Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
Web Address: www.dom.com

Steve
G35-A053A
017-00039

December 29, 2014

BY: U.S. CERTIFIED MAIL, RETURN RECEIPT REQUESTED
7012 3460 0003 4189 7904

William F. Durham
Director, Division of Air Quality
WVDEP
601 57th Street
Charleston, WV 25304

RE: Dominion Transmission, Inc. – General Permit (G35-A) Application
Big Isaac Compressor Station

Dear Mr. Durham:

Enclosed are one complete original and two (2) copies of a G35-A General Permit application for the proposed replacement of the existing flare at Dominion Transmission, Inc.'s Big Isaac Compressor Station in Doddridge County, West Virginia.

The public notice affidavit will be submitted to WVDEP once it is received from the newspaper.

If you require any additional information, please contact Rebekah Remick at (804) 273-3536 or via email at Rebekah.J.Remick@dom.com.

Sincerely,

Amanda B. Tornabene
Director, Gas Environmental Services

APPLICATION FOR CLASS II G35-A GENERAL PERMIT

DOMINION TRANSMISSION, INC.
BIG ISAAC STATION
FACILITY ID NO. 017-00029

Submitted By:

Dominion

DOMINION TRANSMISSION, INC.
445 West Main Street
Clarksburg, WV 26301

Submitted To:

dep

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

Prepared By:

ALL4
2393 Kimberton Road
PO Box 299
Kimberton, PA 19442

Submitted: December 2014

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

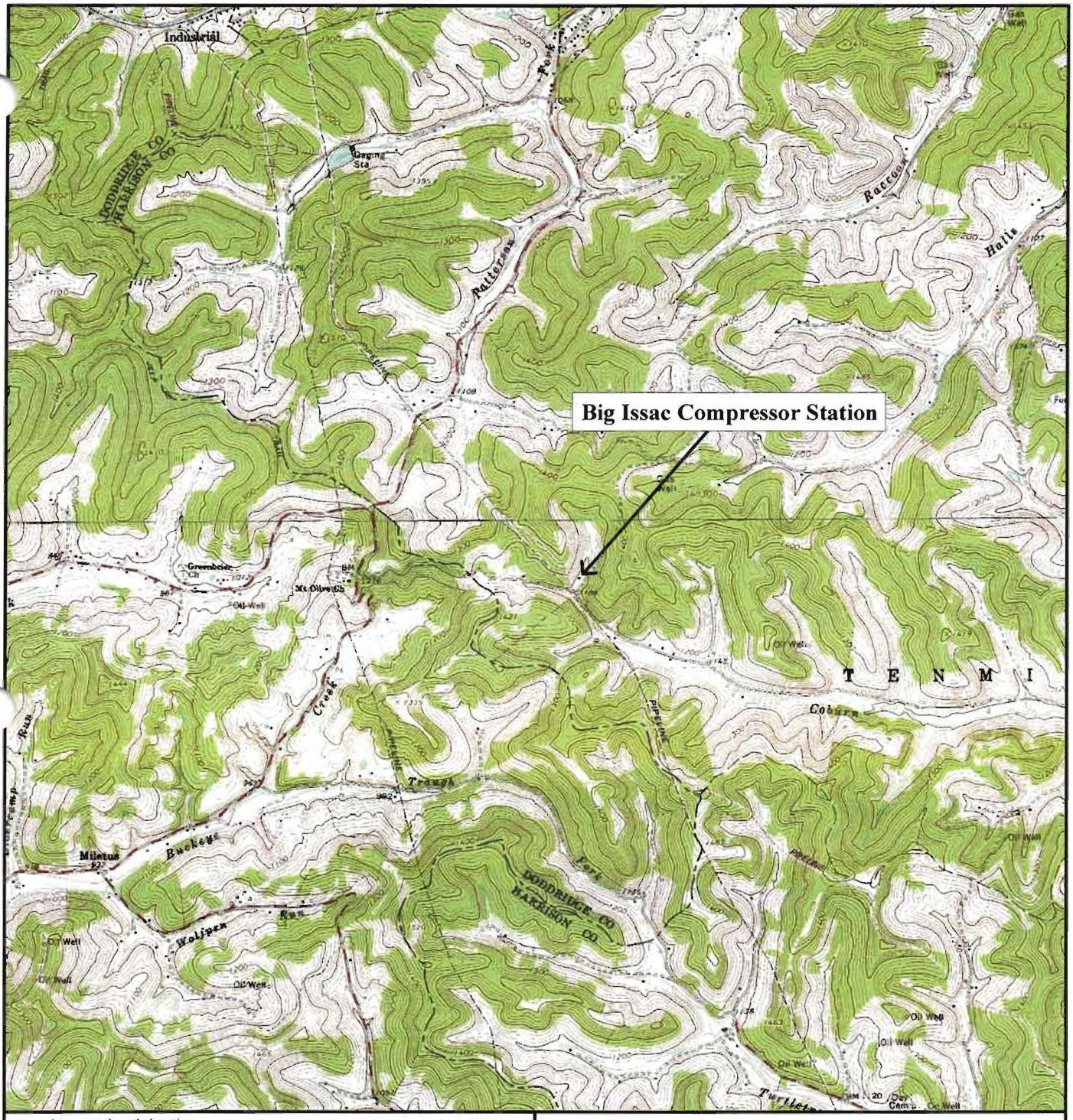
Dominion Transmission, Inc. (Dominion) specializes in gas transmission and storage services. The Big Isaac Compressor Station (Station) is an existing natural gas compressor station that pumps natural gas from production and gathering lines to a Dominion pipeline. The Station uses one (1) glycol dehydration unit to remove water from wet natural gas and transports the natural gas to a natural gas processing plant. Dominion is proposing to replace the existing flare at the Station. The flare serves as an air pollution control device for the glycol dehydration unit.

1.1 EXISTING BIG ISAAC COMPRESSOR STATION

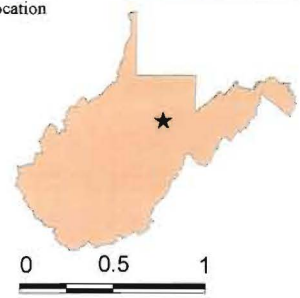
The Station is located in Doddridge County, West Virginia. Figure 1-1 shows the general location of the Station on sections of the Big Isaac and Salem, West Virginia, United States Geological Survey (USGS) quadrangles. The major source thresholds for the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single hazardous air pollutant (HAP), 25 tpy of any combination of HAP, or 100 tpy of all other regulated pollutants. The Station does not have the potential to emit over 100 tpy of any pollutant, nor does the Station emit any individual HAP or any combination of HAPs above the 10 tpy and 25 tpy thresholds respectively. Therefore, the Station is classified as a nonmajor source for Title V purposes and is classified as an area source of HAPs. Because the Station is not a major source, it is not required to have an operating permit pursuant to Title V of the Federal Clean Air Act (CAA) as amended, and West Virginia 45 CSR30 regulations. However, the Station is required to have a General Permit pursuant to West Virginia 45 CSR13 regulations. The Station currently operates under a Class II General Permit G35-A053, issued on May 10, 2011, with an effective date of May 10, 2011.

1.2 PROJECT OVERVIEW

Dominion is submitting an Application for a Class II General Permit G35-A, to the West Virginia Department of Environmental Protection (WVDEP) for a proposed modification to the Station.



approximate quadrangle location



N

Based on USGS 1 24,000 topographical map for Big Isaac, WV (1976) and Salem, WV (1976)

Dominion Transmission Inc.
Big Isaac Compressor Station
Doddridge County, WV

Figure 1-1
Facility Location Map

Specifically, Dominion is proposing to remove the existing flare (Emission Point ID: FL-1) that serves as a control device to the glycol dehydration unit, and replace it with a new enclosed flare, which will also serve as an air pollution control device for the existing glycol dehydration unit.

Although 45 CSR§13-4.2(b) identifies a change in control equipment as a Class II administrative update, "flares" meet the 45 CSR§6-2 definition of "incinerator". Because the proposed enclosed flare meets the West Virginia definition of incinerator, the replacement of the control device (i.e., flare) is considered a minor modification. Therefore, in accordance with 45 CSR§13-5, a Class II General Permit application must be submitted to WVDEP for review. This interpretation was confirmed on March 28, 2014 during a phone call with Beverly McKeone of the WVDEP. Therefore, Dominion is submitting this Application for a G35-A General Permit for the proposed project change.

Dominion plans to begin construction upon issuance of this permit (anticipated March, 2015). This Application includes the requisite WVDEP Application form, supporting Application attachments, supporting narrative, and the applicable Application fees.

1.3 APPLICATION ORGANIZATION

This Application is organized in a report format and includes the following sections and appendices:

Section 1 – Introduction
Section 2 – Process Description and Proposed Changes
Section 3 – Emissions Inventory
Section 4 – Regulatory Analysis
Section 5 – Summary of Application Forms and Supporting Information
Appendix A –Application Forms and Attachments
Appendix B – GRI-GLYCalc Emission Summary and Wet Gas Analysis
Appendix C – Flare Design Evaluation

2. PROCESS DESCRIPTION AND PROPOSED CHANGES

The Big Isaac Compressor Station is a natural gas compressor station used to compress gas for Dominion's pipeline system in West Virginia. The Station transports natural gas to a natural gas processing plant while serving the purpose of pumping natural gas from production and gathering lines to a Dominion pipeline. The Station operates under General Permit G35-A053, which was issued May 10, 2011. As part of operations at the Station, Dominion utilizes a glycol dehydration unit. The purpose of the glycol dehydration unit is to remove water and impurities from the inlet natural gas stream. Water is removed from the rich natural gas stream via physical absorption while it flows countercurrent to circulating triethylene glycol (TEG) in a contactor. The rich TEG is sent to a flash tank to reduce volatile hydrocarbons. Vapors from the flash tank are primarily vented back to station suction and reclaimed. Vapors from the reboiler pass through a still column that is controlled by the existing flare referenced as Emission Point ID: FL-1.

Dominion proposes to replace the control device (i.e., flare) for the dehydration unit with a new enclosed flare. For the purposes of this Application, the new enclosed flare will be referenced as Emission Point ID FL-2. As part of the control device replacement, a blow-case will be installed between the still column and enclosed flare on the glycol dehydration unit. The installation of the blow-case is considered part of the control device installation, as it serves to enhance the efficiency of the enclosed flare. The installation of the blow-case is not considered a modification of the glycol dehydration unit. The glycol dehydration unit will not be debottlenecked as a result of the proposed project.

The Emissions Unit Table for the changes associated with this modification is shown in Table 2-1.

Table 2-1
Emission Units Table
Dominion Transportation – Big Isaac Mountain Station

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type of Change	Control Device
FL-1	FL-1	Glycol Dehydration Flare	2011	21.0 scf/m	Removal	N/A
FL-2	FL-2	Glycol Dehydration Unit Enclosed Flare, Questor Q50 (95% control efficiency)	2015	22.8 scf/m	New	N/A

The existing flare (Emission Point IDs: FL-1) at the Station is proposed to be replaced by a new Questor Technologies Inc. (Questor) Q50 enclosed flare, referenced within the Application as Emission Point ID FL-2. The new Questor Q50 enclosed flare will operate with a 95% control efficiency. The changes in emissions of criteria pollutants, greenhouse gases (GHG), and HAPs as a result of this project are discussed in Section 3. Emissions of lead (Pb) are insignificant from this source and are not considered further.

3. EMISSIONS INVENTORY

Dominion proposes to replace the existing control device (i.e., flare) with a new control device (i.e., enclosed flare) for the glycol dehydration unit at the Station. For the purposes of this project, emissions were calculated for applicable NSR regulated pollutants except Pb. These pollutants include particulate matter (PM), volatile organic compounds (VOC), nitrogen oxides (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2), GHG, and HAPs. Emissions of PM account for both condensable PM and filterable PM, where filterable PM is all PM less than or equal to 30 microns in diameter according the WVDEP Division of Air Quality Guidance for Pollutant Reporting. PM is conservatively assumed to be equivalent to particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$).

The proposed replacement control device is a Questor Q50 enclosed flare. A summary of the potential to emit (PTE) of NSR regulated pollutants from the new enclosed flare and the pilot flame is included in Table 3-1. The potential emissions of NO_X, CO, and SO_2 are based on vendor guarantees (see Attachment G, located in Appendix A, for the Questor vendor information sheets) which account for emissions associated with the combustion of natural gas and waste gas. The potential emissions of VOC and HAP were calculated using GRI-GLYCalc Version 4.0 with an updated gas analysis, a maximum stripping gas flowrate of 6.9 standard cubic feet per minute (scfm), and natural gas emission factors from AP-42 (Chapter 1.4, Table 1.4-2, 07/98) for VOC and total organic compounds (TOC). The use of stripping gas lowers the partial pressure of the water in the glycol solution, thus increasing the glycol concentration. The GRI-GLYCalc Version 4.0 model was used to calculate the VOC and HAP emissions from the combustion of waste gas in the flare, while the AP-42 emission factors were used to calculate the emissions from the combustion of natural gas from the pilot. The TOC emission factor for natural gas combustion was conservatively used to estimate total HAP emissions from natural gas.

Table 3-1
Dominion Transportation - Big Isaac Compressor Station
Project Related Potential Emissions Summary

Regulated Pollutant	Emission Points			
	RSV-1 (Controlled by FL-2)		FL-2 (New)	
	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Criteria Pollutants				
PM[a]	-	-	0.01	0.05
VOC[b]	2.17	9.55	-	-
NO_X[c]	-	-	0.07	0.32
CO[c]	-	-	0.06	0.27
SO_2[c]	-	-	0.00	0.00
Greenhouse Gas Pollutants[d]				
CO_2[e]	-	-	77.63	340.95
CH_4[f]	-	-	0.22	0.97
N_2O[g]	-	-	8.84E-04	3.88E-03
CO_2e[h]	-	-	83.40	366.29
Hazardous Air Pollutants				
Total HAP[b]	0.24	1.07	-	-

[a]Potential emissions of PM include PTE from the combustion of natural gas from the pilot flame and the supplemental natural gas stream, calculated based on the AP-42, Chapter 1.4, Table 1 4-2 emission factor for PM (Total). PM emissions also include PTE from enclosed flare's combustion of emissions from the dehydration still vent and waste fuel gas, calculated based on the AP-42, Chapter 13 5, Table 13.5-1 emission factor for soot, assuming a lightly smoking flare (40 µg/L). According to the May 2011 Emission Estimation Protocol for Petrolcum Refineries, approved by the U.S. EPA on March 28, 2011, 40 µg/L is equivalent to 0.027 lb/MMBtu. PM is conservatively assumed to be equivalent to all filterable PM including PM_{10} and $PM_{2.5}$, and condensable fractions.

[b] Potential emissions of VOC and HAP include PTE from the pilot flame's natural gas combustion, calculated using AP-42 Chapter 1.4, Table 1.4-2 emissions factors for VOC and TOC, and PTE from enclosed flare's combustion of emissions from the dehydration still vent and fuel gas, calculated using GRI-GLYCalc Version 4.0 and an updated gas analysis The dehydration still vent VOC and HAP emissions represent the sum of controlled regenerator emissions and flash tank off gas emissions generated using GRI-GLYCalc 4.0 with the incorporation of a 20% safety factor. GRI-GLYCalc summaries are included in Appendix B of the Application.

[c]Potential emissions of NO_X, CO, and SO_2 are based on vendor specifications, maximum flowrate = 32.88 Mscf/day (22 8 scf/min); waste to fuel gas ratio of 1:0.2.

[d]Potential emissions of greenhouse gases are calculated from the combustion of natural gas from the pilot flame, the supplemental natural gas stream, and the waste gas in the enclosed flare. Emissions from the supplemental natural gas fuel and the pilot flame natural gas were calculated using a fuel flowrate of 10,000 scf/day and a pilot flame flowrate of 1,200 scf/day to the enclosed flare. Greenhouse gas pollutant emission factors for the combustion of natural gas were obtained from 40 CFR Part 98, Subpart C. The emissions from the combustion of waste gas use the methodologies outlined below:

[e]CO_2 is calculated assuming emissions from both natural gas and waste gas streams in metric tons/year, calculated according to 40 CFR 98 Equation Y-1a, where:

$$CO_2 = 0.98 \times 0.001 \times \left(\sum_{p=1}^{n} \left[\frac{44}{12} \times (Flare)_p \times \frac{(MW)_p}{MVC} \times (CC)_p \right] \right)$$

Flare p = volume flare gas combusted = ~23 acfm
MW = molecular weight flare gas = 21 kg/kg-mol.
MVC = molar conversion factor of 849.5 scf/kg-mol at 68°F
CC = carbon concentration of flare gas = 7.87%.
0.98 = combustion efficiency of flare (used 0.95 for 95% efficiency)

[f]CH_4 is in metric tons/year, calculated according to 40 CFR 98 Equation Y-4, where:

$$CH_4 = \left(CO_2 \times \frac{EmF_{CH4}}{EmF} \right) + CO_2 \times \frac{0.02}{0.98} \times \frac{16}{44} \times f_{CH4}$$

EmF_{CH4} = Default CH_4 emission factor for "Fuel Gas" from Table C-2
EmF = default CO_2 emission factor for flare gas of 60 kg/CO_2/MMBtu.
CO_2 = emission rate of CO_2 from flared gas in metric tons/year.
f_{CH4} = default weight fraction of carbon in flare gas of 0 4
0 98 = combustion efficiency of flare (used 0 95 for 95% efficiency)

[g]N_2O is in metric tons/year, calculated according to 40 CFR 98 Equation Y-5, where:

$$N_2O = \left(CO_2 \times \frac{EmF_{N2O}}{EmF} \right) \qquad (Eq.\ Y\text{-}5)$$

CO_2 = emission rate of CO_2 from flared gas in metric tons/year.
EmF_{N2O} = Default N_2O emission factor for "Fuel Gas" from Table C-2
EmF = default CO_2 emission factor for flare gas of 60 kg/CO_2/MMBtu.

[h]CO_2e is carbon dioxide equivalent in metric tons/year, calculated according to 40 CFR 98 Equation A-1, where:

$$CO_2e = \sum_{i=1}^{n} GHG_i \times GWP_i$$

GHG_i = mass emissions of each greenhouse gas listed in Table A-1, metric tons/year.
GWP_i = global warming potential for each greenhouse gas from Table A-1.
n = number of greenhouse gases emitted.

Table A-1: Global Warming Potentials	
Pollutant	*GWP (100 year)*
CO_2	1
CH_4	25
N_2O	298

Table 3-2
Dominion Transportation - Big Isaac Compressor Station
Project Related Changes in Potential Emissions Summary

Regulated Pollutant	Existing Potential Emissions (tons/yr) [a]			Project Related Potential Emissions (tons/yr)[b]			Change in Potential Emissions (tons/yr)[c]			Summary of Changes in Potential Emissions[d]
	RBV-1	RSV-1	FL-1	RBV-1	RSV-1	FL-2	RBV-1	RSV-1	FL-2	
Criteria Pollutants										
PM	<0.01	-	-	<0.01	-	0.05	<0.01	-	0.05	**0.05**
VOC	0.17	3.97	-	0.17	9.55	-	0.00	5.58	-	**5.58**
NO_X	0.22	-	0.22	0.22	-	0.32	0.00	-	0.1	**0.10**
CO	0.18	-	0.70	0.18	-	0.27	0.00	-	0.00	**0.00**
SO_2	<0.01	-	-	<0.01	-	-	<0.01	-	-	**0.00**
Greenhouse Gas Pollutants										
CO_2e	239.17	-	2,485.66	239.17	-	366.29	0.00	-	0.00	**0.00**
Hazardous Air Pollutants										
Total HAP	<0.01	0.71	-	<0.01	1.07	-	<0.01	0.36	-	**0.36**

[a] As reported in Attachment I of the G35-A General Permit application submitted to the West Virginia Department of Environmental Protection (WVDEP) on April 6, 2011.

[b] As calculated in Table 3-1 of this G35-A General Permit application.

[c] Change in Potential Emissions = ([Project Related Potential Emissions] - [Existing Potential Emissions]).

[d] Summary of Changes in Potential Emissions represents the increase in potential emissions from the facility as a result of the proposed project.

A summary of the GRI-GLYCalc inputs and results are included in Appendix B. Potential emissions of PM include emissions from the combustion of natural gas used for the pilot flame and the supplemental natural gas stream (calculated using the emission factor from AP-42, Chapter 1.4, Table 1.4-2, 07/98 for PM-Total). The potential emissions of PM also include emissions from the combustion of waste gas in the enclosed flare (calculated using AP-42 Chapter 13.5, Table 13.5-1, 09/91 emission factors for soot, conservatively assuming a lightly smoking flare).

Potential emissions of GHG from the new enclosed flare include emissions from the combustion of waste gas from the glycol dehydration unit and the combustion of natural gas used for the pilot flame and the supplemental natural gas inlet stream. GHG were calculated on a carbon dioxide equivalent (CO_2e) basis by adding the potential emissions of carbon dioxide (CO_2) with potential emissions of nitrous oxide (N_2O) and methane (CH_4), using the emission factors, global warming potential (GWP), and methodology obtained from 40 CFR 98, Subparts C and Y. GHG emissions from the combustion of the glycol dehydration unit's waste gas were calculated pursuant to 40 CFR Part 98, Subpart Y (Petroleum Refineries). This method was used rather than 40 CFR Part 98, Subpart W (Petroleum and Natural Gas Systems) because Subpart Y more appropriately estimates GHG emissions based on flare specifications rather than Subpart W, which estimates GHG emissions based on the specifications of glycol dehydration units. GHG emissions from the combustion of natural gas used for the pilot flame and the supplemental natural gas inlet stream were calculated based on emission factors obtained from 40 CFR Part 98, Subpart C, Tables C-1 and C-2, and the maximum natural gas flowrate supplied to the enclosed flare.

The PTE of the new enclosed flare was calculated by assuming 8,760 operating hours per year, and a maximum volumetric flowrate of 22.8 standard cubic feet per minute (scf/min), based on the design capacity of the new Questor Q50 enclosed flare. A summary of project related changes in emissions can be found in Attachment G, located within Appendix A. The summary of Facility-wide emissions following the replacement of the existing control device (i.e., flare) can also be found in Attachment G, located in Appendix A.

4. REGULATORY ANALYSIS

Dominion has reviewed the Federal and State of West Virginia air quality regulations for potentially applicable requirements that could impact the proposed project. The following sections address only those air regulations that could apply to the proposed project.

4.1 FEDERAL AIR QUALITY REGULATIONS

For the purpose of this application, potentially applicable Federal regulations include the following:

- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Compliance Assurance Monitoring (CAM)
- New Source Review (NSR)

A discussion of each specific Federal requirement is presented in the following subsections.

4.1.1 New Source Performance Standards (NSPS)

The United States Environmental Protection Agency (U.S. EPA) has promulgated standards of performance for new, modified, or reconstructed sources of air pollution at 40 CFR Part 60, referred to as New Source Performance Standards (NSPS). Neither the enclosed flare nor the glycol dehydration unit is subject to an NSPS regulation. The proposed project will not impact the applicability of existing NSPS, and/or the Station's ability to comply with the applicable requirements.

4.1.2 National Emission Standards for Hazardous Air Pollutants (NESHAP)

U.S. EPA has promulgated National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40 CFR Part 63. Several existing emission units at the Station are already subject to a NESHAP. The proposed project will not impact the applicability of any NESHAP, or the Station's ability to comply with previously applicable requirements. The following Part 63 Subparts potentially apply to the proposed project:

- Subpart A – General Provisions

- Subpart HH – NESHAP for Oil and Natural Gas Production Facilities
- Subpart HHH – NESHAP for Natural Gas Transmission and Storage Facilities

4.1.2.1 40 CFR Part 63, Subpart A – General Provisions

Pursuant to the Clean Air Act Amendments of 1990, process-specific NESHAPs are promulgated at 40 CFR Part 63. NESHAPs promulgated under 40 CFR Part 63, also referred to as Maximum Achievable Control Technology (MACT) standards, apply to identified source categories that are considered area sources or major sources of HAPs. As previously mentioned in Section 1.1, the potential emissions of HAPs from the Station are less than the major source thresholds. Therefore, the Station qualifies as an area source of HAPs as defined in §63.2. As an area source of HAPs, the glycol dehydration unit at the Station is potentially subject to MACT standards codified at 40 CFR Part 63. Note that the existing flare serving as a control device for the glycol dehydration unit, and replacement enclosed flare are subject to the control device and work practice requirements specified in Condition No. 10.1.4 of General Permit 35-A053, which are based on provisions in 40 CFR §63.11 (Subpart A).

4.1.2.2 40 CFR Part 63, Subpart HH – NESHAP for Oil and Natural Gas Production Facilities

The Station is subject to 40 CFR Part 63, Subpart HH – *National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities* (Subpart HH) because the Station transports natural gas to a natural gas process plant. The Station is subject to the area source requirements, and the only affected source is the Station's glycol dehydration unit. The glycol dehydration unit at the Station meets the definition of a large glycol dehydration unit because its actual annual gas flowrate is greater than 85 thousand standard cubic meters per day (Mm^3/day), and its uncontrolled benzene emissions are greater than 0.90 megagrams per year (Mg/yr), or 1 tpy. The Station is not located within an urbanized area plus offset (UA plus offset) and urban cluster (UC) boundary. A map depicting the location determination is included in Attachment F.

The Station's glycol dehydration unit actual average benzene emissions (i.e., controlled emissions) are less than 0.90 Mg/yr (1 tpy), as determined in accordance with §63.772(b)(2)(i). Therefore, the Station's glycol dehydration unit meets the exemption criteria as specified by

§63.764(e)(ii). Potential actual average benzene emissions following the replacement of the control device will remain less than 0.90 Mg/yr (1 tpy), due to the emissions reductions associated with the federally enforceable controls (i.e., replacement enclosed flare) in place per §63.772(b)(2). Because the control device replacement continues to reduce the potential annual potential benzene emissions to less than 0.90 Mg/yr (1 tpy), the dehydration unit will remain exempt from the requirements of §63.764(d)(1)(i) through (iii). Records associated with this determination will be maintained in accordance with §63.774(d)(1). Although the dehydration unit is not subject to control device requirements of 40 CFR 63 Subpart HH or Subpart A, the dehydration unit's control devices (existing flare and replacement enclosed flare) are subject to the control device and work practice requirements specified in §63.11 (Subpart A), as required per Condition No. 10.1.4 of General Permit 35-A053.

4.1.2.3 Condition40 CFR Part 63, Subpart HHH – NESHAP for Natural Gas Transmission and Storage Facilities

The provisions of 40 CFR Part 63, Subpart HHH apply to glycol dehydration units located at natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user. Because the Station is a natural gas production facility, HHH does not apply.

4.1.3 Compliance Assurance Monitoring (CAM)

U.S. EPA promulgated the Compliance Assurance Monitoring (CAM) rule at 40 CFR Part 64 on October 22, 1997 with an effective date of November 21, 1997. U.S. EPA developed the regulation as a means for providing reasonable assurance that an emissions unit is in continuous compliance with applicable requirements for affected units located at major stationary sources subject to Title V permitting. According to 40 CFR §64.2(a), a unit located at a nonmajor source that is not required to obtain Title V permit, is exempt from CAM. Therefore, the Station is not subject to CAM requirements.

4.1.4 New Source Review (NSR)

U.S. EPA has approved West Virginia's NSR regulations through their incorporation into the West Virginia State Implementation Plan (SIP). The state-specific NSR regulations are codified in West Virginia 45 CSR§14 and 19.

4.1.4.1 Prevention of Significant Deterioration (PSD)

The Prevention of Significant Deterioration (PSD) regulations ensure that major new sources and major modifications to existing sources will not result in the significant deterioration of air quality in areas designated by U.S. EPA as in attainment of National Ambient Air Quality Standards (NAAQS). Because the replacement of the existing control device (i.e. replacement enclosed flare) is not a major modification and since the Station is not a major source under the PSD rules, PSD does not apply.

4.1.4.2 Nonattainment New Source Review (NNSR)

The NNSR regulations ensure that major new sources and major modifications to existing sources located in areas of nonattainment of NAAQS will not adversely impact the area's progress toward achieving NAAQS. Because the change is not a major source when considered alone and as the Station is not a major source under the PSD rules, the NNSR rules do not apply.

4.2 STATE OF WEST VIRGINIA REQUIREMENTS

The proposed project is potentially subject to the following West Virginia air quality regulations as codified in Title 45 – Division of Air Quality Code. It should be noted that none of the existing Title 45 regulations that currently apply to the Station will be impacted by the proposed project.

- 45 CSR6 – To Prevent and Control Air Pollution from Combustion of Refuse
- 45 CSR10 – To Prevent and Control Air Pollution from the Emission of Sulfur Oxides
- 45 CSR13 – Permits for Construction, Modification, Relocation, and Operation of Stationary Sources of Air Pollutants
- 45 CSR30 – Requirements of Operating Permits
- 45 CSR30A – Deferral of Nonmajor and Area Sources from Permitting Requirements

- 45 CSR34 – Emission Standards for Hazardous Air Pollutants

4.2.1 45 CSR6 – To Prevent and Control Air Pollution from Combustion of Refuse

The provisions of this rule establish emission standards for PM and requirements for activities involving incineration of refuse which are not subject to, or are exempted from regulation under a federal counterpart for specific combustion sources. The proposed control device (i.e., enclosed flare) for the glycol dehydration unit at the Station meets the definition of an "incinerator" in 45 CSR§6-2, and therefore is subject to the 45 CSR6 regulations. The monitoring requirements, testing requirements, recordkeeping requirements, and reporting requirements of this rule therefore apply.

Based on 45 CSR§6-4, the allowable PM emissions for the flare are calculated using the following formula:

$$PM_{allowable}\left(\frac{lb}{hr}\right) = Incinerator\ Capacity\ (\frac{tons}{hr})\ x\ F$$

Where: F = Factor for determining maximum allowable particulate emissions. For incinerators with a capacity less than 15,000 lb/hr: $F = 5.43$.
Incinerator Capacity = design capacity of the flare (estimated total flow rate to the flare, including materials to be burned, carrier gases, auxiliary fuel, etc.).

The allowable PM limit calculation is provided below:

$$PM_{allowable} = 106\frac{lb}{hr}x\ 5.43\ (F\ factor)x\frac{1\ ton}{2000\ lb}\ =\ 0.29\ lb/hr,$$

Based on AP-42, the enclosed flare will comply with the allowable PM emission limit determined in accordance with 45 CSR§6-4.

4.2.2 45 CSR10 – To Prevent and Control Air Pollution from the Emission of Sulfur Oxides (SOx)

The provisions of this rule regulate emissions of SOx. The existing control device (i.e., flare) is subject to the applicable emission limits specified in 45 CSR§10-4.1 Standards for Manufacturing Process Source Operations and 45 CSR§10-5.1 Combustion of Refinery or Process Gas Streams. The existing source-specific emission limits will not change as a result of the proposed project. The new enclosed flare is exempt from the testing, monitoring,

recordkeeping, and reporting requirements of 45 CSR§10-8 because it combusts natural gas (CSR§10-10.3).

4.2.3 45 CSR13 – Permits for Construction, Modification, Relocation, and Operation of Stationary Sources of Air Pollutants

The provisions of this rule set forth the procedures for stationary source reporting, and the criteria for obtaining a permit to modify a nonmajor stationary source. The proposed project is a modification to a nonmajor source as defined in 45 CSR13, and therefore requires a General Permit.

4.2.4 45 CSR30 – Requirements of Operating Permits and 45 CSR30A – Deferral of Nonmajor and Area Sources From Permitting Requirements

The provisions of 45 CSR30A provide for the deferral of nonmajor and area sources from the obligation to obtain a permit under 45 CSR30. 45 CSR30 provides for the establishment of a comprehensive air permitting system consistent with the requirements of Title V of the CAA. As the Station meets the definition of a nonmajor facility and is not a major Title V source for criteria pollutants, the monitoring, recordkeeping, and reporting requirements contained in 45 CSR30 do not apply.

4.2.5 45 CSR34 – Emission Standards for Hazardous Air Pollutants (HAP)

The provisions of this rule incorporate 40 CFR Parts 61 and 63 by reference including any required methods, performance specifications, and all test methods which are approved to flare standards. Exclusions are identified at 45 CSR§34-4. The proposed project does not affect the applicability of 45 CSR34. Therefore, the standards set forth by 40 CFR Part 63, Subpart HH will continue to apply.

5. SUMMARY OF APPLICATION FORMS AND SUPPORTING INFORMATION

Dominion is including a check payable to the "West Virginia Department of Environmental Protection – Division of Air Quality" in the amount of $3,000, as established in 45 CSR§22-3.4(a) and (b), to cover the G-35-A General Permit Application fees ($500) for applicable sources subject to NESHAP requirements ($2,500).

The following attachments included as Appendix A provide supporting information for the General Permit G35-A Application:

- Attachment A – Business Certificate
- Attachment B – Process Description
- Attachment D – Process Flow Diagram
- Attachment E – Plot Plan
- Attachment F – Area Map
- Attachment G – Equipment Data Sheets
- Attachment H – Air Pollution Control Device Sheets
- Attachment I – Emission Calculations
- Attachment J – Class I Legal Advertisement
- Attachment L – General Permit Registration Application Fee

**Note – There are no Attachments C, H, K, M, N and O for this permit application

APPENDIX A
APPLICATION FORMS AND ATTACHMENTS

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475 • *www.dep.wv.gov/daq*

APPLICATION FOR GENERAL PERMIT REGISTRATION

CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE A STATIONARY SOURCE OF AIR POLLUTANTS

☐ CONSTRUCTION ☒ **MODIFICATION** ☐ RELOCATION ☐ CLASS I ADMINISTRATIVE UPDATE
☐ CLASS II ADMINISTRATIVE UPDATE

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

☐ G10-D – Coal Preparation and Handling
☐ G20-B – Hot Mix Asphalt
☐ G30-D – Natural Gas Compressor Stations
☐ G33-A – Spark Ignition Internal Combustion Engines
☒ **G35-A – Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)**
☐ G40-C – Nonmetallic Minerals Processing
☐ G50-B – Concrete Batch
☐ G60-C - Class II Emergency Generator
☐ G65-C – Class I Emergency Generator
☐ G70-A – Class II Oil and Natural Gas Production Facility

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office):
Dominion Transmission, Inc.

2. Federal Employer ID No. **(FEIN):**
550629203

3. Applicant's mailing address:
445 West Main Street
Clarksburg, WV 26301

4. Applicant's physical address:
CR 28/Coburn Fork Road & Raccoon Run Road
Salem, Harrison County, West Virginia 26426

5. If applicant is a subsidiary corporation, please provide the name of parent corporation: ***N/A***

6. **WV BUSINESS REGISTRATION.** Is the applicant a resident of the State of West Virginia? ☒ ***YES***

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

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.):
Replacement of glycol dehydration unit control device (i.e., flare) with a new control device (i.e., enclosed flare).

8a. Standard Industrial Classification (SIC) code: ***4922***

8b. North American Industry Classification System (NAICS) code: ***486210***

9. DAQ Plant ID No. (for existing facilities only): ***017 – 00029***

10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): ***G35-A053***

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:	
Big Isaac Compressor Station	Mailing: ***445 West Main Street*** ***Clarksburg, WV 2630***	Physical: ***CR 28/Coburn Fork Rd. & Raccoon Run Rd.*** ***Salem, Harrison County, West Virginia 26426***

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ***YES***

- IF **YES**, please explain: ***The applicant owns the proposed site.***
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14A. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

Traveling west on Interstate 50, take the Salem exit and continue onto CR 50/73 (E. Main Street). Drive south along E. Main Street, and stay left at the fork to continue driving south on CR29. At the intersection of CR 29 and CR15, stay left at the fork and continue to until CR15 intersects CR28 (Coburn Fork Road). Turn left on CR28 (Coburn Fork Road) and continue until Raccoon Run Road. The Big Isaac Compressor Station will be on the left at the intersection of CR28 (Coburn Fork Road) and Raccoon Run Road.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
Salem	***Doddridge County***	Northing (KM): ***4344.0282*** Easting (KM): ***538.3356*** Zone: ***17***

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Dominion Transmission, Inc. is proposing to construct one (1) new enclosed flare to replace the existing flare used as control devices on the glycol dehydration system located at the Big Isaac Compressor Station.	Latitude: ***39.2470*** Longitude: ***-80.5563***

B: 1ST ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site:
N/A	Mailing: ***N/A*** Physical: ***N/A***

13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ***N/A***

- IF **YES**, please explain: ***N/A***
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14B. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

N/A

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates:
N/A	***N/A***	Northing (KM): ***N/A*** Easting (KM): ***N/A*** Zone: ***N/A***
18B. Briefly describe the proposed new operation or change (s) to the facility: ***N/A***		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: ***N/A*** Longitude: ***N/A***

C: 2ND ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):

11C. Name of 2nd alternate operating site:	12C. Address of 2nd alternate operating site:
N/A	Mailing: ***N/A*** Physical: ***N/A***

13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ***N/A***

- IF **YES**, please explain: ***N/A***
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14C. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

N/A

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates:
N/A	***N/A***	Northing (KM): ***N/A*** Easting (KM): ***N/A*** Zone: ***N/A***
18C. Briefly describe the proposed new operation or change (s) to the facility: ***N/A***		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: ***N/A*** Longitude: ***N/A***

20. Provide the date of anticipated installation or change:	21. Date of anticipated Start-up if registration is granted:
N/A ☐ If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: : _ ***N/A***	***N/A***

22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day ***N/A*** Days per week ***N/A*** Weeks per year ***N/A*** Percentage of operation ***N/A***

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ☒ **ATTACHMENT A : CURRENT BUSINESS CERTIFICATE**
- ☒ **ATTACHMENT B: PROCESS DESCRIPTION**
- ☐ ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ☒ **ATTACHMENT D: PROCESS FLOW DIAGRAM**
- ☒ **ATTACHMENT E: PLOT PLAN**
- ☒ **ATTACHMENT F: AREA MAP**
- ☒ **ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM**
- ☒ **ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS**
- ☒ **ATTACHMENT I: EMISSIONS CALCULATIONS**
- ☒ **ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT**
- ☐ ATTACHMENT K: ELECTRONIC SUBMITTAL
- ☒ **ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE**
- ☐ ATTACHMENT M: SITING CRITERIA WAIVER
- ☐ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ☐ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☐ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of a Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, Emission Inventory, Certified Emission Statement, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. Any administratively incomplete or improperly signed or unsigned Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

☒ I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

☐ I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

☐ I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

☐ I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

I hereby certify that (please print or type) ***Brian Sheppard***
is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible

Signature _____ 12-19-14
(please use blue ink) Responsible Official Date

Name & Title ***Brian Sheppard, Vice President, Pipeline Operations***
(please print or type)

Signature _____
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name ***Dominion Transmission, Inc.***

Phone & Fax ***304-627-3733*** (Phone) ***304-627-3323*** (Fax)

Email ***Brian.C.Sheppard@dom.com***

ATTACHMENT A
BUSINESS CERTIFICATE

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
DOMINION TRANSMISSION INC
445 W MAIN ST
CLARKSBURG, WV 26301-2843

BUSINESS REGISTRATION ACCOUNT NUMBER: **1038-3470**

This certificate is issued on: 06/8/2011

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

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

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

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

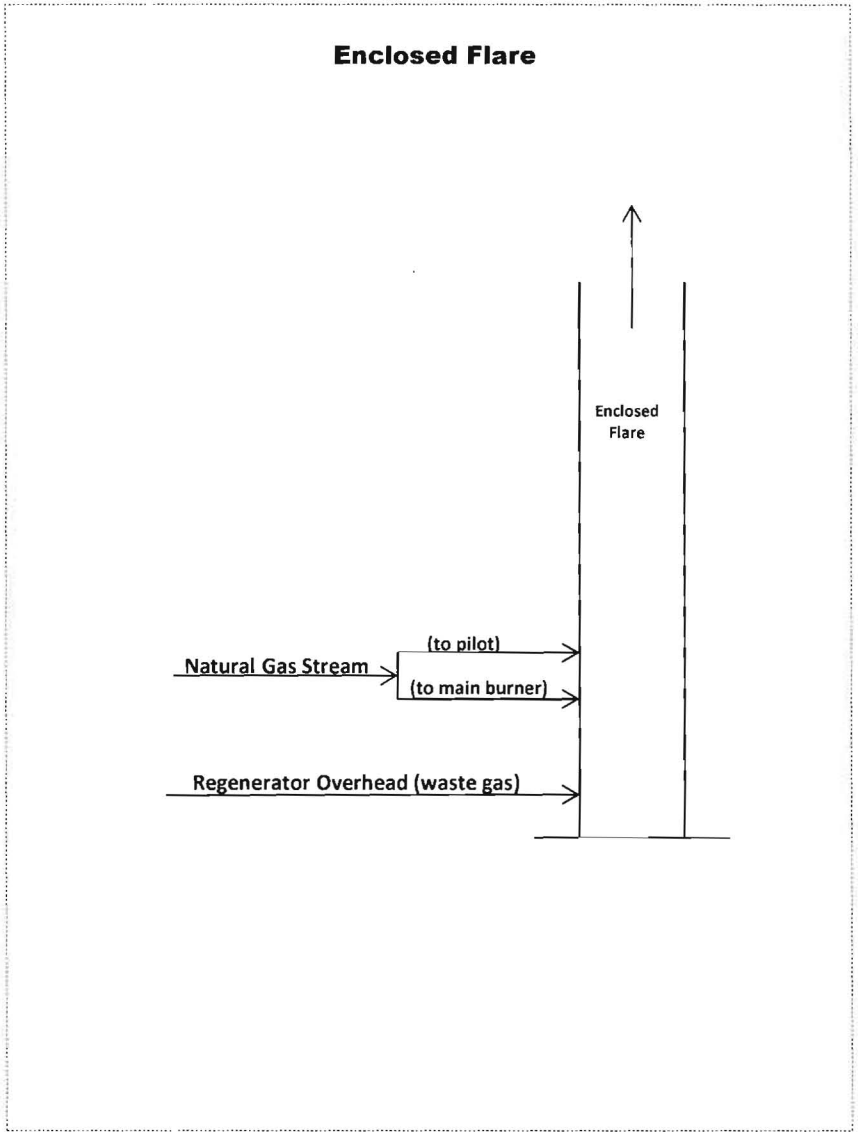
Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

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

atL006 v.4
L0228957312

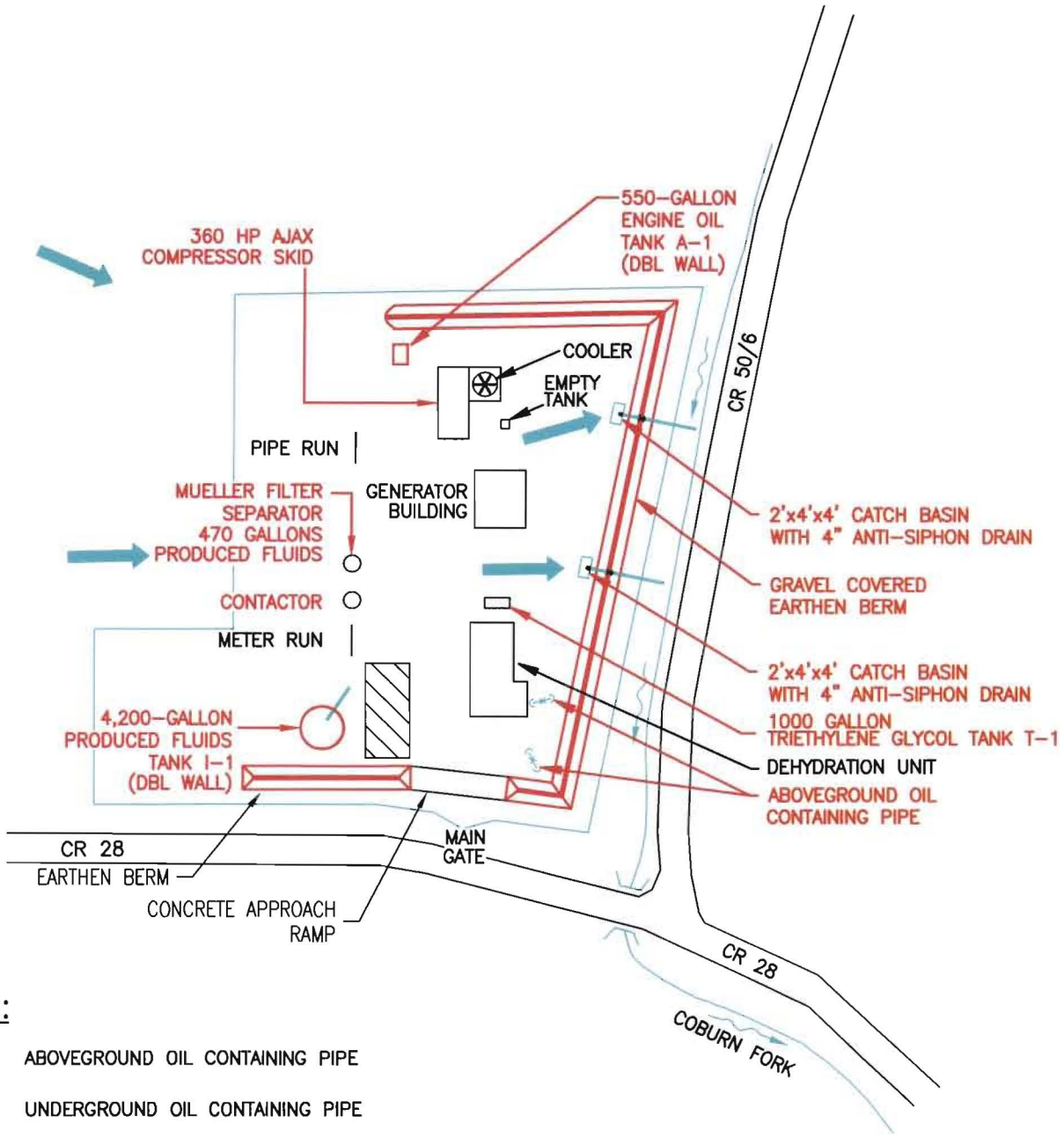
ATTACHMENT B
PROCESS DESCRIPTION (IN SECTION 2 OF TEXT)

ATTACHMENT D
PROCESS FLOW DIAGRAM



Process Flow Diagram
Dominion Transmission, Inc.
Big Isaac Compressor Station – Doddridge County, WV

ATTACHMENT E
PLOT PLAN



LEGEND:

- ABOVEGROUND OIL CONTAINING PIPE
- UNDERGROUND OIL CONTAINING PIPE
- FLOW DIRECTION
- TRUCK LOADING/ UNLOADING AREA

SCALE	N.T.S.	DATE	
DRAWN	JSS	7/13/06	
CHECKED	RRE		
V	JDB	04/07/10	MARK-UPS BY RUSS EVANS
REV	TBB	12/03/12	MARK-UPS BY TIM JACKSON
REV	TBB	06/06/14	MARK-UPS BY TIM JACKSON

Dominion Transmission, Inc.

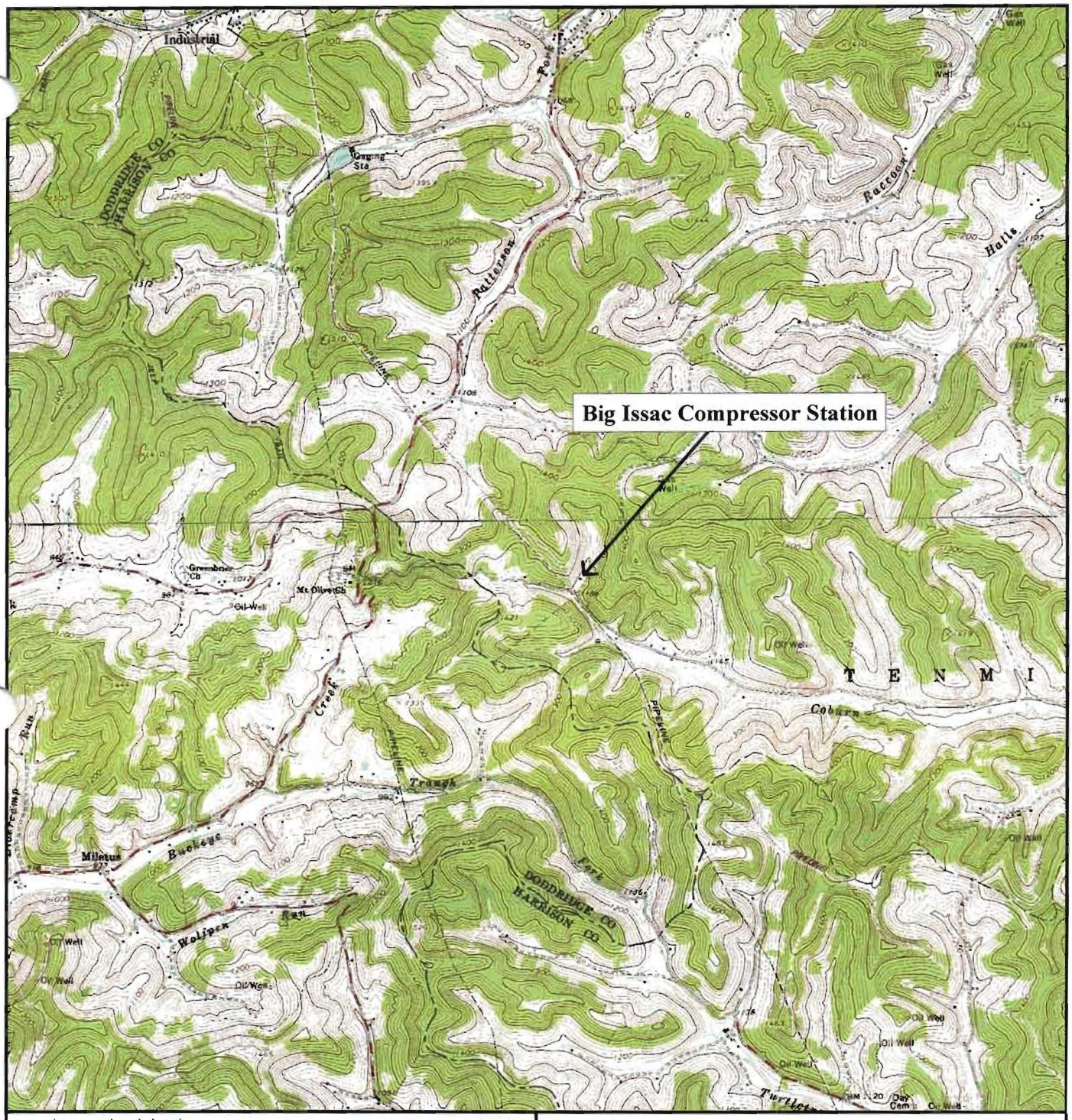
445 West Main St. Clorksburg, West Virginia 26301 / Phone: (304) 623-8000

TITLE: BIG ISAAC COMPRESSOR STATION
HARRISON COUNTY, WEST VIRGINIA
ENVIRONMENTAL EMERGENCY SITE PLAN

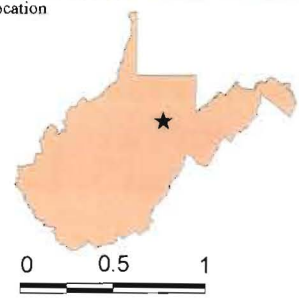
DIR:		GROUP	DWG. NO.	REV.
FILE:	PRJ/TSK:	PD	W3521G	3

Printed: Jun 06, 2014 @09:56, By: timo409, Filename: PDW35216.dwg

ATTACHMENT F
AREA MAP



approximate quadrangle location



0 0.5 1

N

Based on USGS 1:24,000 topographical map for Big Isaac, WV (1976) and Salem, WV (1976)

Dominion Transmission Inc.
Big Isaac Compressor Station
Doddridge County, WV

Figure 1-1
Facility Location Map

Big Isaac Station
Location: Lat 39.2470 , Long -80.5563
Non-Urban
Created 8/4/2014
● = Big Isaac Station

Legend:

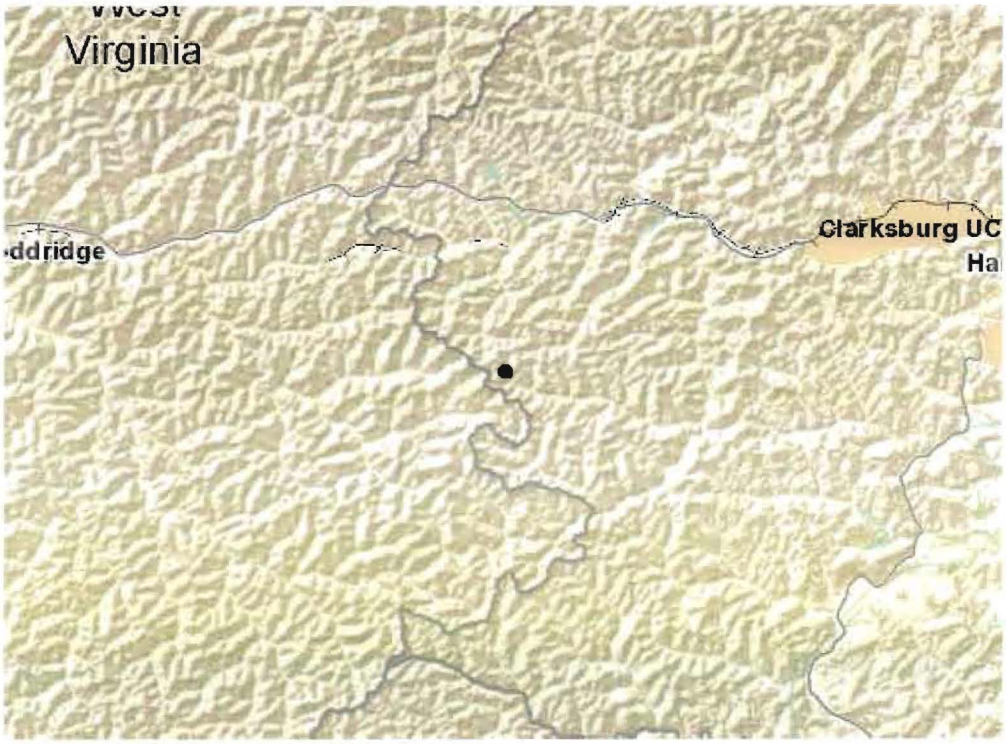
Boundaries

- State
- '00 County
- '00 Urban Area

Features

- Street
- Railroad
- Pipe/Powerline
- Stream/Waterbody

Items in grey text are not visible at this zoom level



ATTACHMENT G
EQUIPMENT DATA SHEETS

General Permit G35-A Registration
Section Applicability Form

General Permit G35-A was developed to allow qualified registrants to seek registration for a variety of sources. These sources include internal combustion engines, boilers, reboilers, line heaters, tanks, emergency generators, dehydration units not subject to MACT standards, dehydration units not subject to MACT standards and being controlled by a flare control device, dehydration units not subject to MACT standards and being controlled by recycling the dehydration unit back to flame zone of reboiler, dehydration units not subject to MACT standards being controlled by a thermal oxidizer, and permit exemptions including the less than 1 ton/year benzene exemption, the 40CFR63 Subpart HH - Annual Average Flow of Gas Exemption (3 mmscf/day), and the 40CFR63 Subpart HHH - Annual Average Flow of Gas Exemption (10 mmscf/day). All registered facilities will be subject to Sections 1.0, 1.1, 2.0, 3.0, and 4.0.

General Permit G35-A allows the registrant to choose which sections of the permit that they wish to seek registration under. Therefore, please mark which sections that you are applying for registration under. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

Section 5	Reciprocating Internal Combustion Engines (R.I.C.E.)*	☒
Section 6	Boilers, Reboilers, and Line Heaters	☒
Section 7	Tanks	☐
Section 8	Emergency Generators	☒
Section 9	Dehydration Units Not Subject to MACT Standards	☐
Section 10	Dehydration Units Not Subject to MACT Standards and being controlled by a flare control device	☒
Section 11	Dehydration Units Not Subject to MACT Standards being controlled by recycling the dehydration unit back to the flame zone of the reboiler	☐
Section 12	Dehydration Units Not Subject to MACT Standards and being controlled by a thermal oxidizer	☐
Section 13	Permit Exemption (Less than 1 ton/year of benzene exemption)	☒
Section 14	Permit Exemption (40CFR63 Subpart HH – Annual average flow of gas exemption (3 mmscf/day))	☐
Section 15	Permit Exemption (40CFR63 Subpart HHH – Annual average flow of gas exemption (10 mmscf/day))	☐
Section 16	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40CFR60 Subpart JJJJ)	☒

* **Affected facilities that are subject to Section 5 may also be subject to Section 16. Therefore, if the applicant is seeking registration under both sections, please select both.**

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		*CE-1*		*GE-1*			
Engine Manufacturer and Model		*Ajax Model DPC-360 LE*		*Cummins Power Generation Model WSG-1068*			
Manufacturer's Rated bhp/rpm		*360/400*		*97.5/1800*			
Source Status[2]		*ES*		*ES*			
Date Installed/Modified/Removed[3]		*12/1998*		*2010*			
Engine Manufactured/Reconstruction Date[4]		*1998 or prior*		*2010*			
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		*N/A*		*Yes*			
Engine, Fuel and Combustion Data	Engine Type[6]	*2SLB*		*4SRB*			
	APCD Type[7]	*None*		*None*			
	Fuel Type[8]	*RG*		*RG*			
	H_2S (gr/100 scf)	*Negligible*		*Negligible*			
	Operating bhp/rpm	*360/400*		*97.5/1800*			
	BSFC (Btu/bhp-hr)	*~7,700*		*N/A*			
	Fuel throughput (ft^3/hr)	*~2,222*		*~861*			
	Fuel throughput ($MMft^3$/yr)	*~19.46*		*~0.43*			
	Operation (hrs/yr)	*8,760*		*500*			
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO_X	*1.59*	*6.95*	*2.15*	*0.54*		
MD	CO	*0.71*	*3.13*	*83.19*	*20.80*		
MD	VOC	*0.95*	*4.17*	*2.15*	*0.54*		
AP	SO_2	*<0.01*	*<0.01*	*<0.01*	*<0.01*		
AP	PM_{10}	*0.11*	*0.47*	*0.01*	*<0.01*		
AP	Formaldehyde	*0.15*	*0.67*	*0.02*	*<0.01*		
AP	Total HAP	*0.22*	*0.97*	*0.03*	*<0.01*		

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

3. Enter the date (or anticipated date) of the engine's installation (construction of source), modification or removal.

4. Enter the date that the engine was manufactured, modified or reconstructed.

5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

Provide a manufacturer's data sheet for all engines being registered.

6. Enter the Engine Type designation(s) using the following codes:

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other _____	(please list)

10. Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		*Cameron 210/350*	
		Max Dry Gas Flow Rate (mmscf/day)		*4 mmscfd*	
		Design Heat Input (mmBtu/hr)		*0.567 MMBtu/hr*	
		Design Type (DEG or TEG)		*TEG*	
		Source Status[2]		*ES*	
		Date Installed/Modified/Removed[3]		*06/01/2011*	
		Regenerator Still Vent APCD[4]		*FL*	
		Fuel HV (Btu/scf)		*~1,248*	
		H_2S Content (gr/100 scf)		*Negligible*	
		Operation (hrs/yr)		*8,760*	
Source ID #[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
*RBV-1**	Reboiler Vent	MD	NO_X	*0.05*	*0.22*
		MD	CO	*0.04*	*0.18*
		MD	VOC	*0.04*	*0.17*
		AP	SO_2	*<0.01*	*<0.01*
		AP	PM_{10}	*<0.01*	*<0.01*
*RSV-1***	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	*2.17*	*9.55*
		GRI-GLYCalc™	Benzene	*0.02*	*0.07*
		GRI-GLYCalc™	Ethylbenzene	*0.01*	*0.06*
		GRI-GLYCalc™	Toluene	*0.02*	*0.07*
		GRI-GLYCalc™	Xylenes	*0.18*	*0.79*
		GRI-GLYCalc™	n-Hexane	*0.02*	*0.07*

1. Enter the appropriate Source Identification Numbers for the glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent. The glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a *Glycol Dehydration Unit Data Sheet* shall be completed for each, using Source Identification #s RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

2. Enter the Source Status using the following codes:

   NS Construction of New Source
   MS Modification of Existing Source
   ES Existing Source
   RS Removal of Source

3. Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.

4. Enter the Air Pollution Control Device (APCD) type designation using the following codes:

   NA None
   FL Flare
   TO Thermal Oxidizer
   CD Condenser
   CC Condenser/Combustion Combination

5. Enter the Potential Emissions Data Reference designation using the following codes:

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-GLYCalc™	OT	Other _____	(please list)

6. Enter the Reboiler Vent and glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc *Aggregate Calculations Report* to this *Glycol Dehydration Unit Data Sheet(s)*. This PTE data shall be incorporated in the *Emissions Summary Sheet*.

Include a copy of the GRI-GLYCalc™ analysis. This includes a printout of the aggregate calculations report, which shall include emissions reports, equipment reports, and stream reports.

***An explanation of input parameters and examples, when using GRI-GLYCalc™ is available on our website.**

West Virginia Department of Environmental Protection

Division of Air Quality

40 CFR Part 63; Subpart HH & HHH Registration Form

DIVISION OF AIR QUALITY : (304) 926-0475
WEB PAGE: http:\\www.wvdep.org

Complete this form for any oil and natural gas production or natural gas transmission and storage facility that uses an affected unit under HH/HHH, whether subject or not.

Section A: Facility Description	
Affected facility actual annual average natural gas throughput (scf/day):	***4 mmscf/day***
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	***N/A***
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	***No***
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user. The affected facility is: ☒ prior to a NG processing plant ☐ a NG processing plant ☐ prior to the point of custody transfer and there is no NG processing plant	***Yes***
The affected facility transports or stores 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).	***No***
The affected facility exclusively processes, stores, or transfers black oil. Initial producing gas-to-oil ratio (GOR): _____ scf/bbl API gravity: _____ degrees	***No***

Section B: Dehydration Unit (if applicable) [1]

Description: ***Cameron Glycol Dehydration Unit***

Date of Installation: ***6/2011***	Annual Operating Hours: ***8,760***	Burner rating (MMbtu/hr): ***0.567***
Exhaust Stack Height (ft): ***25.5***	Stack Diameter (ft): ***1.10***	Stack Temp. (°F): ***~1,600***

Glycol Type:	☒ TEG	☐ EG	☐ Other:			
Glycol Pump Type:	☒ Electric	☐ Gas	If gas, what is the volume ratio? _____ ACFM/gpm			
Condenser installed?	☐ Yes	☒ No	Exit Temp. _____ °F	Condenser Pressure _____ psig		
Incinerator/flare installed?	☒ Yes	☐ No	Destruction Eff. 95 %			
Other controls installed?	☐ Yes	☒ No	Describe:			
Wet Gas[2]: (Upstream of Contact Tower)	Gas Temp.: ***~110*** °F	Gas Pressure ***~170*** psig	Saturated Gas? ☒ Yes	☐ No	If no, water content _____ lb/MMSCF	
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate(MMSCFD) Actual _____	Design ***4***	Water Content ***7*** lb/MMSCF			
Lean Glycol:	Circulation rate (gpm) Actual[3] _____	Maximum[4] ***3 gal/lb H_2O***	Pump make/model:			
Glycol Flash Tank (if applicable):	Temp.: ***150*** °F	Pressure ***60*** psig	Vented? Yes ☐	No ☒	If no, describe vapor control: ***Recycle back to process***	
Stripping Gas (if applicable):	Source of gas: ***N/A***	Rate _____ scfm				

Please attach the following required dehydration unit information:

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.
2. Extended gas analysis from the Wet Gas Stream including mole percents of C_1-C_8, benzene, ethylbenzene, toluene, xylene and n-Hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

Affected facility status: (choose only one)

- ☒ Subject to Subpart HH
- ☐ Subject to Subpart HHH
- ☐ Not Subject because:
  - ☐ < 10/25 TPY
  - ☐ Affected facility exclusively handles black oil
  - ☐ The facility wide actual annual average NG throughput is < 650 thousand scf/day and facility wide actual annual average hydrocarbon liquid is < 250 bpd
  - ☐ No affected source is present

COMPRESSOR STATION EMISSION SUMMARY SHEET FOR CRITERIA POLLUTANTS

Compressor Station						Registration Number (Agency Use) G35-A				
	Potential Emissions (lbs/hr)					Potential Emissions (tons/yr)				
Source ID No.	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
CE-1	*1.59*	*0.71*	*0.95*	*<0.01*	*0.11*	*6.95*	*3.13*	*4.17*	*<0.01*	*0.47*
GE-1	*2.15*	*83.19*	*2.15*	*<0.01*	*0.01*	*0.54*	*20.80*	*0.54*	*<0.01*	*<0.01*
RBV-1	*0.05*	*0.04*	*0.04*	*<0.01*	*<0.01*	*0.22*	*0.18*	*0.17*	*<0.01*	*<0.01*
RSV-1	-	-	*2.17*	-	-	-	-	*9.55*	-	-
FL-2	*0.07*	*0.06*	-	-	*0.01*	*0.32*	*0.27*	-	-	*0.05*
Total	*3.86*	*84.00*	*5.31*	*<0.01*	*0.13*	*8.03*	*24.38*	*14.43*	*<0.01*	*0.52*

COMPRESSOR STATION EMISSION SUMMARY SHEET FOR HAZARDOUS/TOXIC POLLUTANTS

Compressor Station							Registration Number (Agency Use) G35-A					
	Potential Emissions (lbs/hr)						Potential Emissions (tons/yr)					
Source ID No.	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formalde-hyde	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formalde-hyde
CE-1	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*0.15*	*0.02*	*<0.01*	*0.01*	*<0.01*	*<0.01*	*0.67*
GE-1	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*0.02*	*0.02*	*<0.01*	*0.01*	*<0.01*	*<0.01*	*<0.01*
RBV-1	-	-	-	-	-	-	-	-	-	-	-	-
RSV-1	*0.02*	*0.01*	*0.02*	*0.18*	*0.02*	-	*0.07*	*0.06*	*0.07*	*0.79*	*0.07*	-
Total	*0.02*	*0.01*	*0.02*	*0.18*	*0.02*	*0.17*	*0.11*	*0.06*	*0.09*	*0.79*	*0.07*	*0.67*

ATTACHMENT H
AIR POLLUTION CONTROL DEVICE SHEETS

Flare System Control Device Sheet

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1) Control Device ID#: ***FL-2***	2) Installation Date: ***March 2015*** ☒ New
3) Maximum Flare Rated Capacity: ***32.88*** ***Mscf/day***	4) Maximum Pilot Rated Capacity: ***0.05*** MMBtu/hr

5) Emission Unit Information

List the emission units whose emissions are controlled by this flare:
(Emission Point ID#: ***FL-2***)

Emission Unit ID#	Emission Source Description	Installation Date
RSV – 1	***Glycol Dehydrator – Regeneration Still Vent***	***06/01/2011*** ☐ NEW
		☐ NEW
		☐ NEW

If this flare controls emissions from more than five emission units, please attach additional pages.

6) Stack Information

Flare Height	Tip Diameter	Stack Discharge	Assist Type	Exit Velocity of Gas	Heat Content of Waste Gas + Any Auxiliary Fuel
25.5 ft	***1.10*** ft	☐ Horizontal ☒ Vertical ☐ Vertical with Rain cap	☐ Steam ☐ Air ☐ Pressure ☒ Non	***<60*** ft/s	***>200*** Btu /scf

7) Flare Fuel Information

Type/Grade of Fuel Combusted	Maximum Fuel Capacity (include units)	Heat Content (include units)	Fuel Contents	Requested Operating Limitation (include units)
Waste Gas	***~22.8 scfm***	***>200 Btu/scf***	% Sulfur: ***negligible*** % Ash: ***negligible***	***None***

8) Pilot Fuel Information

Type/Grade of Fuel Combusted	Maximum Fuel Capacity (include units)	Heat Content (include units)	Fuel Contents	Requested Operating Limitation (include units)
Natural Gas	***~0.05 MMBtu/hr***	***~1,050 Btu/scf***	% Sulfur: ***negligible*** % Ash: ***negligible***	***None***

If either the Flare or Pilot will combust more than one type of fuel, attach additional information.

Flare System Control Device Sheet (continued)

9) Control Information			
Pollutant(s) Controlled	% Control Efficiency	Pollutant(s) Controlled	% Control Efficiency
VOC	*95%*		
HAP	*95%*		
If additional pollutants are being controlled, attach additional information.			
10) Emission Calculations Attached? ☒ **YES** ☐ **NO** **Please attach a copy of all emission calculations.**			
11) Additional Information Attached? ☒ **YES** ☐ **NO** **Please attach a copy of flare manufacturer's data sheet.**			

If any of the requested information is not available, please contact the flare manufacturer.

Flares meeting the requirements of G35-A Section 10 and registered under General Permit G35-A are considered federally enforceable.

QUESTOR TECHNOLOGY INC.

Dominion – Big Isaac OP4 Station

Q50 Thermal Oxidizer Emission Estimates

Design Load – GRI-GLYCalc Simulation Data received August 2013

Waste stream	**Regenerator Overheads Stream**
Flowrate	**32.88 mscf/d**
Major Components	**83.3% H_2O, 9.75% C_1, 1.74% C_2**

Flue gas emission estimates based on waste to fuel gas ratio of 1:0.2

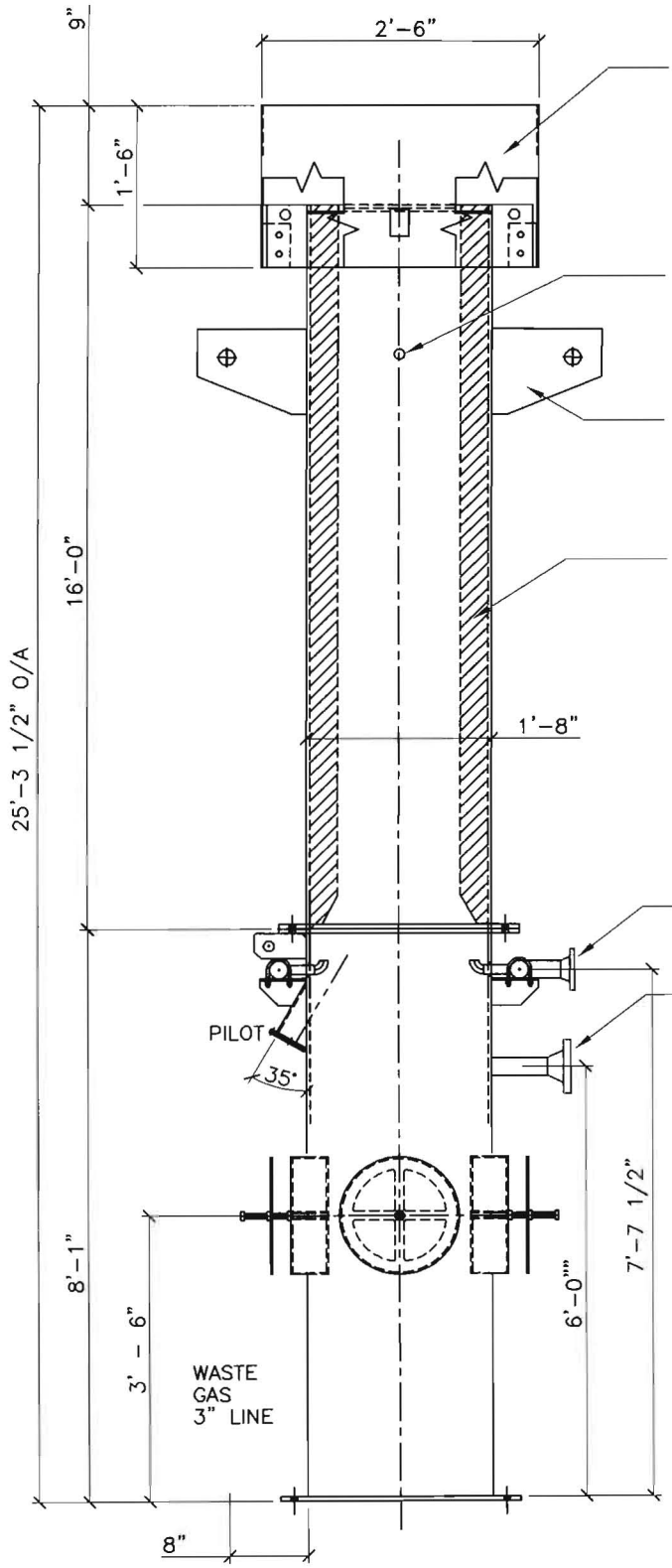
Nitrogen Oxides	
NOx (ppm)	less than 60 ppm
NOx (tons/yr)	0.32 tons/yr
Sulphur Dioxide	
SO_2 (ppm)	0 ppm
SO_2 (tons/yr)	0 tons/yr
Carbon Monoxides	
CO (ppm)	less than 120 ppm
CO (tons/yr)	0.27 tons/yr
Total Hydrocarbons	
HCT (ppm)	less than 20 ppm
HCT (tons/yr)	0.017 tons/yr
Nonmethane Hydrocarbons	
NMHC (ppm)	less than 20 ppm
NMHC (tons/yr)	0.008 tons/yr

Fuel

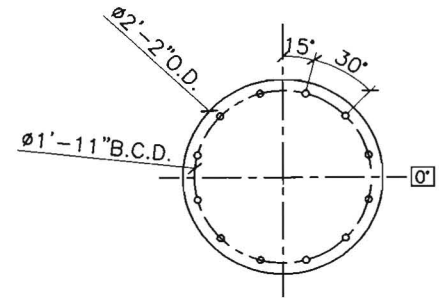
Fuel type	Natural gas (1050 Btu/scf NHV)
Typical fuel consumption	5 - 10 mscf/d

Exhaust characteristics

Exhaust diameter	13.2 inches
Exhaust height	30 Ft from skid base
Exhaust temperature	1112 - 1600°F
Exhaust velocity	16 - 25 ft/sec
Questor model number	Q50 Thermal Oxidizer
Questor combustion Efficiency	>99.99%



ELEVATION
(NOT TRUE ORIENTATION)



BASE PLATE DETAIL

QUESTOR TECHNOLOGY INC.
510, 100 - 4th Ave SW
CALGARY, ALBERTA, T2P 3K7

CUSTOMER:			
CLIENT:		LOCATION:	

Q50 INCINERATOR – ELEVATION

DWN. BY: J.V.	DATE: 25/08/04	JOB#: 2004	
APP. BY: D.M.	DATE: 25/08/04	DWG.# QUOTATION	REV.#: 0

QUESTOR TECHNOLOGY INC.

QUESTOR Q50 INCINERATOR

TECHNICAL SPECIFICATIONS

Design Basis

Maximum throughput:	50,000 scf/d of methane equivalent gas
Fuel requirement:	(varies depending upon waste gas composition)
Design operating temperature:	600 to 1200 °C

Questor Q50 Incinerator Detail

Total height:	25 ½ feet (7.7 meters)
Total weight:	4,000 lbs (1,814 kg)
Foot print:	2 feet – 3 ¾ inch Dia (0.84 m Dia)
Number of sections:	3 – Stack and air induction
Stack material:	A36 - Refractory lined
Stack OD:	20.0 inches (51 cm)
Stack Refractory I.D.:	13.5 inches (34 cm)
Stack length:	16.0 feet (4.9 m)
Stack wall thickness:	0.25 inches (6.35 mm)
Air induction material:	A36
Air induction OD:	20.0 inches (51 cm)
Air induction length:	8 feet – 5 inches (2.5 m)
Air induction wall thickness:	0.500 inches (12.7 mm)
Wind shroud:	Stainless steel, 2 feet – 6 inches OD
Flanges	A105 BWRF
Bolting	A335

Refractory Specification

Type:	4LI
Thickness:	3 inches
Manufacturer:	Rescocast
Maximum working temperature:	2600 °F 1427 °C

Gas Supply Connections

Waste gas:	3 inch 150ANSI RFWN
Pilot gas:	¼ inch NPT
Fuel gas:	2 inch 150ANSI RFWN

Questor Technology Inc., Suite 510, 100 - 4th Avenue SW, Calgary, Alberta, Canada, T2P 3N2 Phone: (403) 571 - 1530 Fax: (403) 571 - 1539 http://www.questortech.com/

QUESTOR TECHNOLOGY INC.

QUESTOR Q50 INCINERATOR

TECHNICAL SPECIFICATIONS

Combustion Air

Natural draft:	3 openings c/w flame arrestor cells (Optional)

Pilot Gas Burner

Pilot Ignition Control:	Profire 1100,
Number of Igniters:	1
Capacity at 3 psi:	34 m^3/d

Fuel Gas Burner

Operating Pressure Range:	5 - 7 psig
Manifold material:	Stainless steel 304

Waste Gas Burner

Operating Pressure Range:	1 – 40 psig
Manifold material:	Stainless steel 304

Control Panel – (Solar Power Battery)

NEMA 4, local control panel:	24 VDC controls
Ignition panel:	NEMA 4 x enclosure

Surface Preparation

Sand blast:	SP6
Top coat:	High temperature aluminum

Questor Technology Inc., Suite 510, 100 - 4th Avenue SW, Calgary, Alberta, Canada, T2P 3N2 Phone. (403) 571 - 1530 Fax: (403) 571 - 1539 http://www.questortech.com/

QUESTOR TECHNOLOGY INC.

QUESTOR Q50 INCINERATOR

TECHNICAL SPECIFICATIONS

Optional Equipment

Stack top temperature:	2 – Alltemp Type K Thermocouple, Inconel 600 & Hastelloy X thermowell 2 – Rosemount 644 Temperature Transmitters
Air intake flame arrestors:	3 – Circular wrapped corrugated aluminum flash Back arrestors 4" thick x 15" diameter 1 – Zirco burner box housing flame arrestor
Inline flame arrestor:	1 - 3" 150ANSI RF flanged, CS body, SS element Flame arrestor
Matching base plate:	1 – ½" x 2' 3 ¾" plate with matching ⅞" bolt holes
Guy Wires	3 - ⅜" x 100' guy wires

Questor Technology Inc., Suite 510, 100 - 4th Avenue SW, Calgary, Alberta, Canada, T2P 3N2 Phone: (403) 571 - 1530 Fax: (403) 571 - 1539 http://www.questortech.com/

ATTACHMENT I
EMISSIONS CALCULATIONS

Table 3-1
Dominion Transportation - Big Isaac Compressor Station
Project Related Potential Emissions Summary

Regulated Pollutant	Emission Points			
	RSV-1 (Controlled by FL-2)		FL-2 (New)	
	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Criteria Pollutants				
PM[a]	-	-	0.01	0.05
VOC[b]	2.17	9.55	-	-
NO_X[c]	-	-	0.07	0.32
CO[c]	-	-	0.06	0.27
SO_2[c]	-	-	0.00	0.00
Greenhouse Gas Pollutants[d]				
CO_2[e]	-	-	77.63	340.95
CH_4[f]	-	-	0.22	0.97
N_2O[g]	-	-	8.84E-04	3.88E-03
CO_2e[h]	-	-	83.40	366.29
Hazardous Air Pollutants				
Total HAP[b]	0.24	1.07	-	-

[a]Potential emissions of PM include PTE from the combustion of natural gas from the pilot flame and the supplemental natural gas stream, calculated based on the AP-42, Chapter 1 4, Table 1 4-2 emission factor for PM (Total). PM emissions also include PTE from enclosed flare's combustion of emissions from the dehydration still vent and waste fuel gas, calculated based on the AP-42, Chapter 13 5, Table 13.5-1 emission factor for soot, assuming a lightly smoking flare (40 µg/L). According to the May 2011 Emission Estimation Protocol for Petroleum Refineries, approved by the U.S. EPA on March 28, 2011, 40 µg/L is equivalent to 0.027 lb/MMBtu. PM is conservatively assumed to be equivalent to all filterable PM including PM_{10} and $PM_{2.5}$, and condensable fractions

[b] Potential emissions of VOC and HAP include PTE from the pilot flame's natural gas combustion, calculated using AP-42 Chapter 1 4, Table 1.4-2 emissions factors for VOC and TOC, and PTE from enclosed flare's combustion of emissions from the dehydration still vent and fuel gas, calculated using GRI-GLYCalc Version 4.0 and an updated gas analysis . The dehydration still vent VOC and HAP emissions represent the sum of controlled regenerator emissions and flash tank off gas emissions generated using GRI-GLYCalc 4.0 with the incorporation of a 20% safety factor. GRI-GLYCalc summaries are included in Appendix B of the Application.

[c]Potential emissions of NO_X, CO, and SO_2 are based on vendor specifications; maximum flowrate = 32.88 Mscf/day (22.8 scf/min); waste to fuel gas ratio of 1:0.2.

[d]Potential emissions of greenhouse gases are calculated from the combustion of natural gas from the pilot flame, the supplemental natural gas stream, and the waste gas in the enclosed flare. Emissions from the supplemental natural gas fuel and the pilot flame natural gas were calculated using a fuel flowrate of 10,000 scf/day and a pilot flame flowrate of 1,200 scf/day to the enclosed flare. Greenhouse gas pollutant emission factors for the combustion of natural gas were obtained from 40 CFR Part 98, Subpart C. The emissions from the combustion of waste gas use the methodologies outlined below:

[e]CO_2 is calculated assuming emissions from both natural gas and waste gas streams. in metric tons/year, calculated according to 40 CFR 98 Equation Y-1a, where

$$CO_2 = 0.98 \times 0.001 \times \left(\sum_{p=1}^{n} \left[\frac{44}{12} \times (Flare)_p \times \frac{(MW)_p}{MVC} \times (CC)_p \right] \right)$$

Flare p = volume flare gas combusted = ~23 acfm.
MW = molecular weight flare gas = 21 kg/kg-mol.
MVC = molar conversion factor of 849 5 scf/kg-mol at 68°F.
CC = carbon concentration of flare gas = 7 87%
0.98 = combustion efficiency of flare (used 0 95 for 95% efficiency)

[f]CH_4 is in metric tons/year, calculated according to 40 CFR 98 Equation Y-4, where:

$$CH_4 = \left(CO_2 \times \frac{EmF_{CH4}}{EmF} \right) + CO_2 \times \frac{0.02}{0.98} \times \frac{16}{44} \times f_{CH4}$$

EmF_{CH} = Default CH_4 emission factor for "Fuel Gas" from Table C-2 .
EmF = default CO_2 emission factor for flare gas of 60 kg/CO_2/MMBtu.
CO_2 = emission rate of CO_2 from flared gas in metric tons/year.
f_{CH4} = default weight fraction of carbon in flare gas of 0.4
0 98 = combustion efficiency of flare (used 0.95 for 95% efficiency)

[g]N_2O is in metric tons/year, calculated according to 40 CFR 98 Equation Y-5, where

$$N_2O = \left(CO_2 \times \frac{EmF_{N2O}}{EmF} \right) \qquad (Eq.\ Y\text{-}5)$$

CO_2 = emission rate of CO_2 from flared gas in metric tons/year.
EmF_{N2O} = Default N_2O emission factor for "Fuel Gas" from Table C-2
EmF = default CO_2 emission factor for flare gas of 60 kg/CO_2/MMBtu.

[h]CO_2e is carbon dioxide equivalent in metric tons/year, calculated according to 40 CFR 98 Equation A-1, where:

$$CO_2e = \sum_{i=1}^{n} GHG_i \times GWP_i$$

GHG_i = mass emissions of each greenhouse gas listed in Table A-1, metric tons/year
GWP_i = global warming potential for each greenhouse gas from Table A-1.
n = number of greenhouse gases emitted.

Table A-1: Global Warming Potentials	
Pollutant	*GWP (100 year)*
CO_2	1
CH_4	25
N_2O	298

Table 3-2
Dominion Transportation - Big Isaac Compressor Station
Project Related Changes in Potential Emissions Summary

Regulated Pollutant	Existing Potential Emissions (tons/yr) [(a)]			Project Related Potential Emissions (tons/yr)[(b)]			Change in Potential Emissions (tons/yr)[(c)]			Summary of Changes in Potential Emissions[(d)]
	RBV-1	RSV-1	FL-1	RBV-1	RSV-1	FL-2	RBV-1	RSV-1	FL-2	
Criteria Pollutants										
PM	<0.01	-	-	<0.01	-	0.05	<0.01	-	0.05	**0.05**
VOC	0.17	3.97	-	0.17	9.55	-	0.00	5.58	-	**5.58**
NO_X	0.22	-	0.22	0.22	-	0.32	0.00	-	0.1	**0.10**
CO	0.18	-	0.70	0.18	-	0.27	0.00	-	0.00	**0.00**
SO_2	<0.01	-	-	<0.01	-	-	<0.01	-	-	**0.00**
Greenhouse Gas Pollutants										
CO_2e	239.17	-	2,485.66	239.17	-	366.29	0.00	-	0.00	**0.00**
Hazardous Air Pollutants										
Total HAP	<0.01	0.71	-	<0.01	1.07	-	<0.01	0.36	-	**0.36**

[(a)] As reported in Attachment I of the G35-A General Permit application submitted to the West Virginia Department of Environmental Protection (WVDEP) on April 6, 2011.

[(b)] As calculated in Table 3-1 of this G35-A General Permit application.

[(c)] Change in Potential Emissions = ([Project Related Potential Emissions] - [Existing Potential Emissions]).

[(d)] Summary of Changes in Potential Emissions represents the increase in potential emissions from the facility as a result of the proposed project.

Table 3-3
Dominion Transportation - Big Isaac Compressor Station
Facility-Wide Potential Emission Summary

Regulated Pollutant	Potential Emissions (tons/yr)								Title V Thresholds	Title V Facility?
	Existing Ajax Compressor Engine	Existing Auxiliary Generator	Existing Glycol Dehydrator	Existing Reboiler	Proposed Flare	Equipment Fugitives	Total Emissions	Total Emissions Minus Fugitives[a]		
Criteria Pollutants										
PM	0.47	2.60E-03	-	3.80E-03	0.05	-	0.53	0.53	100	No
VOC	4.17	0.54	9.55	0.17	-	42.24	56.67	14.43	100	No
NO_X	6.95	0.54	-	0.22	0.32	-	8.03	8.03	100	No
CO	3.13	20.80	-	0.18	0.27	-	24.37	24.37	100	No
SO_2	0.01	2.00E-04	-	1.20E-03	-	-	0.01	0.01	100	No
Greenhouse Gas Pollutants										
CO_2e	1,170.00	26.00	-	239.20	366.29	3,293.26	5,094.75	1,801.49	100,000	No
Hazardous Air Pollutants										
Total HAP	0.97	0.01	1.07	0.24	-	1.03	3.32	2.29	25	No

[a] Fugitives are not included in Title V applicability.

ATTACHMENT J
CLASS I LEGAL ADVERTISEMENT

AIR QUALITY PERMIT NOTICE

Notice of Application

Notice is given that Dominion Transportation, Inc. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a General Permit Registration (G35-A), Modification Permit for the Big Isaac Compressor Station located in Harrison County, West Virginia. The latitude and longitude coordinates are 39.2470° North latitude, -80.5563° East longitude.

The applicant estimates the project's increase in potential to emit (PTE) the following criteria air pollutants will be approximately 0.05 tons per year (tpy) particulate matter (PM), 5.58 tpy volatile organic compounds (VOC), 0.10 tpy nitrogen oxides (NO_X), 0.00 tpy carbon monoxide (CO), and 0.00 tpy sulfur dioxide (SO_2). Additionally, the project's increase in PTE of greenhouse gases (GHG) and hazardous air pollutants (HAP) will be approximately 0.00 tpy and 0.36 tpy, respectively. Startup of operation is planned to begin in March 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.
Dated this the **(Day)** day of **(Month)**, **(Year)**.

By: Dominion Transmission, Inc.
Brian Sheppard
VP of Pipeline Operations
445 West Main Street
Clarksburg, WV 26301

ATTACHMENT L
GENERAL PERMIT REGISTRATION APPLICATION FEE

APPENDIX B
GRI-GLYCALC EMISSION SUMMARY AND WET GAS ANALYSIS

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Big Isaac Mountian
File Name: M:\Dominion\RFP 02-2014 WV Flare Permitting Projects\GLYCalc\Big Isaac Mountain\GRI-GLYCalc Big Isaac (11-5-14).ddf
Date: November 25, 2014

DESCRIPTION:

Description: GLYCalc PTE Run for Big Isaac Mountain 11-5-14

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.7054	16.929	3.0896
Ethane	0.2134	5.123	0.9349
Propane	0.1581	3.794	0.6925
Isobutane	0.0453	1.087	0.1984
n-Butane	0.0787	1.889	0.3447
Isopentane	0.0370	0.889	0.1623
n-Pentane	0.0319	0.765	0.1395
n-Hexane	0.0140	0.337	0.0614
Cyclohexane	0.0100	0.241	0.0439
Other Hexanes	0.0185	0.445	0.0812
Heptanes	0.0515	1.235	0.2254
2,2,4-Trimethylpentane	0.0002	0.006	0.0010
Benzene	0.0142	0.341	0.0622
Toluene	0.0127	0.304	0.0555
Ethylbenzene	0.0110	0.265	0.0484
Xylenes	0.1503	3.607	0.6583
C8+ Heavies	1.1783	28.280	5.1611
Total Emissions	2.7306	65.536	11.9602
Total Hydrocarbon Emissions	2.7306	65.536	11.9602
Total VOC Emissions	1.8118	43.484	7.9358
Total HAP Emissions	0.2025	4.859	0.8868
Total BTEX Emissions	0.1882	4.517	0.8244

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	14.1077	338.585	61.7917
Ethane	4.2688	102.452	18.6975
Propane	3.1620	75.887	13.8494
Isobutane	0.9060	21.744	3.9683
n-Butane	1.5741	37.779	6.8946
Isopentane	0.7409	17.781	3.2450
n-Pentane	0.6371	15.291	2.7905
n-Hexane	0.2805	6.732	1.2286
Cyclohexane	0.2006	4.815	0.8788
Other Hexanes	0.3709	8.901	1.6245

Heptanes	1.0290	24.697	4.5072
2,2,4-Trimethylpentane	0.0047	0.112	0.0204
Benzene	0.2840	6.816	1.2439
Toluene	0.2533	6.078	1.1093
Ethylbenzene	0.2208	5.300	0.9673
Xylenes	3.0061	72.146	13.1666
C8+ Heavies	23.5665	565.595	103.2211
Total Emissions	54.6130	1310.712	239.2049
Total Hydrocarbon Emissions	54.6130	1310.712	239.2049
Total VOC Emissions	36.2365	869.675	158.7157
Total HAP Emissions	4.0494	97.184	17.7362
Total BTEX Emissions	3.7642	90.340	16.4871

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.6269	15.047	2.7460
Ethane	0.3739	8.974	1.6378
Propane	0.2834	6.802	1.2414
Isobutane	0.0804	1.930	0.3523
n-Butane	0.1320	3.167	0.5780
Isopentane	0.0607	1.457	0.2658
n-Pentane	0.0481	1.154	0.2106
n-Hexane	0.0156	0.375	0.0685
Cyclohexane	0.0036	0.088	0.0160
Other Hexanes	0.0243	0.582	0.1062
Heptanes	0.0349	0.837	0.1527
2,2,4-Trimethylpentane	0.0003	0.006	0.0011
Benzene	0.0009	0.022	0.0040
Toluene	0.0005	0.013	0.0024
Ethylbenzene	0.0003	0.007	0.0013
Xylenes	0.0027	0.065	0.0119
C8+ Heavies	0.1318	3.163	0.5773
Total Emissions	1.8204	43.689	7.9733
Total Hydrocarbon Emissions	1.8204	43.689	7.9733
Total VOC Emissions	0.8195	19.668	3.5894
Total HAP Emissions	0.0203	0.488	0.0891
Total BTEX Emissions	0.0045	0.107	0.0195

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature:	68.00 deg. F
Excess Oxygen:	5.00 %
Combustion Efficiency:	95.00 %
Supplemental Fuel Requirement:	2.49e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	5.00%	95.00%
Propane	5.00%	95.00%
Isobutane	5.00%	95.00%
n-Butane	5.00%	95.00%
Isopentane	5.00%	95.00%
n-Pentane	5.00%	95.00%
n-Hexane	5.00%	95.00%
Cyclohexane	5.00%	95.00%
Other Hexanes	5.00%	95.00%
Heptanes	5.00%	95.00%
2,2,4-Trimethylpentane	5.00%	95.00%
Benzene	5.00%	95.00%
Toluene	5.00%	95.00%
Ethylbenzene	5.00%	95.00%
Xylenes	5.00%	95.00%
C8+ Heavies	5.00%	95.00%

ABSORBER

Calculated Absorber Stages:	1.67
Specified Dry Gas Dew Point:	7.00 lbs. H2O/MMSCF
Temperature:	110.0 deg. F
Pressure:	170.0 psig
Dry Gas Flow Rate:	4.0000 MMSCF/day
Glycol Losses with Dry Gas:	0.0480 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	341.60 lbs. H2O/MMSCF
Specified Lean Glycol Recirc. Ratio:	3.00 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	2.03%	97.97%
Carbon Dioxide	99.79%	0.21%
Nitrogen	99.98%	0.02%
Methane	99.98%	0.02%
Ethane	99.94%	0.06%
Propane	99.88%	0.12%
Isobutane	99.81%	0.19%
n-Butane	99.75%	0.25%
Isopentane	99.70%	0.30%
n-Pentane	99.62%	0.38%
n-Hexane	99.29%	0.71%
Cyclohexane	96.99%	3.01%
Other Hexanes	99.47%	0.53%
Heptanes	98.49%	1.51%
2,2,4-Trimethylpentane	99.27%	0.73%
Benzene	79.45%	20.55%
Toluene	68.84%	31.16%
Ethylbenzene	52.75%	47.25%
Xylenes	41.49%	58.51%
C8+ Heavies	84.77%	15.23%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 150.0 deg. F
Flash Pressure: 60.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.99%	0.01%
Carbon Dioxide	81.23%	18.77%
Nitrogen	29.09%	70.91%
Methane	30.54%	69.46%
Ethane	59.13%	40.87%
Propane	75.14%	24.86%
Isobutane	81.26%	18.74%
n-Butane	84.72%	15.28%
Isopentane	86.19%	13.81%
n-Pentane	88.46%	11.54%
n-Hexane	92.92%	7.08%
Cyclohexane	98.13%	1.87%
Other Hexanes	91.10%	8.90%
Heptanes	96.21%	3.79%
2,2,4-Trimethylpentane	93.14%	6.86%
Benzene	99.70%	0.30%
Toluene	99.80%	0.20%
Ethylbenzene	99.88%	0.12%
Xylenes	99.92%	0.08%
C8+ Heavies	99.50%	0.50%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 6.9000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	7.72%	92.28%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.58%	99.42%
n-Pentane	0.57%	99.43%
n-Hexane	0.54%	99.46%
Cyclohexane	3.26%	96.74%
Other Hexanes	1.10%	98.90%
Heptanes	0.52%	99.48%
2,2,4-Trimethylpentane	1.61%	98.39%
Benzene	5.02%	94.98%
Toluene	7.92%	92.08%
Ethylbenzene	10.42%	89.58%
Xylenes	12.92%	87.08%

C8+ Heavies	12.06%	87.94%

STREAM REPORTS:

WET GAS STREAM

Temperature: 110.00 deg. F
Pressure: 184.70 psia
Flow Rate: 1.68e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.20e-001	5.74e+001
Carbon Dioxide	1.00e-001	1.95e+001
Nitrogen	1.12e+000	1.39e+002
Methane	7.84e+001	5.57e+003
Ethane	1.13e+001	1.50e+003
Propane	4.76e+000	9.29e+002
Isobutane	8.74e-001	2.25e+002
n-Butane	1.32e+000	3.40e+002
Isopentane	4.61e-001	1.47e+002
n-Pentane	3.43e-001	1.09e+002
n-Hexane	8.14e-002	3.11e+001
Cyclohexane	1.69e-002	6.29e+000
Other Hexanes	1.33e-001	5.08e+001
Heptanes	1.37e-001	6.08e+001
2,2,4-Trimethylpentane	9.93e-004	5.02e-001
Benzene	3.97e-003	1.37e+000
Toluene	1.99e-003	8.10e-001
Ethylbenzene	9.93e-004	4.67e-001
Xylenes	1.09e-002	5.13e+000
C8+ Heavies	2.04e-001	1.53e+002
Total Components	100.01	9.35e+003

DRY GAS STREAM

Temperature: 110.00 deg. F
Pressure: 184.70 psia
Flow Rate: 1.67e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	1.17e+000
Carbon Dioxide	1.01e-001	1.95e+001
Nitrogen	1.13e+000	1.39e+002
Methane	7.90e+001	5.57e+003
Ethane	1.14e+001	1.50e+003
Propane	4.79e+000	9.28e+002
Isobutane	8.79e-001	2.24e+002
n-Butane	1.33e+000	3.39e+002
Isopentane	4.63e-001	1.47e+002
n-Pentane	3.44e-001	1.09e+002
n-Hexane	8.15e-002	3.08e+001
Cyclohexane	1.65e-002	6.10e+000

Other Hexanes	1.33e-001	5.05e+001
Heptanes	1.36e-001	5.99e+001
2,2,4-Trimethylpentane	9.93e-004	4.98e-001
Benzene	3.18e-003	1.09e+000
Toluene	1.38e-003	5.58e-001
Ethylbenzene	5.28e-004	2.46e-001
Xylenes	4.57e-003	2.13e+000
C8+ Heavies	1.74e-001	1.30e+002
Total Components	100.00	9.26e+003

LEAN GLYCOL STREAM

Temperature: 110.00 deg. F
Flow Rate: 2.78e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.95e+001	1.56e+003
Water	3.00e-001	4.70e+000
Carbon Dioxide	2.61e-013	4.10e-012
Nitrogen	1.43e-013	2.24e-012
Methane	1.93e-018	3.03e-017
Ethane	2.75e-008	4.32e-007
Propane	2.96e-009	4.64e-008
Isobutane	8.21e-010	1.29e-008
n-Butane	1.37e-009	2.14e-008
Isopentane	1.40e-004	2.20e-003
n-Pentane	1.33e-004	2.08e-003
n-Hexane	7.04e-005	1.10e-003
Cyclohexane	3.99e-004	6.25e-003
Other Hexanes	1.74e-004	2.72e-003
Heptanes	2.93e-004	4.60e-003
2,2,4-Trimethylpentane	3.58e-006	5.61e-005
Benzene	9.47e-004	1.49e-002
Toluene	1.38e-003	2.17e-002
Ethylbenzene	1.63e-003	2.56e-002
Xylenes	2.84e-002	4.45e-001
C8+ Heavies	2.03e-001	3.19e+000
Total Components	100.00	1.57e+003

RICH GLYCOL STREAM

Temperature: 110.00 deg. F
Pressure: 184.70 psia
Flow Rate: 2.96e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.40e+001	1.56e+003
Water	3.68e+000	6.09e+001
Carbon Dioxide	2.47e-003	4.09e-002
Nitrogen	1.34e-003	2.22e-002
Methane	5.46e-002	9.03e-001
Ethane	5.53e-002	9.15e-001
Propane	6.89e-002	1.14e+000

Isobutane	2.59e-002	4.29e-001
n-Butane	5.22e-002	8.64e-001
Isopentane	2.66e-002	4.39e-001
n-Pentane	2.52e-002	4.17e-001
n-Hexane	1.33e-002	2.21e-001
Cyclohexane	1.18e-002	1.95e-001
Other Hexanes	1.65e-002	2.72e-001
Heptanes	5.56e-002	9.20e-001
2,2,4-Trimethylpentane	2.26e-004	3.74e-003
Benzene	1.80e-002	2.97e-001
Toluene	1.66e-002	2.74e-001
Ethylbenzene	1.49e-002	2.46e-001
Xylenes	2.08e-001	3.45e+000
C8+ Heavies	1.61e+000	2.66e+001
Total Components	100.00	1.65e+003

FLASH TANK OFF GAS STREAM

Temperature: 150.00 deg. F
Pressure: 74.70 psia
Flow Rate: 2.50e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.74e-001	5.62e-003
Carbon Dioxide	2.65e-001	7.69e-003
Nitrogen	8.54e-001	1.58e-002
Methane	5.94e+001	6.27e-001
Ethane	1.89e+001	3.74e-001
Propane	9.76e+000	2.83e-001
Isobutane	2.10e+000	8.04e-002
n-Butane	3.45e+000	1.32e-001
Isopentane	1.28e+000	6.07e-002
n-Pentane	1.01e+000	4.81e-002
n-Hexane	2.75e-001	1.56e-002
Cyclohexane	6.59e-002	3.65e-003
Other Hexanes	4.28e-001	2.43e-002
Heptanes	5.29e-001	3.49e-002
2,2,4-Trimethylpentane	3.41e-003	2.56e-004
Benzene	1.75e-002	9.02e-004
Toluene	8.98e-003	5.45e-004
Ethylbenzene	4.09e-003	2.86e-004
Xylenes	3.90e-002	2.72e-003
C8+ Heavies	1.18e+000	1.32e-001
Total Components	100.00	1.85e+000

FLASH TANK GLYCOL STREAM

Temperature: 150.00 deg. F
Flow Rate: 2.96e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.41e+001	1.56e+003
Water	3.69e+000	6.09e+001
Carbon Dioxide	2.01e-003	3.33e-002

Nitrogen	3.91e-004	6.46e-003
Methane	1.67e-002	2.76e-001
Ethane	3.27e-002	5.41e-001
Propane	5.18e-002	8.57e-001
Isobutane	2.11e-002	3.49e-001
n-Butane	4.43e-002	7.32e-001
Isopentane	2.29e-002	3.79e-001
n-Pentane	2.23e-002	3.68e-001
n-Hexane	1.24e-002	2.05e-001
Cyclohexane	1.16e-002	1.92e-001
Other Hexanes	1.50e-002	2.48e-001
Heptanes	5.35e-002	8.85e-001
2,2,4-Trimethylpentane	2.11e-004	3.48e-003
Benzene	1.79e-002	2.96e-001
Toluene	1.66e-002	2.74e-001
Ethylbenzene	1.49e-002	2.46e-001
Xylenes	2.09e-001	3.45e+000
C8+ Heavies	1.60e+000	2.64e+001
Total Components	100.00	1.65e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.70e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.96e+001	5.62e+001
Carbon Dioxide	4.14e-002	8.17e-002
Nitrogen	2.80e-001	3.52e-001
Methane	1.96e+001	1.41e+001
Ethane	3.16e+000	4.27e+000
Propane	1.60e+000	3.16e+000
Isobutane	3.47e-001	9.06e-001
n-Butane	6.04e-001	1.57e+000
Isopentane	2.29e-001	7.41e-001
n-Pentane	1.97e-001	6.37e-001
n-Hexane	7.26e-002	2.81e-001
Cyclohexane	5.31e-002	2.01e-001
Other Hexanes	9.59e-002	3.71e-001
Heptanes	2.29e-001	1.03e+000
2,2,4-Trimethylpentane	9.10e-004	4.67e-003
Benzene	8.10e-002	2.84e-001
Toluene	6.13e-002	2.53e-001
Ethylbenzene	4.64e-002	2.21e-001
Xylenes	6.31e-001	3.01e+000
C8+ Heavies	3.08e+000	2.36e+001

Total Components	100.00	1.11e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.56e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.51e+001	7.05e-001
Ethane	1.05e+001	2.13e-001
Propane	5.31e+000	1.58e-001
Isobutane	1.15e+000	4.53e-002
n-Butane	2.01e+000	7.87e-002
Isopentane	7.60e-001	3.70e-002
n-Pentane	6.54e-001	3.19e-002
n-Hexane	2.41e-001	1.40e-002
Cyclohexane	1.77e-001	1.00e-002
Other Hexanes	3.19e-001	1.85e-002
Heptanes	7.60e-001	5.15e-002
2,2,4-Trimethylpentane	3.02e-003	2.33e-004
Benzene	2.69e-001	1.42e-002
Toluene	2.04e-001	1.27e-002
Ethylbenzene	1.54e-001	1.10e-002
Xylenes	2.10e+000	1.50e-001
C8+ Heavies	1.02e+001	1.18e+000
Total Components	100.00	2.73e+000

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Big Isaac Mountian
File Name: M:\Dominion\RFP 02-2014 WV Flare Permitting Projects\GLYCalc\Big Isaac Mountain\GRI-GLYCalc Big Isaac (11-5-14).ddf
Date: November 25, 2014

DESCRIPTION:

Description: GLYCalc PTE Run for Big Isaac Mountain
11-5-14

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 110.00 deg. F
Pressure: 170.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1010
Nitrogen	1.1290
Methane	79.0010
Ethane	11.3620
Propane	4.7940
Isobutane	0.8800
n-Butane	1.3310
Isopentane	0.4640
n-Pentane	0.3450
n-Hexane	0.0820
Cyclohexane	0.0170
Other Hexanes	0.1340
Heptanes	0.1380
2,2,4-Trimethylpentane	0.0010
Benzene	0.0040
Toluene	0.0020
Ethylbenzene	0.0010
Xylenes	0.0110
C8+ Heavies	0.2050

DRY GAS:

Flow Rate: 4.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 0.3 wt% H2O
Recirculation Ratio: 3.0 gal/lb H2O

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control:	Recycle/recompression
Temperature:	150.0 deg. F
Pressure:	60.0 psig

STRIPPING GAS:

Source of Gas:	Dry Gas
Gas Flow Rate:	6.900 scfm

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device:	Combustion Device
Destruction Efficiency:	95.0 %
Excess Oxygen:	5.0 %
Ambient Air Temperature:	68.0 deg. F

Certificate of Analysis

Number: 1030-14020696-006A

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

W. Steven Kiser
Dominion Transmission
335 US Highway 33 West
Weston , WV 26452

Feb. 26, 2014

Station Name: Big Isaac Station
Method: GPA 2286
Cylinder No: 0931
Analyzed: 02/24/2014 16:32:08 by JD

Sampled By:
Sample Of: Gas Spot
Sample Date: 02/11/2014 12:33
Sample Conditions: 176.4 psig, @ 82.7 °F

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia		
Nitrogen	1.129	1.504		GPM TOTAL C2+	5.633
Carbon Dioxide	0.101	0.211		GPM TOTAL C3+	2.591
Hydrogen Sulfide	NIL	NIL		GPM TOTAL iC5+	0.561
Methane	79.001	60.264			
Ethane	11.362	16.245	3.042		
Propane	4.794	10.052	1.322		
Iso-Butane	0.880	2.432	0.288		
n-Butane	1.331	3.679	0.420		
Iso-Pentane	0.464	1.592	0.170		
n-Pentane	0.345	1.184	0.125		
Hexanes	0.216	0.895	0.090		
Heptanes Plus	0.377	1.942	0.176		
	100.000	100.000	5.633		

Physical Properties	Total	C7+
Relative Density Real Gas	0.7283	3.7442
Calculated Molecular Weight	21.03	108.44
Compressibility Factor	0.9964	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Real Gas Dry BTU	1261	5832
Water Sat. Gas Base BTU	1239	5731

Comments: H2O Mol% : 1.744 ; Wt% : 1.498
H2S 0 ppm

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

Number: 1030-14020696-006A

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

W. Steven Kiser
Dominion Transmission
335 US Highway 33 West
Weston , WV 26452

Feb. 26, 2014

Station Name: Big Isaac Station
Method: GPA 2286
Cylinder No: 0931
Analyzed: 02/24/2014 16:32:08 by JD

Sampled By:
Sample Of: Gas Spot
Sample Date: 02/11/2014 12:33
Sample Conditions: 176.4 psig, @ 82.7 °F

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia
Nitrogen	1.129	1.504	
Methane	79.001	60.264	
Carbon Dioxide	0.101	0.211	
Hydrogen Sulfide	NIL	NIL	
Ethane	11.362	16.245	3.042
Propane	4.794	10.052	1.322
Iso-Butane	0.880	2.432	0.288
n-Butane	1.331	3.679	0.420
Iso-Pentane	0.464	1.592	0.170
n-Pentane	0.345	1.184	0.125
i-Hexanes	0.134	0.555	0.056
n-Hexane	0.082	0.340	0.034
Benzene	0.004	0.012	0.001
Cyclohexane	0.017	0.069	0.006
i-Heptanes	0.095	0.437	0.042
n-Heptane	0.043	0.206	0.020
Toluene	0.002	0.009	0.001
i-Octanes	0.095	0.492	0.044
n-Octane	0.024	0.132	0.013
Ethylbenzene	NIL	NIL	NIL
Xylenes	0.011	0.058	0.004
i-Nonanes	0.039	0.226	0.020
n-Nonane	0.015	0.091	0.008
i-Decanes	0.019	0.123	0.009
n-Decane	0.005	0.034	0.003
Undecanes	0.003	0.027	0.002
Dodecanes	0.002	0.011	0.001
Tridecanes	0.002	0.010	0.001
Tetradecanes Plus	0.001	0.005	0.001
	100.000	100.000	5.633

GPM TOTAL C2+ 5.633

Physical Properties	Total	C14+
Calculated Molecular Weight	21.030	198.413
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Real Gas Dry BTU	1260.7	10728.8
Water Sat. Gas Base BTU	1239	10541.6
Relative Density Real Gas	0.7283	6.8500
Compressibility Factor	0.9964	

Comments: H2S 0 ppm

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

APPENDIX C
FLARE DESIGN EVALUATION SHEET

Flare Design Evaluation

Type	Unassisted
Throat Diameter (inches)	13.5

GLYCalc	Flowrate (scf/h):	1700	scf/h
	INPUT	*Compound Net*	*Mixture Net*
	mole	*Heating Value*	*Heating Value*
Compound	*percent*	*(Btu/scf)*	*(Btu/scf)*
Water	69.600	0	0.0
Carbon Dioxide	0.041	0	0.0
Nitrogen	0.280	0	0.0
Methane	19.600	913	178.9
Ethane	3.160	1641	51.9
Propane	1.600	2385	38.2
Isobutane	0.347	3105	10.8
n-Butane	0.604	3113	18.8
Isopentane	0.229	3716	8.5
n-Pentane	0.197	3709	7.3
Cyclopentane	0.000	3516	0.0
n-Hexane	0.073	4412	3.2
Cyclohexane	0.053	4185	2.2
Other Hexanes	0.096	4870	4.7
Heptane	0.229	4925	11.3
2, 2, 4 - Trimethylpentane	0.001	3698	0.0
Benzene	0.081	3601	2.9
Toluene	0.061	4284	2.6
Ethylbenzene	0.046	4977	2.3
Xylene	0.631	4980	31.4
Octane (C8+)	3.080	5804	178.8
Hydrogen Sulfide	0.000	596	0.0
TOTALS:	100		553.8

Assist gas requirements for nonassisted flare per 40 CFR 60.18(c)(3):

Minimum allowable net heating value	200	*Btu/scf*
Additional assist gas required	0.0	*scfh*
Assist (fuel) gas supplied	0	*scfh*
Composite net heating value	553.8	*Btu/scf*

Maximum allowable flare exit velocity (V_{max}) for nonassisted flare per 40 CFR 60.18(f)(5):

Lower (Net) Heating Value	Btu/scf	MJ/scm
(1000 Btu/scf = 37.3 MJ/scm)	554	20.7
Vmax = 10^[(LHV+28.2)/31.7] for Vmax in m/sec and LHV in MJ/scm	**m/sec**	**ft/sec**
(1 m = 3.28 ft)	36.3	119.1
Vmax limit based on 40 CFR 60.18(b)(4)(iii)	36.3	119.1

Actual flare exit velocity:

Total volumetric flow *(vent gas + assist gas in scfh/3600 sec/hr)* =	0.47	*scf/sec*
Total volumetric flow at 180F & atmospheric pressure =	0.61	*cf/sec*
Flare exit cross-sectional area based on throat diameter =	0.99	*ft2*
Velocity = volumetric flow / cross-sectional area =	0.6	*ft/sec*