Tug Hill Operating, LLC

Yoder Well Pad

Proctor, West Virginia

G70-D General Permit Application

SLR Ref: 116.01631.00011

October 2017

Yoder Well Pad G70-D General Permit Application

Prepared for:

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

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

Alex Asbury
Staff Engineer

Jesse Hanshaw, P.E.
Principal Engineer

TUG HILL OPERATING

CONTENTS

Section

Notes:
ATTACHMENT B – N/A – No dwellings or businesses located within 300’ of the facility.
ATTACHMENT P – N/A - No glycol dehydration unit in use at the facility.

SECTION 1.

TECHNICAL SUPPORT DOCUMENT

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

1.1 INTRODUCTION

Tug Hill Operating, LLC has prepared this application to reflect the new construction of wells and equipment at the Yoder well pad, and is seeking coverage under the G70-D General Permit. This document contains all applicable permitting forms and fees in accordance with 45CSR13.

The site as evaluated has been classified as a minor NSR and Title V facility. The details of this evaluation are provided in section 2.0 with supporting documentation presented within the calculations section.

1.2 DESCRIPTION OF FACILITY

Tug Hill Operating, LLC is applying for a General Permit Registration under G70-D for the new construction and operation of equipment at the Yoder well pad. The site is planned to consist of (6) Marcellus wells, (6) 1 MMBtu/hr gas processing units, (3) 500 bbl produced water tanks, and (1) 1380 HP 4SLB compressor engine (G3516). Emissions from the tanks will be controlled by a 2 MMBtu/hr enclosed combustor.

DESCRIPTION OF PROCESS

Natural gas, condensate and produced water will be separated from six horizontal wells located onsite producing from the Marcellus formation. Each well stream will first pass through one of six (6) 1 MMBtu/hr gas processing units (GPU-1 through GPU-6).

The gas exiting the gas processing units will be routed into a sales pipeline after going through one final slug catcher separator. The water will be sent into one of three (3) 500 bbl produced water tanks. The condensate is sent to a condensate pipeline and is removed from the site. There will be no dedicated condensate storage tanks located at the Yoder site.

The emissions from the produced water storage tanks are directed to a 2 MMBtu/hr enclosed vapor combustor (VDU-1) for VOC and methane destruction. The produced water is hauled offsite by 140 bbl pump trucks. The displaced emissions from truck loading were accounted for as a point source on an uncontrolled basis.

The site has future plans to install a sales gas compressor at such time as the wells lack the necessary pressure to enter the sales line. The equipment will consist of a Caterpillar G3516 unit which is rated at 1380 HP.

1.3 FEDERAL AND STATE REQUIREMENT

APPLICABLE REGULATIONS

This facility is subject to the following applicable rules and regulations:

Federal and State:

45 CSR 2 – Particulate Matter Standards from Combustion of Fuel in Indirect Heat Exchangers

The indirect heat exchangers consisting of GPU heaters, which are subject to the visible emission standard of §45-2-3 as follows:

3.1. No person shall cause, suffer, allow or permit the emission of smoke and/or particulate matter into the open air from any fuel burning unit which is greater than ten (10) percent opacity based on a six-minute block average.

However, in accordance with the exemptions defined with §45-2-11 these sources have limited requirements as follows:

11.1. Any fuel burning unit(s) having a heat input less than ten (10) million B.T.U.'s per hour will be exempt from sections 4, 5, 6, 8 and 9. However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

Therefore, the GPU heaters at this site are exempt from the weight emission standards of section 4 and the control of fugitive particulate matter standards of section 5. The additionally exempt sections of this rule, section 6, 8, and 9 pertain to registration, testing, monitoring, recordkeeping, and reporting as well as startup, shutdown and malfunctions.

As a result, each combustion source will use Method 9 to determine compliance with the 10% opacity limitation, but periodic monitoring and testing would be required only upon request of the Director or his duly authorized representative.

45 CSR 6 - Open Burning Prohibited

This state rule is geared towards reducing particulate matter emissions from the combustion of refuse and is specific to burning solid waste such as trash, but also includes combustion of waste gas in flares. The rule sets PM limits and establishes a 20% visible emission limit, both of which shouldn't be any problem for the gas fired flare to meet. The Rule 6 PM limit is calculated on the Enclosed Combustor section of the supporting calculations.

45 CSR 10 - Emission of Sulfur Oxides

The facility evaluated within this application utilizes fuel burning units, but they are all below the exemption threshold of 10 MMBtu/hr as stated in 45CSR§10-10.1:

10.1 Any fuel burning units having a design heat input under ten (10) million BTU's per hour will be exempt from section 3 and sections 6 through 8. However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

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

The natural gas fired gas compressor (CE-1) is a 1380 HP Caterpillar 3516BLE and was manufactured on 4-16-2012. Since the engines mfg. date is after 7-1-2010 the corresponding emission limits for this unit are represented as follows:

Table 1 Emission Limits – SI 4SLB HP ≥ 500 HP installed after 7-1-2010

g/Hp-hr			ppmvd at 15% O2		
NOx	CO	VOC	NOx	CO	VOC
1	2	0.7	82	270	60

40 CFR 60 Subpart OOOOa – Flow Back Requirements for Hydraulically Fractured Well(s)

The six (6) new gas wells to be completed by Tug Hill on this site will be subject to the flow back requirements and shall comply by conducting green completions. Therefore they are required to follow the standards of flow back dictated within §60.5375a (a)(1) through (4) for sources that commence construction after September 18, 2015.

40 CFR 60 Subpart OOOOa - Storage Vessel NSPS Requirements

The storage vessels located on the pad have been demonstrated to have a controlled PTEs for VOC < 6 tpy with the use of a permitted VDU enclosed combustor. Therefore, they are not considered affected sources under this regulation.

40 CFR 60 Subpart OOOOa – Fugitive Component Leak Monitoring

The site is classified as a well pad facility, which will be subject to the semiannual monitoring requirement. The site will develop a monitoring plan in accordance with the regulation in according to the specifications of this Regulation. Initial monitoring shall be conducted and documented within 60 days of startup.

40 CFR 63 Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants from Stationary Reciprocating Internal Combustion Engines

This facility is considered an area source of HAPs and therefore certain engines located at this facility would be considered subject to the rule, but they are all considered new sources so they are directed to comply with NSPS JJJJ.

40 CFR 61 - This facility is subject to the asbestos inspection and notification requirements related to construction activities containing asbestos.

45 CSR 4 - No Objectionable Odors

45 CSR 11 - Standby Plans for Emergency Episodes.

45 CSR 13 - Permits for Construction, Modification, Relocation, and Operation of Stationary Source of Air Pollutants

The company has applied to receive coverage under general permit G70-D for the construction and operations of a minor source.

WV Code § 22-5-4 (a) (14)

The Secretary can request any pertinent information such as annual emission inventory reporting.

45 CSR 17 - Fugitive Particulate Emissions

NON-APPLICABILITY DETERMINATIONS

The following requirements have been determined “not applicable” due to the following:

45 CSR 27 - To Prevent and Control the Emissions of Toxic Air Pollutants

This rule is not applicable because natural gas is included as a petroleum product and contains less than 5% benzene by weight. 45CSR § 27-2.4 exempts equipment “used in the production and distribution of petroleum products providing that such equipment does not produce or contact materials containing more than 5% benzene by weight.”

45 CSR 30 – Requirements for Operating Permits – Title V of the Clean Air Act

This facility does not meet the emission threshold to trigger a 45CSR30, Title V Operating Permit nor is it subject to any Federal Standards that trigger the need for a Title V Permit.

40 CFR 60 Subpart OOOOa – Pneumatic Control Valve and Pumps NSPS

The site was evaluated and found to contain only intermittent venting pneumatic control valves rated at less than 6 SCF/hr. Therefore the site is not proposing to install or operate any affected continuous bleed pneumatic devices defined by this NSPS.

Additionally, the site design was evaluated and no natural gas driven pneumatic pumps are planned to operate for greater than 90 days at this site.

40 CFR 63 Subpart HH - National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities

There is no dehydration unit at this site.

40 CFR 63 HHH - National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities

This subpart is related to Natural Gas Transmission Facilities which are major sources of HAPs. This federal regulation is not applicable since this facility is neither a transmission facility nor is it a major source of HAPs.

40 CFR 60 Subpart KKK - Natural Gas Processing Plant NSPS

This subpart is not applicable because this station is not a processing site engaged in extracting natural gas liquids by fractionation from natural gas.

> *Natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.*

40 CFR 60 Subpart K, Ka, Kb - Storage Vessel NSPS

The produced water storage tanks are exempt under 60.110b(d)(4) in accordance with the following: Vessels with a design capacity less than or equal to 1,589.874 m^3 (approx 420,000 gallons) used for petroleum or condensate stored, processed, or treated prior to custody transfer.

40 CFR 63 Subpart DDDDD - Boilers & Process Heaters Located at Major Sources of HAPs

The requirements of this subpart is not applicable because this facility is not a major source of HAPs.

40 CFR 63 Subpart JJJJJJ - Boilers Located at Area Sources of HAPs

This subpart is not applicable because the process heaters are exempt from the definition of “boilers” under this area source GACT standard.

40 CFR 82 Subpart F - Ozone Depleting Substances

The purpose of this subpart is to reduce emissions of class I and class II refrigerants and their substitutes. The facility does not utilize class I and class II refrigerants and their substitutes.

Aggregation Discussion (Facility Determination)

The Yoder well pad is operated solely by Tug Hill Operating, LLC. This well pad facility has the ability to transfer its products via pipeline to midstream compression companies, which are located on non-contiguous sites over a mile away. Additionally, these sources are not under common control nor is there any support and/or dependency relationship between the midstream companies and Tug Hill Operating, LLC.

Tug Hill Operating, LLC operated other well pads in the area, the closes being the Greer Pad, which has a straight line distance of 1.54 miles away. Therefore, no other facilities operated by Tug Hill Operating, LLC are within a quarter-mile radius and as a result this pad should be considered a single facility as defined within this application.

SECTION 2.

APPLICATION FOR PERMIT

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

dep

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25 4
Phone (304) 926-0475
Fax (304) 926-0479
www.dep.wv.gov

G70-D GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

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

SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): TH Exploration II, LLC

Federal Employer ID No. (FEIN): 26-2056245

Applicant's Mailing Address:
380 Southpointe Blvd., Suite 200

City: Canonsburg	State: PA	ZIP Code: 15317

Facility Name: Yoder Well Pad

Operating Site Physical Address: Waynes Ridge
If none available, list road, city or town and zip of facility.

City: Proctor	Zip Code: 26155	County: Marshall

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.78042
Longitude: -80.84016

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities)

CERTIFICATION OF INFORMATION

This G70-D 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 the 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, 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 G70-D Registration Application will be returned to the applicant. Furthermore, if the G70-D forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

I hereby certify that 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 Division of Air Quality immediately.

I hereby certify that all information contained in this G70-D 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.

Responsible Official Signature: S.K.W [signature]
Name and Title: Sean Willis Vice President   Phone: 817-632-5200   Fax:
Email: swillis@tug-hillop.com   Date: 11/03/2017

If applicable:
Authorized Representative Signature:
Name and Title: Phone: Fax:
Email: Date:

If applicable:
Environmental Contact
Name and Title: Jerry V. DeRosa Director, EH&S Affairs   Phone: (412) 736-5767   Fax:
Email: jderosa@tug-hillop.com   Date:

OPERATING SITE INFORMATION
Briefly describe the proposed new operation and/or any change(s) to the facility: This site will encompass 10 new Marcellus wells and associated separation and gas compression equipment. The facility will also utilize a condensate stabilization system and liquid storage vessels.
Directions to the facility: In Proctor travel southeast on Plum St. toward WV-2 S. Turn left onto WV-2 N and travel 1.5 miles. Turn right onto Wells Hill Rd. and travel 2.4 miles. Turn left onto Waynes Ridge and travel 3.4 miles. Turn right (East) onto the dirt access road and travel 0.18 miles. The well site will be located 0.35 miles down the hill (Northwest) from the access road.

ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☒ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☐ I wish to pay by credit card. Contact for payment (incl. name and email address): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☐ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed)** – Attachment A	
☒ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☒ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Pneumatic Pump Data Sheet – Attachment R	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T	
☒ Facility-wide Emission Summary Sheet(s) – Attachment U	
☒ Class I Legal Advertisement – Attachment V	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

All attachments must be identified by name, divided into sections, and submitted in order.

ATTACHMENT A

SINGLE SOURCE DETERMIATION FORM

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

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ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Classifying multiple facilities as one “stationary source” under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of Building, structure, facility, or installation as given in §45-14-2.13 and §45-19-2.12. The definition states:

“Building, Structure, Facility, or Installation” means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same “Major Group” (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term “adjacent” and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

Is there equipment and activities in the same industrial grouping (defined by SIC code)?
Yes ☐ No ☒

Is there equipment and activities under the control of the same person/people?
Yes ☐ No ☒

Is there equipment and activities located on the same site or on sites that share equipment and are within ¼ mile of each other?
Yes ☐ No ☒

ATTACHMENT B

SITING CRITERIA WAIVER

NOT APPLICABLE – No dwellings or businesses located within 300’ of the facility

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
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Canonsburg, PA 15317

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ATTACHMENT C

BUSINESS CERTIFICATE

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

State of West Virginia

Certificate

I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that

TH EXPLORATION II, LLC

Control Number: 9ADVD

a limited liability company, organized under the laws of the State of Texas

has filed its "Application for Certificate of Authority" in my office according to the provisions of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a foreign limited liability company from its effective date of March 30, 2016, until a certificate of cancellation is filed with our office.

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

to the limited liability company authorizing it to transact business in West Virginia

Given under my hand and the Great Seal of the State of West Virginia on this day of March 30, 2016

Natalie E Tennant

Secretary of State

H

Natalie E. Tennant
West Virginia Secretary of State
1900 Kanawha Blvd. East
Bldg. 1, Suite 157-K
Charleston, WV 25305

FILED
MAR 30 2016
IN THE OFFICE OF SECRETARY OF STATE

Penney Barker, Manager
Business & Licensing Division
Tel: (304)558-8000
Fax: (304)558-8381
Website: www.wvsos.com
E-mail: business@wvsos.com

Office Hours: Monday - Friday
8:30 a.m. - 5:00 p.m. EST

FILE ONE ORIGINAL
(Two if you want a filed stamped copy returned to you.)

WEST VIRGINIA APPLICATION FOR CERTIFICATE OF AUTHORITY OF LIMITED LIABILITY COMPANY

FILING FEE: $150
* **Fee Waived for Veteran-owned organization**

Control # 9ADVD

***** The undersigned, having authority to transact business on behalf of a foreign (out-of-state) registered entity, agrees to comply with the requirements of West Virginia Code** §31B-10-1002 **to apply for Certificate of Authority. *****

1. The **name** of the **limited liability company** as registered in its home state is: TH Exploration II, LLC

   and the **State** or **Country** of organization is: Texas

   [X] **CHECK HERE to indicate you have obtained and submitted with this application a CERTIFICATE OF EXISTENCE (GOOD STANDING), dated during the current tax year, from your home state of original formation as required to process your application. The certificate may be obtained by contacting the Secretary of State's Office in the home state of original formation.**

2. The **business name** to be used in **West Virginia** will be: [The **name must contain one of the required terms** such as "limited liability company" or abbreviations such as "LLC" or "PLLC." See instructions for complete list of acceptable terms and requirements for use of Trade Name.]

   [X] **Home State name as listed in Section 1. above,** if available in West Virginia
   (If name is not available, check **DBA Name** box below and follow special instructions in **Section 2.** attached.)

   [ ] **DBA Name** ____________
   (See special instructions in **Section 2.** regarding the **Letter of Resolution** attached to this application. Click here to see a sample Letter of Resolution.)

3. The **company will be a**: [See instructions for limitations on professions which may form **P.L.L.C.** in WV. All members must have WV professional license. See (*) note at the right.]

   [X] **regular LLC**
   [ ] **Professional LLC*** for the profession of: ____________
   * In most cases, a **Letter of Authorization/Approval from the appropriate State Licensing Board** is required to process the application. See attached instructions.

4. The **address** of the **principal office** of the company will be:

   Street: 1320 South University Drive, Suite 500
   City: Fort Worth State: Texas Zip Code: 76107

   Located in the **County** of (required): County: Tarrant

   The **mailing address** of the above location, if different, will be:

   Street:
   City: State: Zip Code:

5. The **address** of the initial **designated** (physical) office of the company in West Virginia, if any, will be:

   Street:
   City: State: Zip Code:

   Located in the **County** of: County:

RECEIVED
MAR 30 2016

5. (*Continued from previous page....*)

The **mailing address** of the above location, if different, will be:	Street: City: State: Zip Code:

6. **Agent of Process:** may be sent, if any, will be:

Name:	Corporation Service Company
Street:	209 West Washington Street
City:	Charleston State: WV Zip Code: 25302

7. **E-mail address** where business correspondence may be received: eradler@tug-hillop.com

8. **Website address** of the business, if any (*ex: yourdomainname.com*):

9. Do you **own or operate** **more than one business in West Virginia**? [X] **Yes** * *Answer* ***a. and b.*** *below.* [ ] **No** [ ] **Decline to answer**

If **"Yes"**... a. How many businesses? 2 b. Located in how many West Virginia counties? 1

10. The company is: (required)
[X] an **AT-WILL** company, conducting business for an indefinite period.
[ ] a **TERM** company, conducting business for the term of ________ years.

11. The company is: (required)
[ ] **MEMBER**-MANAGED [List the names and addresses of all **members** below.]
[X] **MANAGER**-MANAGED [List the names and addresses of all **managers** below.]

List the **name(s) and address(es) of the Member(s)/Manager(s)** of the company (required; attach additional pages if necessary):

Name	No. & Street Address	City	State	Zip Code
Tug Hill, Inc.	1320 South University Drive, Suite 500	Fort Worth	TX	76107

12. All or specified members of a limited liability company are **liable in their capacity as members** for all or specified debts, obligations or liabilities of the company (required):
[X] **No** - All debts, obligations and liabilities are those of the company.
[ ] **Yes** - Those persons who are liable in their capacity as members for all debts, obligations or liability of the company have consented in writing to the adoption of the provision or to be bound by the provision.

13. The **purpose(s)** for which this limited liability company is formed is as follows:
[Describe the type(s) of business activity which will be conducted, for example, "real estate," "construction of residential and commercial buildings," "commercial painting," "professional practice of law" (see **Section 2.** for acceptable "professional" business activities). Purpose may conclude with words "...including the transaction of any or all lawful business for which corporations may be incorporated in West Virginia."]

Oil and gas extraction activities including the transaction of any or all related lawful business for which limited liability companies may be formed in West Virginia

14. Is the business a **Scrap Metal Dealer**?

[ ] **Yes** [If **"Yes,"** you must complete the **Scrap Metal Dealer Registration Form** (Form SMD-1) and proceed to Section 15.]
[X] **No** [Proceed to Section 15.]

15. Other provisions which may be set forth in the operating agreement or matters not inconsistent with law:
[See instructions for further information; use extra pages if necessary.]

N/A

16. The number of pages attached and included in these Articles is: 3

17. The **requested effective date** is:
[Requested date ***may not be earlier than filing nor later than 90 days after filing in our office.***]

[X] the **date and time of filing** in the Secretary of State's Office.

[ ] the following date ____________ and time ____________ .

18. Is the organization a "**veteran-owned**" organization?

Effective **JULY 1, 2015**, to meet the requirements for a "**veteran-owned**" organization, the entity filing the registration must meet the following criteria per West Virginia Code §59-1-2a:

1. A "**veteran**" must be honorably discharged or under honorable conditions, and
2. A "**veteran-owned business**" means a business that meets one of the following criteria:
   - Is at least fifty-one percent (51%) unconditionally owned by one or more veterans; or
   - In the case of a publicly owned business, at least fifty-one percent (51%) of the stock is unconditionally owned by one or more veterans.

[ ] **Yes** (If "**Yes,**" attach **Form DD214**) → [ ] **CHECK BOX** indicating you have **attached Veteran Affairs Form DD214**

[X] **No**

You may obtain a copy of your Veterans Affairs Form DD214 by contacting:

National Personnel Records Center
Military Personnel Records
1 Archives Drive
St. Louis, MO 63138
Toll free: 1-86-NARA-NARA or 1-866-272-6272
Phone: 314-801-0800
www.archives.gov/veterans/military-service-records

Per WV Code 59-1-2(j) effective July 1, 2015, the **registration fee is waived for entities that meet the requirements as a "veteran-owned" organization**. See attached instructions to determine if the organization qualifies for this waiver. In addition, a "**veteran-owned**" entity will have **four (4) consecutive years of Annual Report fees waived** AFTER the organization's initial formation [see WV Code 59-1-2a(m)].

19. **Contact and Signature Information*** (See below ***Important Legal Notice Regarding Signature***):

a. Contact person to reach in case there is a problem with filing: Courtney J. Roane Phone: 214-969-1312

b. Print or type name of signer: Tug Hill, Inc., Manager
Michael Evan Radler, Vice President
Title/Capacity of signer: ____________

c. **Signature:** [signature] **Date:** March 24, 2016

****Important Legal Notice Regarding Signature:*** Per **West Virginia Code** §31B-2-209. **Liability for false statement in filed record.** If a record authorized or required to be filed under this chapter contains a false statement, one who suffers loss by reliance on the statement may recover damages for the loss from a person who signed the record or caused another to sign it on the person's behalf and knew the statement to be false at the time the record was signed.

Important Note: This form is a public document. Please **do NOT provide any personal identifiable information on this form** such as social security number, bank account numbers, credit card numbers, tax identification or driver's license numbers.

Reset Form Print Form

Corporations Section
P.O.Box 13697
Austin, Texas 78711-3697

Carlos H. Cascos
Secretary of State

Office of the Secretary of State

Certificate of Fact

The undersigned, as Secretary of State of Texas, does hereby certify that the document, Certificate of Formation for TH Exploration II, LLC (file number 802423622), a Domestic Limited Liability Company (LLC), was filed in this office on March 28, 2016.

It is further certified that the entity status in Texas is in existence.

In testimony whereof, I have hereunto signed my name officially and caused to be impressed hereon the Seal of State at my office in Austin, Texas on March 29, 2016.

Carlos H. Cascos
Secretary of State

ATTACHMENT D

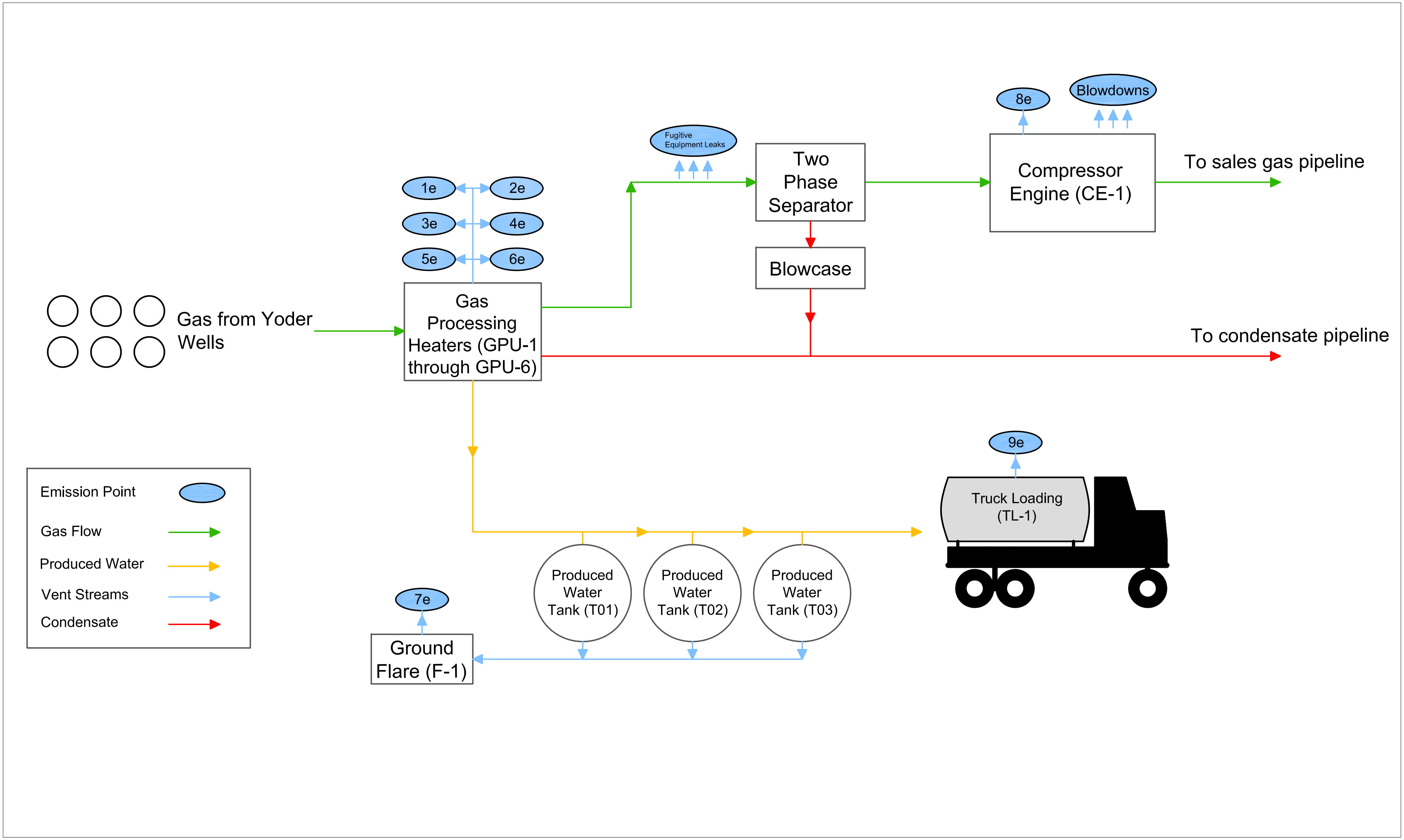
PROCESS FLOW DIAGRAM

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017



SLR

Tug Hill Operating, LLC

Attachment D - Process Flow Diagram

Yoder Well Pad

October 2017

ATTACHMENT E

PROCESS DESCRIPTION

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia
Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

Tug Hill Operating, LLC is applying for a General Permit Registration under G70-D for the new construction and operation of equipment at the Yoder well pad. The site is planned to consist of (6) Marcellus wells, (6) 1 MMBtu/hr gas processing units, (3) 500 bbl produced water tanks, and (1) 1380 HP 4SLB compressor engine (G3516). Emissions from the tanks will be controlled by a 2 MMBtu/hr enclosed combustor.

DESCRIPTION OF PROCESS

Natural gas, condensate and produced water will be separated from six horizontal wells located onsite producing from the Marcellus formation. Each well stream will first pass through one of six (6) 1 MMBtu/hr gas processing units (GPU-1 through GPU-6).

The gas exiting the gas processing units will be routed into a sales pipeline after going through one final slug catcher separator. The water will be sent into one of three (3) 500 bbl produced water tanks. The condensate is sent to a condensate pipeline and is removed from the site. There will be no dedicated condensate storage tanks located at the Yoder site.

The emissions from the produced water storage tanks are directed to a 2 MMBtu/hr enclosed vapor combustor (VDU-1) for VOC and methane destruction. The produced water is hauled offsite by 140 bbl pump trucks. The displaced emissions from truck loading were accounted for as a point source on an uncontrolled basis.

The site has future plans to install a sales gas compressor at such time as the wells lack the necessary pressure to enter the sales line. The equipment will consist of a Caterpillar G3516 unit which is rated at 1380 HP.

ATTACHMENT F

PLOT PLAN

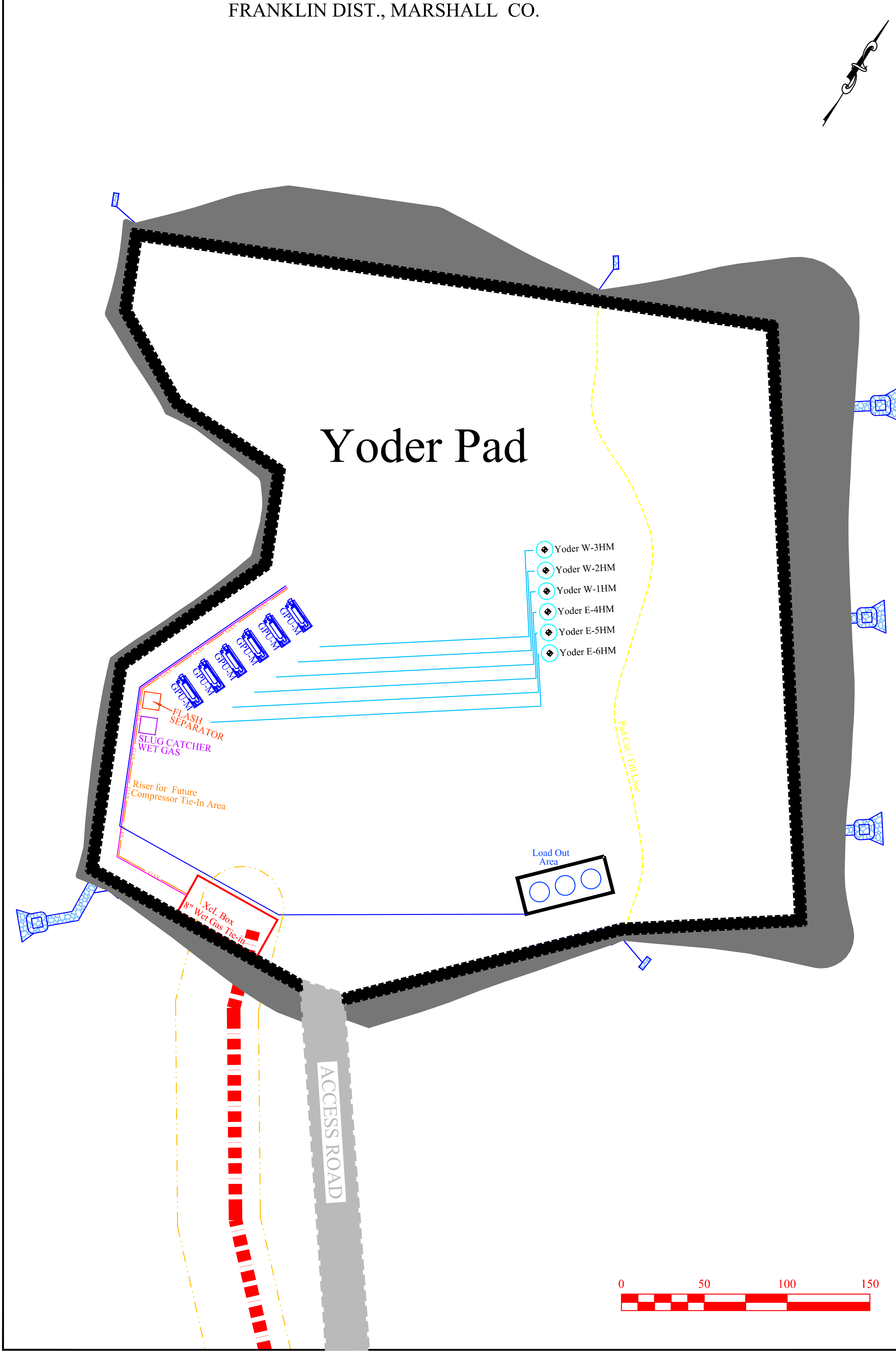
General G70-D Permit Modification Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

YODER PAD LAYOUT AND
WELL HOOKUP
FRANKLIN DIST., MARSHALL CO.



ATTACHMENT G

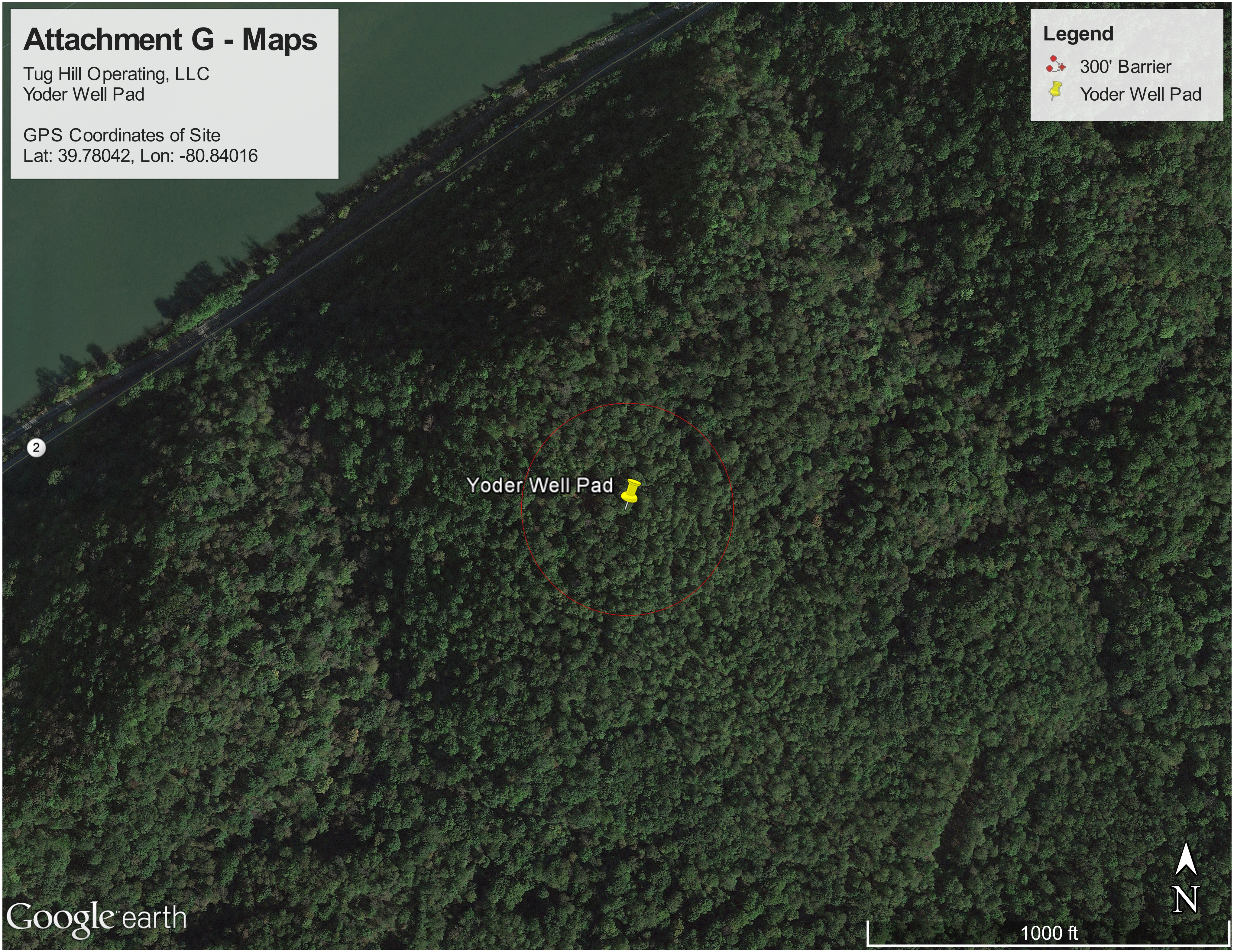
AREA MAP

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017


Attachment G - Maps
Tug Hill Operating, LLC
Yoder Well Pad
GPS Coordinates of Site
Lat: 39.78042, Lon: -80.84016
Legend
300' Barrier
Yoder Well Pad
2
Yoder Well Pad
Google earth
N
1000 ft

ATTACHMENT H

G70-D SECTION APPLICABILITY FORM

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT H – G70-D SECTION APPLICABILITY FORM

General Permit G70-D Registration
Section Applicability Form

General Permit G70-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, pneumatic pumps, reciprocating internal combustion engines (RICEs), tank truck/rail car loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-D allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

GENERAL PERMIT G70-D APPLICABLE SECTIONS	
☒Section 5.0	Gas and Oil Well Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐Section 11.0	Pneumatic Pump Affected Facility (NSPS, Subpart OOOOa)
☒Section 12.0	Fugitive Emissions GHG and VOC Standards (NSPS, Subpart OOOOa)
☒Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines
☒Section 14.0	Tanker Truck/Rail Car Loading[2]
☐Section 15.0	Glycol Dehydration Units[3]

1 *Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subparts OOOO or OOOOa control requirements or the applicable control device requirements of Section 8.*

2 *Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.*

3 *Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.*

ATTACHMENT I

EMISSION UNITS / ERD TABLE

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT I – EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment L table. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
GPU-1	1e	GPU Heater	2017		1 MMBtu/hr	New	None	None
GPU-2	2e	GPU Heater	2017		1 MMBtu/hr	New	None	None
GPU-3	3e	GPU Heater	2017		1 MMBtu/hr	New	None	None
GPU-4	4e	GPU Heater	2017		1 MMBtu/hr	New	None	None
GPU-5	5e	GPU Heater	2017		1 MMBtu/hr	New	None	None
GPU-6	6e	GPU Heater	2017		1 MMBtu/hr	New	None	None
T01-T03	7e	Produced Water Tanks	2017		500 bbl each	New	F-1	None
F-1	7e	Ground Flare	2017		2 MMBtu/hr	New	None	None
CE-1	8e	Cat G3516TALE Compressor Engine	2017	11/17/2014	1380 Hp	New	C-1	None
TL-1	9e	Truck Loading	2017		14,016,219 gal/yr	New	None	None
BD	10e	Compressor CE-1 Blowdown Vent	2017		6,163 scf/event	New	None	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] When required by rule
[4] New, modification, removal, existing
[5] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.
[6] For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

ATTACHMENT J

FUGITIVE EMISSION SUMMARY SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
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Canonsburg, PA 15317

October 2017

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions, etc.
Use extra pages for each associated source or equipment if necessary.

Source/Equipment: Fugitives

Leak Detection Method Used	☐ Audible, visual, and olfactory (AVO) inspections	☒ Infrared (FLIR) cameras	☐ Other (please describe)	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (methane, CO_2e)
Pumps	☐ Yes ☐ No	--	--	☐ Gas ☐ Liquid ☐ Both	--	--	--
Valves	☐ Yes ☒ No	222	*1995 EPA Protocol for Equipment Leak Emission Estimates* - Table 2-4, Oil & Gas Production Operations Average Emission Factors (kg/hr/source) (4.5E-03)	☒ Gas ☐ Liquid ☐ Both	2.05	0.03	28.93
Safety Relief Valves	☐ Yes ☒ No	6	*1995 EPA Protocol for Equipment Leak Emission Estimates* - Table 2-4, Oil & Gas Production Operations Average Emission Factors (kg/hr/source) (8.8E-03)	☒ Gas ☐ Liquid ☐ Both	0.11	<0.01	1.53
Open Ended Lines	☐ Yes ☒ No	15	*1995 EPA Protocol for Equipment Leak Emission Estimates* - Table 2-4, Oil & Gas Production Operations Average Emission Factors (kg/hr/source) (2.0E-03)	☒ Gas ☐ Liquid ☐ Both	0.06	<0.01	0.87
Sampling Connections	☐ Yes ☐ No	--	--	☐ Gas ☐ Liquid ☐ Both	--	--	--
Connections (Not sampling)	☐ Yes ☒ No	981	*1995 EPA Protocol for Equipment Leak Emission Estimates* - Table 2-4, Oil & Gas Production Operations Average Emission Factors (kg/hr/source) (3.9E-03)	☒ Gas ☐ Liquid ☐ Both	0.78	0.01	11.08
Compressors	☐ Yes ☒ No	1	*1995 EPA Protocol for Equipment Leak Emission Estimates* - Table 2-4, Oil & Gas Production Operations Average Emission Factors (kg/hr/source) (8.8E-03)	☒ Gas ☐ Liquid ☐ Both	<0.01	<0.01	<0.01
Flanges	☐ Yes ☒ No	See Notes Below (2)	See Notes Below (2)	☐ Gas ☐ Liquid ☐ Both	--	--	--
Other[1]	☐ Yes ☐ No	--	--	☐ Gas ☐ Liquid ☐ Both	--	--	--

[1] Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.

[2] Assumption made that flange connections are included in connections (not sampling) count

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):
Please indicate if there are any closed vent bypasses (include component):
Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck/rail car loading, etc.)

ATTACHMENT K

GAS WELL AFFECTED FACILITY DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOO or OOOOa?
47-103-02910	1/1/2018	10/1/2017	Green	OOOOa
47-103-02911	1/1/2018	10/1/2017	Green	OOOOa
47-103-02912	1/1/2018	10/1/2017	Green	OOOOa
47-103-02913	1/1/2018	10/1/2017	Green	OOOOa
47-103-02914	1/1/2018	10/1/2017	Green	OOOOa
47-103-02915	1/1/2018	10/1/2017	Green	OOOOa

Note: If future wells are planned and no API number is available please list as PLANNED.
If there are existing wells that commenced construction prior to August 23, 2011, please acknowledge as existing.

This is the same API (American Petroleum Institute) well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).

Every oil and gas well permitted in West Virginia since 1929 has been issued an API number. This API is used by agencies to identify and track oil and gas wells.

The API number has the following format: 047-001-00001

Where,
047 = State code. The state code for WV is 047.
001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).
00001= Well number. Each well will have a unique well number.

ATTACHMENT L

STORAGE VESSEL(S) DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT L – STORAGE VESSEL DATA SHEET

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for ***each*** new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water. (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**
 	
The following information is REQUIRED:
 	
☒ Composition of the representative sample used for the simulation
☒ For each stream that contributes to flashing emissions:
    ☒ Temperature and pressure (inlet and outlet from separator(s))
    ☒ Simulation-predicted composition
    ☒ Molecular weight
    ☒ Flow rate
☒ Resulting flash emission factor or flashing emissions from simulation
☒ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions
 	
Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name: Yoder Well Pad	2. Tank Name Produced Water Tanks
2. Emission Unit ID number: T01-T03	3.Emission Point ID number: 7e
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☒ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ProMax Model Simulation Report Ran (See Calculations) ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. 500 bbl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 25
10A. Maximum Liquid Height (ft.) 25	10B. Average Liquid Height (ft.) 12.5
11A. Maximum Vapor Space Height (ft.) 25	11B. Average Vapor Space Height (ft.) 12.5
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume". 500 bbl	
13A. Maximum annual throughput (gal/yr) 4,672,073 - per tank	13B. Maximum daily throughput (gal/day) 12,800.20 per tank
14. Number of tank turnovers per year 222.48 per tank	15. Maximum tank fill rate (gal/min) 8.89 per tank

16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading

17. Is the tank system a variable vapor space system? ☐ Yes ☒ No
If yes, (A) What is the volume expansion capacity of the system (gal)?
(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply):
☒ Fixed Roof ☐ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe)

☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☒ cylindrical
☐ Other (describe)

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:
☐ Does Not Apply ☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____________ ☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)
☒ Conservation Vent (psig) ☐ Condenser[1]
-0.03 Vacuum Setting 0.88 Pressure Setting
☒ Emergency Relief Valve (psig)
-0.03 Vacuum Setting 0.88 Pressure Setting
☐ Thief Hatch Weighted ☐ Yes ☒ No
[1] Complete appropriate Air Pollution Control Device Sheet

20. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name	Flashing Loss		Working/ Breathing Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
VOC (Each Tank-controlled)	0.12	0.52	<0.00	0.00	0.12	0.52	O - ProMax

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)
Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

TANK CONSTRUCTION AND OPERATION INFORMATION

21. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded

21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted: 2018

22. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig): 0.88 **Must be listed for tanks using VRUs with closed vent system.**		
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): 0.17
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):		
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No		
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):		
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No		
25F. Describe deck fittings:		

26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No			

SITE INFORMATION	
29. Provide the city and state on which the data in this section are based: Elkins, WV	
30. Daily Avg. Ambient Temperature (°F): 49.06	31. Annual Avg. Maximum Temperature (°F): 61.15
32. Annual Avg. Minimum Temperature (°F): 36.97	33. Avg. Wind Speed (mph): 6.17
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): 1193.89	35. Atmospheric Pressure (psia): 13.73

LIQUID INFORMATION		
36. Avg. daily temperature range of bulk liquid (°F): 52.14	36A. Minimum (°F): 39.97	36B. Maximum (°F): 61.15
37. Avg. operating pressure range of tank (psig): 0.88	37A. Minimum (psig): -0.03	37B. Maximum (psig): 0.88

38A. Minimum liquid surface temperature (°F): 47.17	38B. Corresponding vapor pressure (psia): 0.17
39A. Avg. liquid surface temperature (°F): 57.20	39B. Corresponding vapor pressure (psia): 0.25
40A. Maximum liquid surface temperature (°F): 67.23	40B. Corresponding vapor pressure (psia): 0.35

41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary. SEE PROMAX MODEL IN CALCULATIONS.

41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

ATTACHMENT M

NATURAL GAS FIRED FUEL BURNING UNIT(S) DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART DC DATA SHEET						
Complete this data sheet for each small heater and reboiler not subject to 40CFR60 Subpart Dc at the facility. ***The Maximum Design Heat Input (MDHI) must be less than 10 MMBTU/hr.***						
Emission Unit ID#[1]	**Emission Point ID#[2]**	**Emission Unit Description (manufacturer, model #)**	**Year Installed/ Modified**	**Type[3] and Date of Change**	**Maximum Design Heat Input (MMBTU/hr)[4]**	**Fuel Heating Value (BTU/scf)[5]**
GPU-1	1e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-2	2e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-3	3e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-4	4e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-5	5e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-6	6e	GPU Heater	2017	New	1 MMBtu/hr	1,253

1 Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

2 Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

5 Enter the fuel heating value in BTU/standard cubic foot.

ATTACHMENT N

INTERNAL COMBUSTION ENGINE DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID#[1]	CE-1		
Engine Manufacturer/Model	Caterpillar/G3516BLE		
Manufacturers Rated bhp/rpm	1380/ 1400		
Source Status[2]	NS		
Date Installed/ Modified/Removed/Relocated[3]	2017		
Engine Manufactured /Reconstruction Date[4]	11/17/2014		
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	4SLB		
APCD Type[7]	OxCat.-A/F		
Fuel Type[8]	RG		
H_2S (gr/100 scf)	0.25		
Operating bhp/rpm	1380/1400		
BSFC (BTU/bhp-hr)	8,200 HHV		
Hourly Fuel Throughput	9,035 ft^3/hr	ft^3/hr	ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	79.15 $MMft^3$/yr	$MMft^3$/yr	$MMft^3$/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☐

Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
MD	NO_x	1.52	6.66				
MD	CO	6.08	26.65				
MD	VOC	2.13	9.33				
AP	SO_2	0.01	0.03				
AP	PM_{10}	0.11	0.49				
MD	Formaldehyde	1.19	5.20				
AP	Total HAPs	1.43	6.24				
MD	GHG (CO_2e)	1745.52	6950.63				

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion engine/generator engine located at the well site. Multiple engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-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	Relocated Source
REM	Removal of Source		

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation 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 IIII/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 as appropriate.

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

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

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

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	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

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*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Engine Air Pollution Control Device
(Emission Unit ID# CE-1, use extra pages as necessary)

Air Pollution Control Device Manufacturer's Data Sheet included?
Yes ☒ No ☐

☐ NSCR ☐ SCR ☒ Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream: NA

Manufacturer: Catalytic Combustion	Model #:
Design Operating Temperature: 450°F- 1350F	Design gas volume: 9,151 acfm
Service life of catalyst: 8760 hr.	Provide manufacturer data? ☒Yes ☐ No
Volume of gas handled: 9,193 acfm at 1004°F	Operating temperature range for NSCR/Ox Cat: From 450 °F to 1350 °F
Reducing agent used, if any: NA	Ammonia slip (ppm): NA

Pressure drop against catalyst bed (delta P): inches of H_2O

Provide description of warning/alarm system that protects unit when operation is not meeting design conditions:

Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ?
☐ Yes ☒ No

How often is catalyst recommended or required to be replaced (hours of operation)?

How often is performance test required?
☐ Initial
☐ Annual
☒ Every 8,760 hours of operation
☐ Field Testing Required
☐No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT, EPA Certified Engine – See Certificate of Conformity Attached

USA COMPRESSION

USA Compression Unit 2353 Caterpillar G3516BLE Engine Emissions

Date of Manufacture	***4/16/2012***	Engine Serial Number	**JEF01670**	Date Modified/Reconstructed	Not Any
Driver Rated HP	1380	Rated Speed in RPM	1400	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	16	Compression Ratio	8:1	Combustion Setting	Ultra Lean Burn
Total Displacement (in^3)	4211	Fuel Delivery Method	Carburetor	Combustion Air Treatment	T.C./Aftercooled

Raw Engine Emissions (Customer Supplied Fuel Gas with H2S < 10 PPM)

Fuel Consumption *7417 LHV BTU/bhp-hr* *or* *8174 HHV BTU/bhp-hr*
Altitude *1200 ft*
Maximum Air Inlet Temp *90 F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	0.5		1.52	6.66
Carbon Monoxide (CO)	3.00		9.13	39.98
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.98		2.98	13.06
Formaldehyde (CH2O)	0.39		1.19	5.20
Particulate Matter (PM) Filterable+Condensable		9.99E-03	1.13E-01	4.93E-01
Sulfur Dioxide (SO2)		5.88E-04	6.63E-03	2.91E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	513	1561	6200
Methane (CH4)	2.41	7.33	29.13

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) Customer Supplied fuel gas, 1200 ft elevation, and 90 F Max Air Inlet Temperature.
Note that g/bhp-hr values are based on 100% Load Operation. It is recommended to add a safety margin to CO, VOC, and Formaldehyde to account for variations in fuel gas composition and load.
[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-2).

Catalytic Converter Emissions

Catalytic Converter Make amd Model: *Oxidation*
Element Type: *2*
Number of Elements in Housing: *Caterpillar ADEM3, NOx Feedback*
Air/Fuel Ratio Control

	% Reduction	**g/bhp-hr**	**lb/hr**	**TPY**
Nitrogen Oxides (NOx)	0	<1.00	**1.52**	**6.66**
Carbon Monoxide (CO)	33	2.00	**6.09**	**26.66**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	29	0.70	**2.12**	**9.27**
Formaldehyde (CH2O)	0	0.390	**1.19**	**5.20**
Particulate Matter (PM)	0		**1.13E-01**	**4.93E-01**
Sulfur Dioxide (SO2)	0		**6.63E-03**	**2.91E-02**

	% Reduction		**lb/hr**	**Metric Tonne/yr**
Carbon Dioxide (CO2)	0	513	**1561**	**6200**
Methane (CH4)	0	2.41	**7.33**	**29.13**

Catalyst Group
709 21st Ave, Bloomer, WI 54724
Tel: (715) 568-2882 • Fax: (715)568-2884
E-mail : bweninger@catalyticcombustion.com

CATALYTIC COMBUSTION
EMISSION TECHNOLOGIES

To USA Compression
Attn Chris Magee
Via E-mail

Our Ref. QT-116-2511-2
Date: 17 November, 2016

PERFORMANCE EXPECTATION

For :
Location :

Engine Parameters

Engine Manufacturer	Caterpillar			Raw Exhaust	
Engine Model	G3516		NOx	0.50	g/bhp-hr
Horsepower	1380	bhp	CO	3.00	g/bhp-hr
Speed	1400	rpm	NMHC	1.93	g/bhp-hr
Exhaust Flowrate	9193	acfm	NMNEHC (VOC)	0.98	g/bhp-hr
Exhaust Temperature	1004	° F	HCHO	0.39	g/bhp-hr
Fuel	Natural Gas		Oxygen	9.10	%

Catalyst Description and Performance Expectations

Substrate Type	Folded Metal Foil	Catalyst Dimensions	35.875 x 14.875 x 3.50"
Cell Pattern	320 cpsi Herringbone	Quantity Required	2 per Unit
Banding	CCC C-Channel Design	Formulation	HFX4

	Performance	
NOx	< 1.00	g/bhp-hr
CO	2.00	g/bhp-hr
NMHC		
NMNEHC (VOC)	0.70	g/bhp-hr
HCHO		

General Terms and Conditions of Sale and Manufacturers Warranty documents are available upon request.

This catalyst is to be installed into a converter housing produced by another manufacturer. CCC cannot verify that the housing is structurally sound and permits proper catalyst sealing. Therefore, should the catalyst not reach the catalyst outlet targets with the engine operating as listed above, then all efforts must be made to ensure that a proper catalyst seal has been obtained before questioning the performance of the catalyst.

Best regards,

Brian Weninger

Brian Weninger
Mechanical Engineer, Catalyst Group

G3516B

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
CNX Oxford 11 Engine Quote 4/19/16

CATERPILLAR®

ENGINE SPEED (rpm):	1400
COMPRESSION RATIO:	8
AFTERCOOLER TYPE:	SCAC
AFTERCOOLER - STAGE 2 INLET (°F):	130
AFTERCOOLER - STAGE 1 INLET (°F):	201
JACKET WATER OUTLET (°F):	210
ASPIRATION:	TA
COOLING SYSTEM:	JW+OC+1AC, 2AC
CONTROL SYSTEM:	ADEM3
EXHAUST MANIFOLD:	DRY
COMBUSTION:	LOW EMISSION
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5
SET POINT TIMING:	28

RATING STRATEGY:	STANDARD
RATING LEVEL:	CONTINUOUS
FUEL SYSTEM:	CAT WIDE RANGE WITH AIR FUEL RATIO CONTROL

SITE CONDITIONS:

FUEL:	CNX Oxford 1-12-15
FUEL PRESSURE RANGE(psig):	7.0-40.0
FUEL METHANE NUMBER:	52.0
FUEL LHV (Btu/scf):	1171
ALTITUDE(ft):	1200
MAXIMUM INLET AIR TEMPERATURE(°F):	90
STANDARD RATED POWER:	1380 bhp@1400rpm

			MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING	**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER (WITHOUT FAN)	(1)	bhp	1380	1380	1035	690
INLET AIR TEMPERATURE		°F	90	90	90	90
ENGINE DATA						
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	7417	7417	7944	8533
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	8174	8174	8755	9403
AIR FLOW (@inlet air temp, 14.7 psia) (WET)	(3)(4)	ft3/min	3224	3224	2529	1768
AIR FLOW (WET)	(3)(4)	lb/hr	13956	13956	10948	7654
FUEL FLOW (60ºF, 14.7 psia)		scfm	146	146	117	84
INLET MANIFOLD PRESSURE	(5)	in Hg(abs)	92.9	92.9	75.4	53.0
EXHAUST TEMPERATURE - ENGINE OUTLET	(6)	°F	1004	1004	989	998
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(7)(4)	ft3/min	9193	9193	7149	5036
EXHAUST GAS MASS FLOW (WET)	(7)(4)	lb/hr	14447	14447	11342	7936
EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)	(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50
CO	(8)(9)	g/bhp-hr	3.00	3.00	3.22	3.16
THC (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	4.34	4.34	4.65	4.72
NMHC (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	1.93	1.93	2.06	2.09
NMNEHC (VOCs) (mol. wt. of 15.84)	(8)(9)(10)	g/bhp-hr	0.98	0.98	1.05	1.07
HCHO (Formaldehyde)	(8)(9)	g/bhp-hr	0.39	0.39	0.38	0.37
CO2	(8)(9)	g/bhp-hr	513	513	548	595
EXHAUST OXYGEN	(8)(11)	% DRY	9.1	9.1	8.8	8.4
HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(12)	Btu/min	22670	22670	21482	20250
HEAT REJ. TO ATMOSPHERE	(12)	Btu/min	6110	6110	5092	4074
HEAT REJ. TO LUBE OIL (OC)	(12)	Btu/min	4475	4475	3978	3363
HEAT REJ. TO A/C - STAGE 1 (1AC)	(12)(13)	Btu/min	11152	11152	9217	3134
HEAT REJ. TO A/C - STAGE 2 (2AC)	(12)(13)	Btu/min	5501	5501	5179	3381

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(13)(14)	Btu/min	42017
TOTAL AFTERCOOLER CIRCUIT (2AC)	(13)(14)	Btu/min	5776
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

CONDITIONS AND DEFINITIONS

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

For notes information consult page three.

PREPARED BY: Chris Magee, USAC
Data generated by Gas Engine Rating Pro Version 6.01.00
Ref. Data Set EM1748-00-001, Printed 19Apr2016

ATTACHMENT O

TANKER TRUCK/ RAIL CAR LOADING DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

Complete this data sheet for each new or modified bulk liquid transfer area or loading rack at the facility. This is to be used for bulk liquid transfer operations to tanker trucks/rail cars. Use extra pages if necessary.

Truck/Rail Car Loadout Collection Efficiencies

The following applicable capture efficiencies of a truck/rail car loadout are allowed:

- For tanker trucks/rail cars passing the MACT level annual leak test – 99.2%
- For tanker trucks/rail cars passing the NSPS level annual leak test – 98.7%
- For tanker trucks/rail cars not passing one of the annual leak tests listed above – 70%

Compliance with this requirement shall be demonstrated by keeping records of the applicable MACT or NSPS Annual Leak Test certification for ***every*** truck and railcar loaded/unloaded. This requirement can be satisfied if the trucking/rail car company provided certification that its entire fleet was compliant. This certification must be submitted in writing to the Director of the DAQ. These additional requirements must be noted in the Registration Application.

Emission Unit ID#: TL-1	Emission Point ID#: 9e	Year Installed/Modified:2017
Emission Unit Description: Tank Truck Loading (Water & Condensate)		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks/rail cars loading at one (1) time: 1
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☐ No ☒ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses.		
Are any of the following truck/rail car loadout systems utilized? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

Projected Maximum Operating Schedule (for rack or transfer point as a whole)

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	24	24	24	24
Days/week	7	7	7	7

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	Produced Water		
Max. Daily Throughput (1000 gal/day)	38.40		
Max. Annual Throughput (1000 gal/yr)	14,016.22		
Loading Method[1]	SUB		
Max. Fill Rate (gal/min)	26.67		
Average Fill Time (min/loading)	60		
Max. Bulk Liquid Temperature (^{o}F)	52.14		
True Vapor Pressure[2]	0.25		
Cargo Vessel Condition[3]	C		
Control Equipment or Method[4]	NA		
Max. Collection Efficiency (%)	0		

Max. Control Efficiency (%)		0		
Max.VOC Emission Rate	Loading (lb/hr)	<0.01		
	Annual (ton/yr)	0.01		
Max.HAP Emission Rate	Loading (lb/hr)	0		
	Annual (ton/yr)	0		
Estimation Method[5]		O - ProMax		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

3 B Ballasted Vessel C Cleaned U Uncleaned (dedicated service)
O Other (describe)

4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)
CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)
ECD Enclosed Combustion Device F Flare
TO Thermal Oxidization or Incineration

5 EPA EPA Emission Factor in AP-42 MB Material Balance
TM Test Measurement based upon test data submittal O Other (describe)

ATTACHMENT P

GLYCOL DEHYDRATION UNIT DATA SHEET(S)

NOT APPLICABLE- No glycol dehydration unit in use at the facility.

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT Q

PNEUMATIC CONTROLLERS DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

ATTACHMENT R

PNEUMATIC PUMP DATA SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT R – PNEUMATIC PUMP DATA SHEET

Are there any natural gas-driven diaphragm pumps located at a well site that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list.

Source ID #	Date	Pump Make/Model	Pump Size

ATTACHMENT S

AIR POLLUTION CONTROL DEVICE/ EMISSION REDUCTION DEVICE SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT S – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS	
Complete the applicable air pollution control device sheets for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit, BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary. Emissions calculations must be performed using the most conservative control device efficiency.	
The following five (5) rows are only to be completed if registering an alternative air pollution control device.	
Emission Unit ID: T01-T03	Make/Model:
Primary Control Device ID: F-1	Make/Model: The Frederick Logan Company, Inc
Control Efficiency (%): 98	APCD/ERD Data Sheet Completed: ☒ Yes ☐ No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: F-1	Installation Date: 2017 ☒ New ☐ Modified ☐ Relocated
Maximum Rated Total Flow Capacity 2,000 scfh 48,000 scfd	Maximum Design Heat Input (from mfg. spec sheet) 2 MMBTU/hr — Design Heat Content 1,000 BTU/scf

Control Device Information

Type of Vapor Combustion Control?
☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare
☐ Thermal Oxidizer

Manufacturer: The Frederick Logan Company, Inc Model:	Hours of operation per year? 8760

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# 7e)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
T01-T03	Produced Water Tanks		

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	20 feet	TBD	☒ Yes ☐ No Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate 19.85 (scfm)	Heat Value of Waste Gas Stream	Exit Velocity of the Emissions Stream
	200 BTU/ft^3 or greater	< 60 (ft/s)

Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	5 scfh	5,000 BTU/hr	☒ Yes ☐ No

If automatic re-ignition is used, please describe the method. Electronic re-ignition will be installed and monitored for proof of pilot flame through flame ionization, auto relight.

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☐ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☒ Other: Ionization rod which sends a signal to controller as long as it is in contact with the flame.

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).* Available upon request

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

Equipment Description

ITEM	QTY	DESCRIPTION
1	1	**DVC-36 Skid Mounted, Valve Train Enclosed Flare complete with:**

- 36” Dia. Combustion Chamber
- 36” x 20’ Tall Exhaust Stack
- (3) 24” Adjustable Flame Cell Air Inlets (one Hinged)
- (2) Dual Type K thermocouples with Thermowell
- (2) 4” Flanged Sample Ports
- Stack Lined with 4” 2300 deg. Folded Blanket Flue Liners
- Lower stack lined with 4” Castable Refractory
- (1) Sight Glass
- Stack Material –A-36
- Surface prep and paint:
  - Standard 2 coat paint
  - Color to be determined
- 4” Dehy Overhead Still Column Vapor Inlet. To be mounted on top of the Heated Enclosure. Block & Vent valves to be installed. Vent line to extend 6’ above roof. (vent line to be removed for shipping)
- Install low point drains on bottom of vent line, run SS tubing with hand valve to + 1’ above grade.
- Install low point drain upstream of the 3” Flame arrestor. Install SS tubing and hand valve.
- (1) 1” NPT for Flash Gas and Vessel Relief Vapors Inlet.
- (2) Lifting lug mounted on top stack section.
- Valve Train C/W: Pneumatic Shutoff Valve, Pilot Solenoid, Manual Block Valve, Strain, and Regulator.

ITEM	QTY	DESCRIPTION
2	1	**2 MMBTU/HR Burner**

- Natural Draft Gas induced Burner

ITEM	QTY	DESCRIPTION
3	1	**MR-1000 Pilot**

- Self-inspirited pilot.
- Direct Spark Ignition
- Flame Ionization Detection Rod.

ITEM	QTY	DESCRIPTION
4	1	**Burner Control Panel**

- 24 VDC Solar power Option
  - Solar Panel and mounting bracket
  - Solar Charging Module

- (2) 12 VDC deep cycle batteries
- (1) Battery enclosure
- Mounting pole

- ProFire 2100 Ignition System with Modbus Communications card.
- NEMA 4 Main Enclosure
- Assist heat burner is on when temperature drops below 1450 deg F.
- Continuous pilot operation.
- System shut down for the following events:
  - Loss of Flame
  - High Stack Temp

  - Customer contacts for the following signals
  - Fault
  - At Temp

5 1 Process Valve Train

- 4” Pneumatic Block Valve for Dehy Stream Vapors.
- 1/2” ASCO Solenoid Low draw Valve for burner gas
- 1” Pneumatic block Valve for flash Gas inlet.
- ½” ASCO Next Generation low draw solenoid valve for pilot gas
- ¼” 3-way Solenoid valve for Pneumatic valve operation.
- Manual block valve for pilot gas
- fuel gas regulator
- Instrument gas regulator for pneumatic controls
- Fuel Gas Strainer

6 2 Flame Arrestor

- 3” 150#, CS/AL construction, for Low Pressure Overhead Dehy Inlet.
- 1” NPT Threaded, CS/AL construction, for High Pressure Flash Gas Vapors.

7 3 Documentation

- Operation and Maintenance Manual

8 1 FAT – Factory Acceptance Test

- Complete test of system at Fort Worth, TX location

9 1 Heated Enclosure for Vessels and Skid mounted Valve train

- 1” thick lined insulation on roof and walls
- 6,000 BTU/HR Catco Heater
- Access door
- Louvered Vent ports

10 1 24” Dia. Knockout/Blow Pot Vessel with complete instrumentation

- ASME Pressure Vessel
- 150 PSIG @250 deg F
- 4” NPT inlet
- 4” NPT Outlet
- 1” NPT Liquid Drain
- 2” NPT Level Controller Connection
- 1” NPT Level Gauge Connections
- Kimray Gen II Level controller
- Kimray dump valve
- 1” Check valve
- 3-way pneumatic valve

Technical Summary

Process inlet stream: Based on GRI-Gly calc output (attached)

Overhead Still Inlet

Inlet Temperature:	212 °F
Inlet Pressure:	≥ 2" WC

Flash Gas Inlet

Inlet Temperature:	100 °F
Inlet Pressure:	20-50 PSIG
Combustion Chamber Temp:	1450 – 1600 deg F
Destruction Efficiency:	≥98.0%

Site Conditions:

Wind Speed	90 MPH
Seismic Zone	1
Elevation	1,000 ft.
Humidity	High

Utilities:

Gas Service Required for Burner	400 SCFH – Natural Gas Intermittent use, Only on when temp <1450 deg F
Electrical Service Required	Solar Powered 24 VDC, 5 amps
Gas Consumption at Start-up	400,000 Btu/hr
Gas Consumption under load	≤ 400 SCFH, Dependent on BTU value of waste stream

ATTACHMENT T

EMISSION CALULATIONS

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

Table 1. Annual Potential To Emit (PTE) Summary
Tug Hill Operating, LLC Yoder Pad

Criteria PTE

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	CO2e
Line Heaters (tpy)	0.196	0.196	0.196	0.015	2.576	2.164	0.142	3075
Compressor (tpy)**	0.495	0.495	0.495	0.029	6.663	26.651	14.525	6951
Tanks (tpy)*	--	--	--	--	--	--	1.539	--
Ground Flare (tpy)	--	--	--	0.004	0.598	2.726	6.025	1024
Truck Loading (tpy)	--	--	--	--	--	--	0.004	--
Compressor Blowdowns (tpy)							1.396	158
Component Fugitives (tpy)	--	--	--	--	--	--	3.002	42
Total Emissions (tpy)	**0.691**	**0.691**	**0.691**	**0.048**	**9.837**	**31.542**	**25.094**	**11250**
Total Emissions (lb/hr)	0.158	0.158	0.158	0.011	2.246	7.201	5.729	2568

*VOC emissions from tanks accounted for within VOC emissions from ground flare

**VOC emissions from compressor includes formaldehyde emissions

HAP PTE

Source	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs (tpy)
Line Heaters (tpy)	0.000	0.000	--	--	0.046	0.002	0.049
Compressor (tpy)	0.005	0.020	0.002	0.009	0.055	5.197	6.240
Fugitives (tpy)	0.000	0.000	0.000	0.000	0.039	--	0.039
Total Emissions (tpy)	**0.005**	**0.020**	**0.002**	**0.009**	**0.140**	**5.199**	**6.328**
Total Emissions (lb/hr)	0.001	0.005	0.000	0.002	0.032	1.187	1.445

Table 1 Compressor Engine Emissions (CE-1)
Caterpillar G3516BLE
Tug Hill Operating, LLC Yoder Pad

Pollutant	Emission Factor			PTE (lb/hr)		PTE (tons/yr)	
Criteria Pollutants							
PM/PM10/PM2.5**	9.98E-03	lb/MMBtu	(1)	0.11	(a)	0.49	(c)
SO_2	5.88E-04	lb/MMBtu	(1)	0.01	(a)	0.03	(c)
NOx	5.00E-01	g/hp-hr	(2)	1.52	(b)	6.66	(d)
CO	2.00E+00	g/hp-hr	(2)	6.08	(b)	26.65	(d)
VOC*	7.00E-01	g/hp-hr	(2)	2.13	(b)	9.33	(d)
*VOC's does not include formaldehude							
Hazardous Air Pollutants							
1,1,2,2-Tetrachloroethane	4.00E-05	lb/MMBtu	(1)	0.000	(a)	0.002	(c)
1,1,2-Trichloroethane	3.18E-05	lb/MMBtu	(1)	0.000	(a)	0.002	(c)
1,3-Butadiene	2.67E-04	lb/MMBtu	(1)	0.003	(a)	0.013	(c)
1,3-Dichloropropene	2.64E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
2-Methylnapthalene	3.32E-05	lb/MMBtu	(1)	0.000	(a)	0.002	(c)
2,2,4-Trimethylpentane	2.50E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Acetaldehyde	8.36E-03	lb/MMBtu	(1)	0.095	(a)	0.415	(c)
Acrolein	5.14E-03	lb/MMBtu	(1)	0.058	(a)	0.255	(c)
Benzene	4.40E-04	lb/MMBtu	(1)	0.005	(a)	0.022	(c)
Biphenyl	2.12E-03	lb/MMBtu	(1)	0.024	(a)	0.105	(c)
Carbon Tetrachloride	3.67E-05	lb/MMBtu	(1)	0.000	(a)	0.002	(c)
Chlorobenzene	3.04E-05	lb/MMBtu	(1)	0.000	(a)	0.002	(c)
Chloroform	2.85E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Ethylbenzene	3.97E-05	lb/MMBtu	(1)	0.000	(a)	0.002	(c)
Ethylene Dibromide	4.43E-05	lb/MMBtu	(1)	0.001	(a)	0.002	(c)
Formaldehyde	3.90E-01	g/hp-hr	(2)	1.187	(b)	5.197	(d)
Methanol	2.50E-03	lb/MMBtu	(1)	0.028	(a)	0.124	(c)
Methylene Chloride	2.00E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
n-Hexane	1.11E-03	lb/MMBtu	(1)	0.013	(a)	0.055	(c)
Naphthalene	7.44E-05	lb/MMBtu	(1)	0.001	(a)	0.004	(c)
PAH (POM)	2.69E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Phenol	1.04E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Styrene	2.36E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Toluene	4.08E-04	lb/MMBtu	(1)	0.005	(a)	0.020	(c)
Vinyl Chloride	1.49E-05	lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Xylenes	1.84E-04	lb/MMBtu	(1)	0.002	(a)	0.009	(c)
Total HAP				**1.425**		**6.240**	
Greenhouse Gas Emissions						Metric Tonne/yr	
CO_2	4.99E+02	g/hp-hr	(2)	1518.12	(b)	6044.88	(d)
CH_4	2.98E+00	g/hp-hr	(2)	9.07	(b)	36.10	(d)
N_2O	2.2E-04	lb/MMBtu	(3)	0.00	(a)	0.01	(c)
$CO_2e^{(e)}$	-	-		1745.52		6950.63	

** includes condensible PM

Calculations:

Hourly Emissions - If emission factor note 1 is used, use calculation (a). If emission factor note 2 is used, use calculation (b).

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

(b) Hourly Emissions (lb/hr) = Emission factor (g/hp-hr) * Engine Power Output (hp) * (lb/453.6g)

Annual Emissions - If emission factor note 1 is used, use calculation (c). If emission factor note 2 is used, use calculation (d).

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

(d) Annual emissions (tons/yr) = Emission factor (g/hp-hr) * Engine Power Output (hp) * Annual Hours of operation (hr/yr) * (1ton/2000lbs) * (lb/453.6g)

MAXIMUM HOURLY EMISSION INPUTS

Engine Power Output (kW) =	1029	
Engine Power Output (hp) =	1,380	
Number of Engines =	1	
BSFC (BTU/HP-hr) =	8,203	(4)
Heat Content Natural Gas(Btu/scf) =	1,253.0	(5)
Fuel Throughput (ft3/hr) =	9,034.4	(6)
PTE Hours of Operation =	8,760	

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

CO_2	1	(7)
CH_4	25	(7)
N_2O	298	(7)

Notes:

(1) AP-42, Chapter 3.2, Table 3.2-2. Natural Gas-fired Reciprocating Engines (7/00). *Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines.*

(2) Emission limits supplied from manufacturer's specification sheet

(3) Emission limits supplied from 40 CFR 98, Subpart C, Table C-1 and C-2.

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

(5) Value obtained from AP-42, Chapter 3.2, Table 3.2-1, footnote b

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

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

Table 2 GPU Heater (GPU-1 through GPU-6) Rates and Emissions
Tug Hill Operating, LLC Yoder Pad

Pollutant	Emission Factor			1.00 MBtu/hr GPU Emissions (lb/hr)	1.00 MMBtu/hr GPU Emissions (ton/yr)	1.00 MMBtu/hr GPU Emissions x 6 (lb/hr)	1.00 MMBtu/hr GPU Emissions x 6 (ton/yr)
Criteria Pollutants							
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.007	0.033	0.045	0.196
SO_2	0.6	lb/MMcf	(1)	0.001	0.003	0.004	0.015
NOx	100	lb/MMcf	(2)	0.098	0.429	0.588	2.576
CO	84	lb/MMcf	(2)	0.082	0.361	0.494	2.164
VOC	5.5	lb/MMcf	(1)	0.005	0.024	0.032	0.142
Hazardous Air Pollutants							
Arsenic	2.0E-04	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Benzene	2.1E-03	lb/MMcf	(4)	0.000	0.000	0.000	0.000
Beryllium	1.2E-05	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Cadmium	1.1E-03	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Chromium	1.4E-03	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Cobalt	8.4E-05	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	0.000	0.000	0.000	0.000
Formaldehyde	7.5E-02	lb/MMcf	(4)	0.000	0.000	0.000	0.002
Hexane	1.8E+00	lb/MMcf	(4)	0.002	0.008	0.011	0.046
Lead	5.0E-04	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Manganese	3.8E-04	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Mercury	2.6E-04	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Naphthalene	6.1E-04	lb/MMcf	(4)	0.000	0.000	0.000	0.000
Nickel	2.1E-03	lb/MMcf	(3)	0.000	0.000	0.000	0.000
PAH/POM	1.3E-03	lb/MMcf	(4)	0.000	0.000	0.000	0.000
Selenium	2.4E-05	lb/MMcf	(3)	0.000	0.000	0.000	0.000
Toluene	3.4E-03	lb/MMcf	(4)	0.000	0.000	0.000	0.000
Total HAP	**1.9E+00**	**lb/MMCF**		0.002	0.008	0.011	0.049
Greenhouse Gas Emissions							
CO_2	116.89	lb/MMBtu	(5)	116.889	511.974	701.335	3071.845
CH_4	2.2E-03	lb/MMBtu	(5)	0.002	0.010	0.013	0.058
N_2O	0.0	lb/MMBtu	(5)	0.000	0.001	0.001	0.006
$CO_2e^{(b)}$	-	-		117.010	512.503	702.059	3075.020

Calculations:

(a) Annual emissions (tons/yr) = [Annual Usage (MMBtu/yr or MMCF/yr)]x [Number of Identical Heaters]x [Emission Factor (lb/MMBtu or lb/MMCF)] / [2,000 lb/ton]

Number of Line Heaters= 6
Fuel Use (MMBtu/hr) = 1
Hours of Operation (hr/yr)= 8760
PTE Fuel Use (MMcf/yr) = 8.6

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

CO_2	1	(6)
CH_4	25	(6)
N_2O	298	(6)

Notes:

(1) AP-42, Chapter 1.4, Table 1.4-2. Emission Factors For Criteria Pollutants and Greenhouse Gases From Natural Gas Combustion, July 1998.
(2) AP-42, Chapter 1.4, Table 1.4-1. Emission Factors For Nitrogen Oxides (Nox) and Carbon Monoxide(CO) From Natural Gas Combustion, July 1998.
(3) AP-42, Chapter 1.4, Table 1.4-4. Emission Factors For Metals From Natural Gas Combustion, July 1998.
(4) AP-42, Chapter 1.4, Table 1.4-3. Emission Factors for Speciated Organic Compounds from Natural Gas Combustion, July 1998.
(5) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.
(6) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1
(7) MMBtu to MMcf conversion factor is 1020. AP-42, Chapter 1.4

Table 3 Tank Emissions
Tug Hill Operating, LLC Yoder Pad

Emission Unit	Tank Contents	Control Devices	Tank Throughput (bbls/day)	Flashing EF (lbs/bbls)		Flashing Emissions (lbs/day) (a)	Working and Breathing Emissions (lbs/day) (b)	VOC Emissions (lb/hr)	VOC Emissions (tons/yr)
T01	Produced Water	F-1	304.8	0.461	(1)	140.55	1.56E-03	5.856	25.650
T02	Produced Water	F-1	304.8	0.461	(1)	140.55	1.56E-03	5.856	25.650
T03	Produced Water	F-1	304.8	0.461	(1)	140.55	1.56E-03	5.856	25.650
Total			914.30			421.64	0.00	17.569	76.951
						Controlled Emissions		**0.35**	**1.54**

Calculations:

(a) Flashing Emissions
PTE emissions (lbs/day) from ProMax.

(b) Working and Breathing Emissions
PTE emissions (lbs/day) from ProMax.

(c) Emissions routed to combustion device with conservative 98% destruction efficiency

Notes:

(1) ProMax Simulation based on representative inputs and worst case operating parameters

Table 4 Truck Loading (TL-1) VOC Emissions
Tug Hill Operating, LLC Yoder Pad

Contents	Volume Transferred		PTE VOC Emissions (lb/hr)	PTE VOC Emissions[(a)] (tons/yr)
Produced Water	14,016,219	gal/yr	9.46E-04	4.15E-03
Total	14,016,219	gal/yr	9.46E-04	4.15E-03

Notes:

(a) Annual Emissions(tons/yr) from ProMax loading losses

(b) 70% Capture efficiency for tanker trucks/rail cars not passing a MACT or NSPS level annual leak test.

(c) 2.02 tpy of VOC Point Source Emissions are added to VDU-1's potential to emit.

Table 5 Ground Flare Emissions
Tug Hill Operating, LLC Yoder Pad

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.31	1,191	1,679	(1/1,000,000)	0.62	2.72
NOx	0.068	1,191	1,679	(1/1,000,000)	0.14	0.60
VOC[a]	0.14	1,191	1,679	(1/1,000,000)	0.28	6.02
CO2e	116.89	1,191	1,679	(1/1,000,000)	233.74	1023.77

[a] - Measured as methane equivalent, assumed worst case

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\ factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\ heat\ value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\ Btu} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

Emission Factor = AP-42 Tables 13.5-1 and 2 emission factor for specific pollutant
Volume = 2000 scf/hr set to equate to 2 MMBtu/hr Ground Flare rating
Hours of operation calculated at 8760

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	1,191	0.25	0.0000040	64.00	1/379.4	0.0008	0.0035

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = Volume\left(\frac{scf}{hr}\right) \times mol\ fraction\left(\frac{H2S}{100\ scf} \times 0.00001588\right) \times molecular\ weight \times \frac{lb\text{-}mol}{scf} \times \frac{876\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

$$\frac{1\ grain\ H2S}{100\ scf} = 15.26\ ppm\ of\ H2S$$

H2S conversion taken from supporting Sulfur Measurement Handbook
grain H2S/100 scf = 0.25
Volume = 2000 scf/hr
Hours of operation calculated at 8760
1 lb mol = 379.4 cubic feet

For Pilot Light

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.31	5	1,679	(1/1,000,000)	0.0026	0.0114
NOx	0.068	5	1,679	(1/1,000,000)	0.0006	0.0025
VOC[a]	0.14	5	1,679	(1/1,000,000)	0.0012	0.0051

[a] - Measured as methane equivalent, assumed worst case

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\ factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\ heat\ value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\ Btu} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

Emission Factor = AP-42 Tables 13.5-1 and 2 emission factor for specific pollutant

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	5.00	0.25	0.0000040	64.00	1/379.4	0.0000	0.0000

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = Volume\left(\frac{scf}{hr}\right) \times mol\ fraction\left(\frac{H2S}{100\ scf} \times 0.00001588\right) \times molecular\ weight \times \frac{lb\text{-}mol}{scf} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

$$\frac{1\ grain\ H2S}{100\ scf} = 15.26\ ppm\ of\ H2S$$

H2S conversion taken from supporting Sulfur Measurement Handbook
grain H2S/100 scf = 15.26

1 lb mol = 379.4 cubic feet

Ground Flare and Pilot Combined

Pollutant	lb/hr	ton/yr
CO	**0.622**	**2.726**
Nox	**0.137**	**0.598**
VOC	**1.376**	**6.025**
SO2	**0.001**	**0.004**

Rule 6 - Weight Rate Determination

Waste Gas Volume	Waste Gas Density	Gas Wt. Rate	**45CSR6-4.1 PM Limit**
(scf/hr)	(lb/scf)	(tons/hr)	**(lb/hr)**
1191.00	0.0769	0.05	**0.25**

Gas Density Taken from Promax Tank Emission Stream

Table 6 Fugitive Leaks
Tug Hill Operating, LLC Yoder Pad

Pollutant	Emission Factor		PTE[(a) Gas Service] (tons/yr)	PTE VOC emissions (ton/yr)	PTE CO_2e emissions (ton/yr)	PTE Total HAPs emissions (ton/yr)
Valves	9.9E-03	lb/hr/source	9.64	2.05	28.93	0.03
Pressure Relief Valves	1.9E-02	lb/hr/source	0.51	0.11	1.53	0.00
Connectors (2)	8.6E-04	lb/hr/source	3.69	0.78	11.08	0.01
Open Ended Lines	4.4E-03	lb/hr/source	0.29	0.06	0.87	0.00
Compressors	1.9E-02	lb/hr/source	0.08	0.00	0.00	0.00
Total	-	-	14.21	3.00	42.41	0.04

Pollutant	PTE Benzene emissions (ton/yr)	PTE Toluene emissions (ton/yr)	PTE Ethylbenzene emissions (ton/yr)	PTE Xylenes emissions (ton/yr)	PTE n-Hexane emissions (ton/yr)
Valves	9.64E-05	9.64E-05	9.64E-05	9.64E-05	2.61E-02
Pressure Relief Valves	5.09E-06	5.09E-06	5.09E-06	5.09E-06	1.38E-03
Connectors (2)	3.69E-05	3.69E-05	3.69E-05	3.69E-05	1.00E-02
Open Ended Lines	2.89E-06	2.89E-06	2.89E-06	2.89E-06	7.85E-04
Compressors	8.49E-07	8.49E-07	8.49E-07	8.49E-07	2.30E-04
Total	0.00	0.00	0.00	0.00	0.04

Calculations:

(a) Annual emissions (tons/yr) = [Emission Factor (lb/hr/source)] x [Number of Sources] x [Hours of Operation per Year] x [ton/2000lb]

WET GAS INPUTS TABLE	
Gas Stream Components	**Wt Percent**
Methane	56.50%
Ethane	22.25%
VOC	21.25%
Benzene	0.00%
Toluene	0.00%
Ethylbenzene	0.00%
Xylenes	0.00%
n-Hexane	0.27%

Number of Components in Gas Service

Valves =	222
Pressure Relief Valves =	6
Connectors =	981
Open Ended Lines =	15
Compressors =	1.000
Maximum Hour of Operation =	8,760

Global Warming Potential (GWP)

CO_2	1
CH_4	25
N_2O	298

(1) Emission factors from 1995 EPA Protocol for Equipment Leak Emission Estimates, Table 2-4 Oil and Gas Production

(2) Connectors is assumed to include flange connections in the total count

(3) Worst case VOC wt % assumption for station based on gas sample analysis from facility

(4) *Default Average Component Counts for Major Onshore Natural Gas Production Equipment* from 40 CFR 98, Subpart W, Table W-1B

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

Table 7 Compressor Blowdown Venting Emissions
Caterpillar G3516BLE; 4SLB
Tug Hill Operating, LLC Yoder Pad

Pollutant	Volume (scf/event)	Moles	Molecular Weight of Gas	lbs VOC/event	Events per Year	Emissions (lbs/hr)	Emissions (ton/yr)
VOC[a]	6,163	16.01	19.90	47	60	46.53	1.40
CO2e						36.30	157.75

Measured VOC content of GPU Gas GPU outlet gas.

Bryan Research & Engineering, Inc.

ProMax® 4.0

Simulation Report

Project: TugHill_Yoder_WellPad.pmx

Licensed to SLR International Corporation and Affiliates

Client Name: Tug Hill
Location: Yoder
Job: G70-D Permit

ProMax Filename: N:\West Virginia\Tug Hill\Projects\Air Permits\General Permit G70\Yoder\ProMax\TugHill_Yoder_Wel
ProMax Version: 4.0.16071.0
Simulation Initiated: 11/2/2017 12:55:57 PM

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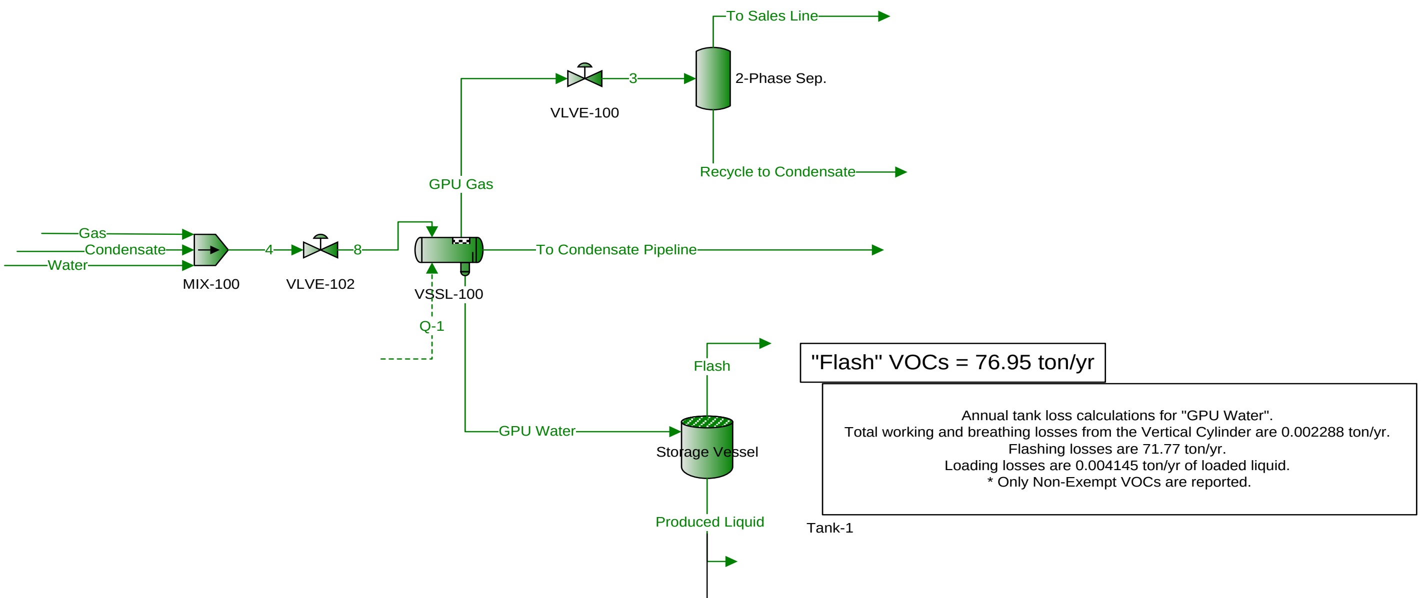
Report Navigator can be activated via the ProMax Navigator Toolbar.
An asterisk (*), throughout the report, denotes a user specified value.
A question mark (?) after a value, throughout the report, denotes an extrapolated or approximate value.

Yoder Well Pad Worst Case



Properties	Produced Liquid	
Liquid Volumetric Flow (Light Liquid)	1.937	bbl/d
Liquid Volumetric Flow (Total)	914.3	bbl/d
Analysis	Produced Liquid	
True Vapor Pressure(Vapor Pressure 1, Total)	3.0349	psig
Composition	Produced Liquid	
Water(Volumetric Flow , Total)	912.29	bbl/d

Process Streams		Condensate	Flash	Gas	GPU Gas	GPU Water	Produced Liquid	Recycle to Condensate	To Condensate Pipeline	To Sales Line	Water
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	Storage Vessel	--	VSSL-100	VSSL-100	Storage Vessel	2-Phase Sep.	VSSL-100	2-Phase Sep.	--
	To Block:	MIX-100	--	MIX-100	VLVE-100	Storage Vessel	--	--	--	--	MIX-100
Mass Fraction		%	%	%	%	%	%	%	%	%	%
C1		2.34727*	27.8776	56.5081*	56.6088	0.0748203	0.00113342	2.46025	3.97448	56.7952	0*
C2		5.27925*	17.2999	22.2497*	22.0522	0.0468756	0.00114931	5.40303	6.52437	22.1096	0*
C3		9.11945*	13.8299	11.9336*	11.8165	0.0375944	0.00104025	9.54185	9.58323	11.8243	0*
iC4		2.40579*	2.89419	1.46099*	1.44759	0.00798659	0.000337165	2.78009	2.40969	1.44301	0*
nC4		8.90203*	10.4073	3.94878*	3.90603	0.0292169	0.00171145	10.8843	8.84039	3.88201	0*
iC5		3.88150*	3.73708	0.722039*	0.781254	0.0112166	0.00134181	4.96512	3.56369	0.766854	0*
nC5		6.49969*	6.04502	0.959329*	1.04177	0.0186938	0.00272201	8.65421	6.01305	1.01557	0*
N2		0.0102111*	0.211273	0.781816*	0.786928	0.000562584	4.13079E-06	0.0106860	0.0216640	0.789600	0*
CO2		0.0231715*	2.56888	0.450770*	0.439629	0.00875880	0.00197360	0.0495505	0.0700704	0.440971	0*
Benzene		0.0622174*	0.0411535	0.00367003*	0.00369854	0.000369109	0.000261017	0.0933145	0.0597284	0.00339010	0*
Ethylbenzene		0.325349*	0.0450390	0*	0.00295519	0.000995555	0.000878825	0.397366	0.303012	0.00159772	0*
Toluene		0.298535*	0.0925986	0.00432905*	0.00658995	0.00106085	0.000818243	0.438650	0.279584	0.00510291	0*
o-Xylene		0*	0	0*	0	0	0	0	0	0	0*
C6		4.39529*	3.15308	0.271275*	0.267060	0.0131424	0.00482053	7.06602	4.24826	0.243659	0*
C7		4.21248*	1.70743	0.117698*	0.109424	0.0126110	0.00811912	6.97219	4.08015	0.0858038	0*
C8		7.61806*	1.26987	0.0751372*	0.0793634	0.0225911	0.0192854	10.4975	7.31097	0.0435068	0*
C9		5.04380*	0.293346	0.0120519*	0.0199894	0.0149006	0.0141626	4.25452	4.82229	0.00541516	0*
C10		4.96922*	0.0970441	0*	0.00880222	0.0146689	0.0144505	2.25237	4.74734	0.00108043	0*
C11		4.12756*	0.0256599	0*	0.00292177	0.0122287	0.0121931	0.814056	3.95761	0.000130050	0*
C12		3.32977*	0.00699971	0*	0.000997387	0.00987879	0.00988642	0.286080	3.19711	1.62027E-05	0*
C13		2.80254*	0.00195383	0*	0.000382629	0.00831919	0.00833606	0.110851	2.69237	2.42462E-06	0*
2,2-Dimethylpropane		0.150000*	0.0795824	0.00338986*	0.0256687	0.000226006	1.56847E-05	0.0889915	0.0714894	0.0254508	0*
2,2-Dimethylbutane		0.110522*	0.0977939	0.0121467*	0.0122726	0.000329413	7.10990E-05	0.159604	0.106263	0.0117655	0*
Cyclopentane		0*	0	0*	0	0	0	0	0	0	0*
2,3-Dimethylbutane		0.110522*	0.141066	0.0323911*	0.0149012	0.000511298	0.000138781	0.256063	0.164575	0.0140712	0*
2-Methylpentane		2.15111*	1.71911	0.170053*	0.172788	0.00640190	0.00186266	3.28459	2.06484	0.162078	0*
3-Methylpentane		1.31231*	1.02146	0.0971732*	0.0968336	0.00394154	0.00124477	2.02317	1.26599	0.0902036	0*
Methylcyclopentane		0.649893*	0.451184	0.0276792*	0.0370781	0.00185825	0.000667388	0.951627	0.594932	0.0339304	0*
Cyclohexane		0.704429*	0.447708	0.0316334*	0.0343603	0.00210890	0.000927907	1.06945	0.669285	0.0307978	0*
2-Methylhexane		1.68553*	0.824715	0.0423712*	0.0560479	0.00487612	0.00270326	2.69662	1.57690	0.0469597	0*
3-Methylhexane		1.50426*	0.710523	0.0423712*	0.0467243	0.00443188	0.00256050	2.45615	1.43314	0.0384316	0*
2,2,4-Trimethylpentane		0*	0	0*	0	0	0	0	0	0	0*
Methylcyclohexane		1.79478*	0.739232	0.0415188*	0.0438837	0.00532945	0.00338436	2.87025	1.71882	0.0341561	0*
m-Xylene		0*	0	0*	0	0	0	0	0	0	0*
p-Xylene		0*	0	0*	0	0	0	0	0	0	0*
Water		0*	2.16156	0*	0.0762430	99.5814	99.8396	6.14020	0.0128540	0.0553723	100*
Tetradecane		2.40779*	0.000578927	0*	0.000149889	0.00714920	0.00716661	0.0435928	2.31372	3.69179E-07	0*
Pentadecane		2.07045*	0.000173496	0*	5.79167E-05	0.00614829	0.00616413	0.0168694	1.98980	5.58985E-08	0*
Hexadecane		1.51322*	4.60447E-05	0*	2.03826E-05	0.00449381	0.00450560	0.00594018	1.45435	8.16408E-09	0*
Heptadecane		1.35049*	1.59465E-05	0*	9.47936E-06	0.00401064	0.00402123	0.00276320	1.29798	1.73585E-09	0*
Octadecane		1.26435*	5.91829E-06	0*	4.48812E-06	0.00375487	0.00376481	0.00130841	1.21520	3.62016E-10	0*
Nonadecane		1.10566*	1.84072E-06	0*	1.86040E-06	0.00328360	0.00329229	0.000542380	1.06268	6.10184E-11	0*
Eicosane		0.854441*	3.66152E-07	0*	5.18464E-07	0.00253754	0.00254426	0.000151157	0.821234	4.90189E-12	0*
Heneicosane		0.660632*	1.22669E-07	0*	2.25339E-07	0.00196196	0.00196716	6.56972E-05	0.634958	1.07519E-12	0*
Docosane		0.637366*	5.01038E-08	0*	1.20734E-07	0.00189287	0.00189788	3.51997E-05	0.612596	2.87311E-13	0*
Tricosane		0.433873*	9.83559E-09	0*	3.27988E-08	0.00128853	0.00129194	9.56247E-06	0.417012	2.57274E-14	0*
Tetracosane		0.347466*	2.62759E-09	0*	1.19897E-08	0.00103191	0.00103465	3.49560E-06	0.333963	3.69591E-15	0*
Pentacosane		0.247587*	7.12419E-10	0*	4.29275E-09	0.000735290	0.000737239	1.25155E-06	0.237965	5.86111E-16	0*
Hexacosane		0.247532*	2.25263E-10	0*	1.89800E-09	0.000735129	0.000737077	5.53362E-07	0.237913	9.77053E-17	0*
Heptacosane		0.292980*	6.78812E-11	0*	8.10084E-10	0.000870102	0.000872408	2.36180E-07	0.281595	1.22737E-17	0*
Octacosane		0.250480*	2.87078E-11	0*	4.40558E-10	0.000743885	0.000745856	1.28445E-07	0.240746	3.90700E-18	0*
Nonacosane		0.0607061*	3.09981E-12	0*	6.13865E-11	0.000180287	0.000180765	1.78972E-08	0.0583469	2.84124E-19	0*
Triacontane		0.0627891*	1.09835E-12	0*	2.97343E-11	0.000186473	0.000186967	8.66903E-09	0.0603490	5.60043E-20	0*
Hentriacontane		0.365642*	1.54617E-11	0*	3.29759E-10	0.00108590	0.00108877	9.61412E-08	0.351433	7.40659E-19	0*
Other C10s		0*	0	0*	0	0	0	0	0	0	0*
Other C7s		0*	0	0*	0	0	0	0	0	0	0*
Other C8s		0*	0	0*	0	0	0	0	0	0	0*
Other C9s		0*	0	0*	0	0	0	0	0	0	0*

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
C1	489.211*	9.81887	40494.6*	40113.6	9.96950	0.150624	5.97963	860.207	40107.7	0*
C2	1100.29*	6.09324	15944.5*	15626.5	6.24598	0.152736	13.1320	1412.09	15613.3	0*
C3	1900.65*	4.87106	8551.78*	8373.30	5.00930	0.138243	23.1915	2074.12	8350.11	0*
iC4	501.407*	1.01937	1046.97*	1025.78	1.06418	0.0448071	6.75701	521.534	1019.02	0*
nC4	1855.34*	3.66559	2829.76*	2767.85	3.89303	0.227441	26.4543	1913.35	2741.40	0*
iC5	808.972*	1.31625	517.425*	553.605	1.49457	0.178318	12.0677	771.297	541.537	0*
nC5	1354.65*	2.12914	687.471*	738.209	2.49087	0.361738	21.0340	1301.42	717.175	0*
N2	2.12817*	0.0744130	560.262*	557.626	0.0749620	0.000548956	0.0259723	4.68879	557.600	0*
CO2	4.82933*	0.904795	323.029*	311.526	1.16707	0.262279	0.120432	15.1655	311.405	0*
Benzene	12.9672*	0.0144948	2.63000*	2.62083	0.0491823	0.0346875	0.226801	12.9272	2.39402	0*
Ethylbenzene	67.8084*	0.0158633	0*	2.09408	0.132654	0.116790	0.965798	65.5816	1.12828	0*
Toluene	62.2197*	0.0326145	3.10227*	4.66971	0.141354	0.108739	1.06614	60.5109	3.60357	0*
o-Xylene	0*	0	0*	0	0	0	0	0	0	0*
C6	916.054*	1.11056	194.400*	189.241	1.75118	0.640618	17.1740	919.462	172.068	0*
C7	877.952*	0.601379	84.3441*	77.5388	1.68036	1.07898	16.9459	883.077	60.5930	0*
C8	1587.73*	0.447264	53.8445*	56.2378	3.01018	2.56291	25.5142	1582.33	30.7236	0*
C9	1051.21*	0.103320	8.63661*	14.1647	1.98545	1.88213	10.3406	1043.70	3.82408	0*
C10	1035.67*	0.0341802	0*	6.23735	1.95457	1.92039	5.47437	1027.48	0.762977	0*
C11	860.254*	0.00903775	0*	2.07040	1.62942	1.62038	1.97856	856.555	0.0918391	0*
C12	693.982*	0.00246539	0*	0.706760	1.31631	1.31384	0.695318	691.959	0.0114420	0*
C13	584.096*	0.000688166	0*	0.271135	1.10850	1.10781	0.269423	582.717	0.00171222	0*
2,2-Dimethylpropane	31.2627*	0.0280300	2.42922*	18.1892	0.0301144	0.00208439	0.216294	15.4726	17.9729	0*
2,2-Dimethylbutane	23.0347*	0.0344443	8.70448*	8.69649	0.0438929	0.00944860	0.387916	22.9988	8.30858	0*
Cyclopentane	0*	0	0*	0	0	0	0	0	0	0*
2,3-Dimethylbutane	23.0347*	0.0496853	23.2120*	10.5592	0.0681284	0.0184431	0.622361	35.6194	9.93682	0*
2-Methylpentane	448.328*	0.605492	121.863*	122.440	0.853027	0.247535	7.98320	446.898	114.457	0*
3-Methylpentane	273.507*	0.359773	69.6359*	68.6173	0.525194	0.165421	4.91731	274.000	63.7000	0*
Methylcyclopentane	135.449*	0.158913	19.8353*	26.2739	0.247605	0.0886916	2.31293	128.763	23.9610	0*
Cyclohexane	146.815*	0.157689	22.6690*	24.3481	0.281002	0.123313	2.59930	144.855	21.7488	0*
2-Methylhexane	351.294*	0.290476	30.3639*	39.7162	0.649722	0.359247	6.55414	341.292	33.1620	0*
3-Methylhexane	313.514*	0.250256	30.3639*	33.1094	0.590530	0.340274	5.96968	310.178	27.1397	0*
2,2,4-Trimethylpentane	0*	0	0*	0	0	0	0	0	0	0*
Methylcyclohexane	374.063*	0.260367	29.7530*	31.0965	0.710127	0.449760	6.97614	372.009	24.1203	0*
m-Xylene	0*	0	0*	0	0	0	0	0	0	0*
p-Xylene	0*	0	0*	0	0	0	0	0	0	0*
Water	0*	0.761332	0*	54.0266	13268.8	13268.0	14.9238	2.78203	39.1028	13325.6*
Tetradecane	501.824*	0.000203906	0*	0.106213	0.952601	0.952397	0.105952	500.765	0.000260707	0*
Pentadecane	431.517*	6.11078E-05	0*	0.0410404	0.819234	0.819173	0.0410010	430.656	3.94744E-05	0*
Hexadecane	315.382*	1.62176E-05	0*	0.0144434	0.598782	0.598766	0.0144376	314.769	5.76532E-06	0*
Heptadecane	281.466*	5.61658E-06	0*	0.00671718	0.534402	0.534396	0.00671596	280.925	1.22582E-06	0*
Octadecane	263.513*	2.08450E-06	0*	0.00318033	0.500321	0.500319	0.00318008	263.010	2.55649E-07	0*
Nonadecane	230.438*	6.48328E-07	0*	0.00131830	0.437526	0.437525	0.00131825	229.999	4.30900E-08	0*
Eicosane	178.080*	1.28964E-07	0*	0.000367390	0.338117	0.338116	0.000367386	177.742	3.46162E-09	0*
Heneicosane	137.687*	4.32058E-08	0*	0.000159678	0.261423	0.261423	0.000159677	137.426	7.59282E-10	0*
Docosane	132.838*	1.76472E-08	0*	8.55531E-05	0.252217	0.252217	8.55529E-05	132.586	2.02893E-10	0*
Tricosane	90.4266*	3.46423E-09	0*	2.32416E-05	0.171691	0.171691	2.32416E-05	90.2549	1.81682E-11	0*
Tetracosane	72.4179*	9.25473E-10	0*	8.49606E-06	0.137498	0.137498	8.49605E-06	72.2804	2.60998E-12	0*
Pentacosane	51.6013*	2.50924E-10	0*	3.04189E-06	0.0979744	0.0979744	3.04189E-06	51.5033	4.13900E-13	0*
Hexacosane	51.5900*	7.93406E-11	0*	1.34494E-06	0.0979529	0.0979529	1.34494E-06	51.4920	6.89975E-14	0*
Heptacosane	61.0622*	2.39087E-11	0*	5.74034E-07	0.115938	0.115938	5.74034E-07	60.9462	8.66746E-15	0*
Octacosane	52.2044*	1.01113E-11	0*	3.12184E-07	0.0991195	0.0991195	3.12184E-07	52.1053	2.75905E-15	0*
Nonacosane	12.6522*	1.09180E-12	0*	4.34992E-08	0.0240225	0.0240225	4.34992E-08	12.6282	2.00643E-16	0*
Triacontane	13.0863*	3.86855E-13	0*	2.10701E-08	0.0248467	0.0248467	2.10701E-08	13.0615	3.95492E-17	0*
Hentriacontane	76.2062*	5.44581E-12	0*	2.33671E-07	0.144691	0.144691	2.33671E-07	76.0615	5.23039E-16	0*
Other C10s	0*	0	0*	0	0	0	0	0	0	0*
Other C7s	0*	0	0*	0	0	0	0	0	0	0*
Other C8s	0*	0	0*	0	0	0	0	0	0	0*
Other C9s	0*	0	0*	0	0	0	0	0	0	0*

Process Streams		Condensate	Flash	Gas	GPU Gas	GPU Water	Produced Liquid	Recycle to Condensate	To Condensate Pipeline	To Sales Line	Water
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	**From Block:**	--	Storage Vessel	--	VSSL-100	VSSL-100	Storage Vessel	2-Phase Sep.	VSSL-100	2-Phase Sep.	--
	To Block:	MIX-100	--	MIX-100	VLVE-100	Storage Vessel	--	--	--	--	MIX-100
Property	**Units**										
Temperature	°F	100*	81.3435	100*	80.0000	80.0000	81.3435	55.0544	80.0000	55.0544	100*
Pressure	psig	1900*	0	1900*	648	648	0	348	648	348	1900*
Molecular Weight	lb/lbmol	74.7294	30.1555	21.2842	21.2714	18.0592	18.0400	55.6182	68.4112	21.2263	18.0153
Mass Density	lb/ft^3	39.9254	0.0768871	9.69144	2.91347	62.0317	62.1312	39.6480	38.5261	1.56189	62.0610
Molar Flow	lbmol/h	278.896	1.16799	3366.90	3331.28	737.830	736.662	4.36997	316.370	3326.91	739.684
Mass Flow	lb/h	20841.7	35.2213	71661.6	70861.1	13324.6	13289.4	243.050	21643.2	70618.1	13325.6
Std Vapor Volumetric Flow	MMSCFD	2.54007	0.0106376	30.6644*	30.3400	6.71987	6.70923	0.0398000	2.88138	30.3002	6.73676
Std Liquid Volumetric Flow	sgpm	67.0149*	0.163101	414.610	409.739	26.7460	26.5829	0.794265	71.7792	408.945	26.6389*
Gross Ideal Gas Heating Value	Btu/ft^3	4135.19	1678.69	1276.79	1275.19	54.4290	51.8537	2912.74	3796.59	1273.04	50.3101
Gross Liquid Heating Value	Btu/lb	20832.1	20988.3	22698.2	22682.8	87.8430	32.4497	19642.4	20896.5	22693.2	0

Environments Report

Client Name:	G70-D Permit	**Job:**	N:\West Virginia\Tug Hill\Projects\Air Permits\General Permit G70\Yoder\ProMax\TugHill_Yoder_WellPad.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	Ideal Gas Reference Volume	379.484 ft^3/lbmol
Ideal Gas Reference Pressure	14.6959 psia	Liquid Reference Temperature	60 °F
Ideal Gas Reference Temperature	60 °F		

Environment1

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	1 %
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	FALSE
Freeze Out Temperature Threshold Difference	10 °F		

Components

Component	Henry's Law Comp.	Phase Initiator	Component	Henry's Law Comp.	Phase Initiator
C1	FALSE	FALSE	C2	FALSE	FALSE
C3	FALSE	FALSE	iC4	FALSE	FALSE
nC4	FALSE	FALSE	iC5	FALSE	FALSE
nC5	FALSE	FALSE	N2	FALSE	FALSE
CO2	FALSE	FALSE	Benzene	FALSE	FALSE
Ethylbenzene	FALSE	FALSE	Toluene	FALSE	FALSE
o-Xylene	FALSE	FALSE	C6	FALSE	FALSE
C7	FALSE	FALSE	C8	FALSE	FALSE
C9	FALSE	FALSE	C10	FALSE	FALSE
C11	FALSE	FALSE	C12	FALSE	FALSE
C13	FALSE	FALSE	2,2-Dimethylpropane	FALSE	FALSE
2,2-Dimethylbutane	FALSE	FALSE	Cyclopentane	FALSE	FALSE
2,3-Dimethylbutane	FALSE	FALSE	2-Methylpentane	FALSE	FALSE
3-Methylpentane	FALSE	FALSE	Methylcyclopentane	FALSE	FALSE
Cyclohexane	FALSE	FALSE	2-Methylhexane	FALSE	FALSE
3-Methylhexane	FALSE	FALSE	2,2,4-Trimethylpentane	FALSE	FALSE
Methylcyclohexane	FALSE	FALSE	m-Xylene	FALSE	FALSE
p-Xylene	FALSE	FALSE	Water	FALSE	TRUE
Tetradecane	FALSE	FALSE	Pentadecane	FALSE	FALSE
Hexadecane	FALSE	FALSE	Heptadecane	FALSE	FALSE
Octadecane	FALSE	FALSE	Nonadecane	FALSE	FALSE
Eicosane	FALSE	FALSE	Heneicosane	FALSE	FALSE
Docosane	FALSE	FALSE	Tricosane	FALSE	FALSE
Tetracosane	FALSE	FALSE	Pentacosane	FALSE	FALSE
Hexacosane	FALSE	FALSE	Heptacosane	FALSE	FALSE
Octacosane	FALSE	FALSE	Nonacosane	FALSE	FALSE
Triacontane	FALSE	FALSE	Hentriacontane	FALSE	FALSE
Other C10s	FALSE	FALSE	Other C7s	FALSE	FALSE
Other C8s	FALSE	FALSE	Other C9s	FALSE	FALSE

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Vapor Package	Peng-Robinson
Overall Package	Peng-Robinson	Light Liquid Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Notes:

Calculators Report

Client Name:	G70-D Permit	**Job:**	N:\W
Location:	0		
Flowsheet:	Flowsheet1		

Simple Solver 1

Source Code

Residual Error (for CV1) = Temp-80

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!QStreams!Q-1!Energy Rate
Value	2.11302
Units	MMBtu/h

Measured Variable [Temp]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!GPU Water!Phases!Total!Properties!Temperature
Value	80.0000
Units	°F

Solver Properties

Status: **Solved**

Error	-1.92247E-06		Iterations	10
Calculated Value	2.11302E+06	Btu/h	Max Iterations	20
Lower Bound		Btu/h	Weighting	1
Upper Bound		Btu/h	Priority	0
Step Size		Btu/h	Solver Active	Active
Is Minimizer	FALSE		Group	
Algorithm	Default		Skip Dependency Check	FALSE

Notes:

Simple Solver 2

Source Code

Residual Error (for CV1) = GPU_Gas-30.34

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Gas!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	30.6644
Units	MMSCFD

Measured Variable [GPU_Gas]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!GPU Gas!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	30.3400
Units	MMSCFD

Solver Properties

Status: **Solved**

Error	2.17445E-07		Iterations	10
Calculated Value	30.6644	MMSCFD	Max Iterations	20
Lower Bound		MMSCFD	Weighting	1
Upper Bound		MMSCFD	Priority	0
Step Size		MMSCFD	Solver Active	Active
Is Minimizer	FALSE		Group	
Algorithm	Default		Skip Dependency Check	FALSE

Notes:

Simple Solver 3

Source Code

Residual Error (for CV1) = CondPipeline-2461

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	2297.65
Units	bbl/d

Measured Variable [CondPipeline]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!To Condensate Pipeline!Phases!Light Liquid!Properties!Std Liquid Volumetric Flow
Value	2461.00
Units	bbl/d

Solver Properties

Status: **Solved**

Error	-0.000122836		Iterations	10
Calculated Value	67.0149	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	FALSE		Group	
Algorithm	Default		Skip Dependency Check	FALSE

Notes:

Simple Solver 4

Source Code

Residual Error (for CV1) = WatertoTank-912.3231

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	913.333
Units	bbl/d

Measured Variable [WatertoTank]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!GPU Water!Phases!Heavy Liquid!Properties!Std Liquid Volumetric Flow
Value	912.323
Units	bbl/d

Solver Properties

Status: **Solved**

Error	9.71403E-07		Iterations	10
Calculated Value	26.6389	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	FALSE		Group	
Algorithm	Default		Skip Dependency Check	FALSE

Notes:

User Value Sets Report

Client Name:	G70-D Permit	**Job:**	N:\West Virginia\
Location:	0		
Flowsheet:	Flowsheet1		

Tank-1

User Value [BlockReady]

Parameter	1*		Upper Bour		
Lower Bound			Enforce Boı	FALSE	

User Value [ShellLength]

Parameter	25*	ft	Upper Bour		ft
Lower Bound	0*	ft	Enforce Boı	FALSE	

User Value [ShellDiam]

Parameter	12*	ft	Upper Bour		ft
Lower Bound	0*	ft	Enforce Boı	FALSE	

User Value [BreatherVP]

Parameter	0.0300000*	psig	Upper Bour		psig
Lower Bound		psig	Enforce Boı	FALSE	

User Value [BreatherVacP]

Parameter	-0.0300000*	psig	Upper Bour		psig
Lower Bound		psig	Enforce Boı	FALSE	

User Value [DomeRadius]

Parameter	0.17*	ft	Upper Bour		ft
Lower Bound		ft	Enforce Boı	FALSE	

User Value [OpPress]

Parameter	0*	psig	Upper Bour		psig
Lower Bound		psig	Enforce Boı	FALSE	

User Value [AvgPercentLiq]

Parameter	50*	%	Upper Bour		%
Lower Bound		%	Enforce Boı	FALSE	

User Value [MaxPercentLiq]

Parameter	90*	%	Upper Bour		%
Lower Bound		%	Enforce Boı	FALSE	

User Value [AnnNetTP]

Parameter	911.142*	bbl/day	Upper Bour		bbl/day
Lower Bound	0*	bbl/day	Enforce Boı	FALSE	

User Value [OREff]

Parameter	0*	%	Upper Bour		%
Lower Bound		%	Enforce Boı	FALSE	

User Value [MaxAvgT]

Parameter	61.15*	°F	Upper Bour		°F
Lower Bound		°F	Enforce Boı	FALSE	

User Value [MinAvgT]

Parameter	36.9667*	°F	Upper Bour		°F
Lower Bound		°F	Enforce Boı	FALSE	

User Value [BulkLiqT]

Parameter	52.1383*	°F	Upper Bour		°F
Lower Bound		°F	Enforce Boı	FALSE	

User Value [AvgP]

Parameter	13.7315*	psia	Upper Bour		psia
Lower Bound		psia	Enforce Boı	FALSE	

User Value [Therml]

Parameter	1193.89*	Btu/ft^2/day	Upper Bour		Btu/ft^2/day
Lower Bound		Btu/ft^2/day	Enforce Boı	FALSE	

User Value [AvgWindSpeed]

Parameter	6.16667*	mi/h	Upper Bour		mi/h
Lower Bound		mi/h	Enforce Boı	FALSE	

User Value [MaxHourlyLoadingRate]

Parameter	37.9642*	bbl/hr	Upper Bour		bbl/hr
Lower Bound	0*	bbl/hr	Enforce Boı	FALSE	

User Value [EntrainedOilFrac]

Parameter	1*	%	Upper Bour		%
Lower Bound		%	Enforce Boı	FALSE	

User Value [TurnoverRate]

Parameter	244.565*		Upper Bour		
Lower Bound			Enforce Boı	FALSE	

User Value [LLossSatFactor]

Parameter	0.5*		Upper Bour		
Lower Bound			Enforce Boı	FALSE	

User Value [AtmPressure]

Parameter	13.7315*	psia	Upper Bour		psia
Lower Bound		psia	Enforce Boı	FALSE	

User Value [TVP]

Parameter	0.251741*	psia	Upper Bour		psia
Lower Bound		psia	Enforce Boı	FALSE	

User Value [MaxVP]

Parameter	0.351897*	psia	Upper Bour		psia
Lower Bound		psia	Enforce Boı	FALSE	

User Value [MinVP]

Parameter	0.178574*	psia	Upper Bour		psia
Lower Bound		psia	Enforce Boı	FALSE	

User Value [AvgLiqSurfaceT]

Parameter	57.1967*	°F	Upper Bour		°F
Lower Bound		°F	Enforce Boı	FALSE	

User Value [MaxLiqSurfaceT]

Parameter	67.2326*	°F	Upper Bour		°F
Lower Bound		°F	Enforce Boı	FALSE	

User Value [TotalLosses]

Parameter	0.00228813*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [WorkingLosses]					
Parameter	0.000592299*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [StandingLosses]					
Parameter	0.000170409*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [RimSealLosses]					
Parameter	0*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [WithdrawalLoss]					
Parameter	0*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [LoadingLosses]					
Parameter	0.00414535*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [MaxHourlyLoadingLoss]					
Parameter	0.000946428*	lb/hr	Upper Bour		lb/hr
Lower Bound		lb/hr	Enforce Boı	FALSE	

User Value [PStar]					
Parameter			Upper Bour		
Lower Bound			Enforce Boı	FALSE	

User Value [AllCTotalLosses]					
Parameter	0.221246*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [AllCLoadingLosses]					
Parameter	0.400826*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [AllCMaxHLoadingLoss]					
Parameter	0.0915129*	lb/hr	Upper Bour		lb/hr
Lower Bound		lb/hr	Enforce Boı	FALSE	

User Value [AllCFlashingLosses]					
Parameter	147.693*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [DeckFittingLosses]					
Parameter	0*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [DeckSeamLosses]					
Parameter	0*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [FlashingLosses]					
Parameter	71.7736*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [TotalResidual]					
Parameter	58213.8*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Boı	FALSE	

User Value [GasMoleWeight]

Parameter	0.0189145*	kg/mol	Upper Bour		kg/mol
Lower Bound		kg/mol	Enforce Bo	FALSE	

User Value [VapReportableFrac]

Parameter	1.03420*	%	Upper Bour		%
Lower Bound		%	Enforce Bo	FALSE	

User Value [LiqReportableFrac]

Parameter	0.165017*	%	Upper Bour		%
Lower Bound		%	Enforce Bo	FALSE	

User Value [FlashReportableFrac]

Parameter	48.5966*	%	Upper Bour		%
Lower Bound		%	Enforce Bo	FALSE	

Notes:
This User Value Set was programmatically generated. GUID={1EDE36BA-2D5D-4876-9370-5B5F79CCFF0E}

Sum Component Flow/Frac

User Value [CompSum]

Parameter	76.9508*	ton/yr	Upper Bour		ton/yr
Lower Bound		ton/yr	Enforce Bo	FALSE	

Notes:
This User Value Set was programmatically generated. GUID={06B303CE-D6A3-4C69-ABCE-29F0C05F34E0}

January 23, 2017

FESCO, Ltd.
104 FESCO Run - Bridgeport, West Virginia 26330

For: Tug Hill Operating, LLC
1320 S. University Drive, Suite 500
Fort Worth, Texas 76107

Sample: Goudy No. 9H
Orifice Plate Holder
Spot Gas Sampled @ 388 psig & 64 °F

Date Sampled: 01/17/17 Job Number: 01929.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Nitrogen	0.594	
Carbon Dioxide	0.218	
Methane	74.970	
Ethane	15.749	4.261
Propane	5.760	1.605
Isobutane	0.535	0.177
n-Butane	1.446	0.461
2-2 Dimethylpropane	0.001	0.000
Isopentane	0.213	0.079
n-Pentane	0.283	0.104
Hexanes	0.144	0.060
Heptanes Plus	0.087	0.038
Totals	100.000	6.786

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity --------------------------	3.450	(Air=1)
Molecular Weight -----------------------	99.56	
Gross Heating Value -------------------	5321	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity --------------------------	0.738	(Air=1)
Compressibility (Z) ----------------------	0.9962	
Molecular Weight -----------------------	21.29	
Gross Heating Value		
Dry Basis -------------------------------	1295	BTU/CF
Saturated Basis -----------------------	1273	BTU/CF

Base Conditions: 14.850 PSI & 60 Deg F

Sampled By: (20) C. Gherke
Analyst: AC

Certified: Fesco, Ltd. - Bridgeport, West Virginia

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Nitrogen	0.594		0.782
Carbon Dioxide	0.218		0.451
Methane	74.970		56.505
Ethane	15.749	4.261	22.248
Propane	5.760	1.605	11.932
Isobutane	0.535	0.177	1.461
n-Butane	1.446	0.461	3.948
2,2 Dimethylpropane	0.001	0.000	0.003
Isopentane	0.213	0.079	0.722
n-Pentane	0.283	0.104	0.959
2,2 Dimethylbutane	0.003	0.001	0.012
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.008	0.003	0.032
2 Methylpentane	0.042	0.018	0.170
3 Methylpentane	0.024	0.010	0.097
n-Hexane	0.067	0.028	0.271
Methylcyclopentane	0.007	0.002	0.028
Benzene	0.001	0.000	0.004
Cyclohexane	0.008	0.003	0.032
2-Methylhexane	0.009	0.004	0.042
3-Methylhexane	0.009	0.004	0.042
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.009	0.004	0.042
n-Heptane	0.016	0.007	0.075
Methylcyclohexane	0.009	0.004	0.042
Toluene	0.001	0.000	0.004
Other C8's	0.010	0.005	0.052
n-Octane	0.004	0.002	0.021
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.001	0.000	0.005
O-Xylene	0.000	0.000	0.000
Other C9's	0.002	0.001	0.012
n-Nonane	0.001	0.001	0.006
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	6.786	100.000

Computed Real Characteristics of Total Sample

Specific Gravity ----------------------------------	0.738	(Air=1)
Compressibility (Z) -----------------------------	0.9962	
Molecular Weight -------------------------------	21.29	

Gross Heating Value

Dry Basis --------------------------------------	1295	BTU/CF
Saturated Basis -----------------------------	1273	BTU/CF

January 23, 2017

FESCO, Ltd.
104 FESCO Run - Bridgeport, West Virginia 26330

Sample: Goudy No. 9H
Orifice Plate Holder
Spot Gas Sampled @ 388 psig & 64 °F

Date Sampled: 01/17/17

Job Number: 01929.001

GLYCALC FORMAT

COMPONENT	MOL%	GPM	Wt %
Carbon Dioxide	0.218		0.451
Hydrogen Sulfide	----		----
Nitrogen	0.594		0.782
Methane	74.970		56.505
Ethane	15.749	4.261	22.248
Propane	5.760	1.605	11.932
Isobutane	0.535	0.177	1.461
n-Butane	1.447	0.462	3.951
Isopentane	0.213	0.079	0.722
n-Pentane	0.283	0.104	0.959
Cyclopentane	0.000	0.000	0.000
n-Hexane	0.067	0.028	0.271
Cyclohexane	0.008	0.003	0.032
Other C6's	0.077	0.032	0.311
Heptanes	0.050	0.022	0.229
Methylcyclohexane	0.009	0.004	0.042
2,2,4 Trimethylpentane	0.000	0.000	0.000
Benzene	0.001	0.000	0.004
Toluene	0.001	0.000	0.004
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.001	0.000	0.005
Octanes Plus	0.017	0.008	0.091
Totals	100.000	6.786	100.000

Real Characteristics Of Octanes Plus:

Specific Gravity -----------------------	3.955	(Air=1)
Molecular Weight ----------------------	114.11	
Gross Heating Value -----------------	5929	BTU/CF

Real Characteristics Of Total Sample:

Specific Gravity ------------------------	0.738	(Air=1)
Compressibility (Z) --------------------	0.9962	
Molecular Weight ----------------------	21.29	
Gross Heating Value		
Dry Basis ------------------------------	1295	BTU/CF
Saturated Basis ----------------------	1273	BTU/CF

February 10, 2017

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Tug Hill Operating, LLC
1320 S. University Drive, Suite 500
Fort Worth, Texas 76107

Sample: Goudy No. 9H
Separator Hydrocarbon Liquid
Sampled @ 388 psig & 58 °F

Date Sampled: 01/17/17

Job Number: 71212.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.027	0.008	0.010
Carbon Dioxide	0.039	0.018	0.023
Methane	10.838	4.942	2.345
Ethane	13.005	9.359	5.275
Propane	15.319	11.357	9.113
Isobutane	3.066	2.700	2.404
n-Butane	11.345	9.625	8.895
2,2 Dimethylpropane	0.154	0.159	0.150
Isopentane	3.985	3.922	3.879
n-Pentane	6.673	6.509	6.495
2,2 Dimethylbutane	0.095	0.107	0.111
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.260	0.287	0.302
2 Methylpentane	1.849	2.066	2.150
3 Methylpentane	1.128	1.239	1.312
n-Hexane	3.778	4.180	4.392
Heptanes Plus	28.437	43.524	53.144
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity --------------------------------	0.7718	(Water=1)
°API Gravity --------------------------------------	51.84	@ 60°F
Molecular Weight ------------------------------	138.5	
Vapor Volume ---------------------------------	17.68	CF/Gal
Weight ---	6.43	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity --------------------------------	0.6321	(Water=1)
°API Gravity --------------------------------------	92.36	@ 60°F
Molecular Weight-------------------------------	74.1	
Vapor Volume ---------------------------------	27.06	CF/Gal
Weight ---	5.27	Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

Sampled By: (20) Gherke
Analyst: XG
Processor: XGdjv
Cylinder ID: W-0489

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.039	0.018	0.023
Nitrogen	0.027	0.008	0.010
Methane	10.838	4.942	2.345
Ethane	13.005	9.359	5.275
Propane	15.319	11.357	9.113
Isobutane	3.066	2.700	2.404
n-Butane	11.500	9.784	9.046
Isopentane	3.985	3.922	3.879
n-Pentane	6.673	6.509	6.495
Other C-6's	3.333	3.699	3.875
Heptanes	6.663	7.875	8.740
Octanes	6.294	7.923	9.221
Nonanes	2.913	4.235	4.987
Decanes Plus	11.331	22.262	28.492
Benzene	0.059	0.044	0.062
Toluene	0.240	0.217	0.299
E-Benzene	0.227	0.236	0.325
Xylenes	0.711	0.733	1.018
n-Hexane	3.778	4.180	4.392
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity --	0.6321	(Water=1)
°API Gravity ---	92.36	@ 60°F
Molecular Weight--------------------------------------	74.1	
Vapor Volume ---	27.06	CF/Gal
Weight ---	5.27	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity --	0.8090	(Water=1)
Molecular Weight--------------------------------------	186.4	

Characteristics of Atmospheric Sample:

°API Gravity ---	65.36	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)--------	10.29	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-0489	------
Pressure, PSIG	388	375	------
Temperature, °F	58	58	------

* Sample used for analysis

FESCO, Ltd. Job Number: 71212.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.027	0.008	0.010
Carbon Dioxide	0.039	0.018	0.023
Methane	10.838	4.942	2.345
Ethane	13.005	9.359	5.275
Propane	15.319	11.357	9.113
Isobutane	3.066	2.700	2.404
n-Butane	11.345	9.625	8.895
2,2 Dimethylpropane	0.154	0.159	0.150
Isopentane	3.985	3.922	3.879
n-Pentane	6.673	6.509	6.495
2,2 Dimethylbutane	0.095	0.107	0.111
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.260	0.287	0.302
2 Methylpentane	1.849	2.066	2.150
3 Methylpentane	1.128	1.239	1.312
n-Hexane	3.778	4.180	4.392
Methylcyclopentane	0.572	0.544	0.649
Benzene	0.059	0.044	0.062
Cyclohexane	0.620	0.568	0.704
2-Methylhexane	1.246	1.558	1.684
3-Methylhexane	1.112	1.373	1.503
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.610	0.722	0.816
n-Heptane	2.504	3.108	3.385
Methylcyclohexane	1.354	1.464	1.793
Toluene	0.240	0.217	0.299
Other C-8's	3.406	4.344	5.064
n-Octane	1.534	2.114	2.363
E-Benzene	0.227	0.236	0.325
M & P Xylenes	0.276	0.288	0.396
O-Xylene	0.435	0.445	0.623
Other C-9's	1.958	2.789	3.334
n-Nonane	0.955	1.446	1.653
Other C-10's	2.028	3.175	3.866
n-decane	0.559	0.924	1.073
Undecanes(11)	1.956	3.142	3.879
Dodecanes(12)	1.448	2.512	3.145
Tridecanes(13)	1.126	2.094	2.658
Tetradecanes(14)	0.899	1.791	2.304
Pentadecanes(15)	0.722	1.542	2.008
Hexadecanes(16)	0.495	1.130	1.483
Heptadecanes(17)	0.416	1.004	1.331
Octadecanes(18)	0.368	0.933	1.244
Nonadecanes(19)	0.305	0.807	1.083
Eicosanes(20)	0.224	0.617	0.832
Heneicosanes(21)	0.165	0.477	0.647
Docosanes(22)	0.152	0.459	0.626
Tricosanes(23)	0.099	0.310	0.425
Tetracosanes(24)	0.076	0.247	0.340
Pentacosanes(25)	0.052	0.175	0.242
Hexacosanes(26)	0.050	0.174	0.242
Heptacosanes(27)	0.057	0.206	0.288
Octacosanes(28)	0.047	0.175	0.245
Nonacosanes(29)	0.011	0.043	0.061
Triacontanes(30)	0.011	0.044	0.062
Hentriacontanes Plus(31+)	0.062	0.280	0.406
Total	100.000	100.000	100.000

ATTACHMENT U

FACILITY-WIDE EMISSION SUMMARY SHEET(S)

General G70-D Permit Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

ATTACHMENT U - FACILITY WIDE CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary

Emission Point ID#	NO_X		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1e	0.10	0.43	0.08	0.36	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.03	117.01	512.50
2e	0.10	0.43	0.08	0.36	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.03	117.01	512.50
3e	0.10	0.43	0.08	0.36	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.03	117.01	512.50
4e	0.10	0.43	0.08	0.36	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.03	117.01	512.50
5e	0.10	0.43	0.08	0.36	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.03	117.01	512.50
6e	0.10	0.43	0.08	0.36	0.01	0.02	0.00	0.00	0.01	0.03	0.01	0.03	117.01	512.50
7e	0.14	0.60	0.62	2.73	1.38	6.03	0.00	0.00	--	--	--	--	233.74	1023.77
8e	1.52	6.66	6.08	26.65	2.13	9.33	0.01	0.03	0.11	0.49	0.11	0.49	1745.52	6950.63
9e					0.00	0.00								
10e					46.53	1.40							36.30	157.75
TOTAL	2.25	9.84	7.20	31.54	50.07	16.89	0.01	0.05	0.16	0.69	0.16	0.69	2717.62	11207.17

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except for emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source catergories in Table 1.
Therefore fugitive emissions shall not be included in the PTE above.

ATTACHMENT U - FACILITY WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1e	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	0.00	0.01	0.00	0.01
2e	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	0.00	0.01	0.00	0.01
3e	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	0.00	0.01	0.00	0.01
4e	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	0.00	0.01	0.00	0.01
5e	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	0.00	0.01	0.00	0.01
6e	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	0.00	0.01	0.00	0.01
7e	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8e	1.19	5.20	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.01	0.01	0.06	1.42	6.24
9e	0.00	0.00.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10e	0.00	0.00.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1.19	5.20	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.01	0.02	0.10	1.44	6.29

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except for emergency generators.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source catergories in Table 1. Therefore fugitive emissions shall not be included in the PTE above.

ATTACHMENT V

CLASS I LEGAL ADVERTISEMENT

General G70-D Permit Modification Application

Yoder Well Pad
Proctor, West Virginia

Tug Hill Operating, LLC
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317

October 2017

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Tug Hill Operating, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit Registration, for a natural gas well pad located off Waynes Ridge, North of Proctor, in Marshall County, West Virginia. The latitude and longitude coordinates are 39.78042 and -80.84016.

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

Pollutant	Tons/yr
$PM/PM_{10}/PM_{2.5}$	0.70
NO_X	9.84
CO	31.55
VOCs	25.10
Benzene	0.01
Toluene	0.02
Xylenes	0.01
n-Hexane	0.14
Formaldehyde	5.20
Total HAPs	6.33

Startup of operation is planned to begin in the 4th quarter of 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

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

Dated this the 10th day of November, 2017.

By: Tug Hill Operating, LLC
Sean Willis
Vice President
380 Southpointe Blvd., Suite 200
Canonsburg, PA 15317