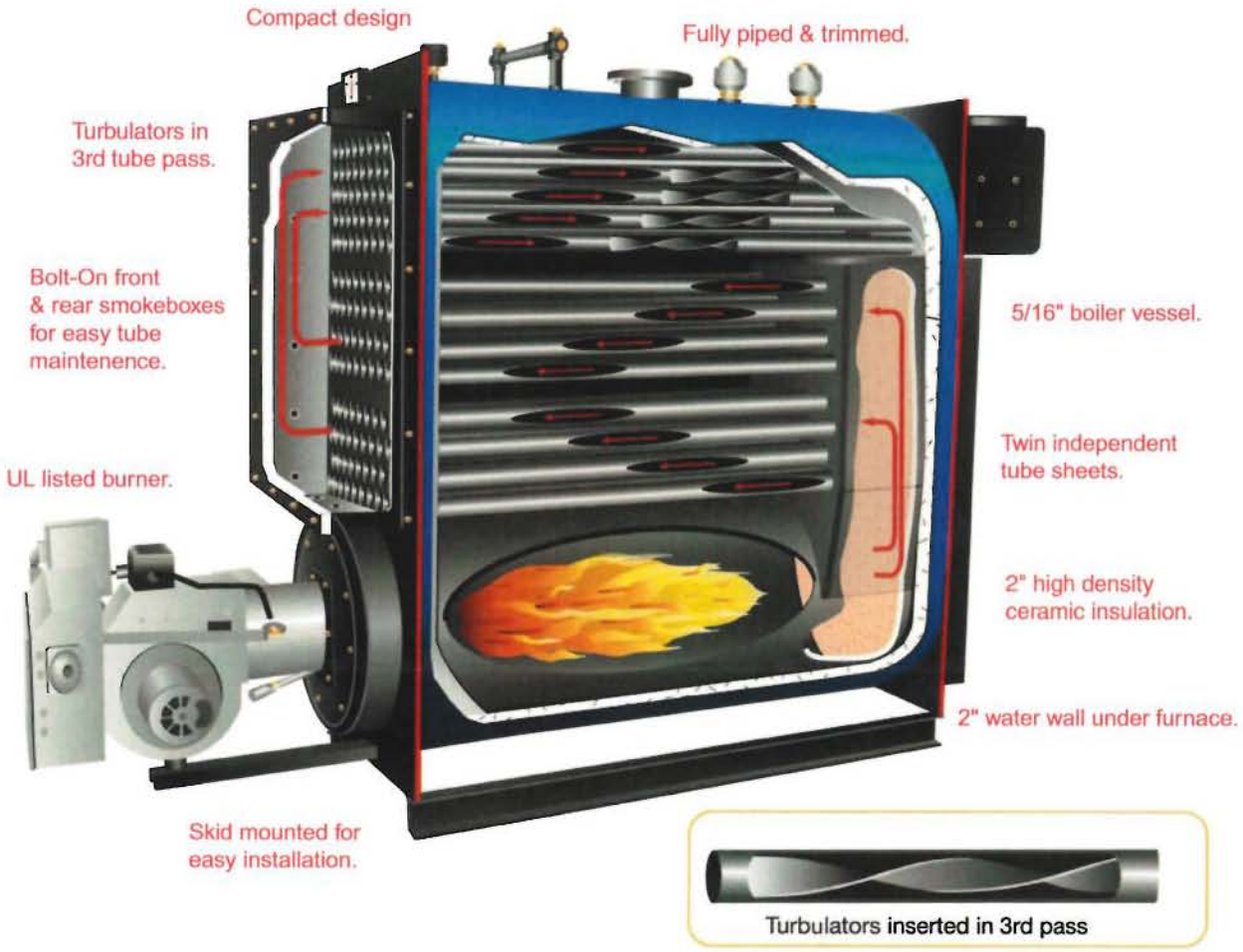
RIGHT SIDE VIEW

BOILER SPECIFICATIONS
(ALL DIMENSIONS ARE IN INCHES)

DIMENSIONS SUBJECT TO CHANGE WITHOUT NOTICE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

	BOILER HORSEPOWER			30	40	50	60	70	80	100	125	
	HEATING SURFACE	FIRESIDE	SQ.FT.	120	160	200	235	284	338	418	511	
	MBH OUTPUT, HOT WATER			1004	1339	1674	2009	2343	2678	3348	4184	
	FIRING RATE, GAS	1,000 BTU	CFH	1260	1680	2100	2520	2940	3360	4200	5250	
	FIRING RATE, #2 OIL	140,000 BTU	GPH	9	12	15	18	21	24	30	37.4	
A	WIDTH WITHOUT TRIM		IN	31	31	31	34 1/2	34 1/2	34 1/2	34 1/2	34 1/2	A
B	WIDTH WITH TRIM		IN	38	38	38	42	42	42	42	42	B
C	WIDTH WITH GAS TRAIN		IN	49	49	49	52	52	52	52	52	C
D	BOILER LENGTH		IN	37	49	61	55	67	79	91	106	D
E	OVERALL LENGTH	STD. BURNER	IN	86	98	114	111	123	140	152	169	E
F	SUPPLY HEIGHT		IN	71 1/2	71 1/2	71 1/2	76 5/8	76 5/8	76 5/8	76 5/8	76 5/8	F
G	HEIGHT WITH TRIM		IN	80	80	83	88	88	88	93	93	G
H	LENGTH OF SKID		IN	37 1/2	49 1/2	61 1/2	55 1/2	67 1/2	79 1/2	91 1/2	106 1/2	H
I	SUPPLY SIZE		IN	4	4	4	6	6	6	6	6	I
J	SUPPLY LOCATION		IN	18 1/2	24 1/2	30 1/2	27 1/2	33 1/2	39 1/2	45 1/2	50 1/2	J
K	RETURN SIZE		IN	4	4	4	4	4	4	4	4	K
L	RETURN LOCATION		IN	27 1/4	27 1/4	27 1/4	32	32	32	32	36	L
M	BOILER DRAIN SIZE		IN	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	M
N	STACK DIAMETER, O.D.		IN	10	10	10	12	12	12	12	14	N
O	STACK HEIGHT		IN	66 3/4	66 3/4	66 3/4	70 1/4	70 1/4	70 1/4	70 1/4	72	O
P	TO CENTER OF STACK		IN	6 7/8	6 7/8	6 7/8	8 1/4	8 1/4	8 1/4	8 1/4	9 1/4	P
Q	REAR SMOKEBOX DEPTH		IN	13 3/4	13 3/4	13 3/4	15 3/4	15 3/4	15 3/4	15 3/4	17 3/4	Q
R	TUBE PULL SPACE		IN	38	50	62	56	68	80	92	107	R
S	OVERALL HEIGHT		IN	72	72	72	78 1/2	78 1/2	78 1/2	78 1/2	78 1/2	S
	SHIPPING WEIGHT		LBS	3050	3800	4500	4500	5285	6100	6950	8010	
	WATER CONTENT - WATER	FLOODED	GALS	134	180	232	243	298	376	404	463	
	BOILER HORSEPOWER			30	40	50	60	70	80	100	125	

CONNECTIONS FOUR INCHES AND SMALLER ARE FEMALE THREAD, 6" CONNECTIONS ARE 150 LB. FLANGES. * STUDDING FLANGE.



STANDARD EQUIPMENT

BOILER: Three pass design for 30 psi hot water (available for 60 psi water). Factory assembled with trim and, tested in accordance with ASME code, UL, and CSD-1 codes. Steel turbulators inserted in third pass for maximum heat-transfer control.

STANDARD BOILER TRIM: Kunkle safety relief valve, operating temperature control, high limit temperature control with manual reset, 3 1/2" combination pressure & temperature gauge, M&M 750 low water cut-off control with manual reset.

BURNER: UL listed with pre-piped, wired and factory tested forced draft power burners for:

- Natural Gas
- Propane (LP) Gas
- No. 2 (Diesel) Oil
- Combination Gas/Oil

HURST "PERFORMANCE" BOILER

- Factory Assembled, Prewired and Tested.
- No Field Assembly Required.
- UL Listed Boiler/Burner Packages.
- Fully Assembled, Pre-piped, Prewired, Pressure Tested Gas Trains.
- Complies with ASME, UL, CSD-1 and ASHRAE Standards.
- High Efficiency, Low Stack Temperatures.
- Customer Service Support Through National Network of Sales, Service, St Training and Parts by Factory Representatives.

LPW BOILER FEATURES

Modified Scotch designed to fit through a standard 36" x 80" door opening
Up to 125 HP (4,184 mbh output).

The Hurst LPW "Performance" boiler is America's most heavily designed and built boiler in its class. Consider the features and specify the Hurst LPW Series.

1. A welded steel firetube boiler, the LPW has extra-heavy 13-gauge tubes for extended life. All tubes are attached to the tube sheets by rolling and flaring. There are no welded tubes in the LPW.

2. Thickest materials used in the industry.

   A. Boiler shell is 5/16" thick boiler plate 30-40 HP / 3/8" 50-125 HP.
   B. Twin boiler tube sheets are 1/2" thick boiler plate.
   C. Insulation is 2" ceramic wool and is lagged with 22-gauge boiler jacket.
   D. Extra heavy 4" channel iron boiler skids.

3. Designed to last with special industrial grade features.

   A. Couplings are 3,000 psi.
   B. Flanged, detachable front and rear smoke boxes.
   C. Brass nuts on front access panels, brass plugs in factory pre-piped crosses and tees on trim.

P. O. Drawer 530
21971 Highway 319 N.
Coolidge, Georgia 31738-0530
Tel: (229) 346-3545
Fax: (229) 346-3874
e-mail: info@hurstboiler.com

Power Flame Incorporated

9/28/2006
Rev. 06/11/2010

Typical Flue Product Emissions Data for Power Flame Burners

	Natural Gas	L.P. Gas	# 2 Fuel Oil [1]
Carbon Monoxide - CO	.037 lb CO 10^6 BTU input (50 PPM)	.037 lb CO 10^6 BTU input (50 PPM)	.037 lb per 10^6 BTU INPUT (50 PPM)
Sulfur Dioxide - SO_2	(1.05) x (% Sulfur by weight in fuel) = lb SO_2 per 10^6 BTU input		
Particulate Matter	.0048 lb PM per 10^6 BTU input	.0048 lb PM per 10^6 BTU input	.0143 lb PM per 10^6 BTU input
Hydrocarbons	.025 lb HC's per 10^6 BTU input	.025 lb HC's per 10^6 BTU input	.038 lb HC's per 10^6 BTU input
CO_2	9 % to 10%	10% to 12%	10% to 13%
Nitrogen Oxides - NO_x			
Standard J, FDM & X4 Gas Burners	.088 lb NO_x per 10^6 BTU input (75 PPM)	.092 lb NO_x per 10^6 BTU input (75 PPM)	N/A N/A
Standard C(R) Burners	.088 lb NO_x per 10^6 BTU input (75 PPM)	.092 lb NO_x per 10^6 BTU input (75 PPM)	.159 lb NO_x per 10^6 BTU input (90) PPM[2]
LNIC(R) Burners Fire box/Cast Iron boilers	.029 lb NO_x per 10^6 BTU input (25 PPM)	.031 lb NO_x per 10^6 BTU input (25 PPM)	.159 lb NO_x per 10^6 BTU input (90) PPM[2]
LNIC(R) Burners Water tube boilers	.024 lb NO_x per 10^6 BTU input (20 PPM)	.031 lb NO_x per 10^6 BTU input (25 PPM)	.159 lb NO_x per 10^6 BTU input (90) PPM[2]
LNIAC Burners	.029 lb NO_x per 10^6 BTU input (25 PPM)	.031 lb NO_x per 10^6 BTU input (25 PPM)	.12 lb NO_x per 10^6 BTU input (90) PPM
CM Burners	.070 lb NO_x per 10^6 BTU input (60 PPM)[4]	.074 lb NO_x per 10^6 BTU input (60 PPM)[4]	.146 lb NO_x per 10^6 BTU input (110) PPM
LNICM Burners Fire box/Cast Iron boilers	.029 lb NO_x per 10^6 BTU input (25) PPM	.031 lb NO_x per 10^6 BTU input (25) PPM	.12 lb NO_x per 10^6 BTU input (90) PPM
LNICM Burners Water tube boilers	.029 lb NO_x per 10^6 BTU input (20) PPM	.031 lb NO_x per 10^6 BTU input (20) PPM	.12 lb NO_x per 10^6 BTU input (90) PPM
NPM Premix Burners	.029 lb NO_x per 10^6 BTU input (25) PPM	.031 lb NO_x per 10^6 BTU input (25) PPM	N/A N/A
Nova Plus Burners NVC AND NP2	.010 lb NO_x per 10^6 BTU input (9) PPM	.015 lb NO_x per 10^6 BTU input (12) PPM	N/A N/A

(1) NOx emissions at 3 % 02 will vary based on the percent of fuel bound nitrogen (these are based on .02%) and boiler or heat exchanger configurations

(2) 90 PPM NOx on cast iron sectional, fire box and water tube boiler, 120 PPM on fire tube boilers.

(3) Burning natural gas the VOC are estimated at 0.003 # per million BTU and SO_X are 0.0005 # per million BTU.

(4) In some applications the CMAX will achieve less than 60 PPM without flue gas recirculation - consult factory.

These emission rates are general estimates and do not constitute guarantees by Power Flame Inc.
In instances where guarantees are required, please consult the factory with the specific application information.
All NOx numbers stated are corrected to 3% O_2

****
* Project Setup Information *
****

Project File : M:\Projects\D\Dominion\Atlantic Coastal Pipeline and Supply Header Pipeline\Draft Rule 13 - APC1\Emission Calcs\TK-1 - Produced Fluids Tank.ept
Flowsheet Selection : Oil Tank with Separator
Calculation Method : AP42
Control Efficiency : 100.0%
Known Separator Stream : Low Pressure Gas
Entering Air Composition : No

Date : 2015.07.13

****
* Data Input *
****

Separator Pressure : 552.00[psig]
Separator Temperature : 77.00[F]
Molar GOR : 0.0500
Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[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	1.0410
4	N2	0.9940
5	C1	94.2060
6	C2	2.9230
7	C3	0.5460
8	i-C4	0.0790
9	n-C4	0.0840
10	i-C5	0.0240
11	n-C5	0.0220
12	C6	0.0320
13	C7+	0.0490
14	Benzene	0.0000
15	Toluene	0.0000
16	E-Benzene	0.0000
17	Xylenes	0.0000
18	n-C6	0.0000
19	224Trimethylp	0.0000

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

-- Sales Oil ----------

Production Rate	: 0.8[bbl/day]
Days of Annual Operation	: 365 [days/year]
API Gravity	: 46.0
Reid Vapor Pressure	: 7.70[psia]
Bulk Temperature	: 80.00[F]

-- Tank and Shell Data ----------

Diameter	: 5.08[ft]
Shell Height	: 11.90[ft]
Cone Roof Slope	: 0.06
Average Liquid Height	: 2.50[ft]
Vent Pressure Range	: 0.06[psi]
Solar Absorbance	: 0.54

-- Meteorological Data ----------

Page 1---------- E&P TANK

City	: Charleston, WV
Ambient Pressure	: 14.70[psia]
Ambient Temperature	: 70.00[F]
Min Ambient Temperature	: 44.00[F]
Max Ambient Temperature	: 65.50[F]
Total Solar Insolation	: 1123.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.010	0.002
Total HC	0.425	0.097
VOCs, C2+	0.383	0.087
VOCs, C3+	0.350	0.080

Uncontrolled Recovery Info.

Vapor	21.2300 x1E-3	[MSCFD]
HC Vapor	19.9800 x1E-3	[MSCFD]
GOR	26.05	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled	Uncontrolled

		[ton/yr]	[lb/hr]
1	H2S	0.002	0.000
2	O2	0.000	0.000
3	CO2	0.022	0.005
4	N2	0.001	0.000
5	C1	0.043	0.010
6	C2	0.032	0.007
7	C3	0.083	0.019
8	i-C4	0.033	0.008
9	n-C4	0.102	0.023
10	i-C5	0.039	0.009
11	n-C5	0.047	0.011
12	C6	0.015	0.003
13	C7	0.014	0.003
14	C8	0.006	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	0.010	0.002
22	224Trimethylp	0.000	0.000
	Total	0.451	0.103

-- Stream Data ----------

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0349	0.0030	0.6834	0.1835	0.5755
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0907	0.0000	6.3467	0.0001	4.9770
4	N2	28.01	0.0102	0.0005	0.0000	0.3990	0.0001	0.3129
5	C1	16.04	0.9543	0.1475	0.0000	33.1362	0.0001	25.9849
6	C2	30.07	0.6701	0.3531	0.0000	13.3133	0.0001	10.4401
7	C3	44.10	2.1827	1.7648	0.4600	18.8508	16.8782	18.4251
8	i-C4	58.12	1.1269	1.0450	0.6191	4.3934	9.6293	5.5234
9	n-C4	58.12	4.6091	4.4100	3.1320	12.5490	33.6645	17.1061
10	i-C5	72.15	3.1066	3.0997	2.8099	3.3810	11.9899	5.2389
11	n-C5	72.15	5.0558	5.0823	4.8107	4.0000	14.9972	6.3734
12	C6	86.16	4.1726	4.2520	4.3657	1.0044	4.1822	1.6902
13	C7	100.20	10.3655	10.6043	11.1500	0.8388	3.6780	1.4516

14	C8	114.23	10.8426	11.1074	11.7774	0.2806	1.2761	0.4954
15	C9	128.28	5.5127	5.6497	6.0063	0.0497	0.2328	0.0892
16	C10+	166.00	45.9695	47.1217	50.1681	0.0099	0.0486	0.0182
17	Benzene	78.11	0.5685	0.5808	0.6057	0.0778	0.3297	0.1322
18	Toluene	92.13	0.2132	0.2183	0.2311	0.0082	0.0362	0.0142
19	E-Benzene	106.17	0.0711	0.0729	0.0774	0.0009	0.0041	0.0016

20	Xylenes	106.17	0.6802	0.6971	0.7408	0.0075	0.0344	0.0133
21	n-C6	86.18	3.5939	3.6672	3.7955	0.6694	2.8351	1.1368
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		123.89	126.03	129.50	38.64	63.78	44.07
	Stream Mole Ratio		1.0000	0.9755	0.9688	0.0245	0.0067	0.0312
	Heating Value	[BTU/SCF]				2044.13	3547.91	2368.67
	Gas Gravity	[Gas/Air]				1.33	2.20	1.52
	Bubble Pt. @ 100F	[psia]	56.28	19.66	6.19			
	RVP @ 100F	[psia]	126.75	78.89	38.81			
	Spec. Gravity @ 100F		0.800	0.803	0.810			

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Accumulator Tank
City:	Washington National AP
State:	Maryland
Company:	Dominion
Type of Tank:	Horizontal Tank
Description:	Accumulator Tank

Tank Dimensions

Shell Length (ft):		15.00
Diameter (ft):		5.33
Volume (gallons):		2,500.00
Turnovers:		5.00
Net Throughput(gal/yr):		12,500.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Washington National AP, District of Columbia (Avg Atmospheric Pressure = 14.67 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Accumulator Tank - Horizontal Tank
Washington National AP, Maryland

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg	Min	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	64.42	56.67	72.17	60.25	0.0076	0.0058	0.0097	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Accumulator Tank - Horizontal Tank
Washington National AP, Maryland

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.29	0.76	1.05

APPENDIX C
ELECTRONIC AIR QUALITY MODELING FILES