

August 25, 2017

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

Re: Tug Hill Operating, LLC, G70-D General Permit Application – Greer Well Pad

Dear Mr. Durham,

Tug Hill Operating, LLC (Tug Hill) and SLR International Corporation (SLR) have prepared the attached G70-D General Permit Application for the Greer well pad located in Marshall County, West Virginia. This application reflects the construction of the following: (10) Marcellus wells, (10) 1 MMBtu/hr gas processing units, (1) 5 MMBtu/hr condensate stabilization unit, (16) 500 bbl condensate storage tanks, (4) 500bbl produced water storage tanks, (1) 690 HP compressor engine, and (1) 118 HP generator. All site emissions have been evaluated and are attached for your review within this application.

The public notice was delivered to the *Moundsville Daily Echo* for publication. The legal advertisement will be forwarded to your office as soon as SLR received the original affidavit from the newspaper.

If any additional information is needed, please feel free to contact me by telephone at (304) 545-8563 or by e-mail at ihanshaw@slrconsulting.com

Sincerely,

SLR International Corporation

Jesse Hanshaw, P.E.

Jesse Hanshaw

Principal Engineer







Greer 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.

Chris Boggess Associate Engineer

Jesse Hanshaw, P.E. Principal Engineer





CONTENTS

Section

Section 1. TECHNICAL SUPPORT DOCUMENT

- 1.1 INTRODUCTION
- 1.2 DESCRIPTION OF FACILITY
- 1.3 FEDERAL AND STATE REQUIREMENTS

Section 2. APPLICATION FOR PERMIT

ATTACHMENTS

ATTACHMENT A	SINGLE SOURCE DETERMINATION FORM
ATTACHMENT B	SINGLE SOURCE DETERMINATION FORM SITING CRITERIA WAIVER (SEE NOTES)
ATTACHMENT C	BUSINESS ČERTIFICATÉ
ATTACHMENT D	PROCESS FLOW DIAGRAM
ATTACHMENT E	PROCESS DESCRIPTION
ATTACHMENT F	PLOT PLAN
ATTACHMENT G	
ATTACHMENT H	G70-D SECTION APPLICABILITY FORM
ATTACHMENT I .	EMISSION UNITS/ERD TABLE
ATTACHMENT J	FUGITIVE EMISSIONS SUMMARY SHEET(S)
ATTACHMENT K	GAS WELL AFFECTED FACILITY DATA SHEET(S)
ATTACHMENT L	STORAGE VESSEL(S) DATA SHEET(S)
ATTACHMENT M.	NATURGAL GAS FIRED FUEL BURNING UNIT(S) DATA SHEET(S)
ATTACHMENT N	INTERNAL COMBUSTION ENGINE DATA SHEET(S)
	TANKER TRUCK/RAIL CAR LOADING DATA SHEET(S)
ATTACHMENT Q	PNEUMATIC CONTROLLERS DATA SHEET(S)
ATTACHMENT R.	PNEUMATIC PUMP DATA SHEET(S)
ATTACHMENT S	APCD/ERD SHEET(S)
ATTACHMENT T	EMISSION CALCULATIONS
ATTACHMENT U	FACILITY-WIDE EMISSION SUMMARY SHEET(S)
ATTACHMENT V	CLASS I LEGAL ADVERTISEMENT

PERMIT APPLICATION FEE

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

Greer 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 Greer well pad, and is seeking coverage under the G70-D General Permit. This document contains all applicable application forms 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 Greer well pad. The site is planned to consist of (10) Marcellus wells, (10) 1 MMBtu/hr gas processing units, (1) 5 MMBtu/hr condensate stabilization unit, (16) 500 bbl condensate tanks, (4) 500 bbl produced water tanks, (1) 690 HP 4SLB compressor engine (G3508BLE), and (1) 118 HP 8.1LNA generator. Emissions from the tanks and truck loading will be controlled by an 8 MMBtu/hr combustion unit.

DESCRIPTION OF PROCESS

Natural gas, condensate and produced water will be collected from ten horizontal wells located onsite producing from the Marcellus formation. The well stream will first pass though one of ten (10) 1 MMBtu/hr gas processing units (GPU-1 through GPU-10).

The gas exiting the gas processing units will be routed into a sales gas pipeline. The water will be sent into one of four (4) 500 bbl produced water tanks. The condensate is sent into a 5 MMBtu/hr stabilization unit (SH-1) to increase the amount of gas recovered. The recovered gas will be compressed and sent into the gas pipeline while the condensate will flow into one of sixteen (16) 500 bbl storage tanks.

The emissions from all storage tanks are directed to an 8 MMBtu/hr enclosed vapor combustor (VDU-1) for VOC and methane destruction. The produced water and condensate are hauled offsite by 140 bbl pump trucks. The displaced emissions from truck loading will also be controlled by the enclosed vapor combustor with 70% capture efficiency.

The site will also utilize an existing 118 HP generator (G-1) to provide prime power to the site. The generator engine is certified by the manufacturer to EPA standards for prime power generation.

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 a stabilizer and GPU heaters 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 and the stabilizer heater 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 this monitoring should only be implemented upon a request by 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.

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 EPA Certified natural gas generator (G-1) is a 118 HP 4SLB PSI 8.1LNA and was manufactured on 12/31/2016. Since the engines Mfg. date is after 1/1/2011 the corresponding emission limits for the unit are represented as follows:

Table 1 Emission Limits – S SLB 100 HP 500 HP installed a ter 1-1-2011

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

The natural gas fired flash gas compressor (CE-1) is a 690 HP Caterpillar 3508BLE and was manufactured on 1-27-2012. 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 500 HP 1350 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 OOOO – Reciprocating Compressor Engines

The sales gas compressor CE-1 was constructed after 8/23/2011 and therefore is subject to the rod packing requirements of this regulation.

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

The ten (10) 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)(3) and (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 or by the extended compliance date of September 1, 2017, which date comes first.

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 of a minor source NSR Rule 13 permit for the construction of the Greer Well Pad.

WV Code § 22-5-4 (a) (14)

The Secretary can request any pertinent information such as annual emission inventory reporting. This station is required to submit an annual air emission inventory.

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 45 CSR 30 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 OOOO - Pneumatic Control Valve 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 for control valves.

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 and condensate 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 m³ (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

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

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

This subpart is not applicable because the process heaters are exempt from regulation 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 Greer 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 Yoder 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

Greer Well Pad Proctor, West Virginia

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



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

NATURAL GAS PRO	DDUCTION FACIL	LITIES LOCAT	ED AT THE WELL SITE		
⊠CONSTRUCTION □MODIFICATION □RELOCATION	□CLASS I ADMINISTRATIVE UPDATE □CLASS II ADMINISTRATIVE UPDATE				
S	SECTION 1. GENE	RAL INFORMA	ΓΙΟΝ		
Name of Applicant (as registered with the	WV Secretary of S	tate's Office): 7	ug Hill Operating, LLC		
Federal Employer ID No. (FEIN): 26-205	6245				
Applicant's Mailing Address: 380 Southpointe Blvd., Suite 200	2				
City: Canonsburg	State: PA		ZIP Code:	: 15317	
Facility Name: Greer Well Pad					
Operating Site Physical Address: Buffalo If none available, list road, city or town as	Run Rd. nd zip of facility.				
City: Jacksonburg	Zip Code: 26377	r.	County: W	/etzel	
Latitude & Longitude Coordinates (NAD8 Latitude: 39.52321 Longitude: -80.64768	3, Decimal Degrees	to 5 digits):			
SIC Code: 1311		DAO Facility I	D No. (For existing facilitie	- \	
NAICS Code: 211111		DAQ Facility I	D No. (For existing facilitie	s)	
	CERTIFICATION (F INFORMATION	ON .		
Official is a President, Vice President, Se Directors, or Owner, depending on busines authority to bind the Corporation, P Proprietorship. Required records of da compliance certifications and all requ Representative. If a business wishes to cer off and the appropriate names and sigunsigned G70-D Registration Application utilized, the application will	ss structure. A busing artnership, Limited illy throughput, hou irred notifications musify an Authorized I hatures entered. Any n will be returned in the content of the co	ness may certify a Liability Compa rs of operation and ust be signed by Representative, the y administrative	an Authorized Representativ ny, Association, Joint Ventu nd maintenance, general corn a Responsible Official or an he official agreement below ly incomplete or improper	re who shall have are or Sole respondence, a Authorized shall be checked by signed or	
	d Representative an ability Company, A ne business changes Quality immediately ned in this G70-D G of my knowledge, tr	d in that capacity ssociation Joint its Authorized F.	y shall represent the interest Venture or Sole Proprietorsh Lepresentative, a Responsible	of the business hip) and may e Official shall	
Responsible Official Signature: Name and Title: Sean Willis Vice President Email: swillis@tug-hilltop.com		-632-5200 24 20 17	Fax:		
If applicable: Authorized Representative Signature: Name and Title: Email:	Phone: Date:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Fax:	i.	
If applicable: Environmental Contact Name and Title: Jerry V. DeRosa Director, Email: jderosa@tug-hilltop.com	EH&S Affairs	Phone: (412)	736-5767	Fax:	

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 1.9 miles. Turn left (West) onto the dirt access road and travel 0.35 miles. The well site will be located 0.16 miles down the hill (Southwest) from the access road.

ATTACHMENTS AND SUPPORTING DOCUMENTS					
I have enclosed the following required documen	ts:				
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) ⊠\$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO a □\$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or H 					
¹ Only one NSPS fee will apply. ² Only one NESHAP fee will apply. The Subpart ZZZZ NESF requirements by complying with NSPS, Subparts IIII and/or J. NSPS and NESHAP fees apply to new construction or if the see	JJJ.				
☐ Responsible Official or Authorized Representative Signatu	re (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					
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	tachment K				
 ⊠ Storage Vessel(s) Data Sheet (include gas sample data, US HYSYS, etc.), etc. where applicable) – Attachment L 	EPA Tanks, simulation software (e.g. ProMax, E&P Tanks,				
 \Boxed Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) − Attachment M 					
\boxtimes Internal Combustion Engine Data Sheet(s) (include manufa N	acturer performance data sheet(s) if applicable) – Attachment				
☐ ☐ Tanker Truck/Rail Car Loading Data Sheet (if applicable)	- Attachment O				
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc TM 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

Greer Well Pad Proctor, West Virginia

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

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 ½ 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 $\frac{1}{4}$ mile of each other? Yes \square No \boxtimes

ATTACHMENT B

SITING CRITERIA WAIVER

NOT APPLICABLE - No dwellings or businesses located within 300' of the facility

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

ATTACHMENT C BUSINESS CERTIFICATE

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

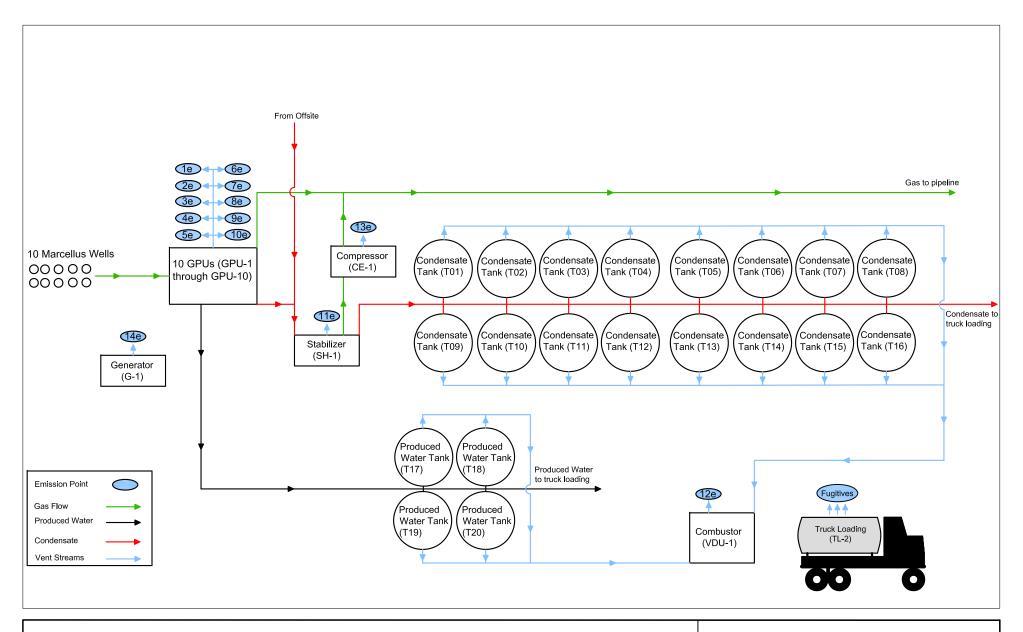
Tug Hill Operating, LLC 380 Southpointe Blvd., Suite 200 Canonsburg, PA 15317

ATTACHMENT D PROCESS FLOW DIAGRAM

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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





Tug Hill Operating, LLC

Attachment D - Process Flow Diagram

Greer Well Pad

ATTACHMENT E PROCESS DESCRIPTION

General G70-D Permit Application

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

PROCESS DESCRIPTION

Tug Hill Operating, LLC is applying for a General Permit Registration under G70-D for the new construction and operation of equipment at the Greer well pad. The site is planned to consist of (10) Marcellus wells, (10) 1 MMBtu/hr. gas processing units, (1) 5 MMBtu/hr condensate stabilization unit, (16) 500 bbl condensate tanks, (4) 500 bbl produced water tanks, (1) 690 HP 4SLB compressor engine (G3508BLE), and (1) 118 HP 8.1LNA generator. Emissions from the tanks and truck loading will be controlled by an 8 MMBtu/hr combustion unit.

DESCRIPTION OF PROCESS

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The gas exiting the gas processing units will be routed into a sales pipeline. The water will be sent into one of four (4) 500 bbl produced water tanks. The condensate is sent into a 5 MMBtu/hr stabilization unit (SH-1) to increase the amount of gas recovered. The recovered gas will be compressed and sent into the gas pipeline while the condensate will flow into one of sixteen (16) 500 bbl storage tanks.

The emissions from all storage tanks are directed to an 8 MMBtu/hr. enclosed vapor combustor (VDU-1) for VOC and methane destruction. The produced water and condensate are hauled offsite by 140 bbl pump trucks. The displaced emissions from truck loading will also be controlled by the enclosed vapor combustor with 70% capture efficiency.

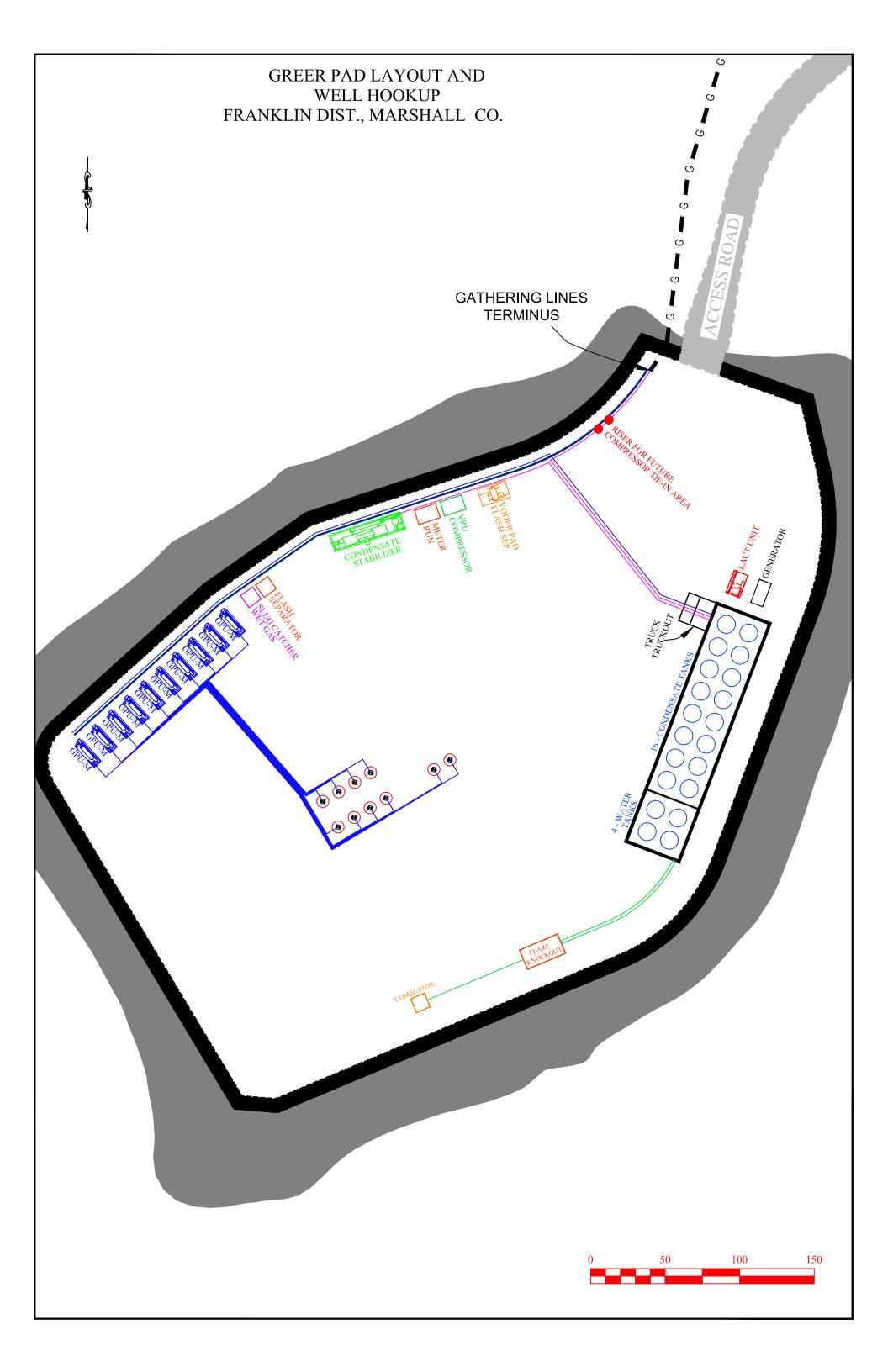
The site will also utilize an existing 118 HP generator (G-1) to provide prime power to the site. The generator engine is certified by the manufacturer to EPA standards for prime power generation.

ATTACHMENT F PLOT PLAN

General G70-D Permit Modification Application

Greer Well Pad Proctor, West Virginia

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

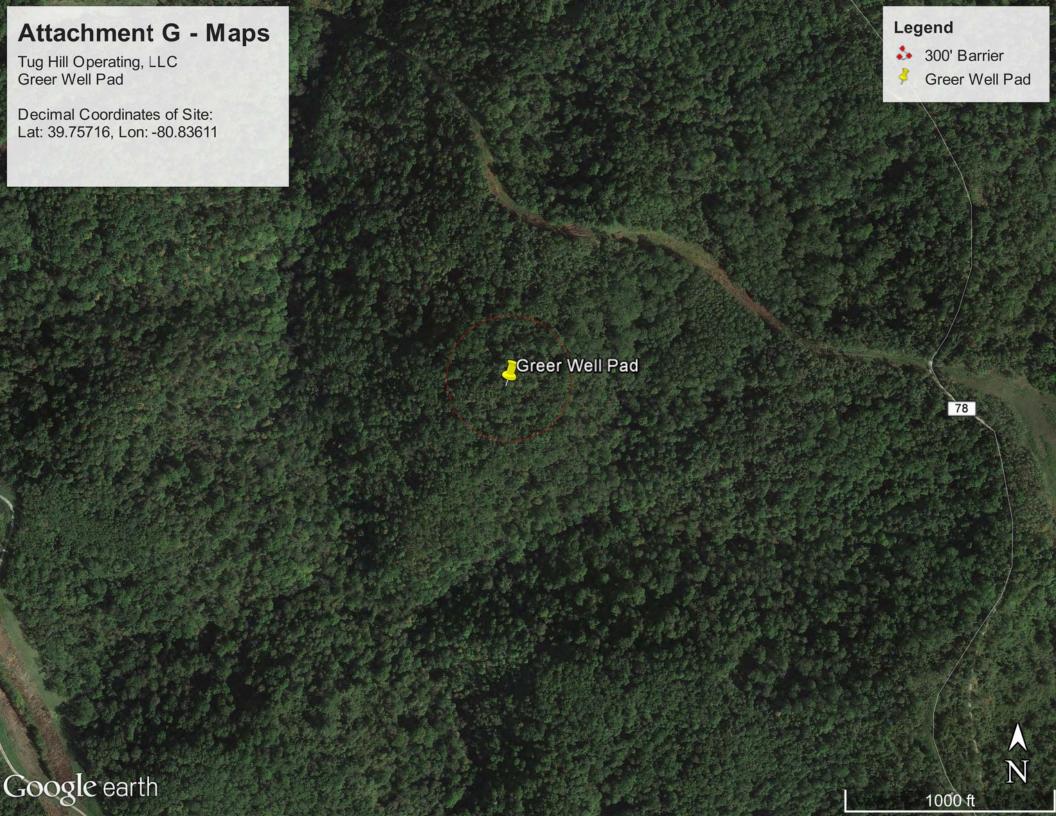


ATTACHMENT G AREA MAP

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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



ATTACHMENT H G70-D SECTION APPLICABILITY FORM

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

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/OOOa)				
⊠Section 6.0	Storage Vessels Containing Condensate and/or Produced Water ¹				
□Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOa)				
⊠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/OOOa)				
□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

Greer Well Pad Proctor, West Virginia

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

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	None
GPU-2	2e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-3	3e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-4	4e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-5	5e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-6	6e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-7	7e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-8	8e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-9	9e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
GPU-10	10e	GPU Heater	2017	1 MMBtu/hr	New	None	None	None
SH-1	11e	Condensate Stabilizer Heater	2017	5 MMBtu/hr	New	None	None	None
VDU-1	12e	Vapor Combustion Unit	2017	8 MMBtu/hr	New	APCD	None	None
T01-T16	12e	Condensate Tanks	2017	500 bbl each	New	VDU-1	VDU-1	None
T17-T20	12e	Produced Water Tanks	2017	500 bbl each	New	VDU-1	VDU-1	None
CE-1	13e	Flash Gas Compressor	2017	690 Hp	New	None	C-1	None
G-1	14e	Prime Power Generator	2017	118 Hp	New	None	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

Greer Well Pad Proctor, West Virginia

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

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 ☐ Audible, visual, and Leak Detection ☑ Infrared (FLIR) cameras ☐ Other (please describe) ☐ None required Method Used olfactory (AVO) inspections Closed Stream type Estimated Emissions (tpy) Component Source of Leak Factors Vent Count (gas, liquid, Type (EPA, other (specify)) VOC HAP GHG (methane, CO₂e) System etc.) ☐ Yes ☐ Gas ----☐ Liquid Pumps \square No □ Both 1995 EPA Protocol for Equipment Leak Emission ⊠ Gas ☐ Yes 376 3.47 0.04 49.00 ⊠ No Estimates - Table 2-4, Oil & Gas Production Operations ☐ Liquid Valves Average Emission Factors (kg/hr/source) □ Both (4.5E-03)1995 EPA Protocol for Equipment Leak Emission □ Yes 10 ⊠ Gas 0.18 < 0.01 2.55 Safety Relief ⊠ No Estimates - Table 2-4, Oil & Gas Production Operations ☐ Liquid Valves Average Emission Factors (kg/hr/source) □ Both (8.8E-03)☐ Yes 20 1995 EPA Protocol for Equipment Leak Emission ⊠ Gas 0.08 < 0.01 1.16 Open Ended ⊠ No Estimates - Table 2-4, Oil & Gas Production Operations ☐ Liquid Lines Average Emission Factors (kg/hr/source) □ Both (2.0E-03)☐ Yes ☐ Gas Sampling □ No ☐ Liquid Connections □ Both ⊠ Gas ☐ Yes 1.662 1995 EPA Protocol for Equipment Leak Emission 18.77 1.33 0.02 ⊠ No Estimates - Table 2-4, Oil & Gas Production Operations ☐ Liquid Connections (Not sampling) Average Emission Factors (kg/hr/source) □ Both (3.9E-03)□ Yes 1995 EPA Protocol for Equipment Leak Emission ⊠ Gas 1 < 0.01 < 0.01 < 0.01 ⊠ No Estimates - Table 2-4, Oil & Gas Production Operations ☐ Liquid Compressors Average Emission Factors (kg/hr/source) □ Both (8.8E-03) ☐ Yes See Notes See Notes Below (2) ☐ Gas Flanges ⊠ No Below (2) ☐ Liquid □ Both □ Yes □ Gas --Other1 \square No ☐ 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.)					
VDU-1, T01-T20, Truck Loading					

ATTACHMENT K GAS WELL AFFECTED FACILITY DATA SHEET(S)

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

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?
47-051-01757	1/1/2018	10/1/2017	Green	0000a
47-051-01758	1/1/2018	10/1/2017	Green	0000a
47-051-01890	1/1/2018	10/1/2017	Green	0000a
47-051-01891	1/1/2018	10/1/2017	Green	0000a
47-051-01892	1/1/2018	10/1/2017	Green	0000a
47-051-01894	1/1/2018	10/1/2017	Green	0000a
47-051-01888	1/1/2018	10/1/2017	Green	0000a
47-051-01889	1/1/2018	10/1/2017	Green	0000a
TBD	1/1/2018	10/1/2017	Green	0000a
TBD	1/1/2018	10/1/2017	Green	0000a

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

Greer Well Pad Proctor, West Virginia

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

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:
 - \boxtimes Temperature and pressure (inlet and outlet from separator(s))
 - ⊠ Simulation-predicted composition
- ☑ 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)

 Bulk Storage Area Name: 	2. Tank Name
Greer Well Pad	Condensate Tank
2. Emission Unit ID number:	3.Emission Point ID number:
T01-T16	10e
5. Date Installed , Modified or Relocated (for existing tanks)	6. Type of change:
Was the tank manufactured after August 23, 2011 and on or	☐ Relocation
before September 18, 2015?	
□ Yes ⊠ No	
Was the tank manufactured after September 18, 2015?	
⊠ Yes □ No	
7A. Description of Tank Modification (if applicable)	
7B. Will more than one material be stored in this tank? If so, a s	separate form must be completed for each material.
☐ Yes	
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	y barrels	or gallor	s). Use the interr	nal cross-sections	al area multip	lied by inte	ernal height.	
500 bbl								
9A. Tank Internal Diamete				9B. Tank In				
10A. Maximum Liquid He	-				10B. Average Liquid Height (ft.) 12.5			
11A. Maximum Vapor Spa	_				ge Vapor Spa	-	(ft.) 12.5	
12. Nominal Capacity (spe								
13A. Maximum annual thr							al/day) 9,861.60 per tank	
14. Number of tank turnov						te (gal/min) 6.85 per tank	
16. Tank fill method ⊠ \$			☐ Splash	☐ Bottom Lo	ading			
17. Is the tank system a var			-					
If yes, (A) What is the volu	_	_		-				
(B) What are the nur			nto the system per	year?				
18. Type of tank (check all				c N		ć –	4 (1 9)	
\boxtimes Fixed Roof \square ve	ertical	☐ horiz	ontal flat roo	of 🛛 cone roo	if ⊔ dome	roof \square	other (describe)	
	_	¬ .	6 🗆 1 11	1 1 6				
☐ External Floating Roof		pontoo		e deck roof				
☐ Domed External (or Co		-						
☐ Internal Floating Roof			column support		ting			
☐ Variable Vapor Space			of \square diaphragm					
☐ Pressurized		☐ spherica	al 🛛 cylindrica	1				
☐ Other (describe)								
PRESSURE/VACUUM C		OL DA	ΓA					
19. Check as many as appl	y:		_					
☐ Does Not Apply				oture Disc (psig)				
☐ Inert Gas Blanket of			☐ Car	bon Adsorption ¹				
□ Vent to Vapor Combust	ion Dev	ice ¹ (vapo			izers, enclose	ed combust	ors)	
□ Conservation Vent (psignature)	g)		☐ Cor	ndenser ¹				
-0.03 Vacuum Setting	0.88	Pressure S	Setting					
	e (psig)							
-0.03 Vacuum Setting	0.88 I	Pressure S	etting					
☐ Thief Hatch Weighted [□ Yes 🏻	⊠ No						
¹ Complete appropriate Air	Pollutio	n Control	Device Sheet					
20. Expected Emission Rat								
Material Name	Flashi	ng Loss	Working/ Brea	athing Loss	Total E	missions	Estimation Method ¹	
					Loss	1		
WOG (All) 1	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy		
VOC (All tanks- Uncontrolled)	0.00	0.00	16.61	72.77	16.61	72.77	O - ProMax	
, , , , , , , , , , , , , , , , , , ,								
EPA = EPA Emission Factor, M	D _ Mat-	mial Dalass	no CC = Cimilan C	roo CT = C::1	Course Test Tl	roughaut D	note O = Other (areaify)	
Remember to attach emissions ca							- ·	
come no en la company com		,	1111/110 000000000000000000000000000000	needs and omer me	odering similar	. y siteets if t	.pp wedote.	
TANK CONSTRUCTION A	ND OPE	RATION	INFORMATION					
21. Tank Shell Construction:								
☐ Riveted ☐ Gunite l	ined \square	Epoxy-c	oated rivets 🖂	Other (describe)	Welded			
21A. Shell Color: Green			1B. Roof Color: G	reen	21C	Year Last	Painted: 2018	
22. Shell Condition (if metal a								
⊠ No Rust ☐ Light Ru		Dense Ru			1	TC :		
22A. Is the tank heated? \square	es ⊠ N	$\log \frac{2}{\sqrt{2}}$	2B. If yes, operating	g temperature:	22C.	. It yes, hov	v is heat provided to tank?	

23. Operating Pressure Range (psig): 0.88	***			
Must be listed for tanks using VRUs v			DAD IC	C C :1 1 (C(C)
24. Is the tank a Vertical Fixed Roof Tank ? ⊠ Yes □ No	24A. If yes, for dome	roof provide radius (ft):	0.17	s, for cone roof, provide slop (ft/ft):
25. Complete item 25 for Floating Roof Tan	$\frac{ }{\mathbf{ks}} \square$ Does not apply	· 🕅		
25A. Year Internal Floaters Installed:	ks Does not appry			
25B. Primary Seal Type (check one): M	etallic (mechanical) sho	e seal	unted resili	ent seal
1 - 1 - 1 - 1	apor mounted resilient s	-		cht scar
25C. Is the Floating Roof equipped with a sec	-		SC110C).	
25D. If yes, how is the secondary seal mount	_		her (describ	۱۵)۰
•			nei (descrit)C).
25E. Is the floating roof equipped with a wea	ilei silieiu! 🗆 1 es			
25F. Describe deck fittings:				
26. Complete the following section for Inter	nal Floating Roof Tanks	□ Does not apply	y	
26A. Deck Type: Bolted	Welded	26B. For bolted decks	, provide dec	k construction:
26C. Deck seam. Continuous sheet construct		□ 5 12 G :1 □	7 4 71	"
\Box 5 ft. wide \Box 6 ft. wide \Box 7 ft. w				
26D. Deck seam length (ft.): 26E. Ar	ea of deck (ft ²):	26F. For column supportanks, # of columns:	orted	26G. For column supported
		tanks, # of columns:		tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes	□ No			
28. Closed Vent System with Enclosed Comb				
SITE INFORMATION				
29. Provide the city and state on which the da	ta in this section are based	: Elkins, WV		
30. Daily Avg. Ambient Temperature (°F): 4		31. Annual Avg. Maxi	mum Tempe	erature (°F): 61.15
32. Annual Avg. Minimum Temperature (°F)		33. Avg. Wind Speed		
34. Annual Avg. Solar Insulation Factor (BT	J/ft ² -day): 1193.89	35. Atmospheric Press	sure (psia): 1	3.73
LIQUID INFORMATION		1		
36. Avg. daily temperature range of bulk	36A. Minimum (°F):		36B. Max	imum (°F):
liquid (°F): 49.08	39.97		61.15	
37. Avg. operating pressure range of tank	37A. Minimum (psig)):		imum (psig):
(psig):	-0.03		0.88	
0.88 38A. Minimum liquid surface temperature (°	E): 44 80	38B. Corresponding v	anor pressure	(ncia): 6.68
39A. Avg. liquid surface temperature (°F): 50		39B. Corresponding vi		* .
40A. Maximum liquid surface temperature (°		40B. Corresponding v		-
41. Provide the following for each liquid or g	as to be stored in the tank.	Add additional pages if	necessary. SI	EE PROMAX MODEL IN
CALCULATIONS.		1	3	
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.				
inputs into masning chiission calculations.				

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
- - \boxtimes Temperature and pressure (inlet and outlet from separator(s))
 - ⊠ Simulation-predicted composition
- ☑ 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:	2. Tank Name
Greer Well Pad	Produced Water Tank
2. Emission Unit ID number:	3.Emission Point ID number:
T17-T20	10e
5. Date Installed , Modified or Relocated (for existing tanks)	6. Type of change:
	oximes New construction $oximes$ New stored material $oximes$ Other
Was the tank manufactured after August 23, 2011 and on or	☐ Relocation
before September 18, 2015?	
□ Yes ⊠ No	
Was the tank manufactured after September 18, 2015?	
⊠ Yes □ No	
7A. Description of Tank Modification (if applicable)	
7B. Will more than one material be stored in this tank? If so, a s	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	harrels	or gallon	c) Use the interr	al cross-sections	ıl area multin	lied by inte	ernal height
500 bbl	ourreis	or ganon	s). Ose the interi	ar cross sections	ir area manap	ned by mic	ernar nergin.
9A. Tank Internal Diamete	r (ft.) 12			9B. Tank Int	ernal Height	(ft.) 25	
10A. Maximum Liquid He				10B. Averag			5
11A. Maximum Vapor Spa	-			11B. Averag			
12. Nominal Capacity (spe	_		ons). This is also	_		-	. ,
13A. Maximum annual thro							al/day) 25,888.80 per tank
14. Number of tank turnov	ers per y	ear 365 pe	er tank	15. Maximui	n tank fill rat	e (gal/min) 17.98 per tank
16. Tank fill method ⊠ S			Splash	☐ Bottom Loa	ading		·
17. Is the tank system a var			svstem? \[Yes				
If yes, (A) What is the volu			-				
(B) What are the nur	_	-	•	· -			
18. Type of tank (check all							
☐ Fixed Roof ☐ ve	ertical	□ horizo	ontal 🗆 flat roo	of 🗵 cone room	f 🗆 dome	roof \square	other (describe)
☐ External Floating Roof	Г	☐ pontoon	roof doubl	e deck roof			
☐ Domed External (or Co		-		e deck 1001			
☐ Internal Floating Roof		_	column support	□ self support	ina		
_					mg		
☐ Variable Vapor Space			of 🗆 diaphragm				
☐ Pressurized	L	spherica	l ⊠ cylindrica	I			
☐ Other (describe)							
PRESSURE/VACUUM C	'ANTR	OI DAT	٠.٨				
19. Check as many as apply		OL DAI	.A				
☐ Does Not Apply	<i>,</i> .		□ Rur	oture Disc (psig)			
☐ Inert Gas Blanket of				bon Adsorption ¹			
 ✓ Went to Vapor Combust 		ical (veno		-		d aambust	ora)
_		ice (vapoi		idenser ¹	izers, enclose	u comousi	.018)
✓ Conservation Vent (psig-0.03 Vacuum Setting		Pressure S		idenser			
□ Emergency Relief Valve		i iessuie 5	etting				
-0.03 Vacuum Setting		Pressure Se	attin a				
_			etting				
☐ Thief Hatch Weighted ☐ Complete appropriate Air			Davica Sheet				
Complete appropriate Air	1 Ollution	i Control	Device Sileet				
20. Expected Emission Rat	e (submi	t Test Dat	a or Calculations	here or elsewher	re in the appli	cation).	
Material Name		ng Loss	Working/ Brea		Total En		Estimation Method ¹
					Loss		
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
VOC'(All tanks	3.59	15.72	<0.01	< 0.01	3.59	15.72	O- ProMax
Uncontrolled)							
EPA = EPA Emission Factor, M	B = Mate	rial Balance	e, SS = Similar Sou	rce, ST = Similar S	Source Test, Th	roughput D	ata, O = Other (specify)
Remember to attach emissions cal	culations	including	TANKS Summary S	heets and other mo	odeling summa	y sheets if a	applicable.
21. Tank Shell Construction:	ND OPE	RATION I	NFORMATION				
☐ Riveted ☐ Gunite li	nad 🗆	Epovy co	oatad rivats 🖂 (Other (describe)	Waldad		
21A. Shell Color: Green	neu 🗆		B. Roof Color: G	` ,		Voor I oot	Painted: 2018
22. Shell Condition (if metal a	nd unline		ib. Kooi Coloi: Gi	CCII	21C.	1 car Last	1 ameu. 2010
⊠ No Rust □ Light Ru		u). Dense Ru	st	icable			
22A. Is the tank heated? \(\sigma\) Y			2B. If yes, operating		22C.	If yes, how	v is heat provided to tank?
227. is the talk heated?	Co MIN		. = 500, operating	, _F 2	220.	_ , = 0, 110 v	F-1 / Tools to tunk.
23. Operating Pressure Range	(psig): 0.8	38			I I		

Must be listed for tanks using VRUs w	ith closed vent systen	1.			
24. Is the tank a Vertical Fixed Roof Tank ?	24A. If yes, for dome	roof pro	vide radius (ft):	24B. If ye	s, for cone roof, provide slop (ft/ft):
⊠ Yes □ No				0.17	
25. Complete item 25 for Floating Roof Tank	s □ Does not apply	\boxtimes			
25A. Year Internal Floaters Installed:					
25B. Primary Seal Type (check one): Me	tallic (mechanical) sho	e seal	☐ Liquid mo	unted resili	ent seal
□ Va	por mounted resilient s	seal	☐ Other (des	scribe):	
25C. Is the Floating Roof equipped with a second	ondary seal?	□ No			
25D. If yes, how is the secondary seal mounte	d? (check one) 🗆 Sho	ре 🗆	Rim 🗆 Otl	ner (describ	e):
25E. Is the floating roof equipped with a weath	ner shield?	□ N	lo		
25F. Describe deck fittings:					
26. Complete the following section for Intern	al Floating Roof Tanks	\boxtimes	Does not apply	v	
	Welded		For bolted decks,		k construction:
26A. Deck Type: ☐ Bolted ☐ V	veided	200.	f of boiled decks,	, provide dec	k construction.
26C. Deck seam. Continuous sheet constructi			_	_	
\square 5 ft. wide \square 6 ft. wide \square 7 ft. wide				-	<u> </u>
26D. Deck seam length (ft.): 26E. Are	a of deck (ft ²):		For column suppo	orted	26G. For column supported
		tanks,	# of columns:		tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes	□ No	1			
28. Closed Vent System with Enclosed Combi	ıstor? ⊠ Yes □ No				
SITE INFORMATION					
29. Provide the city and state on which the dat	a in this section are based				
30. Daily Avg. Ambient Temperature (°F): 49	06	31. A	nnual Avg. Maxi	mum Tempe	rature (°F): 61.15
32. Annual Avg. Minimum Temperature (°F):	36.97	33. A	vg. Wind Speed	(mph): 6.17	
34. Annual Avg. Solar Insulation Factor (BTU	/ft²-day): 1193.89	35. A	tmospheric Press	ure (psia): 13	3.73
LIQUID INFORMATION		•			
36. Avg. daily temperature range of bulk	36A. Minimum (°F):			36B. Max	imum (°F):
liquid (°F): 49.08	39.97			61.15	
37. Avg. operating pressure range of tank	37A. Minimum (psig)	:			imum (psig):
(psig):	-0.03			0.88	
0.88	14.00	200	G 1'		(:) 0.16
38A. Minimum liquid surface temperature (°F			Corresponding va Corresponding va		
39A. Avg. liquid surface temperature (°F): 50. 40A. Maximum liquid surface temperature (°F)			Corresponding va		* '
41. Provide the following for each liquid or ga					
CALCULATIONS.	s to be stored in the tank.	Auu au	intional pages ii i	iecessary. 51	EE FROMAX MODEL IN
41A. Material name and composition:			1		
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.			1		
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

Greer Well Pad Proctor, West Virginia

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

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
GPU-7	7e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-8	8e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-9	9e	GPU Heater	2017	New	1 MMBtu/hr	1,253
GPU-10	10e	GPU Heater	2017	New	1 MMBtu/hr	1,253
SH-1	11e	Condensate Stabilizer Heater	2017	New	5 MMBtu/hr	1,253

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.

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.

New, modification, removal

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

Greer Well Pad Proctor, West Virginia

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

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.*

situit ettse t	ise iiiis joiiii	•						
Emission Unit I	D# ¹	G	-1	CE	E-1			
Engine Manufac	turer/Model	Internatio	folutions onal Inc./ LNA	Caterpillar	/ G3508BLE			
Manufacturers F	Rated bhp/rpm	118/	1800	690/	1400			
Source Status ²		N	IS	N	IS			
Date Installed/ Modified/Remov	ved/Relocated ³	20	17	20)17			
Engine Manufac		12/31	/2016	1/27	/2012			
Check all applic Rules for the en EPA Certificate if applicable) ⁵	gine (include	△40CFR60 S △JJJJ Certifi □40CFR60 S □IIII Certifie △40CFR63 S □ NESHAP Z JJJJ Window □ NESHAP Z Sources	ed? ubpart IIII ed? ubpart ZZZZ ZZZZ/ NSPS		ed? Jubpart IIII ed? Subpart ZZZZ	□ NESHAP 2 JJJJ Window	ed? Subpart IIII ed? Subpart ZZZZ	
Engine Type ⁶		48	LB	45	SLB			
APCD Type ⁷		N	Α	OxCat/ A/F				
Fuel Type ⁸		R	G	R	RG			
H ₂ S (gr/100 scf))	0.	25	0.25				
Operating bhp/r	pm	118/	1800	690/	1400			
BSFC (BTU/bhp	o-hr)	9,6	545	8,203				
Hourly Fuel Thi	oughput	894 ft³/hr		4,517.20	ft³/hr		/hr l/hr	
Annual Fuel The (Must use 8,760 emergency gene	hrs/yr unless	7.83 M	7.83 MMft ³ /yr 39.57 MM		MMft ³ /yr		Mft³/yr l/yr	
Fuel Usage or H Operation Meter		Yes 🗆	No 🗵	Yes □	No 🗵	Yes □	No 🗆	
Calculation Methodology ⁹	Pollutant ¹⁰	Hourly PTE (lb/hr) ¹¹	Annual PTE (tons/year)	Hourly PTE (lb/hr) 11	Annual PTE (tons/year)	Hourly PTE (lb/hr) 11	Annual PTE (tons/year)	
AP	NO _x	0.26	1.14	1.52	6.66			
AP	СО	0.52	2.28	3.04	13.33			
AP	VOC	0.18	0.80	1.06	4.66			
AP	SO ₂	<0.01	<0.01	<0.01	0.01			
AP	PM ₁₀	0.01	0.05	0.06	0.25			
AP	Formaldehyde	0.07	0.30	0.64	2.80			
AP	Total HAPs	0.09	0.40	0.76	3.88			
AP	GHG (CO ₂ e)	137.17	546.21	850.32	3385.98			
							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-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

- Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.
- Enter the date that the engine was manufactured, modified or reconstructed.
- 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.

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

Two Stroke Lean Burn 4SRB Four Stroke Rich Burn

4SLB Four Stroke Lean Burn

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

Air/Fuel Ratio

High Energy Ignition System HEIS SIPC Screw-in Precombustion Chambers Prestratified Charge PSC LEC

Low Emission Combustion

Rich Burn & Non-Selective Catalytic Reduction **NSCR** OxCat Oxidation Catalyst Lean Burn & Selective Catalytic Reduction SCR

Enter the Fuel Type using the following codes:

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

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

Manufacturer's Data AP-42 MD ΑP

GRI-HAPCalcTM GR OT Other (please list)

- 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.
- 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 □ \square SCR \square NSCR □ Oxidation Catalyst Provide details of process control used for proper mixing/control of reducing agent with gas stream: NA Manufacturer: Emit Model #: ELX-3050Z Design Operating Temperature: 931 °F Design gas volume: 4455 acfm Service life of catalyst: 8760 hr. Provide manufacturer data? ⊠Yes Volume of gas handled: 4455 acfm at 931°F Operating temperature range for NSCR/Ox Cat: From 931 °F to Reducing agent used, if any: NA Ammonia slip (ppm): NA Pressure drop against catalyst bed (delta P): inches of H₂O 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 Unit 2311, G3508BLE/JGJ4

Engine Serial Number RBK01117 Engine Manufactured Date 1/27/2012

 Max HP
 690
 Max RPM
 1400

 cylinders
 8
 Total Displacement (in3)
 2105

 Number of Engine Cylinders
 8
 Total Displacement (in3)
 2105

 Combustion Type & Setting
 4 Stroke Lean Burn
 Fuel Delivery Method
 Carburetor

Compression Ratio 8:1 Combustion Air Treatment Turbocharged and Aftercooled

Engine Modified/Reconstructed? EMD after 7/1/10

Compressor Frame Serial # F37427 Unit Packaged Date 8/23/2012

Compressor Frame Max RPM 1800 # of Compressor Throws 4

AIR ENVIRONMENTAL REGULATIONS

County and State selected for Quote: Wetzel, WV

NSPS JJJJ NOx 1 g/hp-hr CO 2 g/hp-hr VOC 0.7 g/hp-hr

Ozone Non-Attainment/General NOx CO VOC CH20
Permit

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption: 8203 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogren Oxides (NOx)	0.5		0.761	3.333
Carbon Monoxide (CO)	2.58		3.925	17.192
Volatile Organic Compounds (NMNEHC excluding CH2O)	0.55		0.837	3.666
Formaldehyde (CH2O)	0.42		0.639	2.799
Particulate Matter (PM) Filterable+Condensable		0.0100	0.0565	0.2476
Sulfur Dioxide (SO2)		0.0006	0.0033	0.0146
	g/bhp-hr	Ib/MMBTU	lb/hr	Metric
	g/biip-iii	ID/WINIDTO	10/111	Tonne/yr
Carbon Dioxide (CO2)	477		725.5952	2882.637
Methane (CH4)	4.67		7.104	28.223

CONTROLLED EMISSIONS

Catalytic Converter Make/Model ELX-3050Z-1010F-31CEE-241

Catalyst Element Type Oxidation

of Catalyst Elements Currently in Housing 1

Air/Fuel Ratio Control Yes

Other Engine Emissions Control Equipment None

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx)	0	0.761	3.333
Carbon Monoxide (CO)	22	3.0423	13.325
Volatile Organic Compounds (NMNEHC excluding CH2O)	0	0.837	3.666
Formaldehyde (CH2O)	0	0.639	2.799
Particulate Matter (PM) Filterable+Condensable	0	0.0565	0.2476
Sulfur Dioxide (SO2)	0	0.0033	0.0146
	% Reduction Required to Comply		
	with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	725.5952	2882.6370
Methane (CH4)	0	7.104	28.223

^{1.} g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition.

^{2.} lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).



6655 Corp. Parkway, Ste 160 Fort Worth, TX 76126 Office: 817.546.7456 | Direct: 307.675.5041 bosbom@emittechnologies.com

QUOTE: QUO-07887-Z8K9

Prepared For: Chris Magee

USA COMPRESSION

INFORMATION PROVIDED BY CATERPILLAR

G3508B Engine: Horsepower: 690 RPM: 1400 Compression Ratio: 8.0:1 Exhaust Flow Rate: 4455 CFM Exhaust Temperature: 931 °F Reference: DM8826-00 Natural Gas Fuel: Annual Operating Hours: 8760

Uncontrolled Emissions

	d/bnb-nr
NOx:	0.50
CO:	2.58
THC:	5.49
NMHC	0.82
NMNEHC:	0.55
HCHO:	0.42
02:	9.30 %

POST CATALYST EMISSIONS

% Reduction g/bhp-hr

NOx: Unaffected by Oxidation Catalyst

CO: < 2.00 VOC: < 0.70

CONTROL EQUIPMENT

Catalytic Converter

Model: ELX-3050Z-1010F-31CEE-241 Catalyst Type: Oxidation, Precious group metals

Manufacturer: EMIT Technologies, Inc. Element Size: Rectangle 24 x 15 x 3.5

Catalyst Elements:

Housing Type: 3 Element Capacity Catalyst Installation: Accessible Housing Construction: 10 gauge Carbon Steel

6 (0.5" NPT) Sample Ports:

Inlet Connections: 10" Flat Face Flange Outlet Connections: 10" Flat Face Flange Configuration: End In / End Out

Silencer: Integrated

Silencer Grade: Hospital Enhanced

35-50 dBA Insertion Loss:



8.1LNA

	11011	٠,٠					
	Std	nits Metric	8.1L NA 1500 1			300	
Poral Engine Date	Siu	Metric	13	00	100	00	
neral Engine Data		1/4		la Lina	avala		
Type Number of cylinders		I/A I/A		In-Line			
Aspiration		I/A		Noturally.			
			4.07			Aspirated	
Bore	in	mm	4.37	111	4.37	111	
Stroke	in	mm	5.47	139	5.47		
Displacement Company Patie	in^3	L	492	8.1	492	8.1	
Compression Ratio	N/A	/	4000	10		0.0	
Mean Piston Speed	ft/min	m/s	1368	6.95	1641	8.3	
Gross Standby Power Rating ^{1,2,3} Per ISO 3046 at the Flywheel							
NG	Нр	kW	99	74	118		
LP	Нр	kW	99	74	118		
MEP (@ rated Load on NG)	psi	bar	106	7	105		
MEP (@ rated Load on LP)	psi	bar	106	7	105		
Gross Prime Power Rating 1,2,3 Per ISO 3046 at the Flywheel							
NG	Нр	kW	90	67	106		
LP	Нр	kW	90	67	106		
MEP (@ rated Load on NG)	psi	bar	97	7	95		
MEP (@ rated Load on LP)	psi	bar	97	7	95		
RPM Range (Min-Max)	R	PM	1500-2000				
Rotation Viewed from Flywheel	1	I/A	Counter Clockwise				
Firing Order	١	I/A		1-5-3-6-2-4			
Dry Weight							
Fan to Flywheel	lb	kg	2200	998	2200	ć	
Rad to Flywheel	lb	kg	2660	1207	2660	12	
Wet Weight							
Fan to Flywheel	lb	kg	2288	1038	2288	10	
Rad to Flywheel	lb	kg	2900	1316	2900	13	
CG							
Distance from FW housing	in	mm	17	426	17	4	
Distance above center of crankshaft	in	mm	7	184	7		
gine Mounting							
Maximum Allowable Bending Moment at Rear of Block	lb ft	N m	3540	4800	3540	48	
Moment of Inertia About Roll Axis	lb ft^2	kg m^2					
Flywheel housing	١	I/A		SAE	No 2		
Flywheel	١	I/A		No 1	1 1/2		
Number of Flywheel Teeth	١	I/A		14	10		
naust System							
Туре				Air Cooled	d Manifold		
Maximum allowable Back pressure	in HG	kPa	3	10.146	3	10.	
Standard Catalyst Back pressure	in HG	kPa	1.5	5.073	1.5	5.0	
Exhaust Outlet Pipe Size							
Maximum Turbine Inlet Temperature	F	С	1382	750	1382	7	
Exhaust Flow at Rated Power	lb/hr	kg/hr	632	283	790	358	
Exhaust Flow at Rated Power @1350F	cfm	m^3/min	478.5	13.5	605.7	17.	
Induction System							
Maximum allowable Intake Air Restriction with Air Cleaner							
Clean	inH2O	kPa	5	20	5		
Dirty	inH2O	kPa	15	4	15		
Combustion Air required (entire engine)	lb/hr	kg/hr	596	267	745		
Combustion Air required (entire engine)	cfm	m^3/min	150	4	189	5	

7/8/2014



8.1LNA

The state of the s		Α					
	Ur	Units		8.1L NA			
	Std	Metric	15	00	18	00	
Electrical System							
Minimum Recommended Battery Capacity	, A	ÅΗ		15	50		
Cold Cranking Current							
Engine only	С	CA		90	00		
Engine with Drive train	С	CA		90	00		
Maximum Allowable Resistance of Starting Circuit		nms		02			
Starting Motor Power	HP	kW	6.0	4.5	6.0	4.5	
Battery Charging Alternator							
Voltage	Vo	olts		2	4		
Current		nps		4			
Coil primary Resistance		nms		0.59Ω			
Spark Plug p/n	- 0.	11110		IFR7			
Spark plug gap	inches	mm	015" (-0	0/+.008") .		+ 2mm)	
Cooling System	IIIOIIOO		.010 (1	<i>31</i> + .000 <i>j</i> .	00111111 (0/		
Coolant Capacity							
Engine only	gal	L	5	19	5	19	
Engine with Radiator	gal	L	22	83	22	83	
Engine Coolant Flow	gal/min	_	53	201	63		
Water Pump Speed		PM	19		23		
		kcal/sec	3915	16	4990	21	
Heat rejected to Cooling water at rated Load	F			68		68	
Maximum Intake Air Temperature (IAT)	F	C	155		155		
ECU IAT Warning			140	79.5	140	79.5	
ECU IAT Shutdown	F:	C	155	88	155	88	
Maximum Coolant Friction Head External to the engine	psi	bar	5.8	0.4	5.8	0.4	
Maximum Air Restriction Across a Radiator	inH2O	mmH2O	0.5	12.7	0.5	12.7	
Standard Thermostat Range			100		100		
Cracking Temperature	F	С	160	71	160	71	
Full Open Temperature	F	С	185	85	185	85	
Maximum Allowable Pressure Cap	psi	bar	14.7	1	14.7	1	
Ambient Clearance Open Genset (water) (Air-to-Boil)		_					
Specified	F	С	142	61	142	61	
Acutal	F	С			160	71	
Ambient Clearance (Oil)		1					
Specified	F	С	142	61	142	61	
Acutal	F	С			148	64	
CAC Rise over Ambient (Charge)							
Specified	F	С		N	/Δ		
Acutal	F	С		14/			
Maximum Allowable Top Tank Temperature	F	С	230	110	230	110	
ECU Warning	F	С	220	104	220	104	
ECU Shutdown	F	С	230	110	230	110	
Fan Power	HP	kW	5	3.7	9	6.	
Fan Diameter, including blades	in	mm	28	711	28	71	
Fan Speed	RI	PM	19	50	23	40	
Cooling Fan Air Flow @ 1" Static H2O Pressure and 125F @ radiator	CFM	m^3/min	8000 224		10000	280	
Charge Air Cooler							
Compressor Outlet Temperature	F	С	N/A	N/A	N/A	N/A	
Compressor Flow Rate per CAC	lb/hr	kg/hr	N/A	N/A	N/A	N/A	
Heat Rejection per CAC	btu/min	kW	N/A	N/A	N/A	N/A	

2

7/8/2014



8.1LNA

		A				
	Uı	Units		8.1L	NA	
	Std	Metric	150	00	18	00
brication System						
				/-40 Low A		J
Oil Specification			(.255%	by wt), AF	PI CD/CF o	or higher
Oil Pressure						
Idle			4.4	0.0		
Min	Psi	Bar	11	8.0	11	0.8
Max	Psi	Bar	20.3	1.4	20.3	1.4
Rated Speed			00.0			
Min	Psi	Bar	20.3	1.4	20.3	1.4
Max	Psi	Bar	70	4.8	70	4.8
Maximum Allowable Oil Temperature	F	С	250	121	250	121
Engine Oil Capacity	-		40		40	
Min	Qts	L.	18	17	18	17
Max	Qts	L	25	24	25	24
Oil Filter Capacity	Qts	L	3.75	4	3.75	4
ECU Oil Pressure Warning ⁵	psi			3		
ECU Oil Pressure Shut Down ⁵	psi			2	5	
el System						
Fuel Consumption ⁶						
NG	Ft ³ /hr	kg/hr	736	16.7	894	20.3
LP	Ft ³ /hr	kg/hr	180	17	392	20.9
Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
Maximum Running pressure to Electronic Pressure Regulator (EPR)	inH2O	kPa	11.0	2.7	11.0	2.7
Minimum Running pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
Minimum Gas Supply Pipe Size			1-1/4" NPT			
Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
Maximum Running Pressure to EPR	inH2O	kPa	11.0	2.7	11.0	2.7
Minimum Running Pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
Minimum LPG Supply Pipe Size ⁴				1-1/4"	NPT	
1 Ctandby and availand retires based on ICO2046						

3

7/8/2014

¹Standby and overload ratings based on ISO3046.

 $^{^2}$ All ratings are gross flywheel horsepower corrected to $77^\circ\!F$ at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

³ Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

power calculations.

⁴ The preceeding pipe sizes are only suggestions and piping sizes may vary with temperature, pressure, distance from supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the EPR.

⁵ >1400RPM

 $^{^{\}rm 6}$ See NGE Technical Spec. 56300002 - Fuel Specification



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY 2016 MODEL YEAR CERTIFICATE OF CONFORMITY WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY ANN ARBOR, MICHIGAN 48105

Byron J. Bunker, Division Director

Compliance Division

Certificate Issued To: Power Solutions International, Inc.

(U.S. Manufacturer or Importer)

Certificate Number: GPSIB8.10NGP-014

Effective Date: 12/03/2015

Expiration Date: 12/31/2016

Issue Date: 12/03/2015

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.

Engine Family: GPSIB8.10NGP

Mobile/Stationary Certification Type: Mobile and Stationary

Fuel: Natural Gas (CNG/LNG)

LPG/Propane

Emission Standards:

Mobile Part 1048

NMHC + NOx (g/kW-hr) : 2.7

CO (g/kW-hr): 4.4

HC + NOx (g/kW-hr): 2.7

Part 60 Subpart JJJJ Table 1

VOC (g/Hp-hr): 0.7

NOx (g/Hp-hr): 1

CO (g/Hp-hr) : 2
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 1048, 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1048, 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 1048, 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 1048, 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

ATTACHMENT O

TANKER TRUCK/ RAIL CAR LOADING DATA SHEET(S)

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

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#: Fugitive Year Installed/Modified:2017												
Emission Unit Description: Tank Truck Loading (Water & Condensate)												
Loading Area Data												
Number of Pumps: 1 Number of Liquids Loaded: 2 Max number of trucks/rail cars load at one (1) time: 1												
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? \square Yes \square No \square 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)												
							as a whol					
Time	Jan – Ma	r	Apr -	- Jun	J	ul – Sept		Oct - Dec				
Hours/day	24		2	4		24		24				
Days/week	7		7	7		7		7				
	Bul	k Liquid	Data (use e	xtra pages a	s necess:	ary)						
Liquid Name	Produced	l Water		Condensate	;							
Max. Daily Throughput (1000 gal/day)	103.55			157.79								
Max. Annual Throughpu (1000 gal/yr)	37,795.3	5		57,594.81								
Loading Method ¹	SUB			SUB								
Max. Fill Rate (gal/min)) 71.91			109.58								
Average Fill Time (min/loading)	60			60								
Max. Bulk Liquid Temperature (°F)	49.08			49.08								
True Vapor Pressure ²	0.20			7.45								
Cargo Vessel Condition	3 C			С								
Control Equipment or Method ⁴	ECD (VI	RU-1)		ECD (VRU	-1)							
Max. Collection Efficient (%)	ncy 0			70								

Max. Control (%)	Efficiency	0	98	
Max.VOC	Loading (lb/hr)	<0.01	9.88	
Emission Rate	Annual (ton/yr)	<0.01	43.26	
Max.HAP	Loading (lb/hr)	0	0	
Emission Rate	Annual (ton/yr)	0	0	
Estimation Method ⁵		EPA	EPA	

1	BF	Bottom Fill	SP	Splash Fil	l		SUB	Submerged Fill
2	At maxim	um bulk liquid temperature						
3	В	Ballasted Vessel	C	Cleaned			U	Uncleaned (dedicated service)
	O	Other (describe)						
4	List as m	any as apply (complete and su	ıbmit app:	ropriate A	ir Polluti	on Contro	1 Device S	Sheets)
	CA	Carbon Adsorption		VB	Dedicate	d Vapor B	alance (cl	osed system)
	ECD	Enclosed Combustion Device	•	F	Flare			
	TO	Thermal Oxidization or Incin	eration					
5	EPA	EPA Emission Factor in AP-	42			MB	Material	Balance
	TM	Test Measurement based upo	n test data	a submitta	ıl	O	Other (des	cribe)

ATTACHMENT P

GLYCOL DEHYDRATION UNIT DATA SHEET(S)

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

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

ATTACHMENT Q PNEUMATIC CONTROLLERS DATA SHEET(S)

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

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

Greer Well Pad Proctor, West Virginia

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

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

Greer Well Pad Proctor, West Virginia

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

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-T20	Make/Model:						
Primary Control Device ID: VDU-1	Make/Model: Zeeco/ EGF-4-30						
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 In	formation					
Control De	evice ID#: VDU-1			Installation New		Modified	☐ Relocated		
Maximum 3,833.33 s	Rated Total Flow C cfh 92,000		,	1 '		Design H 2,085 BT	eat Content U/scf		
			Control Devic	e Informati	on				
=	ed Combustion Dev 1 Oxidizer	ice	Type of Vapor Con		ntrol?		Ground Flare		
Manufactu Model: EG				Hours of o	peration	per year? 8	3760		
List the en	nission units whose	emissic	ons are controlled by this	vapor contr	ol device	(Emission	Point ID# 10e)		
Emission Unit ID#	Emission Source Description				Emissio	on Source I	Description		
T01-T16	Condensate Tanks								
T17-T20	Produced Water T	anks							
If this	s vapor combustor c	ontrols	emissions from more the	ın six (6) em	ission un	its, please	attach additional pages.		
Assist Typ	e (Flares only)		Flare Height	Tip Diameter			Was the design per §60.18?		
Steam Pressu	re Air		30 feet	Multiple Burner Tip					
			Waste Gas I	nformation					
Maxim	um Waste Gas Flow 63.89 (scfm)	Rate	Heat Value of W 2,085 E						
	Provide an	attach	ment with the characteri.	stics of the v	vaste gas	stream to	be burned.		
			Pilot Gas I	nformation					
Number of Pilot Lights Fuel Flow Rate to Pilot Flame per Pilot 65 scfh			Flame per Pilot	Heat Input per Pilot 1,253 BTU/hr			Will automatic re-ignition be used? ⊠ Yes □ No		
If automat	ic re-ignition is use	d, pleas	se describe the method.						
	me equipped with a f the flame?	monito Yes	or to detect the	If Yes, who		☐ Thermoo	=		
	ll operating ranges (e, please indicate).	and mai	intenance procedures req	uired by the	manufac	turer to ma	nintain the warranty. (If		
			Yes ☐ No s data sheets, drawings,	flame demor	nstration	per §60.18	or §63.11(b) and		



Change Order #1: Long Description

Design Information (Estimated):

	<u>Continuous</u>
Flare Type	Enclosed
Gas MW (lb/mol)	39.7
Gas LHV (Btu/Scf)	2085
Flow Rate (MScfd)	92
Available Pressure	8 oz/in2
Smokeless Capacity	0-100%

Scope of Supply:

Enclosed Flare (Continuous)

- 1. (1) 4' Dia. x 30' OAH Enclosed Flare Stack w/ Air Control Dampers
- 2. (1) Multi-Jet (MJ) Flare Tips
- 3. (1) EGF-Z-HEI Electric Ignition Pilot w/ Flame Scanner to Prove Pilot Ignition
- 4. Shutdown Monitoring Logic and Controls
 - a. Stack Mounted Thermocouple for Monitoring and High Temperature Shutdown
 - b. 3" Pneumatic Butterfly Valve for Flare Shutdown
- 5. (1) Nema 4, Skid Mounted Pilot Ignition and Monitoring Panel
- 6. (1) 3" Group D Flame Arrester

Required Utilities:

Pilot Fuel Gas: (Per Pilot) 65 Scfh Natural Gas at 15 Psig OR 30 Scfh Propane at 7 psig

Electricity: 120V / 1 Phase / 60 Hz



Equipment Description:

Enclosed Flare (Continuous):

- <u>Self-Supported Enclosed Flare Stack w/ Damper(s)</u>: The enclosure prevents flame from being seen by personnel while also increasing residence time to ensure high destruction efficiencies. Design wind speed for this type of installation is 90 mph.
- <u>Multi-Jet Flare Tip:</u> The flare tip uses multi-jet technology to break up the exiting gas to allow for more fuel air interaction ensuring smokeless flaring. The tip along with the enclosure will provide a VOC destruction efficiency of at least 98 wt%.
- <u>EGF-Z-HEI Pilot</u>: The high stability, electronic ignition pilot is proven to stay lit in extreme weather conditions. Components in the heat affected zone are made of temperature resistant investment castings. A flame scanner is used in conjunction to continuously monitor the pilot status.
- <u>Shutdown Monitoring & Controls:</u> The burner management and high temperature shutdown systems ensure that the flare will operate in a safe manner to protect both personnel and equipment. A signal from the high temperature thermocouple or should the flame scanner detect a pilot failure, all gas sources to the system will be shut down indefinitely until personnel can check the system to ensure that there is not a build-up of combustible vapors or damage to the equipment.
- <u>Automatic Ignition/Monitoring Panel</u>: The automatic pilot ignition and monitoring panel will continuously monitor the pilot and attempt to relight if a pilot failure signal is received. The control panel (Nema 4 enclosure) will be skid mounted.
- <u>Flame Arrester</u>: If the potential exists for having combustible levels of oxygen in the flare gases, the addition of a flame arrester is recommended. Installed at the inlet to the flare, the arrester ensures that any flashback from the flare tip is stopped before entering the site piping system. Group D gas rating is typical.



Additional Equipment:

- <u>Skid Mounted KO Drum</u> - For areas where liquid carryover is possible in the flare headers, we can offer a separate skidded KO drum. The knock out drum will separate any liquids that condense as the flare gas moves through the header. The KO drum is a 3'OD x 10' TL-TL vessel that is also skid mounted. The KO drum comes complete with an automatic blowcase to automatically drain the drum should a high liquid level be reached. Rosemount level, pressure and temperature transmitters are also provided for remote monitoring of the drum.

ATTACHMENT T EMISSION CALULATIONS

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

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

Criteria PTE

Source	PM	PM10	PM2.5	SO2	NOx	со	VOC *	CO2e
Line Heaters (tpy)	0.326	0.326	0.326	0.026	4.294	3.607	0.236	5125.034
Stabilizer Heater (tpy)	0.163	0.163	0.163	0.013	2.147	1.804	0.118	2562.517
Generator (tpy)	0.049	0.049	0.049	0.003	1.139	2.279	0.798	546.207
Compressor (tpy)	0.247	0.247	0.247	0.015	6.663	13.325	4.664	3385.977
Tanks (tpy)*							1.770	
Vapor Combustor (tpy)				0.090	2.405	10.963	4.951	
Truck Loading Fugitives (tpy)							43.260	
Component Fugitives (tpy)						-	5.060	71.476
Total Emissions (tpy)	0.786	0.786	0.786	0.146	16.648	31.978	59.087	11691.211
Total Emissions (lb/hr)	0.179	0.179	0.179	0.033	3.801	7.301	13.490	2669.226

^{*}VOC emissions from tanks accounted for within VOC emissions from VDU

HAP PTE

			1.74 1				
Source	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs (tpy)
Line Heaters (tpy)	0.000	0.000			0.077	0.003	0.081
Stabilizer Heater (tpy)	0.000	0.000			0.039	0.002	0.041
Generator (tpy)	0.002	0.002	0.000	0.001	0.005	0.296	0.399
Compressor (tpy)	0.002	0.010	0.001	0.005	0.028	2.798	3.320
Vapor Combustor (tpy)							
Fugitives (tpy)	0.000	0.000	0.000	0.000	0.065		0.066
Total Emissions (tpy)	0.005	0.013	0.001	0.006	0.214	3.099	3.907
Total Emissions (lb/hr)	0.001	0.003	0.000	0.001	0.049	0.708	0.892

Table 2 Generator Engine Emissions (G-1) Power Solutions Int. Model: 8.1LNA Tug Hill Operating, LLC Greer Pad

Pollutant	Emission Factor		PTE (lb/hr)		PTE (tons/yr)	
Criteria Pollutants						
PM/PM10/PM2.5**	9.98E-03 lb/MMBtu	(1)	0.01	(a)	0.05	(c)
	5.88E-04 lb/MMBtu	(1)	0.00	(a)	0.00	(c)
SO ₂				. ,	1	
NOx	1.00E+00 g/hp-hr	(2)	0.26	(b)	1.14	(d)
CO VOC	2.00E+00 g/hp-hr	(2)	0.52	(b)	2.28	(d)
VOC	7.00E-01 g/hp-hr	(2)	0.18	(b)	0.80	(d)
Hazardous Air Pollutants						
1,1,2,2-Tetrachloroethane	4.00E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
1,1,2-Trichloroethane	3.18E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
1,3-Butadiene	2.67E-04 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
1,3-Dichloropropene	2.64E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
2-Methylnapthalene	3.32E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
2,2,4-Trimethylpentane	2.50E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Acetaldehyde	8.36E-03 lb/MMBtu	(1)	0.009	(a)	0.041	(c)
Acrolein	5.14E-03 lb/MMBtu	(1)	0.006	(a)	0.025	(c)
Benzene	4.40E-04 lb/MMBtu	(1)	0.000	(a)	0.002	(c)
Biphenyl	2.12E-03 lb/MMBtu	(1)	0.002	(a)	0.010	(c)
Carbon Tetrachloride	3.67E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Chlorobenzene	3.04E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Chloroform	2.85E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Ethylbenzene	3.97E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Ethylene Dibromide	4.43E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Formaldehyde	2.60E-01 g/hp-hr	(2)	0.068	(b)	0.296	(d)
Methanol	2.50E-03 lb/MMBtu	(1)	0.003	(a)	0.012	(c)
Methylene Chloride	2.00E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
n-Hexane	1.11E-03 lb/MMBtu	(1)	0.001	(a)	0.005	(c)
Naphthalene	7.44E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
PAH (POM)	2.69E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Phenol	1.04E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Styrene	2.36E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Toluene	4.08E-04 lb/MMBtu	(1)	0.000	(a)	0.002	(c)
Vinyl Chloride	1.49E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Xylenes	1.84E-04 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Total HAP			0.091		0.399	
Greenhouse Gas Emissions					Metric Tonr	ne/yr
CO ₂	4.71E+02 g/hp-hr	(2)	122.53	(b)	487.88	(d)
CH ₄	2.24E+00 g/hp-hr	(2)	0.58	(b)	2.32	(d)
N₂O	2.2E-04 lb/MMBtu	(3)	0.00	(a)	0.00	(c)
CO ₂ e ^(e)			137.17		546.21	

** includes condensible PM

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) = 88

Engine Power Output (hp) = 118

Number of Engines = 1

BSFC (BTU/HP-hr) = 9,493 (4)

Heat Content Natural Gas(Btu/scf) = 1,253.0 (5)

Fuel Throughput (ft3/hr) = 894.0 (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 ₂ O	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 factors supplied from manufacturer's specification sheet
- (3) Emission factors 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 3 Compressor Engine Emissions (CE-1) Caterpillar G3508BLE

Tug Hill Operating, LLC Greer Pad

Pollutant	Emission Factor		PTE (lb/hr)		PTE (tons/yr)	
Criteria Pollutants						
PM/PM10/PM2.5**	9.98E-03 lb/MMBtu	(1)	0.06	(a)	0.25	(c)
SO ₂	5.88E-04 lb/MMBtu	(1)	0.00	(a)	0.01	(c)
NOx	1.00E+00 g/hp-hr	(2)	1.52	(b)	6.66	(d)
CO	2.00E+00 g/hp-hr	(2)	3.04	(b)	13.33	(d)
VOC	7.00E-01 g/hp-hr	(2)	1.06	(b)	4.66	(d)
Hazardous Air Pollutants						
1.1.2.2-Tetrachloroethane	4.00E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
1,1,2-Trichloroethane	3.18E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
1,3-Butadiene	2.67E-04 lb/MMBtu	(1)	0.002	(a)	0.007	(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)	0.001	(c)
2,2,4-Trimethylpentane	2.50E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Acetaldehyde	8.36E-03 lb/MMBtu	(1)	0.047	(a)	0.207	(c)
Acrolein	5.14E-03 lb/MMBtu	(1)	0.029	(a)	0.127	(c)
Benzene	4.40E-04 lb/MMBtu	(1)	0.002	(a)	0.011	(c)
Biphenyl	2.12E-03 lb/MMBtu	(1)	0.012	(a)	0.053	(c)
Carbon Tetrachloride	3.67E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Chlorobenzene	3.04E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Chloroform	2.85E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Ethylbenzene	3.97E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Ethylene Dibromide	4.43E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Formaldehyde	4.20E-01 g/hp-hr	(2)	0.639	(b)	2.798	(d)
Methanol	2.50E-03 lb/MMBtu	(1)	0.014	(a)	0.062	(c)
Methylene Chloride	2.00E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
n-Hexane	1.11E-03 lb/MMBtu	(1)	0.006	(a)	0.028	(c)
Naphthalene	7.44E-05 lb/MMBtu	(1)	0.000	(a)	0.002	(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)	0.000	(c)
Styrene	2.36E-05 lb/MMBtu	(1)	0.000	(a)	0.001	(c)
Toluene	4.08E-04 lb/MMBtu	(1)	0.002	(a)	0.010	(c)
Vinyl Chloride	1.49E-05 lb/MMBtu	(1)	0.000	(a)	0.000	(c)
Xylenes	1.84E-04 lb/MMBtu	(1)	0.001	(a)	0.005	(c)
Total HAP			0.758		3.320	
Greenhouse Gas Emissions					Metric Tonne/yr	
CO ₂	5.00E+02 g/hp-hr	(2)	760.58	(b)	3028.50	(d)
CH₄	2.35E+00 g/hp-hr	(2)	3.57	(b)	14.23	(d)
N ₂ O	2.2E-04 lb/MMBtu	(3)	0.00	(a)	0.01	(c)
CO ₂ e ^(e)	<u> </u>		850.32		3385.98	
** includes condensible PM						

^^ includes conde

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) = 515
Engine Power Output (hp) = 690
Number of Engines = 1
BSFC (BTU/HP-hr) = 8,203 (4)
Heat Content Natural Gas(Btu/sdf) = 1,253.0 (5)
Fuel Throughput (tt3/hr) = 4,517.2 (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)

CO₂ 1 (7) CH₄ 25 (7) N₂O 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-Bum Engines.
- (2) Emission factors supplied from manufacturer's specification sheet
- (3) Emission factors 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 4 Stabilizer Heater (SH-1) Rates and Emissions Tug Hill Operating, LLC Greer Pad

Pollutant	Emission Factor			SH Emissions (lb/hr)	SH Emissions (ton/yr)
Criteria Pollutants					
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.037	0.163
SO ₂	0.6	lb/MMcf	(1)	0.003	0.013
NOx	100	lb/MMcf	(2)	0.490	2.147
CO		lb/MMcf	(2)	0.412	1.804
VOC		lb/MMcf	(1)	0.027	0.118
Hazardous Air Pollutants					
Arsenic	2.0E-04	lb/MMcf	(3)	0.000	0.000
Benzene	2.1E-03	lb/MMcf	(4)	0.000	0.000
Beryllium	1.2E-05	lb/MMcf	(3)	0.000	0.000
Cadmium	1.1E-03	lb/MMcf	(3)	0.000	0.000
Chromium	1.4E-03	lb/MMcf	(3)	0.000	0.000
Cobalt	8.4E-05	lb/MMcf	(3)	0.000	0.000
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	0.000	0.000
Formaldehyde	7.5E-02	lb/MMcf	(4)	0.000	0.002
Hexane	1.8E+00	lb/MMcf	(4)	0.009	0.039
Lead	5.0E-04	lb/MMcf	(3)	0.000	0.000
Manganese	3.8E-04	lb/MMcf	(3)	0.000	0.000
Mercury	2.6E-04	lb/MMcf	(3)	0.000	0.000
Naphthalene	6.1E-04	lb/MMcf	(4)	0.000	0.000
Nickel	2.1E-03	lb/MMcf	(3)	0.000	0.000
PAH/POM	1.3E-03	lb/MMcf	(4)	0.000	0.000
Selenium	2.4E-05	lb/MMcf	(3)	0.000	0.000
Toluene	3.4E-03	lb/MMcf	(4)	0.000	0.000
Total HAP	1.9E+00	Ib/MMCF		0.009	0.041
Greenhouse Gas Emissions					
CO ₂	116.89	lb/MMBtu	(5)	584.445	2559.871
CH ₄		lb/MMBtu	(5)	0.011	0.048
N ₂ O	0.0	lb/MMBtu	(5)	0.001	0.005
CO ₂ e ^(b)	-	-	-	585.050	2562.517

Calculations:

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

Number of Line Heaters= 1 Fuel Use (MMBtu/hr) = 5 Hours of Operation (hr/yr)= 8760 PTE Fuel Use (MMcf/yr) = 42.9

(b) CO₂ equivalent = [(CO₂ emissions)*(GWP_{CO2})]+[(CH₄ emissions)*(GWP_{CH4})]+[(N₂O 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 5 GPU Heater (GPU-1 through GPU-10) Rates and Emissions Tug Hill Operating, LLC Greer 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 10 (lb/hr)	1.00 MMBtu/hr GPU Emissions x 10 (ton/yr)
Criteria Pollutants					
PM/PM10/PM2.5	7.6 lb/MMcf (1)	0.007	0.033	0.075	0.326
SO ₂	0.6 lb/MMcf (1)		0.003	0.006	0.026
NOx	100 lb/MMcf (2)	0.001	0.429	0.980	4.294
CO	84 lb/MMcf (2)		0.429	0.824	3.607
voc	5.5 lb/MMcf (1)		0.024	0.054	0.236
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
Beryllium	1.2E-05 lb/MMcf (3)		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
Cobalt	8.4E-05 lb/MMcf (3)		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	0.001	0.003
Hexane	1.8E+00 lb/MMcf (4)	0.002	0.008	0.018	0.077
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
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	0.019	0.081
Greenhouse Gas Emissions					
CO ₂	116.89 lb/MMBtu (5)	116.889	511.974	1168.891	5119.742
CH ₄	2.2E-03 lb/MMBtu (5)	0.002	0.010	0.022	0.097
N ₂ O	0.0 lb/MMBtu (5)	0.000	0.001	0.002	0.010
CO ₂ e ^(b)		117.010	512.503	1170.099	5125.034

Calculations:

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

Number of Line Heaters= 10 Fuel Use (MMBtu/hr) = 1 Hours of Operation (hr/yr)= 8760 PTE Fuel Use (MMcf/yr) = 8.6

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

CO₂ 1 (6) CH₄ 25 (6) N₂O 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 6. Combustor (VDU-1) Emissions Tug Hill Operating, LLC Greer Pad

Pollutant	Emission Factor (Ib/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.31	3,833	2,085	(1/1,000,000)	2.48	10.85
NOx	0.068	3,833	2,085	(1/1,000,000)	0.54	2.38
VOCa	0.14	3,833	2,085	(1/1,000,000)	1.12	4.90
CO2	116.89	3,833	2,085	(1/1,000,000)	934.24	4091.98

Example Formula:

$$smissions\left(\frac{ton}{yr}\right) = smission factor\left(\frac{lb}{MMBtu}\right) \times Volums\left(\frac{sof}{hr}\right) \times gas\ heat\ value\left(\frac{Btu}{sof}\right) \times \frac{MMBtu}{1,000,000\ Btu} \times \frac{659\ hrs}{1\ yr} \times \frac{1\ ton}{2,000\ lbs}$$

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

^a - 98% DRE for VOCs from ProMax simulated unconrolled emissions was found to be less than AP-42 Factor.

Hours of operation calculated at 8760 hrs/yr for worst case

Volume from manufacturer spec. sheet.

Gas Heat Value = 1501 Btu/scf from low pressure separator ProMax Estimate

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	3,833	15.26	0.0002423	64.00	1/379.4	0.1567	0.0783

Example Formula:

emissions
$$\left(\frac{ton}{yr}\right) = Volume \left(\frac{sef}{hr}\right) \times mol \ fraction \left(\frac{H2S}{100 \ sef} \times 0.00001588\right) \times molecular \ weight \times \frac{lb \cdot mol}{sef} \times \frac{659 \ hrs}{1 \ yr} \times \frac{1 \ ton}{2,000 \ lbs}$$

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

Volume from manufacturer spec. sheet.

H2S conversion taken from supporting Sulfur Measurement Handbook

grain H2S/100 scf = 15.26

1 lb mol = 379.4 cubic feet

For Pilot Light

1 Of 1 HOULIGHT						
Pollutant	Emission Factor (Ib/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.31	65.0	1,253	(1/1,000,000)	0.0252	0.1106
NOx	0.068	65.0	1,253	(1/1,000,000)	0.0055	0.0243
VOCa	0.14	65.0	1,253	(1/1,000,000)	0.0114	0.0499

^a - Measured as methane equivalent, assumed worst case

Example Formula:

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

Volume from manufacturer spec. sheet.

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

Gas Heat Value = 1197 Btu/scf average of two sales gas samples taken 6-10-16

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	65.0	15.26	0.0002423	64.00	1/379.4	0.0027	0.0116

Example Formula:

$$smissions \left(\frac{ton}{yr}\right) = Volums \left(\frac{sof}{hr}\right) \times mol \ fraction \left(\frac{H2S}{100 \ sof} \times 0.00001588\right) \times \\ molecular \ weight \ \times \\ \frac{lb \cdot mol}{sof} \times \frac{8760 \ hrs}{1 \ yr} \times \frac{1 \ ton}{2,000 \ lbs} \times \frac{100 \ hrs}{1 \ yr} \times \frac{100 \ hrs}{100 \ hrs} \times \frac{100 \ hrs}{100$$

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

Volume from manufacturer spec. sheet.

H2S conversion taken from supporting Sulfur Measurement Handbook

grain H2S/100 scf = 15.26

1 lb mol = 379.4 cubic feet

Note: Controlled emissions from 2% of captured emissions predicted by ProMax = 3.79 tpy VOCs. Therefore, VOC emissions were taken from higher estimates of VOCs using AP-42's THC emission factor.

Flare and Pilo		
Pollutant	lb/hr	ton/yr
СО	2.50	10.96
Nox	0.55	2.40
voc	1.13	4.95
SO2	0.16	0.09

Table 7 Tank Emissions Tug Hill Operating, LLC Greer 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)	VOC Emissions Controlled (lb/hr)(c)	VOC Emissions Controlled (tons/yr)(c)
T01	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T02	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T03	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T04	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T05	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T06	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T07	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T08	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T09	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T10	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T11	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T12	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T13	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T14	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T15	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T16	Condensate	VDU-1	234.8	0.000 (1)	0.00	2.49E+01	1.038	4.548	0.021	0.091
T17	Produced Water	VDU-1	616.4	0.035 (1)	21.53	1.95E-04	0.897	3.930	0.018	0.079
T18	Produced Water	VDU-1	616.4	0.035 (1)	21.53	1.95E-04	0.897	3.930	0.018	0.079
T19	Produced Water	VDU-1	616.4	0.035 (1)	21.53	1.95E-04	0.897	3.930	0.018	0.079
T20	Produced Water	VDU-1	616.4	0.035 (1)	21.53	1.95E-04	0.897	3.930	0.018	0.079
Total			6222.2	0.14	86.14	398.74	20.203	88.490	0.404	1.770

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

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

Table 8 Truck Loading (TL-1) VOC Emissions Tug Hill Operating, LLC Greer Pad

Contents	Volume Trans	sferred	PTE VOC Emissions (lb/hr)	PTE VOC Emissions ^(a) (tons/yr)	Controlled VOC Emissions ^{(b)(c)} (tons/yr)
Produced Water	37,795,349	gal/yr	0.000	0.000	
Condensate	57,594,810	gal/yr	32.922	144.200	
Total	95,390,159	gal/yr	32.922	144.200	
Total Captured (70%)				100.940	2.019
Total Fugitive (30%)				43.260	43.260

- (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 9 Fugitive Leaks Tug Hill Operating, LLC Greer Pad

Pollutant	Emission Factor	PTE ^{(a) Gas Service} (tons/yr)	PTE VOC emissions (ton/yr)	PTE CO ₂ e emissions (ton/yr)	PTE Total HAPs emissions (ton/yr)
Valves Pressure Relief Valves Connectors (2) Open Ended Lines Compressors	9.9E-03 lb/hr/source 1.9E-02 lb/hr/source 8.6E-04 lb/hr/source 4.4E-03 lb/hr/source 1.9E-02 lb/hr/source	16.32 0.85 6.25 0.39 0.08	3.47 0.18 1.33 0.08 0.00	49.00 2.55 18.77 1.16 0.00	0.04 0.00 0.02 0.00 0.00
Total		23.90	5.06	71.48	0.07

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	1.63E-04	1.63E-04	1.63E-04	1.63E-04	4.43E-02
Pressure Relief Valves	8.49E-06	8.49E-06	8.49E-06	8.49E-06	2.30E-03
Connectors (2)	6.25E-05	6.25E-05	6.25E-05	6.25E-05	1.70E-02
Open Ended Lines	3.86E-06	3.86E-06	3.86E-06	3.86E-06	1.05E-03
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	0.06

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 =
 376

 Pressure Relief Valves =
 10

 Connectors =
 1,662

 Open Ended Lines =
 20

 Compressors =
 1.000

 Maximum Hour of Operation =
 8,760

Global Warming Potential

(GWP)

 $\begin{array}{ccc} CO_2 & & 1 \\ CH_4 & & 25 \\ N_2O & & 298 \end{array}$

- (1) Emission factors from 1995 EPA Protocol for Equipment Leak Emission Estimates, Table 2-4 Oil and Gas Production
- $\ensuremath{\text{(2)}}\xspace \ensuremath{\text{Connectors}}\xspace \ensuremath{\text{is}}\xspace \ensuremath{\text{assumed}}\xspace \ensuremath{\text{count}}\xspace$
- (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



Simulation Report

Project: Tug-hill Stabilizer Simulation - 8 wells - June 1st w tank emissions.pmx

Licensed to SLR International Corporation and Affiliates

Client Name: Tug-Hill Location: Greer Facility Job: Marcellus Wells

ProMax Filename:

ProMax Version: 4.0.16071.0

Simulation Initiated: 7/19/2017 12:04:13 PM

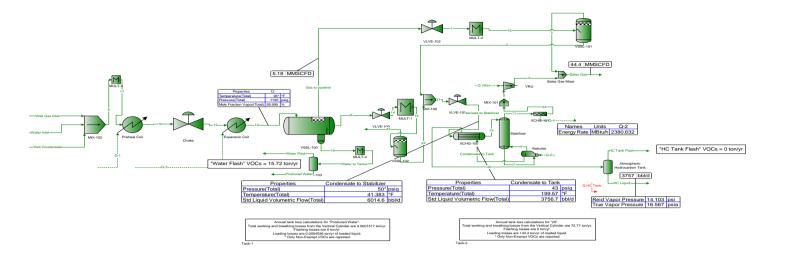
Bryan Research & Engineering, Inc.

Chemical Engineering Consultants P.O. Box 4747 Bryan, Texas 77805 Office: (979) 776-5220 FAX: (979) 776-4818 mailto:sales@bre.com http://www.bre.com/

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.



Process Streams	Condensate to Stabilizer	Condensate to Tank	Gas to pipeline	HC Liquid	HC Tank Flash F	roduced Water	Sales Gas	Water Flash	Water Inlet	Water to Tanks V	Vell Condensate V	Well Gas Inlet
Composition Status: Phase: Total From Block	Solved :: VLVE-101	Solved Reboiler	Solved VSSL-100	Solved Atmospheric Hydrocarbon Tank	Solved Atmospheric Hydrocarbon Tank	Solved VSSL-103	Solved Sales Gas Mixer	Solved VSSL-103	Solved 	Solved MultiplierMixer-O-4	Solved 	Solved -
To Block: Mole Fraction	XCHG-100 %	XCHG-100 %	VLVE-102 %	 %	 %	%	- %	%	MIX-102 %	VSSL-103 %	MIX-102 %	MIX-102 %
Nitrogen Carbon Dioxide	0.0181793 0.0871058	0 1.40130E-08	0.616439 0.205410	0 1.40130E-08		4.21170E-06 0.000898340	0.577551 0.203834	0.400606 2.45024	0* 0*	0.000571907 0.00436930	0.027* 0.039*	0.594* 0.218*
Methane	9.73876	1.70206E-09	75.6298	1.70206E-09		0.00157619	71.8959	75.7862	0*	0.108971	10.838*	74.97*
Ethane Propane	14.7545 16.6020	0.000987685 3.12118	14.9927 5.42902	0.000987685 3.12118		0.000355156 3.92397E-05	16.0557 7.14974	12.5356 2.05450	0*	0.0181189 0.00295062	13.005* 15.319*	15.749* 5.76*
Isobutane n-Butane	3.16700 11.5531	2.37209 11.1803	0.523769 1.45919	2.37209 11.1803		1.17293E-06 7.49530E-06	0.750463 2.11875	0.0950350 0.377408	0*	0.000135846 0.000542311	3.066* 11.345*	0.535* 1.446*
2,2-Dimethylpropane Isopentane	0.0929878 3.79669	0.105841 5.48183	0.00994976 0.265597	0.105841 5.48183		6.74237E-09 3.58011E-07	0.0142155 0.360113	0.000869534 0.0300545	0*	1.23895E-06 4.29479E-05	0.154* 3.985*	0.001* 0.213*
n-Pentane	6.35758	9.88312	0.373844	9.88312		1.19484E-07	0.484250	0.0197495	0*	2.81064E-05	6.673*	0.283*
2,2-Dimethylbutane Cyclopentane	0.0929872	0.160911 0	0.00394730 0	0.160911 0		5.40092E-10 0	0.00451204 0	0.000124885 0	0*	1.77514E-07 0	0.095* 0*	0.003*
2,3-Dimethylbutane 2-Methylpentane	0.263342 1.79782	0.476571 3.28458	0.00924782 0.0607435	0.476571 3.28458		5.45007E-09 1.53268E-08	0.00963934 0.0614507	0.000587347 0.00244387	0* 0*	8.37774E-07 3.47852E-06	0.26* 1.849*	0.008* 0.042*
3-Methylpentane	1.10251	2.04499	0.0341257	2.04499		5.56614E-08	0.0330644	0.00347366	0*	4.97812E-06	1.128*	0.024*
n-Hexane Methylcyclopentane	3.67689 0.537224	6.97328 1.01844	0.100965 0.0141287	6.97328 1.01844		1.36861E-08 8.55780E-08	0.0892521 0.0130504	0.00284207 0.00290566	0* 0*	4.04118E-06 4.20308E-06	3.778* 0.572*	0.067* 0.007*
Benzene Cyclohexane	0.0568604 0.591979	0.107187 1.13856	0.00149812 0.0140856	0.107187 1.13856		2.26094E-05 3.38619E-07	0.00145060 0.0121354	0.0107144	0*	3.77608E-05 8.33305E-06	0.059* 0.62*	0.001* 0.008*
2-Methylhexane 3-Methylhexane	1.17453 1.05831	2.34771 2.12448	0.0215963 0.0182099	2.34771 2.12448		1.57105E-09 1.73500E-09	0.0134747	0.000386159 0.000373733	0* 0*	5.48795E-07 5.31351E-07	1.246* 1.112*	0.009* 0.009*
2,2,4-Trimethylpentane	0	0	0	0		0	0	0	0*	0	0*	0*
n-Heptane Methylcyclohexane	2.97991 1.28561	6.04331 2.60782	0.0451471 0.0179091	6.04331 2.60782		1.73397E-09 5.55465E-08	0.0239190 0.00997071	0.000554870 0.00216689	0* 0*	7.88040E-07 3.12617E-06	3.114* 1.354*	0.025* 0.009*
Toluene n-Octane	0.224061 4.62419	0.454950 9.61616	0.00296846 0.0364197	0.454950 9.61616		2.15131E-05 1.38750E-10	0.00168333 0.0113895	0.0125845	0*	3.93162E-05 1.64235E-07	0.24* 4.94*	0.001* 0.014*
Ethylbenzene	0.208317	0.433314	0.00142502	0.433314		5.22115E-06	0.000492537 0.000558360	0.00388844	0*	1.07241E-05	0.227* 0.276*	0* 0.001*
1,3-Dimethylbenzene 1,4-Dimethylbenzene	0.259976 0.00933444	0.541376 0.0194289	0.00168207 6.22624E-05	0.541376 0.0194289		4.11464E-06 1.65107E-07	2.09667E-05	0.00385834 0.000147392	0*	9.57648E-06 3.73742E-07	0.003*	0.001*
1,2-Dimethylbenzene n-Nonane	0.399550 2.69391	0.833179 5.65184	0.00234800 0.0105419	0.833179 5.65184		1.63212E-05 1.62707E-11	0.000749104 0.00206577	0.00763929 1.75090E-05	0* 0*	2.71238E-05 2.48283E-08	0.435* 2.913*	0* 0.002*
n-Decane Undecane	2.38201 1.80131	5.01208 3.79445	0.00519525 0.00204974	5.01208 3.79445		5.30280E-13 9.41184E-14	0.000653141 0.000167695	1.79382E-06 3.91567E-07	0* 0*	2.54257E-09 5.54985E-10	2.587* 1.956*	0* 0*
Dodecane	1.33355	2.81016	0.000804172	2.81016		1.64743E-13	4.56274E-05	2.62436E-07	0*	3.72063E-10	1.448*	0*
Tridecane Tetradecane	1.03701 0.827958	2.18558 1.74507	0.000355128 0.000160360	2.18558 1.74507		2.55421E-13 4.16926E-13	4.01314E-06	1.76763E-07 1.22690E-07	0* 0*	2.50746E-10 1.74281E-10	1.126* 0.899*	0*
Pentadecane Hexadecane	0.664947 0.455885	1.40152 0.960885	6.11505E-05 2.43842E-05	1.40152 0.960885		1.09971E-12 7.74373E-13	1.00910E-06 2.73466E-07	1.00956E-07 4.26935E-08	0*	1.44164E-10 6.12744E-11	0.722* 0.495*	0*
Heptadecane	0.383128	0.807534	1.27283E-05	0.807534		1.30927E-12	9.62519E-08	3.14291E-08	0*	4.58457E-11	0.416*	0*
Octadecane Nonadecane	0.338921 0.280899	0.714357 0.592063	6.76828E-06 3.22773E-06	0.714357 0.592063		5.12408E-12 6.12157E-12	1.20619E-08	3.74249E-08 2.18765E-08	0*	5.81518E-11 3.71141E-11	0.368* 0.305*	0*
Eicosane Heneicosane	0.206299 0.151962	0.434827 0.320296	1.36025E-06 5.36213E-07	0.434827 0.320296		1.12410E-11 1.57867E-11	3.48820E-09 9.11816E-10	1.37418E-08 6.15072E-09	0*	3.06987E-11 2.44805E-11	0.224* 0.165*	0*
Docosane Tricosane	0.139989 0.0911770	0.295061 0.192178	3.22291E-07 1.06223E-07	0.295061 0.192178		2.22031E-11 1.43965E-11	3.89315E-10 8.32799E-11	3.19742E-09 7.43151E-10	0* 0*	2.67027E-11 1.54293E-11	0.152* 0.099*	0*
Tetracosane	0.0699945	0.147530	4.61474E-08	0.147530		1.32652E-11	2.43887E-11	2.18882E-10	0*	1.35565E-11	0.076*	0*
Pentacosane Hexacosane	0.0478909 0.0460490	0.100942 0.0970595	1.91344E-08 1.02459E-08	0.100942 0.0970595		1.03555E-11 1.09937E-11	7.15337E-12 2.51752E-12	6.30241E-11 2.10035E-11	0* 0*	1.04301E-11 1.10079E-11	0.052* 0.05*	0* 0*
Heptacosane Octacosane	0.0524958 0.0432860	0.110648 0.0912359	5.55341E-09 3.34404E-09	0.110648 0.0912359		1.41821E-11 1.23430E-11	8.72296E-13 3.88228E-13	7.16832E-12 2.92096E-12	0*	1.41722E-11 1.23296E-11	0.057* 0.047*	0*
Nonacosane Triacontane	0.0101308	0.0213531	5.29670E-10	0.0213531		2.38819E-12	4.53444E-14	3.18385E-13	0*	2.38525E-12	0.011*	0*
		0.0213531	3 10185F-10	0.0213531					0*	2 67450F-12		0*
Hentriacontane	0.0101308 0.0571007	0.0213531 0.120354	3.10185E-10 3.05811E-08	0.0213531 0.120354		2.67812E-12 0	1.81557E-14 9.66246E-13	1.20591E-13 0	0* 0*	2.67450E-12 0	0.011* 0.062*	0*
Hentriacontane Water Molar Flow	0.0571007 0.362777 bmol/h		3.05811E-08 0.0885253 lbmol/h		lbmol/h	2.67812E-12 0 99.9970 	1.81557E-14 9.66246E-13 0.0888709 lbmoVh	1.20591E-13 0 6.18931 lbmol/h		99.8641 Ibmol/h	0.011* 0.062* 0*	0* 0* 0* Ibmol/h
Hentriacontane Water	0.0571007 0.362777	0.120354 1.87775E-07 Ibmol/h 0 4.94563E-08	3.05811E-08 0.0885253	0.120354 1.87775E-07 Ibmol/h 0 4.94563E-08	lbmol/h 0 0	2.67812E-12 0 99.9970	1.81557E-14 9.66246E-13 0.0888709	1.20591E-13 0 6.18931	0* 100*	0 99.8641	0.011* 0.062* 0*	0* 0* 0* Ibmol/h 3.31552* 1.21681*
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane	0.0571007 0.362777 Ibmol/h 0.135233 0.647969 72.4454	0.120354 1.87775E-07 Ibmol/h 0 4.94563E-08 6.00710E-09	3.05811E-08 0.0885253 Ibmol/h 3.50887 1.16923 430.497	0.120354 1.87775E-07 IbmoVh 0 4.94563E-08 6.00710E-09	0 0 0	2.67812E-12 0 99.9970 Ibmol/h 8.37198E-05 0.0178571 0.0313313	1.81557E-14 9.66246E-13 0.0888709 lbmol/h 28.1863 9.94774 3508.75	1.20591E-13 0 6.18931 bmol/h 0.0113007 0.0691187 2.13785	0* 100* Ibmol/h 0* 0* 0*	0 99.8641 Ibmol/h 0.0113844 0.0869758 2.16918	0.011* 0.062* 0* Ibmol/h 0.0210203* 0.0303626* 8.43769*	0* 0* 0* IbmoVh 3.31552* 1.21681* 418.459*
Hentriacontane Water Water Miolar Flow Nitrogen Carbon Dioxide Methane Ethane Propane	0.0571007 0.362777 Ibmol/h 0.135233 0.647969 72.4454 109.757 123.500	0.120354 1.87775E-07 Ibmol/h 0 4.94563E-08 6.00710E-09 0.00348584 11.0156	3.05811E-08 0.0885253 Ibmol/h 3.50887 1.16923 430.497 85.3410 30.9029	0.120354 1.87775E-07 IbmoVh 0 4.94563E-08 6.00710E-09 0.00348584 11.0156	0 0 0 0	2.67812E-12 0 99.9970 Ibmol/h 8.37198E-05 0.0178571 0.0313313 0.00705975 0.000780002	1.81557E-14 9.66246E-13 0.0888709 IbmoVh 28.1863 9.94774 3508.75 783.567 348.930	1.20591E-13 0 6.18931 lbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.0579554	0* 100* Ibmol/h 0* 0* 0* 0*	99.8641 Ibmol/h 0.0113844 0.0869758 2.16918 0.360677 0.0587354	0.011* 0.062* 0* Ibmol/h 0.0210203* 0.0303626* 8.43769* 10.1248* 11.9263*	0* 0* 0* Ibmol/h 3.31552* 1.21681* 418.459* 87.9059* 32.1505*
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane n-Butane	0.0571007 0.362777 	0.120354 1.87775E-07 IbmoVh 0 4.94563E-08 6.00710E-09 0.00348584 11.0156 8.37183 39.4587	3.05811E-08 0.0885253 Ibmol/h 3.50887 1.16923 430.497 85.3410 30.9029 2.98138 8.30594	0.120354 1.87775E-07 ibmoVh 0 4.94563E-08 6.00710E-09 0.00348584 11.0156 8.37183 39.4587	0 0 0 0 0	2.67812E-12 99.9970 Ibmol/h 8.37198E-05 0.0178871 0.0313313 0.00705975 0.000780002 2.33154E-05 0.000148991	1.81557E-14 9.66246E-13 0.088709 Ibmol/h 28.1863 9.94774 3508.75 783.567 348.930 36.6250 103.402	1.20591E-13 0 6.18931 IbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.0579554 0.00268084 0.0106463	0* 100* Ibmol/h 0* 0* 0* 0* 0*	0 99.8641 Ibmol/h 0.0113844 0.0869758 2.16918 0.360677 0.0587354 0.00270416 0.0107953	0.011* 0.062* 0* Ibmol/h 0.0210203* 0.0303626* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241*	0° 0° 0° IbmoVh 3.31552° 1.21681° 418.459° 87.9059° 32.1505° 2.98620° 8.07111°
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane	0.0571007 0.362777 	0.120354 1.87775E-07 Ibmol/h 0 4.94563E-08 6.00710E-09 0.00348884 11.0156 8.37183 39.4587 0.373544 19.3471	3.05811E-08 0.0885253 Ibmol/h 3.50887 1.16923 430.497 85.3410 30.9029 2.98138	0.120354 1.87775E-07 IbmoVh 0 4.94563E-08 6.00710E-09 0.00348584 11.0156 8.37183	0 0 0 0 0	2.67812E-12 99.970 Ibmol/h 8.37198E-05 0.0178571 0.0313313 0.00705975 0.000780002 2.33154E-05	1.81557E-14 9.66246E-13 0.0888709 IbmoVh 28.1863 9.94774 3508.75 783.567 348.930 36.6250 103.402 0.693762 17.5746	1.20591E-13 0 6.18931 IbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.0579554 0.00268084 0.0106463 2.45287E-05 0.000847808	0* 100* Ibmol/h 0* 0* 0* 0*	0 99.8641 Ibmol/h 0.0113844 0.0869758 2.16918 0.360677 0.0587354 0.00270416 0.0107953 2.46627E-05	0.011* 0.062* 0* Ibmol/h 0.0210203* 0.0303626* 8.43769* 10.1248* 11.9263* 2.38697*	0° 0° 0° 0° 1bmoVh 3.31552° 1.21681° 418.459° 87.9059° 32.1505° 2.98620° 8.07111° 0.00558168° 1.18890°
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Priopanan 1-Butane 2-2-Dimethylorpoane loopentane n-Pentane	0.0571007 0.362777 Ibmol/h 0.15233 0.45736 72.4454 109.757 123.500 23.5589 85.9417 0.691724 28.2431 47.2293	0.120354 187775E-07 Ibmol/h 0 4.94563E-08 6.00710E-09 0.00248584 11.0156 8.37183 39.4587 0.373544 19.3471 34.8806	3.05811E-08 0.0885253 Ibmol/h 3.50887 1.16923 430.497 85.3410 30.9029 2.98138 8.30594 0.0566356 1.51182 2.12798	0.120354 1.87775E-07 Ibmol/h 4.94563E-08 6.00710E-09 0.00348584 11.0196 3.94587 3.94587 3.94587 3.94587 3.94587 3.94587	0 0 0 0 0 0	2.67812E-12 99.9970 Ibmol/h 8.37198E-05 0.0178571 0.0313313 0.00705975 0.000780002 2.33154E-05 0.000148991 1.34024E-07 7.11650E-06 2.37509E-06	1.81557E-14 9.66246E-13 0.0888709 Ibmolh 28.1863 9.94774 3508.75 783.567 348.930 36.6250 103.402 0.693762 17.5746 23.6329	1.20591E-13 0 6.18931 IbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.00268084 0.0106463 2.45287E-05 0.000847808 0.000557114	0* 100* Ibmol/h 0* 0* 0* 0* 0*	0 99.8641 Ibmol/h 0.0113844 0.0869758 2.16918 0.360677 0.0587354 0.00270416 0.0107953 2.46627E-05 0.00854925	0.011* 0.062* 0* lbm0lb* 0.0210203* 0.0210203* 0.0303626* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241* 0.119893* 3.10244* 5.19512*	0° 0° 0° 1bmol/h 3.31552° 1.21681° 418.459° 87.9059° 32.1505° 2.98620° 8.07111° 0.00558168° 1.18890° 1.57962°
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane labolutane 2-2 Omnethyloropane lacpentane 1-2-2 Omnethyloropane lacpentane 2-2-2 Omnethyloropane lacpentane 2-2-2 Omnethyloropane lacpentane	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4454 100.757 123.509 9.050722 0.60722 0.60722 0.691720 0.691720	1 120354 187775-07 bmol/h 0 4 .94563E-08 6.00710E-09 0.0034854 11.0156 8.37183 39.4587 0.373544 19.3471 34.8906 0.567904	3.05811E-08 0.0885253 Ibm0l/h 3.50887 1.16923 430.497 85.3410 30.9029 2.98138 8.30594 0.0566356 1.51182 2.12798 0.0224887	0.120354 187775E-07 1bmol/h 4.44563E-08 6.00710E-09 0.00348584 11.0158 8.37163 9.37164 1.37544 1.3471 3.48806 0.567904	0 0 0 0 0 0 0	2.67812E-12 99.9970 Ismol/h 8.37198E-05 0.0178571 0.0313313 0.00705975 0.000780002 2.33154E-05 0.000148991 1.34024E-07 7.11650E 2.37509E-06 1.07359E-08	1.81557E-14 9.66246E-13 0.0888709 ibmoth 8.1863 9.94774 3508.75 783.567 348.930 36.6250 103.402 0.693762 17.5746 23.6329 0.220202	1.20591E-13 0 6.18931 IbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.0579554 0.00268084 0.0106463 2.45287E-05 0.000847808 0.000557114 3.52288E-06	0° 100° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0°	0 99.8641	0.011* 0.062* 0* lbm0lb* 0.0210203* 0.020303626* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241* 0.119893* 3.10244* 5.19512* 0.0739602*	0° 0' 1bmoVh 3.31552' 1.21681' 418.459' 87.9059' 32.1505' 2.98620' 8.07111' 0.00558168' 1.18890' 1.57962' 0.0167450' 0'
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Propane Isobutane 1.2-Dimethylyopane Isopentane 2.2-Dimethylyopane 2.2-Dimethylyopane 2.2-Dimethylyopane 2.3-Dimethylyopane 2.3-Dimethylyopane 2.3-Dimethylyopane 2.3-Dimethylyopane	0.0571007 	0.120354 1.87775-07 Ibmolh 0 4.945635-08 6.00710E-09 0.00348584 11.0156 8.37183 39.4567 13.48906 0.567904 1.88196 1.88196 1.88196	3.05811E-08 .0085253 .00	0.120354 1.87775E-07 1bmol/h 4.4465E-08 6.00710E-09 0.00348594 11.10156 8.37183 30.4857 0.0703-09 1.4714 4.4806 0.567904 0 1.68196 1.15923	0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmol/h 8.37198E-05 0.0178571 0.00133131 0.00708975 0.000748092 2.3154E-05 0.00014891 1.34024E-07 2.1759E-08 1.07359E-08 1.07359E-08	1.8155/E-14 3.62467-13 3.0.888709 bm0/h 1.0.888709 bm0/h 3.0.888709 3.9.47774 3.00.75 783.567 783.567 3.48.930 3.6.250 103.402 0.693762 17.5746 23.6329 0.220202 0.470430 2.99893	1.20591E-13 0.6.18931 IbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.00268084 0.00268084 0.00268084 0.000647808 0.000947808 0.000947808 0.000957114 3.52288E-06 0.6.89391E-05	0° 100°	99.8641	0.0111 0.0622 0' Ibmol/h 0.0210203* 0.0303626* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241* 0.119893* 3.10244* 5.19512* 0.0739602* 0.0739602* 0.202417* 1.43950* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 1.43950* 0.202417* 0.202417* 1.43950* 0.202417* 0	0" Ibmo/h 3.31552" 1.21681" 418.459" 87.9059" 32.1505" 2.96620" 8.07111" 0.00558168" 1.18890" 1.57962" 0.0167450" 0.0446535" 0.234431"
Hentricontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane Butane 2,2-Dimethyloppane Isopentane	0.0571007 0.382777 Ibmolth 0.135233 0.647969 72.4464 109.757 12.5.00 23.5589 85.9417 0.691724 28.2431 47.2933 0.691720 0	0.120354 1.87775-07 Ibmol/h 0 4.945635-08 6.007105-09 0.00348584 11.0156 8.37183 39.4597 0.373544 19.3471 34.8806 0.567904 0.1.88196	3.05811E-08 0.0885253 Ibmol/h 3.50887 1.16923 430.497 85.3410 30.9029 2.98138 8.30594 0.0566356 1.51182 2.12798 0.0224687 0.0224687 0.0.05526401	0.120354 1.87775E-07 1bm0l/h 0 4.94653E-08 6.00710E-09 0.00348594 11.101656 8.37183 39.4587 0.373544 19.3471 34.8806 0.557904 0 1.61816	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmol/h 8.37198E-05 0.0178571 0.0013313 0.007089075 0.000148991 1.34024E-07 7.11650E-06 2.37509E-08 0 0 1.08336E-07	1.8155/E-14 9.66246E-13 0.0888709 bmo/h 28,1863 9.94774 3508.75 783.567 348.930 36.6250 103.402 0.693762 21.75746 23.8329 0.220202 0.0470430	1.20591E-13 0.6.18931 Ibmol/h 0.0113007 0.0691187 2.13785 0.0258084 0.0106463 2.45287E-05 0.000577114 3.5228E-06 0.1.65685E-05	0° 100° bmol/h	0 99.8641 Ibmolth 0.0113844 0.0869758 2.16918 0.360677 0.0587354 0.00270416 0.0107953 2.46627E-05 0.000854925 0.000859499 3.53362E-06 0 0 1.66768E-05	0.011* 0.062* 0* bmoth 0.0210203* 0.0303626* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241* 0.119893* 3.10244* 5.19512* 0.0739602* 0.0202417*	0° 0' 1bmol/h 3.31552' 1.21681' 418.459' 87.9059' 32.1505' 2.98620' 8.07111' 0.00558168' 1.18890' 1.57962' 0.0167450' 0
Hentricontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Ethane Industrial	0.0571007 0.382777 Ibmolfh 0.135233 0.647969 72.4464 109.757 22.5589 85.9417 0.691724 28.2431 47.2233 0.691720 13.3738 8.20144 27.3519 3.99654	0.120354 1.87775E-07 Ibmol/h 4.94563E-08 6.00710E-09 0.00348586 11.9156 3.34.857 0.373544 10.3471 34.8806 0.567004 1.800 1.800 1.800 2.7.21740 2.6108 3.99440	3.05811E-08 0.0885253 bmokh 3.50887 1.16923 430.497 85.3410 30.9029 2.98138 8.30594 0.056636 1.51182 2.12798 0.0224887 0 0.0526401 0.345762 0.194249 0.574712	0.120354 1.87758-07 1.87758-07 0 4.49658-08 6.007106-09 0.00346594 1.837183 3.94587 0.373544 19.3471 3.48896 0.567904 11.5902 7.21740 2.46108	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmolh 8.37198E-05 0.0178571 0.00133313 0.007789002 2.33154E-05 0.000148991 1.34024E-07 7.11650E-06 2.37509E-08 0 1.07359E-08 0 1.08336E-07 3.04664E-07 1.10643E-06 2.72050E-07 1.7011E-06	1.81557E-14 9.66246F-14 9.66246F-13 0.0888709 Bmoth 28.1863 9.947744 3306.75 783.567 783.567 348.930 36.6250 0.093762 21.55746 22.56329 0.202020 0.0470430 2.99899 1.61365 4.35579 0.635807	1.20591E-13 0.18931 IbmoVh 0.0113007 0.0691187 2.13785 0.353617 0.0579854 0.00268084 0.0106463 2.45287E-05 0.000847808 0.000557114 3.52288E-06 6.89391E-05 6.89391E-05 8.01720E-05 8.01720E-05 8.19167E-05	0° 100°	0 0 98.841	0.0117 0.062* 0.082* 0.0210203* 0.030828* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241* 0.118883* 3.10244* 2.0738602* 0.0738602* 0.02041* 1.43850* 0.878180* 2.94128*	0" Ibmol/h 3.31552* 121681* 418.459* 7.9059* 32.1505* 8.7711* 0.00558168* 1.18890* 1.57962* 0.0167450* 0.0446535* 0.2344311* 0.133960* 0.373973* 0.3390718*
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Priopinane is-Butane 2-2-Dimetrylpropane loopentane 2-2-Dimetrylpropane 2-2-Westylpropane 2-3-Dimetrylpropane 2-3-Dimetrylpropane 2-3-Dimetrylpropane 2-3-Dimetrylpropane 3-3-Dimetrylpropane 3-3-Dimetrylpropane 4-Metrylpropane 4-Metrylpropane 4-Metrylpropane 4-Metrylpropane 6-Metrylpropane 6-Met	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4454 102.757 123.5091 26.59417 0.691724 28.2431 47.2233 0.691720 0 1.98897 13.33788 27.3519 3.96544 0.422977 4.40368	0.120354 1.87775-07 Ibmol/h 0 4.945636-08 6.00710E-09 0.00348684 11.0150 3.94837 0.373544 19.3471 34.8806 0.567904 1.88196 1.81992 1.15920 2.41010 2.45100 3.376294 0.376294 4.01831	3.05811E-08 0.8885233 lbmolh 3.50887 1.16923 430.497 88.3410 3.9029 2.98138 8.30594 0.0566356 1.51812 2.12798 0.0224687 0.0525401 0.345762 0.194249 0.574712 0.0804228 0.00852733 0.0801773	0.120354 1.8775E-07 1bmol/h 0 4.3465E-08 6.00710E-09 0.00346554 11.0156 3.34587 0.375544 19.3471 34.8806 0.567904 0 1.68186 11.0222 24.6108 3.59440 0.378244	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmolh 8.37198E-05 0.0178571 0.0078002 2.33154E-05 0.000148991 1.34022E-07 7.11650E-06 1.07359E-08 1.07359E-08 1.07359E-08 1.07359E-08 1.07359E-08 1.07359E-08 1.07359E-06 2.72050E-07 1.10643E-07 1.10643E-07 1.7011E-06 0.0004494E-07	1.81557E-13 9.66246E-14 9.66246E-13 10.888709 10.888709 10.888709 10.888709 10.888709 10.89870 10.89870 10.3402 17.5746 17.5746 17.5746 17.5746 17.5746 17.5746 17.5746 17.5746 18.5852 19.89899 1.61365 4.35579 0.63650 0.63762 0.7070937	1.20591E-13 0 6.18931 1bmolh 0.0113007 0.0691187 2.13785 0.353617 0.0579854 0.000268084 0.0106463 2.45287E-05 0.000247808 0.000557114 0.55288E-06 6.89391E-05 6.89391E-05 6.89391E-05 6.89391E-05 6.89591E-05 0.000302243 0.000159147	0° 100/ 100/ 100/ 100/ 100/ 100/ 100/ 10	0 98 8641	0.0111 0.062* 0.082* 0.0210203* 0.0308026* 8.43769* 10.1248* 11.9263* 2.38697* 8.83241* 0.118833* 3.10244* 1.43960* 0.0738602* 0.0738602* 0.07878180* 0.294128* 0.445381* 0.445383* 0.445288*	0" 10mol/h 3.31552" 1.21681" 418.459" 3.21505" 2.98620" 0.00581681" 1.57962" 0.0167450" 0.0446535" 0.234431" 0.0395188
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Propane Isobulare Isobula	0.0571007 0.382777	0.120354 1.87775∈07 Ibmol/h 4.94563€-08 6.0070€-09 0.00348584 11.0156 8.37183 39.4587 0.373544 19.3471 34.8506 0.56790 0 1.86196 11.5923 7.21740 24.6108 3.59440 0.378294	3.05811E-08 0.8885233 ibmol/h 3.50887 1.16923 430.497 85.3410 3.0.9029 2.98138 8.30594 0.0566336 1.51182 2.12798 0.0224687 0.0526401 0.345762 0.194249 0.574712 0.0804228	0.120354 1.8775E-07 1bmol/h 4.44658E-08 6.00710E-09 0.00348584 11.0156 8.37183 39.4587 0.373544 19.3471 34.8686 0.159204 1.15922 7.21740 24.6108 3.59440 0.378244	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmolh 8.37198E-05 0.0178571 0.0313313 0.00705975 0.00748991 1.34024E-07 7.11650E-06 2.37599E-08 1.07359E-08 0.00148991 0.108336E-07 1.10643E-06 2.72590E-07 1.70111E-06	1.81557E-14 9.662467 9.662467 9.808709 9.808709 9.808709 9.80870 9.81633 9.84744 9.90874 9.90874 9.90876 9.84890 9.86250 103.402 0.893762 17.5746 23.6329 0.220202 0.470430 2.99899 1.613657 0.836902 0.836902 0.836902 0.836902 0.836902	1.20591E-13 0 6.18931 Ibmol/h 0.0113007 0.0691187 2.13785 0.353617 0.0579554 0.00268084 0.0106463 2.45287E-05 0.000847808 0.000557114 3.52288E-06 0.000847808 0.000557116 3.52288E-06 8.198391E-05 9.79884E-05 8.19857E-05 8.19857E-05	0* 100*	0 90.8841	0.01117 0.062* 0/1 18moUh 0.0210203* 0.030626* 8.43769* 10.1248* 13.1248* 13.1244* 5.19512* 0.0739602* 0.03244* 5.19512* 0.139602* 0.20244* 1.14865* 0.20244* 0.445318*	0" 1bmol/h 3.31552" 1.21681" 418.459" 87.9059" 32.1505" 2.96620" 8.07111" 0.00558168" 1.18890" 1.57962" 0.0167450" 0.0446535" 0.234431" 0.133967" 0.3390718"
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane n-Butane 2.2-Dimethylorpane Isopentane n-Pentane 2.2-Dimethylotane Cyclopentane 2.3-Dimethylotane Cyclopentane 2.4-Bernylotane Cyclopentane 2.4-Bernylotane Cyclopentane 2.4-Bernylotane Cyclopentane 2.4-Bernylotane Cyclopentane 2.4-Bernylotane Cyclopentane 2.4-Bernylotane Cyclopentane 3.4-Bernylotane Cyclopentane Benzene Cyclopentane Benzene Cyclopentane Benzene Cyclopentane 3.4-Bernylotane 2.4-Bernylotane	0.0571007 0.382777	0.120354 1.87775-07 Ibmol/h 4.945633-08 6.00710E-09 0.00348584 11.0156 8.37183 39.4587 0.373544 19.3471 34.88063 0.567900 1.86196 11.5923 7.21740 24.6108 3.59440 0.378294 4.01831 8.28678	3.05811E-08 0.0885233 bmolh 1.16923 430.497 85.3410 30.9029 2.98138 8.30594 0.0566356 1.51182 2.12798 0.0528401 0.345722 0.194249 0.574712 0.0804228 0.08085733 0.08081773 0.122930	0.120354 1.87775E-07 Ibmulh 0 4.44655E-08 6.00710E-09 0.00348584 11.0156 8.37163 3.94587 0.373544 19.3471 34.8806 0.567904 1.158106 1.15822 7.21740 2.24 6108 3.59440 0.378244 4.01831 8.26575 7.46793	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.00705975 0.00780002 2.33154E-08 0.34024E-07 7.11650E-08 0.34024E-07 7.11650E-08 0.34024E-07 1.0443E-06 2.37509E-06 1.07539E-07 1.10643E-06 2.72050E-07 1.7011E-07 1.7310E-08 3.12291E-08 3.12291E-08	1.81557E-13 9.68246E-14 9.66246E-13 9.0888709 Bmod/h 28.1863 9.94774 3508.75 783.567 348.393 36.6220 0.6832762 0.6832762 0.752746 22.56329 0.202002 0.0470430 2.99889 1.61365 0.688690	120591E-13	0* 100*	0 9.8641	0.0111 0.062* 0.062* 0.0210203* 0.030626* 8.43769* 10.1248* 11.3263* 11.3263* 11.3263* 13.10244* 5.19512* 0.739802* 0.739802* 0.45248* 0.45288* 0.456332* 0.465332*	0" Ibmoth 3.31552" 121681" 418.459 3.71502" 12.71681" 418.459 3.71502" 13.71502"
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Ethane Lockstane Lockstan	0.0571007 0.382777 Ibmolfh 0.135238 0.647969 72.4464 109.757 92.35898 85.9417 0.681724 28.2431 47.2933 0.681720 13.3738 8.20143 27.3519 3.99654 0.422977 4.40366 8.73715 7.8728 22.1677 9.56381	0.120354 1.87775E-07 Ibmolh 4.94563E-08 6.00710E-09 0.03048586 6.0710E-09 0.03048586 1.37153 3.44897 0.373544 1.9.3471 3.4.8006 0.5679904 1.85196 1.15923 7.21740 2.4.6108 3.59440 0.378294 4.01831 6.285793 7.4979 9.20380	3.05811E-08 0.0885253 bmolh	0.120354 1.87758-07 0 4.34563E-08 6.00710E-09 0.00346594 1.337183 3.94587 0.373544 19.3471 34.8806 0.567904 11.5922 7.71740 24.6108 3.59440 0.378244 4.01831 6.28578 7.497900 21.32878	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.00313313 0.00705975 0.00780002 2.33154E-05 0.34624E-07 7.116506 2.37509E-06 1.07539E-06 2.37509E-06 1.07539E-07 1.106436E-07 1.106436E-07 1.106436E-07 1.106436E-07 3.04664E-07 1.70115E-06 0.000449427 6.731036E-07 3.34468E-08 3.34468E-08 3.344676E-08	1.81557E-1 3	1 20591E-13 (1989)1 (1	0° 100°	0 98,8641	0.0111 0.062* Ibmobl	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentricontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Phopane 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4454 109.757 22.5588 23.5898 24.5898 24.5898 25.5898 26.58917 0.680724 28.2431 47.2933 0.6801720 91.3898 25.20143 27.3519 3.9964 0.422977 4.40366 8.73715 7.87266 22.1671 9.586351 1.68676 3.43388	0.120354 1.87775E-07 Ibmolh 4.94563E-08 6.00710E-09 0.00348586-08 11.0156 3.34.857 0.373544 13.3471 34.8806 0.567094 11.5023 7.21740 24.6108 3.59440 0.378294 4.01831 8.28578 7.49790 21.3287 7.21740 22.13287 7.21740 23.359440 0.378294 1.01831	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 430.497 85.3419 95.3419 95.3419 0.056635 1.51182 2.12798 0.0224687 0.0224687 0.0224687 0.0149429 0.149429 0.0574712 0.08052733 0.08052773 0.122930 0.00852773 0.122930 0.103854	0.120354 18775E-07 1bmol/h 0 4.3465E-08 6.00710E-09 0.00346554 11:01566 3.34587 0.375344 19.3471 34.8806 0.667904 18.18023 17.21740 24.6108 3.59440 0.378234 4.01831 8.28578 7.49730 21.3287	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.00705975 0.00718092 2.33154E-05 0.000148991 7.11650E-06 2.137509E-06 1.07359E-07 3.04664E-07 1.106438-07 1.106438-07 3.04664E-07 1.106438-07 3.04664E-07 3.04664E-07 3.04668E-07 3.04668E-08 3.14676E-08 3.14676E-08	1.81557E-13 9.68246E-14 9.66246E-13 9.0888709 BmoWh 28.1863 9.94774 3508.75 783.567 348.930 36.6250 103.4021 22.6232 0.202022 0.202022 0.202022 0.4770430 2.99899 1.61365 4.35579 0.536902 0.0707937 0.5857607 0.533616 0.116733 0.486802 0.4821519 0.4825519	1 20591E-13	0° 100° bmol/h 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0°	0 98 8841 Bmol/h 0.0113844 0.0869778 2.16918 0.0059781 0.0059781 0.0107953 2.466272 0.00559883 3.533622-06 8.044602-06 8.044602-06 8.044602-06 8.066882-06 0.00055887 1.002446-05 1.057712-06 1.057712-06	0.0111 0.062* Ibmoldh 0.0210203* 0.0210203* 0.0309626* 8.43769* 10.1248* 11.9263* 2.38697* 8.83281* 10.10244* 5.19512* 0.0739602* 0.0729602* 0.0728180* 2.94128* 0.455318*	0° 0° 1000 1000 1000 1000 1000 1000 1000
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Priopanan 1-Butane 2-2-Dimethylpropane Isopentane 2-2-Dimethylpropane Isopentane 2-2-Westylpropane Isopentane 2-3-Dimethylpropane 2-3-Dimethylpropane Isopentane 2-3-Dimethylpropane Isopentane 2-3-Dimethylpropane Isopentane 2-3-Dimethylpropane Isopentane 2-3-Dimethylpropane Isopentane 2-3-Dimethylpropane Isopentane I-Propane International Isopentane I-Propane I-Pr	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4454 102.757 123.5089 223.9089 23.9089 24.9089 25.9417 0.61724 28.2431 47.2233 0.681720 0.1.98897 13.93743 27.3519 2.3519 2.3596 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266 8.73715 7.75266	0.120354 1.87775-07 Ibmolh 0 4.945635-08 6.007105-09 0.00348584 11.0159 3.94587 0.373544 13.3471 34.8806 0.567904 1.88196 1.18520 7.18	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 430.497 83.3410 30.9024 83.3254 0.0566356 1.51182 0.0224687 0.0224687 0.0224687 0.0345787 0.0345787 0.0345787 0.122930 0.10365464 0.06682753 0.102930 0.1036540 0.103657402	0.120354 1.8775E-07 1bmol/h 0 4.3465E-08 6.00710E-09 0.00346554 11.0156 3.04587 0.375544 19.3471 34.8806 0.567904 0.168186 11.0222 24.6108 3.394467 7.46703 24.6108 3.39446 4.01831 8.28578 7.47703 2.12007 2.22000 1.650566 3.339344 4.10831	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.00705975 0.00718092 2.33154E-05 7.11650E-06 7.11650E-06 7.11660E-06 7.11660E-	1.81557E-13 9.68246E-14 9.66246E-13 9.0888709 Bmowth 28.1863 9.94774 3508.75 783.567 348.930 103.402 0.823762 0.833762 0.833762 0.833762 0.4770430 2.99899 1.61365 4.35579 0.635807 0.582247 0.657607 0.533616 0.116733 0.4826620 0.0821519 0.052621	120591E-13 6.18931 bmoth 0.0113007 0.0691187 2.13785 0.359617 0.057954 0.0109683 0.359617 0.057954 0.0109683 0.359617 0.057954 0.0109683 0.359617 0.057954 0.0000557114 0.0000557114 0.0000557114 0.0000557114 0.0000557114 0.0000557114 0.0000557114 0.00005714 0.00005714 0.00005714 0.00005714 0.00005714 0.00005714 0.0000	0° 100°	0 9.8 641 Bmol/h 0.0113844 0.0869758 2.16818 0.30697734 0.0587344 0.0078734 0.01177853 2.4662726 0.000554925 0.00055498 3.53362E-06 0.00554978 1.68748E-05 8.36668E-05 8.3668E-05 8.36668E-05 8.36668E-05 8.36668E-05 8.36668E-05 8.3668E-05 8.36668E-05 8.36668E-05 8.36668E-05 8.36668E-05 8.3668E-05 8.36668E-05 8.36668	0.0111 0.062* IbmoUh 0.0210203* 0.0309626* 8.43769* 10.1248* 11.9263* 2.39897* 8.83241* 1.31844* 1.3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane 12.2-Dimethylyopane Isopentane 2.2-Dimethylyopane Isopentane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 2.3-Dimethylyotane 3Methylyoentane Methylyoctopentane Benzene Cyctopentane Benzene Cyctopentane Methylyotopentane Methylyotopentane Dimethylyotopentane Indiana Methylyotopentane Indiana Indi	0.0571007	0.120354 1.87775-07 Ibmolh 0 4.945635-08 6.00710E-09 0.00348584 1.10156 8.37183 38.4587 0.373541 19.3816 11.5923 7.21740 24.6108 3.59440 0.378294 4.01831 8.28573 7.49793 0.21.3287 9.20380 0.21.3287 9.20380 1.505666 3.9384 1.52330 1.191688	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 430.497 85.3410 30.9029 2.98138 8.30594 0.05660386 1.12798 0.0224687 0.0522401 0.0522401 0.345762 0.194249 0.574712 0.0804723 0.0801773 0.0801773 0.122393 0.103585 0.101942 0.01685790 0.255985 0.101942 0.0168970 0.207307 0.0207317	0.120354 1.8775E-07 1bmol/h 4.4465E-08 6.00710E-09 0.00348594 11.0156 8.37183 3.94857 0.373544 9.18196 1.48806 0.567904 0.188196 1.15923 7.21740 2.24 6108 3.59440 0.378224 4.01831 8.22577 2.1740 2.24 6108 3.59440 1.378224 4.01831 8.22577 2.21320 1.21320		2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.007703973 0.007703973 0.0071450E-05 0.000148901 1.34024E-05 0.00014890-06 1.07359E-07 1.10543E-06 2.37509E-06 0.000449427 6.73102E-06 3.44892E-08 3.44892E-08 3.44892E-08 1.0415E-08 1.0415E-08 0.00044942 6.73102E-06 3.4282E-08 0.00045E-08 0.00045E-08 0.00045E-08 0.00045E-08 0.00045E-08 0.00045E-08 0.00045E-08 0.00045E-08	1.81557E-13 9.66246E-14 9.66246E-13 9.0888709 1bmoth 28.1863 9.94774 3506.75 783.565 9.6250 9.625020 0.0470430 0.202020 0.0470430 0.202020 0.0525842 0.0707937 0.1525842 0.0825842 0.0825842 0.0825842 0.0825844	120591E-13 0 6.18931 bmoth 0.0113007 0.0891187 2.13785 0.3539317 0.00288084 0.000288084 0.000657114 3.52288E-06 0.00065714 3.52288E-06 0.00065714 3.52288E-06 0.00065714 3.52288E-06 0.0005714 3.52288E-06 3.5228E-06 3.5228E-	0° 100° bmol/h 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0°	9.8 641	0.0111 0.062* 0" IbmoUh 0.0210203* 0.030626* 8.43769* 10.1248* 11.	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Ethane Industrial	0.0571007 0.38277 Ibmolth 0.135233 0.647969 72.4454 01.4554 01.4556 0.23.5509 8.5.9417 0.681724 28.2431 47.2933 0.681720 0.891724 28.2431 47.2933 0.681720 0.22.1571 4.43386 0.37.2561 0.22.1671 9.56351 1.66676 34.49866 1.133303 0.0684377 0.29720 0.00377	0.120354 1.87775-07 Ibmolh 4.94563E-08 6.00710E-09 0.03348564 6.0710E-09 0.03348564 1.337183 3.94587 0.373544 1.9.3471 3.48006 0.5870900 1.88196 11.5923 7.21740 2.4.6108 3.59440 0.378294 4.01831 8.01793 7.49793 0.21.3287 9.20380 1.60566 3.93984 1.52933 0.0685706 2.94054 1.99471	3.08811E-08 0.0885253 bmolh 1.6923 1.6923 3.0497	0.120354 18775E-07 0 4.34563E-08 6.00710E-09 0.00346556 18.327183 3.94567 0.373544 19.3471 3.48806 0.567004 0.37824 4.01837 0.273544 0.378294 1.0000 0.21.3287 0.21.3287 0.21.3287 0.21.3287		2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.00709975 0.000780000 0.000148901 1.34024E-07 7.116508 0.000148961 1.07359E-06 2.37509E-06 1.07359E-08 0.000148961 1.07359E-08 0.000148961 1.07359E-08 3.44882E-08 3.12291E-08 3.14892E-08 3.149042F-08 3.149	1.81557E-13 9.68246E-14 9.66246E-13 9.0888709 1bmoth 28.1863 9.94774 3508.75 783.565 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 34.390	120591E-13 0 6.18931 bmoth 0.0113007 0.0691187 2.13785 0.138785 0.009185 0.0109485 0.0109485 0.0109485 0.00057114 3.52288E-06 0.00057914 3.52288E-06 0.00057914 0.0004798 0.00057914 0.0004798 0.00057914 0.0004798 0.00057914 0.0004798 0.00057914 0.0005791	0° 1000 1000 1000 1000 1000 1000 1000 1	9.8 641 Bmoth 0.0113844 0.08697783 2.169187 0.05897254 0.0057897254 0.00579678 0.00854925 0.000599489 3.53362E-0.000599489 3.53362E-0.000599489 3.53362E-0.000599489 3.53362E-0.000599489 3.53668E-0.50059489	0.0111 0.062* 0.062* 0.062* 0.0210203* 0.030626* 8.43769* 10.1246* 11.58697 11.1246* 11.58697 10.1246* 11.58697 10.1246* 11.58697 10.1246* 11.58697 10.1246* 11.58697 10.202417* 11.438697 10.4453182* 0.4453182* 0.4453183* 0.4453183* 0.4453183* 0.4453183* 0.453183* 0.453183* 0.15697 10.15697 10.15697 10.15697 10.15697 10.15697 10.156726* 0.145318* 0.156726* 0.156726* 0.156726* 0.124574* 0.156726* 0.156726* 0.224574* 0.156726* 0.224574* 0.156726* 0.224574* 0.156726* 0.224574* 0.0233559* 0.338669* 0.226785*	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Fropane Sizobulane Sizobulan	0.0571007 0.382777 Ibmolfh 0.135238 0.647969 72.4464 109.757 92.35898 85.9417 0.691724 28.2431 47.2933 0.661720 13.3738 82.01443 27.3519 3.99654 0.422977 4.40366 8.73715 7.67266 9.73715 1.66676 34.3988 1.54964 1.53933 0.664372	0.120354 1.87775-07 Ibmolh 4.945031-08 6.007101-09 0.03048586 6.007101-09 0.03048586 1.33783 3.94,897 0.373544 1.3,471 3.4,8006 0.567004 1.85196 1.15023 7.21740 2.4,5108 3.59440 0.378294 4.01831 8.28573 7.49793 0.21,3287 9.20380 1.60566 3.39384 1.52330 1.191068 0.06857084 1.9471 1.94857	3.08811E-08 0.0885253 bmolh	0.120354 18775E-07 1bmol/h 0 4.4465E-08 6.00710E-09 0.00348584 11.0158 8.71697 9.217697 9.217697 9.217697 9.217697 9.217697 9.217697 9.218297		2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.00705975 0.007780002 2.33154E-08 0.3462E-07 7.11650E-08 0.3462E-07 7.11650E-08 0.3462E-07 1.0463E-06 2.37509E-06 1.07539E-07 1.10643E-06 2.72050E-07 0.34657E-07 0.34676E-08 3.4282E-08 0.000427634 2.75806E-09 0.00013785 0.000103785 0.000103785 0.200103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785 0.000103785	1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.8157E-1 1.8157	1 20591E-13 0 6.18931 bmoth bmoth bmoth control state of the control sta	0* 1000**	0 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0111 0.062* IbmoUh 0.0210203* 0.030626* 8.43769* 10.1248* 11.9263* 2.83241* 0.118834* 1.11823* 3.10244* 5.119512* 0.0739802* 0.073910* 2.94128* 0.456332*	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Propane Isobulare Isobula	0.0571007 0.382771 Ibmol/h 0.135233 0.647569 72.4456 109.757 123.500 2.35589 8.25889 8.2431 47.2233 0.691720 0 1.95897 13.3738 8.20143 27.3519 3.3985477 0.40356 8.73715 7.787266 1.5665377 0.22.16771 9.56351 1.566563 3.43988 3.15694377 0.298720 2.0397	0.120354 1.87775-07 Ibmolh 0 4.945635-08 6.00710E-09 0.00348584 11.0159 8.371837 3.373544 13.3471 34.8806 0.567904 1.58196 11.5923 7.21740 24.6100 3.376244 4.01831 8.26578 7.49793 0 21.3287 9.20380 1.60666 33.93845 1.526668 33.93845 1.526686	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 430.497 83.3410 3.9029 2.88138 0.686336 0.552640 0.0526461 0.345762 0.194249 0.0526461 0.345762 0.194249 0.57771 0.0801123 0.0804223 0.103544	0.120354 1.8775E-07 1bmol/h 4.4465E-08 6.00710E-09 0.00348584 11.01356 8.37167 9.37544 0.37544 1.34786 0.567904 0.68196 1.15923 7.271740 3.34781 2.45100 3.378244 1.041831 8.28576 7.49733 0.2124267 9.20380 1.15923 1.15923 9.378244 1.15923 9.378244 1.15923 9.378244 1.15923 9.378244 1.15923 9.378244 1.15923 9.378244 1.15923 9.378244 1.15923 9.20380 1.15923 9.20380 1.15923 9.20380 1.15923 9.20380 9.2085706		2.67812E-12 99.9977	1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.8157E-1	120591E-13 0 6.18931 bmoth 0.0113007 0.0891187 2.137887 2.137887 0.0089187 0.0705481 0.00268084 0.00268084 0.00268084 0.000657114 3.52288E-06 0.00065714 3.52288E-06 0.000658E-06 0	0* 1000** bmol/h	9 8,841	0.01117 0.0622 07 Ibmoble 0.0210203 0.0309626: 8.437697 11.19833 2.38697 8.83241* 0.119833 3.10244* 5.119512 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.07396202 0.075077 0.07507 0.0750	0° 0° 0° 100 0°
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane Indiana India	0.0571007 0.382771	0.120354 1.87775-07 Ibmolh 0 4.945635-08 6.00710E-09 0.00348584 1.10156 8.37183 39.4857 0.3485	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 1.40,407 8.5.3410 3.9029 2.98138 8.30598 0.0524687 0.05224687 0.05224687 0.05224687 0.0804723 0.0804723 0.0804723 0.0805250 0.101942 0.10365408 0.103654 0.103654 0.103654 0.103654 0.00857452 0.00857448 0.00857448	0.120354 1.8775E-07 1bmol/h 4.465E-08 6.00710E-09 0.00348584 11.015E 8.3.7183 3.45854 0.13471 4.48806 0.567904 0.168196 11.5922 7.2.1740 2.45108 3.59440 0.370234 6.25776 7.2873 7.4973 1.1992 1.21227 1.2100 1.1992 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.2100 1.21227 1.21207 1.21227 1.21207 1.21227 1.21207 1.21227 1.21207 1.21227 1.21207 1.21227 1.21207 1.21227 1.		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.0178571 0.0313375 0.00378070 0.000749002 2.33154E-05 0.00074991 1.34024E-07 7.116506 2.3759E-06 2.3759E-06 2.3759E-06 2.3759E-06 2.3759E-06 2.3759E-06 2.3759E-06 2.3759E-06 2.72050E-07 1.10643E-06 0.0004274 6.73102E-06 3.44892E-08 3.44892E-0	1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.8157E-1	120591E-13 0 6.18931 bmoth 0.0113007 0.0691187 2.13785 0.00258084 0.00258084 0.00258084 0.00258084 0.00258084 0.00258084 0.00258084 0.00357114 3.52288E-06 0.003647808 0.000557114 3.52288E-06 0.003647808 0.00055714 0.003624808 0.00055714 0.003624808 0.00055714 0.003624808 0.00058886-06 0.0036868-06 0.0036868-06 0.00036869 0.000036880 0.000036880 0.000036880 0.00003880	0* 1000** bmol/h	9 8 841 Bmoth 0.0113844 0.0869758 2.16918 0.3669779 0.0587354 0.0277416 0.00277416 0.00277416 0.00277416 0.00277416 0.00277416 0.00277416 0.00277416 0.00274640	0.0111 0.062- 07 18mol/h 0.0210203 0.030826- 8.43769- 10.1263- 12.28697 2.38697 8.83241* 0.119893 3.10244* 5.19512 0.0739602 0.02417* 1.202417 1.202417 0.865724* 0.465318 0.469332* 0.4658847* 0.865724* 1.05413 0.186847* 3.84593 0.176726- 0.214874 0.0233569 0.3386000 1.176726- 0.214874 0.0233569 0.3386000 1.176726- 0.214874 0.0233569 0.3386000 1.176726- 0.214874 0.0233569 0.3386000 1.176726- 0.214874 0.0233569 0.3386000 1.176726- 0.12731* 0.876623	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Ethane State	0.0571007 0.382777 Ibmolth	0.120354 1.87775-07 Ibmolh 4.945031-08 6.007101-09 0.030345 1.0156 8.37183 3.94587 0.373544 19.3471 3.48006 0.5879000 1.88196 11.5923 7.21740 2.4.6108 3.59440 0.378294 4.01821 8.01821 8.01821 8.01821 8.01821 9.02030 1.60566 0.0685706 2.94054 1.9471 17.6892 1.33918 9.9471 17.6892 1.33918 9.9471 17.6892 1.33918 9.9471 17.6892 1.33918 9.9471 17.6892 1.33918 9.9471 17.6892 1.33918	3.08811E-08 0.0885253 bmolh 1.16923 430.497 3.3.0887 1.16923 430.497 3.0.029 2.98138 8.30594 0.0566356 1.51182 2.12798 0.0224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05224687 0.05252468 0.0525252 0.0525252 0.0525252 0.0525252 0.0525252 0.0525252 0.0525252 0.0525252	0.120354 18775E-07 Ibmol/h 0 4.34563E-08 6.00710E-09 0.005465666 6.13.27183 3.94567 0.373544 19.3471 3.48856 0.567904 0.115923 7.21740 24.6108 3.59440 0.378234 4.01837 0.0 0.13.2874 19.3878 19.3878 19.3878 19.3878 19.3878 19.3888 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19168 19.19178 19.19168 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178 19.19178		2.67812E-12 99.9970 Ibmoth 8.37198E-05 0.0178571 0.0313313 0.00703973 0.00703973 0.007149971 0.0313316E-05 0.007148991 1.34024E-07 7.11650-06 2.37509E-06 1.07359E-07 3.0468E-06 0.0001489-07 1.70111E-06 0.000149-08 3.44892E-08 3.44892E-08 3.410415E-08 0.000149588-09 0.00013958-09 0.	1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.81557E-1 1.8157E-1 1	120591E-13 0 6.18931 bmoth 0.0113007 0.0891187 2.13785 0.353917 2.13785 0.000288084 0.000288084 0.000288084 0.000287808 0.000857114 3.52288E-06 0.000857143 3.52288E-06 0.000857143 3.52288E-06 0.000857143 3.52288E-06 0.000857143 1.5268E-06 0.0008159147 1.5268E-06 0.000159147	0" 100" bmol/h 0" 0" 0" 0" 0" 0" 0" 0" 0" 0" 0" 0" 0"	9 9,8641	0.0111 0.062* 0.062* 0.0210203* 0.030626* 8.43769* 10.1248* 11.124	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Priopanan a. Butane 2.2-Dimethylpropane lospentane 2.2-Dimethylpropane 2.2-Dimethylpropane 2.3-Dimethylprotane 1.3-Dimethylprotane 1.4-Dimethylprotane 1.4-Dimethylprotane 1.4-Dimethylprotane 1.3-Dimethylprotane 1.3-Dimethylprotane 1.3-Dimethylprotane 1.3-Dimethylprotane 1.3-Dimethylprotane 1.3-Dimethylprotane 1.3-Dimethylprotane 1.4-Dimethylprotane 1.4-	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4454 102.757 122.5089 22.5089 23.5081720 0.61720 0.198817 13.3738 23.5081720 24.282431 47.2233 0.681720 0.198817 13.3738 23.5081720 24.22977 4.40366 8.73715 7.78726 22.167 22.167 24.16875 24.16881 25.16881 26.16881	0.120354 1.87775-07 Ibmolh 4.94563E-08 6.00710E-09 0.00348584 1.0150 3.94587 0.373544 10.3471 3.4.8806 0.567904 1.8.1932 7.1.1932 2.4.6108 3.59440 0.378294 4.01831 8.28578 7.49793 2.1.307 9.120360 1.605566 3.9.9844 1.52330 1.91068 0.0685706 2.94054 1.9.9477 1.7.1588 1.9.171358 6.15888 4.94640	3.05811E-08 0.0885253 bmolh 1.16923 430.497 83.34109 30.9024 83.3420 93.9029 0.0224687 0.0224687 0.0224687 0.024687 0.03547472 0.08652753 0.0122930 0.1036546 0.1036546 0.1036565 0.103657462 0.00851743 0.00851743 0.00851743 0.00851746	0.120354 1.8775E-07 1bmol/h 0 4.4465E-08 6.00710E-09 0.003485M 11.0156 3.94587 0.3755M 11.9367 0.3755M 11.9367 0.3755M 11.9367 0.3755M 11.9327		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.0178571 0.00780375	1.81557E-1.4 9.66246E-13 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888709 9.0888602 9.0888709 9.088602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.0888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.08888602 9.0888886	1 20591E-13 0 6.18931	0* 1000** 1000**	0 9.0 8641	0.0111 0.0622 01 0.00210203 0.00308267 0.0030827 0.0030827 0.0030827 0.0030827 0.0030827 0.0030827 0.0030827 0.0030827 0.0030827 0.0	0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobulare Isobula	0.0571007 0.382771 Ibmol/h 0.135233 0.647569 72.4456 109.757 123.500 2.55897 0.691720 0.691724 0.691724 0.757 1.33738 0.691720 0.195897 1.33738 0.221577 0.422977 0.422977 0.422977 0.422977 0.432988 0.73715 7.787266 0.7221677 0.956351 1.86676 3.43988 1.133997 1.77149 1.133997 1.771422 1.297220 1.	0.120354 1.87775-07 Ibmolh 0 4.945631-08 6.00710E-09 0.00348584 11.01553 8.371837 3.373544 13.3471 34.8806 0.567904 1.88196 0.188196 3.3722 2.2174 2.	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 1.40,477 8.3.3410 3.9023 2.8839 2	0.120354 18775E-07 1bmol/h 4.4465E-08 6.00710E-09 0.00348584 11.01356 8.37167 9.37544 1.37547 1.348806 0.567904 0.0156196 1.15923 7.21740 2.416100 2.416100 2.416100 3.78204 0.01821 1.2527 9.20380 1.15923 1.21227 9.20380 1.15923 1		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.0178571 0.03133376 0.0313376 0.00778072 0.000780072 2.33154E-05 0.000748991 1.34024E-07 7.11650-66 2.37599E-06 2.37599E-06 2.37599E-06 2.37599E-06 2.37599E-06 2.37599E-06 2.37599E-06 2.72050E-07 1.10643E-06 0.0004472-6 2.73102E-06 3.44892E-01 0.0004478-0 0.000478-0 0	1.81557E-14 9.66246E-13 9.0888709 9moth 28.1863 9.94774 3508.787 378.893 36.8250 103.402 0.693762 0.470430 2.19539 0.20200 0.470430 2.19539 0.161365 0.3555842 0.00707937 0.5552842 0.002547 0.00546946 0.00224676 0.00818406 0.00224676 0.00818406 0.00818476 0.00818406 0.00818478 0.00818406 0.00818478 0.00818406 0.0082476 0.00818406	120591E-13 0 6.18931 bmoth 0.0113007 0.0691187 2.137887 0.0691187 2.137887 0.00591581 0.005058084 0.00658084 0.00658084 0.00658084 0.00657114 3.52288E-06 0.00657114 3.52288E-06 0.00657114 3.52288E-06 0.00657114 3.52288E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061868E-06 0.0061888E-06 0.0	0* 1000** Description Des	9.8 641 Bmolh 0.0113844 0.0869758 2.16918 0.3609774 0.0597354 0.00277043 0.00277043 0.00277043 0.00277043 0.00277043 0.00270453 0.00059489 3.53362E-06 0.00059489 3.53362E-06 0.000751670 0.000165873 1.09244E-05 0.000751670 0.000165873 1.09244E-05 0.00075837 1.09244E-05 0.000751670 0.000165870 0.000165870 0.000751670 0.000165870 0.000165870 0.000751670 0.000165870 0.000751670 0.000165870 0.000751670 0.000165870 0.000751670 0.000165870 0.000758688-05 6.222998-05 0.000758630 7.49758-06 0.00059928 4.94234E-07 5.01625E-08 1.10478E-08 1.10478E-0	0.0111 0.062- 07 18mol/h 0.0210233 0.0309626: 8.43769: 10.19833- 11.29831 1.19833- 1.10244* 5.119833- 1.10244* 5.119833- 1.10244* 5.119832- 1.1024396- 1.102396- 1.102	0° 0° 1500 1500 1500 1500 1500 1500 1500
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane Isobutane Isobuta	0.0571007 0.382771 Ibmol/h 0.135233 0.647569 72.4456 100.757 121.500 23.5589 8.2589 8.2431 47.2233 0.691720 0.195897 13.3738 8.20143 27.5519 3.396634 0.405686 4.	0.120354 1.87775-07 Ibmolh 0 4.945635-08 6.00710E-09 0.00348584 1.10156 8.371837 3.37544 13.3471 3.48806 0.567904 0.188196 0.188196 11.5923 7.21740 0.213287 9.20380 1.60566 33.93844 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.60566 33.9384 1.52303 1.53665	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 1.40,407 8.3.410 3.09029 1.51812 2.88138 0.0562461 0.0526461 0.0526461 0.345762 0.194249 0.0526461 0.345762 0.194249 0.0526461 0.0526461 0.0526461 0.0526461 0.0526461 0.0526461 0.0526461 0.0526461 0.0526461 0.0526461 0.0526661 0.0	0.120354 18775E-07 1bmol/h 4.4465E-08 6.00710E-09 0.00348594 11.0155 8.371637 10.37544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.037544 1.03754		2.67812E-12 99.9977	1.81557E-1 4 9.66246E-13 9.6828709 Bmoth 28.1863 9.94774 3506.75 768.85 9.94774 3506.75 768.85 9.94774 3506.75 768.85 9.94774 3506.75 768.85 9.94774 22.683762 0.763	12:0591E-13 0 6:18931 bmoth 0.0113:007 0.0691187 2.137847 0.0095187 2.137847 0.0095187 0.0095187 0.0095187 0.00958884 0.00058818 0.000557114 3.52288E-06 0.00057114 3.52288E-06 0.00057114 0.00058888 0.00057114 0.00058888 0.00058888-05 0.00058888-05 0.00058888-05 0.0005888-05 0.0	0° 1000 1000	9 8 841 Bmoth 0.0113844 0.0869758 2.16918 0.3069771 0.0587364 0.02770416 0.02770416 0.02770416 0.02770416 0.002770416 0.002770416 0.002770416 0.002770416 0.002770416 0.002770416 0.002770416 0.00270416 0.00270416 0.00270416 0.00270416 0.00270416 0.0027047716 0.00270416 0.00	0.0111 0.062- 07 18mol/h 0.021023- 0.030626- 8.43769- 1.19833- 1.19833- 1.10244- 5.19512- 0.0739602	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Phopping Brown Hentria Butane 1,2-2-Dimetrylpropane Isopentane 1,2-2-Dimetrylpropane Isopentane 1,2-3-Dimetrylpropane Isopentane 1,3-3-Dimetrylpropane Isopentane 1,3-3-Dimetrylpropane Isopentane 1,3-3-Dimetrylpropane Isopentane 1,3-3-Dimetrylpropane Isopentane In-Iexane Isopentane	0.0571007 0.382777 Ibmol/h 0.135238 0.647969 72.4454 109.757 123.5588 83.5417 0.691724 28.2431 47.2933 0.661720 13.5979 13.5979 14.5979 15.5976 22.5771 24.5771 25.5	0.120354 1.87775-07 Ibmolh 4.94563E-08 6.00710E-09 0.03048586-08 1.157133 3.34.6897 0.373544 10.3471 3.48006 0.567004 1.8100 1.8100 1.8200 1.8	3.08811E-08 0.0885253 bmolh	0.120354 1.87758-07		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.00178571 0.0313313 0.00709975 0.0007800006 0.000148901 1.00448901	1.81557E-14 9.66246E-13 0.0888709 Bmoth 28.1863 9.94774 3308.75 783.567 348.393 36.62402 0.683762 17.5746 22.58329 0.202020 0.0470430 2.99889 1.61365 0.583616 0.583	12:0591E-13 0 6.18931 bmoth 0.0113007 0.0691187 2.13785 0.0691187 2.13785 0.069187 2.13785 0.009185 0.0094785 0.0094	0* 1000** 1000** 0* 0* 0* 0* 0* 0* 0* 0* 0* 0* 0* 0* 0* 0	0 9.8841	0.0111 0.0622 01 0.00120203 0.00308267 0.003	0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propane 1 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1-	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4456 100.757 123.5090 26.9090 26.9090 27.9090 27.9090 28.9000 28.9	0.120354 1.87775-07 Ibmolh 4.94563E-08 6.00710E-09 0.00348584 6.00710E-09 0.00348584 11.0159 3.94587 0.373544 13.3471 3.4.8806 0.567904 1.8.15923 7.4.15923 7.4.15923 7.4.15923 1.52933 1.9.15923 1.00566 0.0655706 2.94054 1.9.9471 1.7.1588 1.9.9470 7.7.1358 6.15888 4.94640 3.39126 2.252118 2.26503 2.252118 2.26503 2.252118 2.26503	3.05811E-08 0.0885253 bmolh 1.16923 430.497 83.3410 93.93054 430.497 83.3410 93.93054 1.5182 2.12798 0.0224687 0.0345782 0.00852753 0.1022930 0.103654 0.566382 0.00852753 0.00857762 0.00852753 0.00857762 0.00852753 0.00857762 0.00852753 0.00857762 0.00852753 0.00857762 0.00852753 0.00857762 0.00852753 0.00857762 0.00857762 0.00857762 0.00857762 0.00354468 0.0035468	0.120354 1.8775E-07 1bmol/h 0 4.4465E-08 6.00710E-09 0.003485M 11.01056 3.304587 0.3755M 11.01056 0.56790A 0.188186 11.0222 12.027 12.0		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.0178571 0.00780375 0.00780375 0.00078	1.81557E-14 9.66246E-13 0.0888709 9mor/h 28.1863 9.9477.4 39.34567 38.3567 38.3567 38.3567 38.3567 38.3567 38.3567 38.3567 38.3567 38.3567 38.3567 38.6250 0.03762 0.693762 0.292020 0.470430 2.98999 1.61365 0.3567607 0.657607 0.657607 0.657607 0.657607 0.0702324 0.0021266 0.00318753 0.00102324 0.00102324 0.00102324 0.00102526 0.0010255607 0.00102526 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.0010255607 0.001025607	120591E-13 0 6.18931 bmoth 0.0113007 0.009111807 0.0131307 0.00911807 0.00911807 0.00911807 0.00918084 0.00028094 0.00028094 0.000057114 0.00028094 0.000057114 0.000018087 0.000018087 0.0000018087 0.000018087 0	0* 1000** 1000**	0 9.0 8641	0.0111 0.0622 0.18mel/h 0.0210203 0.0304526 8.40782 1.19263 1.19263 2.38697 8.83241* 0.119893 3.10244* 5.195122 0.0738920 0.020417; 1.43890* 0.878180 0.94128* 0.445318 0.45318 0.45318 0.45318 0.45318 0.45318 0.45318 0.15418 0.4531	0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Ethane Priopanal Statistica	0.0571007 0.382777 Ibmol/h 0.135233 0.647969 72.4454 100.757 125.5009 22.5001 23.5017 0.61720 0.61	0.120354 1.87775-07 Ibmolh 0 4.945636-08 6.00710E-09 0.00348584 11.0153 3.34487 0.373544 13.3471 34.8806 0.567904 1.88196 0.567904 1.88196 0.378294 4.01831 8.28573 0.213287 7.47973 0.213287 7.47973 0.213287 1.91088 0.0685706 1.94054 1.9471 1.75892 1.33919 1.91088 0.0685706 1.94054 1.9471 1.75892 1.33919 1.91088 0.0855706 2.94054 1.9471 1.75892 1.33919 2.52188 0.985706 2.52188 0.985706 2.94054 1.9471 1.75892 1.33919 2.711889 2.71189 2.71	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 1.40.497 8.3.410 3.9.9024 1.40.903 1.5036 1.51182 1.21798 0.0224687 0.0568536 1.51182 1.21798 0.0224687 0.0568536 1.51182 0.060065 0.060065 0.0256965 0.0256965 0.0256965 0.0256965 0.0256972 0.00116675 0.000138799 0.00138799 0.000138799	0.120354 1.8775E-07 1bmolh 0 4.4465E-08 6.00710E-09 0.00348594 1.10158 3.34587 3.34587 4.10247		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.0178571 0.0033837 0.000780072 2.33154E-05 0.000748991 1.34024E-07 7.11656E-07 7.11656E-07 7.11656E-07 7.11656E-07 7.11656E-07 7.11656E-07 1.07359E-08 1.0338E-07 1.0643E-06 2.7259E-06 1.07359E-08 1.0445E-06 2.7259E-07 1.70111E-08 3.44676E-08 1.0415E-08 1.04	1.81557E-14 9.66246E-13 0.0888709 Bmoth 28.1863 9.94774 350677 374.56	120591E-13 0 6.18931 bmoth 0.0113007 0.0891187 2.139387 0.0091187 2.139387 0.0091187 2.139387 0.0091187 0.0091187 0.0091187 0.0091187 0.0091887 0.00957514 0.0095714 0	0* 1000** Description Des	0 9 8 841 Bmoth 0 0113844 0.0869758 2.16918 0.3000771 0.0587354 0.0587354 0.0078176 0.00857354 0.00857354 0.00857354 0.00857354 0.00859489 3.53382E-06 0.00859489 3.53382E-06 0.00059489 3.53382E-06 0.00059489 3.53382E-06 0.00059489 3.53382E-06 0.00059489 1.00244E-05 0.000198578 1.00244E-05 0.000198578 1.00244E-06 0.000198578 0.00059378 0.000213474 0.000199030 7.43975E-06 1.10478E-09	0.0111 0.0621 0.0710203 0.0304826 8.43789 1.19263 1.19	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Hentriacontane Water Molar Flow Nitrogen Garbon Dioxide Methane Ethane Ethane Ethane Industrial Ethane	0.0571007 0.382777 Ibmol/h 0.135233 0.647569 72.4456 109.757 122.5000 2.255897 0.691720 0.195897 13.3738 8.20143 2.255897 13.3738 8.20143 2.255897 1.37376 2.2577 4.40368 8.373715 7.78266 3.433989 1.133997 1.77149 1.133997 1.771422 2.297220 2.0397 1.777422 2.297220 2.20397 1.771422 2.297220 2.29727 2.297220 2.29727 2.297220 2.29727 2.297	0.120354 1.87775-07 Ibmolh 0 4.945631-08 6.00710E-09 0.00348584 11.01563 8.371837 3.373544 13.3471 34.8806 0.567904 1.88196 0.188196 11.5923 7-217403 3.59404 0.213.287 9.20880 1.01831 8.28578 7.49793 0.213.287 9.20880 1.056690 33.39841 1.91608 0.6855706 2.94054 19.9471 17.76892 13.3918 9.91790 7.71538 4.401831 8.91790 7.71538 6.15888 4.39066 2.25218 9.91790 7.71538 4.4113942 1.39186 0.6855706 2.24054 1.391790 7.71538 4.4113942 1.39186 0.6855706 2.25218 0.391790 7.71538	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 1.40,407 8.3.410 3.09023 1.40,407 8.3.410 3.09023 1.5182 2.12798 0.0224887 0.0354540 0.056630 0.056630 0.056630 0.0566401 0.345762 0.0467428 0.00852753 0.00852773 0.102930 0.103654 0.013654 0.013654 0.00852763	0.120354 18775E-07 1bmolh 4.4465E-08 6.00710E-00 0.00348584 11.0156 8.37167 9.37544 19.3471 34.8806 0.567904 0.156196 11.5923 7.21740 0.378244 0.378244 0.37824 0.37824 1.0156 1		2.67812E-12 99.9977	1.81557E-14 9.66246E-13 0.0888709 Bmoth 28.1863 9.94774 3508.75 783.365 36.6230 36.62	120591E-13 0 6.18931 bmoth 0.0113007 0.0691187 2.137867 0.00591187 2.137867 0.00591187 2.137867 0.00591884 0.00268084 0.00268084 0.00268084 0.00268084 0.00268084 0.00268714 3.52288E-06 0.003647818 3.52288E-06 0.003647818 3.52288E-06 0.00364781 3.52288E-06 0.0036488-06 0.003648-	0° 1000	9 8 841 Bmoth 0.0113844 0.0869758 2.16918 0.3609774 0.0597354 0.00277041 0.00277045 0.000854925 0.00059489 3.53362E-06 0.00059489 3.53362E-06 0.000751670 0.000165875 1.09244E-07 0.000165875 1.09244E-07 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000165875 0.000751670 0.000165875 0.0001	0.0111 0.062- 07 18mol/h 0.0210233 0.0309626: 8.43709: 10.139831 1.139831 1.139831 1.139831 1.10244* 5.119833 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 1.102413 1	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Propue Propue Labor Dioxide Methane Labor Dioxide Methane Labor Dioxide	0.0571007 0.38277 Ibmol/h 0.135233 0.647969 72.4454 109.757 121.5588 32.55477 121.5588 32.55477 132.5588 32.55477 132.5588 32.55477 132.5588 32.55477 132.5588 32.55477 14.5588 32.55477 14.5588 32.55477 15.5588 15.54964 11.3042 12.5727 1	0.120354 1.87775-07 Ibmolh 4.94563E-08 6.00710E-09 0.00348586-08 11.01563 3.94587 0.373544 10.3471 3.4.8006 0.567004 1.8006 1.5002 7.21740 2.4.6108 3.94404 0.376294 4.01831 8.28573 7.49793 2.1.3287 9.20380 1.500566 33.9384 1.52933 1.91068 0.0685706 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888 4.94640 3.39124 1.71368 6.15888	3.05811E-08 0.0885253 bmolh	0.120354 1.87778E-07 1bmol/h 0 4.44658E-08 6.00710E-09 0.00346584 11:00368 3.94587 0.375344 19.3471 3.48806 0.567904 1.81972 2.46108 3.59440 0.378244 4.01831 8.28578 7.21740 2.436108 3.59440 0.378244 4.01831 8.28578 7.19708 2.13287 2.13287 2.13287 2.13287 2.13287 2.13287 2.13287 2.13287 3.33934 1.52930 1.60566 3.339344 1.52930 1.91008 0.0867706 2.294054 1.13488 4.94440 3.38126 2.285078 7.71358 6.15888 4.94440 3.38126 2.285078 1.13944 1.13042		2.67812E-12 99.9977 Ibmoth 8.37198E-05 0.00178571 0.0313313 0.00709975 0.000780005 0.000148901 1.34024E-07 7.116506 2.37509E-06 2.37509E-06 1.07539E-07 1.106438E-08 2.37509E-06 2.37509E-06 2.37509E-06 2.37509E-06 2.37509E-06 2.37509E-06 2.37509E-06 2.37509E-06 2.34482E-08 3.4489E-08 3.12291E-06 3.12391E-06 3.12391E-0	1.81557E-14 9.66246E-13 0.0888709 Bmoth 28.1863 9.94774 3308.75 783.3563 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 348.390 34.3	12:0591E-13 0.618931 bmoth 0.0113007 0.0691187 2.13785 0.0691187 2.13785 0.0691187 2.13785 0.0691187 2.13785 0.0691187 2.13785 0.00615010000000000000000000000000000000	0° 1000	0 9.8 8441	0.0111 0.062* 0.062* 0.010203* 0.030626* 8.43769* 10.1248* 11.2623* 11.2623* 11.2624* 11.2623* 13.10244* 5.19512* 0.739812* 0.745314* 0.	0
Hentriacontane Water Molar Flow Nitrogen Carbon Dioxide Methane Ethane Ethane Propane Isobutane	0.0571007 0.382777 Ibmol/h 0.135233 0.647569 72.4456 109.757 122.5000 2.255897 0.691720 0.195897 13.3738 8.20143 2.255897 13.3738 8.20143 2.255897 1.37376 2.2577 4.40368 8.373715 7.78266 3.433989 1.133997 1.77149 1.133997 1.771422 2.297220 2.0397 1.777422 2.297220 2.20397 1.771422 2.297220 2.29727 2.297220 2.29727 2.297220 2.29727 2.297	0.120354 1.87775-07 Ibmolh 0 4.945631-08 6.00710E-09 0.00348584 11.01563 8.371837 3.373544 13.3471 34.8806 0.567904 1.88196 0.188196 11.5923 7-217403 3.59404 0.213.287 9.20880 1.01831 8.28578 7.49793 0.213.287 9.20880 1.056690 33.39841 1.91608 0.6855706 2.94054 19.9471 17.76892 13.3918 9.91790 7.71538 4.401831 8.91790 7.71538 6.15888 4.39066 2.25218 9.91790 7.71538 4.4113942 1.39186 0.6855706 2.24054 1.391790 7.71538 4.4113942 1.39186 0.6855706 2.25218 0.391790 7.71538	3.05811E-08 0.0885253 bmolh 1.16923 1.16923 1.40,407 8.3.410 3.09023 1.40,407 8.3.410 3.09023 1.5182 2.12798 0.0224887 0.0354540 0.056630 0.056630 0.056630 0.0566401 0.345762 0.0467428 0.00852753 0.00852773 0.102930 0.103654 0.013654 0.013654 0.00852763	0.120354 18775E-07 1bmolh 4.4465E-08 6.00710E-00 0.00348584 11.0156 8.37167 9.37544 19.3471 34.8806 0.567904 0.156196 11.5923 7.21740 0.378244 0.378244 0.37824 0.37824 1.0156 1		2.67812E-12 99.9977	1.81557E-14 9.66246E-13 0.0888709 9mor/h 28.1863 9.94774 32.567 33.567 34.3567 34.3567 34.3567 34.3567 34.3567 34.3567 34.3567 34.3567 34.3567 36.6250 0.0020200 0.0470430 2.98939 1.61365 0.35664 0.556467 0.555646 0.53666 0.53666 0.53666 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.0020266 0.002026666 0.002026666 0.002026666 0.002026666 0.002026666 0.002026666666666	120591E-13 0 6.18931 bmoth 0.0113007 0.0691187 2.137867 0.00591187 2.137867 0.00591187 2.137867 0.00591884 0.00268084 0.00268084 0.00268084 0.00268084 0.00268084 0.00268714 3.52288E-06 0.003647818 3.52288E-06 0.003647818 3.52288E-06 0.00364781 3.52288E-06 0.0036488-06 0.003648-	0° 1000	9 8 841 Bmoth 0.0113844 0.0869758 2.16918 0.3609774 0.0597354 0.00277041 0.00277045 0.000854925 0.00059489 3.53362E-06 0.00059489 3.53362E-06 0.000751670 0.000165875 1.09244E-07 0.000165875 1.09244E-07 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000751670 0.000165875 0.000165875 0.000751670 0.000165875 0.0001	0.0111 0.062- 07 18mol/h 0.0210233 0.0309626: 8.43709: 10.139831 1.139831 1.139831 1.139831 1.10244* 5.119833 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 5.119813 1.10244* 1.102413 1	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0

Process Streams Properties	Status:	Condensate to Stabilizer Co	ondensate to Tank G	as to pipeline	HC Liquid	HC Tank Flash Pr	roduced Water Solved	Sales Gas Solved	Water Flash	Water Inlet	Water to Tanks W	Vell Condensate V	Well Gas Inlet Solved
Phase: Total	From Block: To Block:	VLVE-101 XCHG-100	Reboiler XCHG-100	VSSL-100 VLVE-102	Atmospheric Hydrocarbon Tank	Atmospheric Hydrocarbon Tank	VSSL-103	Sales Gas Mixer	VSSL-103	Solved MIX-102	MultiplierMixer-O-4 VSSL-103	- MIX-102	 MIX-102
Property Temperature	Units °F	41.3825	199.573	94.9720	61.6803		98.3846	83.1047	98.3846	62.5*	94.9720	62.5*	62.5°
Pressure Molecular Weight	psiq lb/lbmol	50* 72.7647	43 109 414	1194 21.3198	0	0*	0 18.0156	373 22.3405	0* 19.5054	2300* 18.0153	1194 18.0177	2300* 74.9728	2300* 21.2859
Mass Density Molar Flow	lb/ft^3 lbmol/h	3.26145 743.887	39.8346 352.930	5.60950 569,216	44.1847 352.930	0	61.9696 1987.79	1.64332 4880.32	0.0479765	62.4714 226.438	61.9792 1990.61	41.5472 77.8529	13.3824 558.168
Mass Flow	lb/h	54128.7	38615.4	12135.6	38615.4	0	35811.2	109029	55.0228	4079.35	35866.2	5836.84	11881.1
Std Vapor Volumetric Flow Std Liquid Volumetric Flow	MMSCFD sgpm	6.77504 175.425	3.21435 109.569	5.18420 69.9459	3.21435 109.569	0	18.1040 71.5927	44.4480 612.908	0.0256917 0.316273	2.06231 8.15491*	18.1297 71.9090	0.709054 18.7101*	5.08358* 68.7360
Specific Gravity API Gravity			0.638692 67.9093	0.736114	0.708441 68.0073		0.993597 10.0016	0.771358	0.673468	1.00164 9.72236	0.993749 10.0802	0.666151 80.4962	0.734943
Mass Fraction Nitrogen		0.00699877	%	0.809979	%	%	% 6.54900E-06	0.724207	0.575346	% 0*	% 0.000889184	% 0.0100885*	% 0.781738*
Carbon Dioxide Methane		0.0526833 2.14711	5.63647E-09 2.49560E-10	0.424019 56.9091	5.63647E-09 2.49560E-10		0.00219451 0.00140356	0.401541 51.6275	5.52840 62.3313	0*	0.0106723 0.0970245	0.0228933* 2.31908*	0.450725* 56.5025*
Ethane Propane		6.09708 10.0608	0.000271435 1.25789	21.1455 11.2288	0.000271435 1.25789		0.000592776 9.60445E-05	21.6100 14.1121	19.3246 4.64458	0*	0.0302379 0.00722121	5.21587* 9.00995*	22.2475* 11.9324*
Isobutane n-Butane		2.52970 9.22823	1.26009 5.93916	1.42791 3.97806	1.26009 5.93916		3.78414E-06 2.41815E-05	1.95244 5.51224	0.283185 1.12460	0* 0*	0.00722121 0.000438216 0.00174941	2.37690* 8.79515*	1.46085* 3.94838*
2,2-Dimethylpropane		0.0922007	0.0697928	0.0336712	0.0697928		2.70018E-08	0.0459090	0.00321633	0*	4.96117E-06	0.148199*	0.00338952*
Isopentane n-Pentane		3.76455 6.30377	3.61479 6.51706	0.898813 1.26513	3.61479 6.51706		1.43376E-06 4.78509E-07	1.16299 1.56389	0.111169 0.0730517	0* 0*	0.000171977 0.000112547	3.83490* 6.42165*	0.721967* 0.959233*
2,2-Dimethylbutane Cyclopentane		0.110125 0	0.126735 0	0.0159551 0	0.126735 0		2.58346E-09 0	0.0174045 0	0.000551745 0	0*	8.49018E-07 0	0.109195* 0*	0.0121454* 0*
2,3-Dimethylbutane 2-Methylpentane		0.311877 2.12916	0.375353 2.58697	0.0373801 0.245528	0.375353 2.58697		2.60697E-08 7.33137E-08	0.0371824 0.237037	0.00259492 0.0107971	0* 0*	4.00692E-06 1.66371E-05	0.298850* 2.12528*	0.0323878* 0.170036*
3-Methylpentane n-Hexane		1.30570 4.35454	1.61066 5.49224	0.137937 0.408107	1.61066 5.49224		2.66249E-07 6.54657E-08	0.127541 0.344277	0.0153467 0.0125564	0*	2.38094E-05 1.93282E-05	1.29655* 4.34252*	0.0971635* 0.271248*
Methylcyclopentane Benzene		0.621353 0.0610389	0.783374 0.0765220	0.0557728	0.783374 0.0765220		3.99776E-07 9.80296E-05	0.0491625 0.00507189	0.0125370 0.0429073	0*	1.96323E-05 0.000163704	0.642090* 0.0614703*	0.0276764*
Cyclohexane 2-Methylhexane		0.684682 1.61740	0.875762 2.15005	0.0556026 0.101502	0.875762 2.15005		1.58185E-06 8.73810E-09	0.0457156 0.0604367	0.0243422 0.00198375	0*	3.89231E-05 3.05202E-06	0.695971* 1.66529*	0.0316302* 0.0423670*
3-Methylhexane 2,2,4-Trimethylpentane		1.45737	1.94562	0.0855858	1.94562 0		9.65002E-09	0.0490414	0.00190373	0* 0*	2.95500E-06	1.48620*	0.0423670*
n-Heptane		4.10353 1.73476	5.53452	0.212189	5.53452		9.64425E-09	0.107282	0.00285045	0* 0*	4.38253E-06	4.16190*	0.117686*
Methylcyclohexane Toluene		1.73476 0.283717	2.34022 0.383119	0.0824786 0.0128289	2.34022 0.383119		3.02732E-07 0.000110026	0.0438210 0.00694252	0.0109077	0*	1.70358E-05 0.000201054	1.77323* 0.294950*	0.0415146* 0.00432862*
n-Octane Ethylbenzene		7.25922 0.303938	10.0393 0.420449	0.195132 0.00709609	10.0393 0.420449		8.79750E-10 3.07680E-05	0.0582351 0.00234060	0.000678138 0.0211642	0*	1.04122E-06 6.31890E-05	7.52659* 0.321443*	0.0751297* 0*
1,3-Dimethylbenzene 1,4-Dimethylbenzene		0.379310 0.0136191	0.525303 0.0188521	0.00837613 0.000310045	0.525303 0.0188521		2.42474E-05 9.72965E-07	0.00265340 9.96366E-05	0.0210004 0.000802233	0* 0*	5.64271E-05 2.20219E-06	0.390829* 0.00424814*	0.00498758* 0.00498758*
1,2-Dimethylbenzene n-Nonane		0.582950 4.74829	0.808441 6.62511	0.0116922 0.0634181	0.808441 6.62511		9.61802E-05 1.15833E-10	0.00355983 0.0118594	0.0415796 0.000115128	0* 0*	0.000159820 1.76735E-07	0.615981* 4.98324*	0* 0.0120507*
n-Decane Undecane		4.65771 3.86946	6.51772 5.42075	0.0346715 0.0150279	6.51772 5.42075		4.18799E-12 8.16597E-13	0.00415970 0.00117330	1.30850E-05 3.13786E-06	0*	2.00781E-08 4.81464E-09	4.90955* 4.07800*	0*
Dodecane Tridecane		3.12170 2.62745	4.37484 3.68270	0.00642496 0.00307095	4.37484 3.68270		1.55762E-12 2.61383E-12	0.000347885 0.000108251	2.29177E-06 1.67073E-06	0* 0*	3.51739E-09 2.56570E-09	3.28979* 2.76889*	0* 0*
Tetradecane Pentadecane		2.25737 1.94111	3.16415 2.72091	0.00149220	3.16415 2.72091		4.59119E-12 1.29662E-11	3.56374E-05 9.59458E-06	1.24787E-06 1.09942E-06	0*	1.91896E-09 1.69957E-09	2.37887* 2.04559*	0*
Hexadecane Heotadecane		1.41870 1.26613	1.98864 1.77479	0.00003233 0.000258990 0.000143564	1.98864 1.77479		9.73323E-12 1.74758E-11	2.77182E-06 1.03603E-06	4.95635E-07 3.87466E-07	0*	7.70078E-10 6.11865E-10	1.49505* 1.33428*	0*
Octadecane		1.18537	1.66158	8.07930E-05	1.66158		7.23845E-11	4.21789E-07	4.88297E-07	0*	8.21376E-10	1.24917*	0*
Nonadecane Eicosane		1.03659 0.801067	1.45303 1.12289	4.06530E-05 1.80271E-05	1.45303 1.12289		9.12415E-11 1.76299E-10	1.44978E-07 4.41163E-08	3.01162E-07 1.99059E-07	0*	5.53118E-10 4.81407E-10	1.09238* 0.844182*	0*
Heneicosane Docosane		0.619365 0.597552	0.868188 0.837612	7.45913E-06 4.69535E-06	0.868188 0.837612		2.59881E-10 3.82796E-10	1.21045E-08 5.41265E-09	9.35199E-08 5.09151E-08	0* 0*	4.02952E-10 4.60319E-10	0.652700* 0.629713*	0*
Tricosane Tetracosane		0.406771 0.325761	0.570187 0.456632	1.61741E-06 7.33029E-07	0.570187 0.456632		2.59415E-10 2.49356E-10	1.21013E-09 3.69701E-10	1.23682E-08 3.80024E-09	0*	2.77991E-10 2.54803E-10	0.428664* 0.343294*	0*
Pentacosane Hexacosane		0.232121 0.232070	0.325373 0.325301	3.16528E-07 1.76234E-07	0.325373 0.325301		2.02723E-10 2.23777E-10	1.12927E-10 4.13236E-11	1.13955E-09 3.94871E-10	0°	2.04160E-10 2.24039E-10	0.244614* 0.244560*	0*
Heptacosane Octacosane		0.274679 0.234834	0.385028 0.329176	9.91742E-08 6.19189E-08	0.385028 0.329176		2.99719E-10 2.70460E-10	1.48659E-11 6.86004E-12	1.39921E-10 5.91159E-11	0*	2.99474E-10 2.70136E-10	0.289463* 0.247473*	0*
Nonacosane Triacontane		0.0569140 0.0588669	0.0797786 0.0825160	1.01559E-08 6.15158E-09	0.0797786 0.0825160		5.41897E-11 6.28536E-11	8.29710E-13 3.43612E-13	6.67260E-12 2.61402E-12	0* 0*	5.41168E-11 6.27612E-11	0.0599772* 0.0620351*	0*
Hentriacontane Water		0.342802 0.0898173	0.480519 3.09178E-08	6.26604E-07 0.0748042	0.480519 3.09178E-08		99.9953	1.88937E-11 0.0716650	5.71648	0* 100*	0 99.8507	0.361252*	0*
Mass Flow		lb/h 3.78834	lb/h	lb/h 98.2954	lb/h	lb/h	lb/h 0.00234528	1b/h 789,594	lb/h 0.316571	lb/h	lb/h 0.318916	lb/h 0.588849*	lb/h 92.8790*
Nitrogen Carbon Dioxide		28.5168	2.17655E-06	51.4571	2.17655E-06	0	0.785882	437.795	3.04188	0*	3.82776	1.33624*	53.5511*
Methane Ethane		1162.20 3300.27	9.63687E-08 0.104816	6906.23 2566.12	9.63687E-08 0.104816	0	0.502631 0.212280	56288.9 23561.1	34.2964 10.6329	0*	34.7990 10.8452	135.361* 304.442*	6713.11*
Propane Isobutane									2.55558	0*	2.58997	004.442	2643.25*
n-Butane 2,2-Dimethylpropane		5445.81 1369.30	485.739 486.589	1362.68 173.284	485.739 486.589	0 0	0.0343947 0.00135514	15386.3 2128.73	0.155816	0*	0.157172	525.897* 138.736*	1417.70* 173.565*
Isopentane n-Pentane		1369.30 4995.12 49.9071	486.589 2293.43 26.9508	173.284 482.759 4.08619	486.589 2293.43 26.9508		0.00135514 0.00865967 9.66966E-06	2128.73 6009.93 50.0541	0.155816 0.618786 0.00176971	0* 0*	0.157172 0.627446 0.00177938	525.897* 138.736* 513.359* 8.65016*	1417.70* 173.565* 469.111* 0.402712*
		1369.30 4995.12	486.589 2293.43	173.284 482.759 4.08619 109.076 153.531	486.589 2293.43	0	0.00135514 0.00865967	2128.73 6009.93 50.0541 1267.99 1705.09	0.155816 0.618786 0.00176971 0.0611683 0.0401951	0* 0* 0*	0.157172 0.627446 0.00177938 0.0616818 0.0403664	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822*	1417.70* 173.565* 469.111* 0.402712* 85.7776* 113.967*
2,2-Dimethylbutane Cyclopentane		1369.30 4995.12 49.9071 2037.70	486.589 2293.43 26.9508 1395.87	173.284 482.759 4.08619 109.076	486.589 2293.43 26.9508 1395.87	0 0 0 0	0.00135514 0.00865967 9.66966E-06 0.000513447	2128.73 6009.93 50.0541 1267.99	0.155816 0.618786 0.00176971 0.0611683	0* 0*	0.157172 0.627446 0.00177938 0.0616818	525.897* 138.736* 513.359* 8.65016* 223.837*	1417.70* 173.565* 469.111* 0.402712* 85.7776*
Cyclopentane 2,3-Dimethylbutane		1369.30 4995.12 49.9071 2037.70 3412.15 59.6092 0 166.815	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0	0 0 0 0 0 0	0.00135514 0.00865967 9.66966E-06 0.000513447 0.000171360 9.25168E-07 0 9.33587E-06	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0	0.155816 0.618786 0.00176971 0.0611683 0.0401951	0* 0* 0* 0*	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.000304511 0	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822* 6.37355* 0*	1417.70* 173.565* 469.111* 0.402712* 85.7776* 113.967* 1.44301* 0* 3.84803*
Cyclopentane 2,3-Dimethylbutane 2-Methylpentane 3-Methylpentane		1369.30 4995.12 49.9071 2037.70 3412.15 59.6092 0 188.815 1152.49 706.761	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 998.970 621.962	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 998.970 621.962	0 0 0 0 0 0 0	0.00135514 0.00865967 9.66966E-06 0.000513447 0.000171360 9.25168E-07 0 9.33587E-06 2.62545E-05 9.53470E-05	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0 40.5395 258.439 139.056	0.155816 0.618786 0.00176971 0.0611683 0.0401951 0.000303585 0.00142779 0.00594085 0.00844419	0° 0° 0° 0° 0°	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.000304511 0 0.00143713 0.00596710 0.00853953	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822* 6.37355* 0* 17.4434* 124.049* 75.6775*	1417.70" 173.565" 469.111" 0.402712" 85.7776" 113.967" 1.44301" 0" 3.84803" 20.2021"
Cyclopentane 2,3-Dimethylbutane 2-Methylpentane 3-Methylpentane n-Hexane Methylcyclopentane		1369.30 4995.12 49.9071 2037.70 3412.15 59.6092 0 168.815 1152.49 706.761 2357.06	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 998.970 621.962 2120.85 302.503	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834	486.589 2293.43 26.9508 1396.87 2516.59 48.933 0 144.944 998.970 62.962 2120.85	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00135514 0.00865967 9.66966E-06 0.000513447 0.000171360 9.25168E-07 0.933587E-06 2.62545E-05 9.53470E-05 2.34440E-05 0.000143165	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0 40.5395 258.439 139.056 375.361 53.6013	0.155816 0.618786 0.00176971 0.0611683 0.0401951 0.000303585 0.00142779 0.00594085 0.00844419 0.00690885 0.00689819	0° 0° 0° 0° 0° 0° 0°	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.000304511 0.00143713 0.00596710 0.00853953 0.00693229	525.897* 138.796* 513.359* 8.85016* 223.837* 374.822* 6.37355* 0* 17.4434* 124.049* 75.6775* 253.466* 37.4778*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 0' 3.84803' 20.2021' 11.5441' 32.2272' 3.28826'
Cyclopentane 2,3-Dimethylbutane 2.4-Methylpentane 3-Methylpentane n-Hexane Methylcyclopentane Benzene Cyclohexane		1399-30 4995.12 49.9071 2037.70 3412.15 59.6092 0 168.815 1152.49 706.761 2357.06 336.330 33.0395 370.610	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 999.970 621.962 2120.35 302.503 29.5493 338.179	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666101 6.74768	486.599 2293.43 26.9508 1395.87 2516.59 48.93933 0 144.944 989.970 621.962 2120.85 302.5933 29.5483 333.179	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00135514 0.00865967 9.66966E-06 0.000513447 0.000171360 9.25168E-07 0.33587E-06 2.62545E-05 9.53470E-05 2.34440E-05 0.000143165 0.0051056	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0 40.5395 258.439 139.056 375.361 53.6013 5.52983 49.8432	0.155816 0.618788 0.00176971 0.0611683 0.0401951 0.00303585 0 0.00142779 0.00594085 0.00844419 0.00690885 0.00688819 0.0236088	0, 0, 0, 0, 0, 0, 0, 0, 0,	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.00304511 0 0.00143713 0.00596710 0.00653953 0.00693229 0.00704135 0.0587143	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822* 6.37355* 0* 17.4434* 124.049* 75.6775* 253.466* 37.4778* 3.58793* 40.6227*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 0' 3.84803' 20.2021' 11.5441' 32.2272' 3.28826' 0.435996' 3.75801'
Cyclopentane 2.3-Dimethylbutane 2.4Methylpentane 3-Methylpentane 1-Hexane Methylcyclopentane Benzene Cyclohexane 2-Methylhexane 3-Methylhexane		1369.30 4995.12 49.9071 2037.70 3412.15 55.6090 188.815 1152.49 706.761 2257.06 336.330 33.0395	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 998.970 621.962 2120.85 302.503 29.5493	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666101	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 14.4944 989.970 621.962 2120.85 30.2513 29.5483 333.179 830.251 751.307	0 0 0 0 0 0 0 0 0	0.00135514 0.0086596-06 9.66966E-06 0.000513447 0.000171360 9.25168E-07 0 9.33587E-06 2.62545E-05 9.53470E-05 2.34440E-05 0.000143165 0.0351056	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0 40.5395 258.439 130.905 375.361 53.6013 55.2983 49.8432 65.8934 53.4993	0.155816 0.618786 0.00179971 0.0611683 0.0401951 0.000303585 0.00142779 0.00594085 0.00848419 0.00690885 0.00689819 0.0236088 0.0133938 0.00109151 0.00105639	0° 0° 0° 0° 0° 0° 0° 0° 0° 0°	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.000304511 0 0.00143713 0.00596710 0.00653953 0.00693229 0.00704135	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822* 6.37355* 0* 17.4434* 124.049* 75.6775* 253.466* 37.4778* 3.88793* 40.6227* 97.2006* 86.7472*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 0.3.8403' 20.2021' 11.5441' 32.2272' 3.28826' 0.435996' 3.75801' 5.03366'
Cyclopentane 2.3-Dimethylbutane 2.Methylpentane 3.Methylpentane n-Hexane Methylcyclopentane Benzene Cyclohexane 2.4-Methylhexane 3.Methylhexane 2.2.4-Timethylpentane n-Heptane		1 399 30 4995.12 49 9971 2037.70 3412.15 99.6002 1 688.815 1152.49 706.761 2357.06 336.330 33.030 376.479 768.856 0 0	486.589 2293.43 26.9508 1395.87 2516.59 48.3393 0 144.944 996.970 621.962 2120.85 302.503 29.5493 338.179 830.251 751.307 0 2137.18	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.66610 6.74768 12.3178 0.3663 0 25.7504	486.589 2233.43 26.9508 1385.87 2516.59 44.944 989.970 621.962 21210.85 302.503 333.73 751.307	0 0 0 0 0 0 0 0 0 0	0.00135514 0.0085697 9.66966E-06 0.000513447 0.000171380 9.25168E-07 09.33557E-06 2.62445E-05 9.53470E-05 0.000143165 0.00566480 3.145279E-06 0.03579E-06	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0 40.5395 258.439 139.056 375.361 53.6013 5.52983 49.8432 65.8394 0 116.968	0.155816 0.618786 0.00179971 0.0611683 0.0401951 0.000303585 0.00142779 0.00594085 0.00688819 0.00688819 0.0236088 0.0139393 0.0109151 0.00156839	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.000304511 0.00596710 0.0063963 0.00693229 0.00704135 0.0587143 0.0139602 0.00103464 0.00105985 0.00105985	525.897* 138.736* 613.399* 8.65016* 223.837* 374.822* 6.37355* 0* 17.4434* 124.049* 75.6775* 253.466* 37.4778* 3.58793* 40.6227* 97.2006* 86.7472* 0* 242.923*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 0' 3.84803' 20.2021' 11.5441' 32.2272' 3.28826' 0.435996' 0' 5.03366' 0' 13.9824'
Cyclopentane 2.3-Dimethylbutane 2Methylpentane 3Methylpentane n-Hexane Methylcyclopentane Benzene Cyclohexane 2Methylhexane 3Methylhexane 3Methylhexane 1.2,2,4-T rimethylpentane Methylcyclohexane Toluene		1399 30 4995.12 49 9071 2037.70 3412.15 59 60002 0 168.815 1182.49 706.761 2357.06 336.330 337.610 973.410 973	486.589 2293,43 26.9508 1395.87 2516.599 48.3393 0 144.944 996.970 621.962 2120.85 302.503 29.5493 338.179 850.25,37 761.307 761.307	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666101 6.74768 12.3178 10.3863 0 25.7504 10.0092 1.55686	486.589 2293.43 26.9508 1365.87 2516.59 44.9393 44.9393 621.962 2120.25 302.503 333.179 650.25 751.507 61.962 761.867	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00135514 0.0085679 9.669667-06 0.000513447 0.000171360 9.25168E-07 0.9.33587E-06 2.625456-05 9.53470E-05 0.00143165 0.00566480 3.12922E-06 3.45579E-06 0.00168412 0.345372E-06 0.00108412	2128.73 6009.93 50.0541 1267.99 1705.09 18.9760 0 40.5395 258.439 139.056 375.3611 53.6013 5.52983 49.8432 58.934 63.4693 0 116.968 47.7775 7.56935	0.155816 0.618786 0.00176971 0.0611683 0.0401951 0.000303585 0.00142779 0.00594085 0.00844419 0.06690885 0.00689819 0.0236688 0.01393938 0.0109151 0.00156839 0.00156839 0.00105639	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177938 0.0016818 0.0403864 0.0003041 0.00030961 0.00053953 0.00693229 0.00704135 0.0587143 0.0138602 0.0138602 0.0157185 0.00157185	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822* 6.37355* 7.4452* 124.677* 2253.466* 37.478* 3.58733* 40.6227* 97.2006* 86.7472* 0.724293* 103.501* 17.2158*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 0' 3.84803' 20.2021' 11.5441' 32.2272' 3.28826' 0.435996' 0' 13.9824' 4.93239' 0.514287'
Cyclopentane 2.4Methylpotrane 2.4Methylpotrane 3.4Methylpotrane n.+Hexane Methyloyclopentane Benzene Cyclohexane 2.4Methylhexane 3.4Methylpotrane n.+Heptane Methylcyclohexane Methylcyclohexane Methylcyclohexane		1369.30 4995.12 49.9071 2037.70 3412.15 59.6002 0 168.815 1152.87 706.761 2357.06 336.330 337.610 875.479 786.856	486.589 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 989.970 621.962 2120.85 302.503 338.179 830.251 751.307 2127.18 903.685 147.943 3876.73 162.358	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 4.9.5260 6.76834 0.666101 6.74716 10.3863 0 0 25.7504 10.0092 1.55686 23.6804 0.861150	486.589 2293.43 26.9508 1365.67 2516.59 48.9393 48.9393 49.93970 621.962 2120.35 302.503 329.5433 338.179 850.251 751.307 21217.18 901.665 147.943 3876.73	0 0 0 0 0 0 0 0 0 0	0.00138514 0.0085897 9.669661-96 0.00051347 0.000171360 9.251867-06 2.625456-05 2.344406-05 2.344406-05 0.0001486-03 0.0051698 3.152726-06 3.455726-06 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.000189415 0.0039105 0.003	2128.73 5009.93 50.0541 1267.99 1705.09 18.9760 04.5395 258.439 139.056 375.361 35.2613 49.8432 65.8934 65.4893 0 116.968 47.7775	0.155816 0.618786 0.00176971 0.0611683 0.0401951 0.000303585 0.00142779 0.00594085 0.00844419 0.00690885 0.00688819 0.0236088 0.0109151 0.00156839 0.00156839 0.0000170 0.0327089 0.00373130 0.0016451	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177938 0.0616818 0.0403664 0.00304511 0.00596710 0.00858743 0.0754155 0.0754155 0.0754155 0.0015985 0.00157185 0.00157185	525.897* 138.736* 513.359* 8.65016* 223.837* 374.822* 6.37355* 0.17.4434* 124.049* 75.6775* 253.466* 37.4778* 3.58783* 40.6227* 97.2006* 86.7472* 0.242.923* 103.501*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 20.2021' 11.5441' 32.2022' 32.2021' 32
Cyclopentane 2.3-Dimethylutane 2.4-Methyloentane 2.4-Methyloentane n-Hexane Methylcyclopentane Benzene Cyclohexane 2.4-Methylmexane 3.4-Methylmexane 3.4-Methylmexane n-Heptane Methylcyclohexane Toluene Toluene n-Octane		1399 30 4995.12 49.9071 2037.70 3412.15 59.6092 0 168.815 1152.49 705.761 2357.36 33.033 33.033 33.030 97.62.79 97.62.65 97.62.79 97.62.65 97.62.79 97.62.70 97.62.70 97.62.70 97.62.70 97.62.70 97.62.70 97.62.70 97.62.70 97.62.70 97.62.70	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 998.970 621.962 2120.85 302.503 33.6479 830.251 751.307 0 2137.18 903.885 147.943 3876.73 162.358	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.78834 0.868114 0.3863 0 25.7504 0.861150 0.861150 0.0922	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 989.970 621.962 2120.85 30.25.349 30.32.549 30.3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00135514 0.0085979,6696E-0 9.6696E-0 9.6696E-0 9.25168E-07 9.33587E-06 2.62546E-03 9.33587E-06 2.34440E-05 0.0001478-0 3.12922E-06 3.12922E-06 0.000148E-0	2128.73 5009.93 50.0541 1267.99 1705.09 0 40.5395 258.439 139.056 375.3613 4.5293 4.53.4693 0 116.058 47.7775 7.56935 63.4930 2.55193	0.155816 0.00176871 0.0011683 0.00176871 0.0011683 0.000303585 0.0004277 0.00594085 0.00844419 0.0069085 0.00844419 0.0250088 0.0133938 0.01019151 0.00156839 0.001070 0.027089 0.0060170 0.0327089 0.00327089 0.003373130 0.0116451	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177938 0.0016818 0.0063040 0.00143713 0.00569710 0.006853983 0.00685222 0.00704135 0.0056222 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946 0.0010946	525.897* 138.736* 613.399 8.65016* 223.837* 374.822* 6.37365* 17.4434* 124.049* 75.6775* 225.4665* 37.4778* 3.58733* 40.6222* 97.2006* 86.7472* 24.9325* 105.501* 17.2158* 439.3315* 18.7621* 22.8121*	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 1.44301' 0.3.84803' 20.2021' 11.5441' 32.2272' 3.28826' 0.435996' 3.75801' 5.03366' 5.03366' 5.03366' 5.03366' 4.93239' 0.514287' 0.592579'
Cyclopentane 2,3-Dimethylutane 2-Methylpentane 3-Methylpentane n-Hexane Methylepotane Benzene Cyclohexane 2-Methylmexane 3-Methylmexane 3-Methylmexane 2-Methylmexane 2-2,4-Timethylpentane Methyleychtexane Tolune Cyclohexane Tolune Ethylbenzene 1,4-Dimethylbenzene 1,4-Dimethylbenzene 1,2-Dimethylbenzene		1 399 30 4995.12 49 9071 2037.70 347.2-15 99.0002 168.815 1152.49 706.761 2357.06 336.330 33.030 376.479 788.856 0 2221.19 939.004 153.573 380.034 153.573 153	486.589 2293,43 26.05008 1395.87 2516.390 44.994 989.970 621.962 2120.85 302.503 23.443 33.02.51 751.307 0 2137.18 903.685 147.943 3677.73 3677.744 72.7979 312.183	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 26.7395 49.5260 6.7883 0.668101 6.74768 12.3178 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863	486.589 2233.43 26.9508 1385.87 2515.59 44.9509 01 44.944 998.970 621.962 21210.85 302.593 303.251 70 0 2137.18 903.685 147.943 3367.333 367.333 367.333 367.333 367.333		0.00135514 0.0085957 9.6696E-0 0.000513447 0.000171360 9.25168E-07 9.33587E-06 2.62545E-05 2.34440E-05 0.000143165 0.000143165 0.000143165 0.000143165 0.000143165 0.00014212 0.00014212 0.00014412 0.0001640E-07 0.0110184	2128.73 5009.93 50.0541 1267.99 1705.09 0 40.5395 258.439 139.056 375.361 5.52983 49.8432 65.38483 49.8432 65.38641 53.4803 0 116.0588 47.7775 7.56935 63.4930 2.55193 2.89297 0.108633 3.88125	0.155816 0.618768 0.00176971 0.0611683 0.4041951 0.003030585 0 0.004142779 0.00594085 0.008444193 0.00594085 0.00689088 0.0133393 0.01056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.001056839 0.00444411 0.0115550 0.00444411	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177938 0.0016818 0.0063964 0.0063964 0.006396710 0.00653963 0.00653963 0.00653963 0.00653963 0.00653963 0.00537143 0.0010964 0.00109694 0.001079694 0.001079694	525.897* 138.736* 513.399* 8.85016* 223.837* 374.822* 6.37385* 17.4434* 124.049* 75.6775* 2253.466* 37.4778* 3.58793* 40.6227* 97.2006* 86.7472* 0.42.937* 17.2188* 43.315* 18.7621* 12.8121* 2.41957* 12.41957* 14.7218* 15.551* 16.551* 17.2188* 18.7621* 2.41957* 19.551* 1	1417.70' 173.565' 469.111' 0.402712' 85.7776' 113.967' 144301' 3.84803' 20.2021' 11.5441' 32.2272' 3.28826' 0.435996' 0.75801' 5.03366' 0.73366' 0.73366' 0.73366' 0.51426' 0.
Cyclopentane 2,3-Dimethybutane 2-Methybpentane n-Hexane Methylopentane n-Hexane Methylopentane Benzene Cyclohexane 2-Methylmexane 2-Methylmexane 2-Methylmexane 2-2,4-Timethylpentane n-Heptane Methylopichtexane D-Ctaine Ethylbenzene 1,4-Dimethylbenzene 1,4-Dimethylbenzene 1,2-Dimethylbenzene n-Nonane		1 399 30 4995.12 49 9071 2037.70 3412.15 59 60002 0 1688.815 1182.49 706.761 2357.06 336.330 3310.335 370.617 9788.856 788.856 788.856 92221.19 933.004 153.573 342.32 164.518 205.318 215.518	486.589 2293,43 26.9508 1395.87 2516.599 48.3393 0 144.944 998.970 621.962 2120.85 302.503 29.5493 338.177 751.307 203.885 147.943 3876.73 162.386 202.898 202.898 325.893 325.5633 255.833 255.833 255.833 255.833 255.833	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666110 0.3863 10.3863 0.56110 0.25.7504 10.1092 1.55686 23.6804 0.861150 0.037167 0.037167 0.037167 0.0371	486.589 2293.43 26.9508 1385.87 2516.59 44.9346 98.970 621.962 2120.35 302.503 333.173 600.35 14.944 90.977 751.307 75		0.00138514 0.00868997 9.60966E-06 0.000513447 0.000171360 9.25168E-07 0 9.3587E-06 2.62445E-05 9.53470E-05 0.00143165 0.00351056 0.0	2128.73 5009.93 50.0541 1267.99 1705.09 18.9760 40.5395 258.439 139.056 375.361 53.5013 5.52882 49.8324 69.8324 67.7775 67.56935 63.4893 2.55193 2.55197 0.08837 0.08838 2.55193	0.155816 0.611876 0.00176971 0.00176971 0.00181833 0.0401993 0.00303585 0 0.00142779 0.00594085 0.00844419 0.006980819 0.0258083 0.001055839 0.001055839 0.001055839 0.001056839 0.0010	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177388 0.0616818 0.0608041 0.0003041 0.0003041 0.00056971 0.00653085 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00611011 0.00159862 0.00611011 0.00377445 0.00611011 0.0037745 0.0063741 0.0037745 0.0063741 0.0037745 0.0063741 0.0037745 0.0063741 0.0037745 0.0063741 0.00377415 0.00637	525.897 138.736* 513.359* 8.85016* 223.837* 274.4822* 6.37335* 17.4434* 124.049* 75.6775* 253.466* 37.4778* 3.58733* 40.6227* 97.2006* 86.7472* 07.206* 19.3514	1417.70' 173.565' 469.111' 40402712' 85.7776' 113.567' 1.44301 b' 147.50' 113.567' 1.44301 b' 147.50' 113.567' 1.44301 b' 15441' 32.272' 3.28626' 0.592570' 0' 1.39824' 4.92239' 0.592570'
Cyclopentane 2,3-Dimethybutane 2-Methybpentane 3-Methybpentane 3-Methybpentane Methylycdopentane Benzene Cyclohexane 2-Methyhexane 3-Methyhexane 3-Methyhexane 1-Methythexane 1-Methythexane 1-Methythexane 1-Cyclane Ethythexane 1-3-Dimethybenzene 1,3-Dimethybenzene 1,2-Dimethybenzene		1369-30 4995.12 49.9071 2037.70 3412.15 59.6002 168.815 1182.49 706.761 2367.06 336.330 33.0395 370.810 973.479 786.855 370.811 933.479 1768.855 176.815 175.373 3829.32 164.518 206.315 7.37185 215.173 3829.32 164.518 206.315 7.37185	486.589 2293.43 26.9508 1395.87 2516.59 48.3393 0 144.944 998.970 621.962 2120.85 302.503 338.179 830.251 751.307 2137.18 903.685 147.943 3876.73 162.358 202.848 7.2797 3.356.31 2516.84 203.24 1689.36	173.284 482.759 4.08619 109.076 153.531 1.98625 0 4.53628 22.7962 16.7395 49.5260 6.76834 0.66610 16.74768 10.3863 0.56710 10.5863 23.178 10.3863 0.56710 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.3863 10.38634 10.39633 10.38634 10.39633 10.38634 10.39633 10.38634 10.39633 10.38634 10.38644 10.38	486.589 2293.43 26.9508 1365.87 2516.59 48.9303 44.9343 989.970 621.962 2120.85 302.503 333.179 8503.251 751.307 903.855 147.943 3676.73 162.358 202.848 72.1979 312.637 32.5463 33.33.377		0.00138514 0.00868967 9.60966E-06 0.000513447 0.000171380 9.25186E-07 9.25187-06 9.25470E-05 9.53470E-05 0.000143185 0.00568480 3.12922E-0 3.45579E-06 0.00568480 3.45572E-06 0.00108412 0.00868327 0.0101084 0.00868327 0.00038415 3.14927E-09 0.00108414 0.00868327 0.0101084 0.00868327 0.003584 0.00868327 0.003584 0.00868327 0.003584 0.00	2128.73 5009.93 50.0541 1267.99 1705.00 40.5395 258.439 139.056 375.361 53.6013 5.52983 49.8432 65.8934 65.893	0.155816 0.611876 0.00176971 0.00176971 0.00181833 0.4019193 0.000303585 0 0.00142779 0.00594085 0.00684419 0.00689819 0.0236088 0.010195839 0.00195	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177588 0.0616818 0.003941 0.003941 0.003941 0.00583945 0.00683929 0.00704135 0.00683929 0.00704135 0.00683229 0.00704135 0.0051091 0.00159694 0.00159695 0.00611091 0.00377445 0.00611091 0.00377445 0.00611091 0.0037745 0.00611091 0.0037745 0.00611091 0.0037745 0.00611091 0.0037745 0.0061095	525.897 138.736* 513.359* 8.85016* 223.837* 374.822* 6.37355* 17.4454* 124.049* 75.6775* 253.466* 37.4778* 3.58793* 40.6227* 97.2006* 86.7472* 07.206* 439.315* 17.2188* 439.315* 19.24767* 10.24767*	1417.70' 173.565' 469.111' 40402712' 85.7776' 113.957' 1.44301 b' 173.565' 113.957' 1.44301 b' 173.565' 113.952' 115.41' 32.2272' 3.28526' 0.435996' 3.28526' 0.435996' 3.28526' 0' 1.39524' 4.92239' 0' 1.542570' 0' 1.5952570' 0' 1.5952570' 0' 1.43176' 0' 0' 0' 0' 0' 0' 0' 0' 0' 0' 0' 0' 0'
Cyclopentane 2,3-Dimethybutane 2-Methybpentane 3-Methypentane n-Heozane 1-Heozane Cyclohezane Cyclohezane Cyclohezane 3-Methyhezane 3-Methyhezane 3-Methyhezane 1-Heptane Methylopentane n-Heptane Methylopentane n-Octane Ethylbenzene 1,3-Dimethybenzene 1,3-Dimethybenzene 1,2-Dimethybenzene 1,3-Dimethybenzene		1369.30 4995.12 49.9071 2037.70 3412.15 59.6002 0 168.815 1182.49 706.761 2357.06 336.330 33.0395 370.610 973.479 788.556 0 2221.19 93.0044 153.573 3929.32 164.518 205.315 7.37165 315.544 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14 2570.14	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 0 144.944 989.970 621.962 2120.85 302.503 29.5493 338.179 830.251 751.307 2137.18 903.685 147.943 3876.73 162.358 202.848 7.27979 312.183 2558.31 2558.31 2558.31 2558.31 2558.31	173.284 482.759 4.08619 109.076 153.531 1.93621 0 4.53628 29.7962 16.7396 49.5260 6.76834 0.66610 10.3863 12.3178 10.3863 12.3178 10.3863 12.3178 10.3863 12.3178 10.3863 12.3178 10.3863 10.50610 10.0962 1.55686 10.31767 10.0963 10	486.589 2293.43 26.9508 1365.67 2516.59 48.9303 44.9303 44.9303 621.962 210.265 302.503 328.179 830.261 751.307 21217.18 903.685 147.943 3876.73 162.388 202.848 7.27979 312.183 2258.34 226.34 236.34 24.94 25.95 26.34		0.00138514 0.00868967 9.60966E-06 0.000513447 0.000171380 9.25168E-07 9.33587E-06 2.62545E-05 9.53470E-05 9.53470E-05 0.000143165 0.000566480 3.12922E-06 3.45579E-06 0.000108412 0.000108412 0.000108414 0.00868327 0.00144433 4.14813E-05 0.00344433 4.14813E-05 0.00344433 4.14813E-10 0.00344453 1.5578E-06 0.00344433 1.15848E-07 0.00344453 1.15848E-07 0.00344453 1.15858E-07 0.0034458 1.15858 1.158	2128.73 5009.93 50.0541 1267.99 1705.00 0 40.5396 258.439 139.056 375.361 53.6013 5.52983 49.8432 65.8934 65.8934 65.8934 65.8933 65.8	0.155816 0.611786 0.00176971 0.00176971 0.0011683 0.00401851 0.000303851 0.000303851 0.000303851 0.00044419 0.00590885 0.00690885 0.00690885 0.00690885 0.005908819 0.00590819 0.0019015 0.00115683 0.00190151 0.0015681 0.001	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157/12 0.627446 0.00177938 0.0616818 0.00339411 0.00339411 0.0059951 0.00659953 0.00659953 0.0065922 0.00704135 0.0059953 0.0067143 0.0119862 0.00119864 0.00119864 0.00119864 0.0011986 0.000373445 0.0022843 0.0022843 0.0022843 0.0072841 0.0022843 0.0072845 0.0022843 0.0072845 0.00728	525.897 138.736* 513.399 8.8016* 274.822* 63.7355* 6.37355* 6.37355* 7.4434* 124.049* 7.56775* 253.466* 6.7472* 0.7206* 86.7472* 0.7206* 103.501* 113.501* 118.7621* 12.8121* 12.8121* 12.8121* 12.8121* 12.8121* 13.9538*	1417.70** 173.565** 408.111** 807.5** 807.5** 807.5** 807.5** 807.5** 807.5** 807.5** 807.5** 907.5**
Cyclopentane 2,3-Dimethybutane 2-Methybpentane 3-Methylpentane n-Hexame n-Hexame Cyclohexane Cyclohexane Cyclohexane 3-Methylmexane 3-Methylmexane 1-Hexame Tolune 1-Hexame 1-Dimethylbenzane 1-S-Dimethylbenzane 1-Dimethylbenzane		1 399 30 4995.12 49 907.1 2037.70 3412.15 59 6002 0 168.815 1152.87 706.761 2357.06 336.330 337.0610 875.479 788.856 0 221.16 155.573 362.92 164.518 265.315 7.37185 315.544 2570.19 2581.16 2	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 0 14.944 98.970 621.962 2120.85 302.503 33.179 830.251 751.307 2137.18 903.685 147.943 3876.73 162.358 202.848 7.27979 312.183 2558.31 2516.24 1682.258 212.858 147.9590 122.185	173.284 482.759 4.08619 109.076 153.531 1.93623 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666101 6.74768 12.3178 10.3863 25.7504 11.0092 1.55686 23.8504 0.861150 1.01649 0.0376257 1.41892 0.0376257 1.41892 0.0376257 1.4298	486.589 2293.43 26.9508 1365.67 2516.59 48.3936 48.393		0.001385147 0.00815947 0.000171380 9.25168E-07 9.35587E-06 9.25470E-05 9.53470E-05 9.53470E-05 9.53470E-06 9.53470E-06 3.45579E-06	2128.73 5009.93 50.0541 1267.99 1705.09 04.5395 258.439 139.056 375.361 53.6013 5.52983 49.8432 65.8934 53.4693 116.90 84.7777 5.56935 63.4930 2.55193 2.89297 0.108633 3.88125 0.108205 0.118026 0.118026 0.118026 0.118025 0.0188255 0.01046509	0.155816 0.6118786 0.00176971 0.0611883 0.04019183 0.04019183 0.04019183 0.00142779 0.00142779 0.00544419 0.00594085 0.008948419 0.005968819 0.025968819 0.025968819 0.025968819 0.02596819 0.02596819 0.02596819 0.02596819 0.02596819 0.02596819 0.00596110 0.00158819 0.00596110 0.00158819 0.00596110 0.00158819 0.005961110 0.00158819 0.005961110 0.00158819 0.005961110 0.00158819 0.005961110 0.005961110 0.005961110 0.00	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157/122 0.627446 0.00177938 0.0616818 0.00030941 0.00030941 0.00030941 0.00030941 0.00058931 0.00685303 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.0058323 0.0058323 0.00708841 0.00573215 0.00573215 0.3081816.00 7.201236-00 1.728585-0	525.897* 138.736* 513.399* 8.8016* 22.887* 37.322* 6.37355* 6.37355* 7.6775* 253.466* 7.6775* 253.466* 6.7472* 0.2206* 6.7472* 0.7206* 10.5501* 17.1587 10.5501* 17.2182* 10.22822* 10.5501* 17.2182* 10.247957* 36.9538* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084* 28.553* 20.084*	1417.70** 173.565** 408.111* 40.2712* 85.775* 1.4301* 0* 3.48003* 20.2021* 1.15411* 3.22272* 2.22262* 0.75801* 0.35805* 0.3580* 0.75801* 0.35805* 0.95805* 0
Cyclopentane 2,3-Dimethylusine 2Methylpentane 3Methylpentane n-Hexana Methylectopentane Benzere Benzere 2Methylhexane 3Methylmexane 3Methylmexane 3Methylmexane 3Methylmexane 1Methylmexane 1Methylmexane 1Methylmexane 1Methylmexane 1Methylmexane 1Indexene 1Johnethylmexane		1369.30 4995.12 49.907.1 2037.70 3412.15 59.6002 0 168.815 1152.25 706.761 2387.30 336.330 336.330 336.330 3370.610 875.479 788.856 221 164.518 205.315 7.37185 315.544 2570.19 2521.16 2004.49 1680.72 1690.70 176.7923 685.342 685.342	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 0 14.944 98.970 621.962 2120.85 302.503 33.179 830.251 751.307 2137.16 830.251 3751.307 2157.18 202.848 7.27979 312.183 2558.31 2516.84 2093.2585 147.943 3876.73 162.358 202.848 7.27979 312.183 2558.31 2516.84 2093.258 120.868 7.27979 312.183 2558.31	173.284 482.759 4.08619 109.076 153.531 1.93620 0 4.53629 29.7662 16.7395 49.5260 6.76834 0.666101 6.74768 10.3863 0.666101 6.74768 10.3863 0.666101 6.74768 10.3863 10.5680 10.5692 10.5692 10.5692 10.5692 10.5797 10.5797 10.719707 10.71	486.589 2293.43 26.9508 1365.67 2516.59 48.3936 48.3936 48.3936 48.3936 48.3936 38.3179 621.982 2120.85 302.503 338.179 830.251 751.307 2137.18 2137.18 2137.18 2137.18 2137.18 2137.18 2137.18 2157.68 202.848 7.27979 312.183 2516.34 1693.36		0.001385147 0.008159147 0.000171380 9.25168E-07 9.35587E-08 9.251470E-05 9.251470E-05 9.251470E-05 9.251470E-06 9.254470E-05 0.00143165 0.00566480 3.12922E-06 3.45579E-06	2128.73 5009.93 50.0541 1267.99 1705.09 18.9760 04.5395 258.439 139.056 375.361 53.6013 5.52983 49.8432 65.8934 53.4693 10.6884 47.7775 7.56935 63.4930 2.55193 2.89297 0.108633 3.88125 12.9302 4.53528 1.27324 0.379295 0.0104650 0.0104609 0.00302208 0.00112957	0.155816 0.6118786 0.00176971 0.0611883 0.0401951 0.0003038893 0.00044419 0.00594085 0.00644419 0.00594085 0.006890885 0.00688819 0.0258088 0.0133938 0.00589085 0.00590811 0.00158599 0.0059011 0.0059011	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157/12/ 0.627446 0.00177938 0.0616818 0.000309411 0.000309411 0.000589313 0.006893229 0.00704135 0.006893220 0.00704135 0.006893220 0.00109685 0.00687143 0.0139692 0.00109685 0.00587143 0.0139692 0.00109685 0.00587143 0.0139692 0.00109685 0.00587143 0.0139692 0.00109685 0.00587143 0.0139692 0.00109685 0.00587143 0.0139692 0.00109685 0.00587143 0.00732156 0.00587163 0.00732156 0.005873157 0.0058731	525.897* 138.736* 513.399* 8.65016* 223.807* 3.7325* 6.37355* 6.37355* 6.37457* 225.3466* 7.47434* 124.049* 7.6775* 225.3466* 3.47772* 3.56727* 3.5	1417.70** 173.565** 408.111* 48.775** 14.40271* 14.4071* 14.4071* 14.4071* 14.4071* 14.4071* 14.4071* 14.4071* 14.4071* 14.4071* 15.441* 15.2272* 15.441* 15.2272* 15.441* 15.2272* 15.2366** 15.2366** 15.2366** 15.2366** 15.2366** 15.2366** 16.252570** 17.43176** 0.592570** 0
Cydopentane 2.3-Dimethylutane 2.4Methylpentane 2.4Methylpentane n-Hexana 3.4Methylpentane n-Hexana Benzane 2.4Methylmexane 3.4Methylmexane 3.4Methylmexane 3.4Methylmexane 3.4Methylmexane 1.4Methylmexane 1.4Dimethylmexane 1.4Dimethylmexane 1.4-Dimethylmexane 1.		1 399 30 4995.12 49 997.1 24 99 51.2 49 997.1 24 99 51.2 49 997.1 24 97.1 24 97.1 24 97.1 24 97.1 24 97.1 24 97.1 24 97.1 24 97.1 25 9	486.589 2293,43 26.05008 1395.87 2516.393 48.3930 144.944 998.970 621.962 2120.85 302.503 23.443 33.02.51 751.307 0 2137.18 903.685 147.943 367.27979 312.183 2558.31 2516.84 2093.24 1689.32 1150.868 767.920 685.341	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.78634 0.866110 6.31768 12.3178 10.360 0.25.7504 10.0092 1.55686 23.86904 0.25.7504 0.376257 1.4787 0.372577 0.372577 0.372577 0.3723370 0.314228	486.589 2293.43 26.9508 1385.87 2515.59 44.944 989.970 621.962 2120.85 302.503 323.41 630.261 75.307 0 21377.18 903.85 147.943 3377.75 107.85 147.943 325.85 147.943 325.85 147.943 325.85 325.		0.00135514 0.00865967 9.60665-06 0.000513447 0.000171360 9.251665-0 9.251665-0 9.2514705-05 0.00143165 0.00143165 0.00143165 0.00143165 0.00345105 0.00345	2128.73 5009.93 50.0541 1267.99 1705.09 18.976.0 18.976.0 40.5395 258.439 139.056 375.361 53.5013 53.2013 63.4633 0 116.088 47.7775 7.56335 2.3832 2.202 2.202 2.202 2.202 2.202 2.202 2.203 2.203 2.203 3.4633 3.88125 12.7324 4.3528 1.27324 6.372256 0.378256 0.378256 0.3384560 0.01146509 0.00302208	0.155816 0.618786 0.00176971 0.00116831 0.0401828 0.040182779 0.00343086 0.00844419 0.0288819 0.02888819 0.02888819 0.02888819 0.02888819 0.02868819 0.02868819 0.00156839	0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0° 0	0.157172 0.627446 0.00177938 0.0016818 0.0063954 0.0063954 0.0063957 0.00653953 0.00683229 0.00704135 0.0053744 0.0010964 0.00	525.897* 138.736* 613.399* 8.65016* 223.837* 374.822* 6.37362* 124.949* 75.6775* 225.466* 37.4778* 3.58733* 40.6227* 97.2006* 86.7472* 97.2005* 17.2158* 439.315* 18.7621* 12.8121* 12.8121* 12.8121* 12.8121* 12.8121* 12.8121* 13.8551* 16.615* 13.8551* 113.388* 67.2640* 77.8788*	1417.70' 173.565' 469.111' 469.111' 469.111' 489.11' 489.11' 185.77' 67' 67' 67' 67' 67' 67' 67' 67' 67'
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Cyclopentane 2,3-Dimethybutane 2Methybpentane 3Methylpentane n-Hozaria Methylpentane n-Hozaria Gydhexane 2,4-Methylhexane 3Methylhexane 3Methylhexane 3Methylhexane 1Methylhexane 1Methylhexane 1Methylhexane 1Methylhexane 1Dimethylbentane 1		1369 30 4995.12 49.9071 2037.70 3412.15 59.6002 0 168.815 1152.87 706.761 2387.06 338.330 33.0395 370.610 875.479 788.856 0 221.15 2387.06 152.57 338.29 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 238.20 248.20 258.20 268.315 7.37185 315.544 2570.19 258.116 208.416.28 561.03 438.20 442.20 422.89 1050.70 767.923 685.342 685.342 681.333 435.827 335.244 222.19 223.19 223.19 223.19 223.19 223.19 233.24 24.25 24.3330 24.26 25.116 22.20 24.26 25.216 26.3330 26.3330 26.3330 26.3330 26.5330 27.5330 27.5330 27.5330 27.5330 27.5330 27.55616	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 0 14.944 989.970 621.962 2120.85 302.503 29.5493 338.179 830.251 751.307 2137.18 205.868 147.943 3876.73 162.358 202.848 7.27979 312.183 2556.31 2516.24 1402.09 685.341 641.627 561.093 433.607 338.2544 641.627 561.093 433.607 338.2544 125.616	173.284 482.759 4.08619 109.076 153.531 1.93621 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666101 6.74768 12.3178 10.3863 23.6804 12.1758 10.3863 23.6804 12.1758 10.3863 10.586101 10.1649 10.37627 1.41892 10.37627 1.41892 10.37627 1.41892 10.37627 10.37167 10.37637 10.376	486.589 2293.43 26.9508 1365.67 2516.59 48.9393 48.9393 48.9393 48.9393 38.179 621.982 2120.85 302.503 338.179 830.251 751.307 2137.18 2037.88 202.848 7.27979 312.183 2518.84 202.948 7.27979 312.183 2518.84 202.948 7.27979 312.183 2518.84 3258.341 48.209 48.341 48.361 48.363		0.00135514 0.001355147 0.000171380 9.25168E-07 9.35587E-06 9.53470E-05 9.53470E-05 9.53470E-05 9.53470E-05 9.53470E-05 0.00143165 0.00566480 3.15927E-06 3.45579E-06 3.45579E-06 3.45579E-06 3.45579E-06 3.45579E-06 3.45376E-08 3.25746E-08	2128.73 5009.93 50.0541 1267.99 1705.00 04.5395 258.439 139.056 375.361 53.6013 5.5283 49.8432 65.8934 53.4693 65.8934 65.34693 65.8934 65.34693 65.8934 67.776.6935 63.4693 63.4893 6	0.155816 0.681876 0.00176971 0.0011683 0.0401981 0.000303883 0.0401981 0.00594088 0.00594088 0.00594088 0.00594088 0.00594088 0.00594088 0.00594088 0.00596088 0.00596088 0.00596088 0.00596088 0.00596088 0.00596088 0.00596088 0.0059608 0.0059608 0.00596088 0.0059608		0.1571/22 0.627446 0.00177938 0.0616818 0.000309411 0.00030941 0.00030941 0.00030941 0.00030941 0.00030941 0.00030941 0.00030941 0.00030941 0.00030941 0.00159682 0.00704135 0.00681011 0.00159682 0.00109684 0.001159685 0.00681101 0.001577415 0.00611011 0.07272104 0.00377445 0.0020283 0.000798941 0.00737215 0.00673215 0.202283 0.000798941 0.00737216 0.202285 0.20	525.897* 138.736* 513.399* 8.65016* 223.807* 3.7322* 6.37355* 6.37355* 6.37457* 225.3466* 7.47434* 124.049* 7.6775* 2.53.466* 7.4772* 3.56727* 3.57227* 3.57	1417.70** 173.565** 408.111* 487.716** 14.00** 11.1400** 11.1400** 11.1400** 11.1541* 13.2272* 13.28020* 13.9803* 15.141* 15.2272* 13.28020* 13.9803* 15.14287* 15.0386* 13.9804* 14.9239* 15.14287* 16.925.70* 17.925.70* 1
Cyclopentane 2,3-Dimethybutane 2Methybpentane 2Methybpentane n-Heazane Methylepotane n-Heazane Cyclohexane 2Methythexane 3Methylepotane 6Methylexane 3Methylexane 3Methylexane 3Methylexane 1Methylexane 1Methylexane 1Dimethylexane 1Dimethy		1369.30 4995.12 49.907.1 249.907.1 3412.15 59.6002 0 168.815 1152.25 706.751 338.330.330 336.3300 336.330 336.	486.599 2293.43 26.9508 1395.87 2516.59 48.9393 31 44.944 99.970 621.962 2120.85 302.503 338.179 830.251 751.307 1177.16 803.685 202.848 7.27979 312.183 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31 2516.84 2093.483 2556.31	173.284 482.759 4.08619 109.076 153.531 1.93620 0 4.53629 29.7662 16.7395 49.5260 6.76834 49.5260 6.76834 10.3863 2.36804 11.55886 12.3178 10.3863 12.3178 10.3863 12.3178 10.3863 10.	486.589 2293.43 26.9508 1365.67 2516.59 48.3936 48.3936 48.3936 48.3936 48.3936 48.3936 38.3179 62.1982 2120.55 302.503 333.179 631.75 317.307 2137.307 2137.31 2157.65 49.565 49		0.00135514 0.000565967 9.600665-06 9.600613447 0.000171360 9.25168E-07 9.35587E-06 9.251470E-05 9.53470E-05 9.53470E-06 9.53470E-06 9.53470E-06 3.45579E-06 3.45578E-06 3.45579E-06 3.25746E-08 3.25746E-08 3.25746E-08 3.25746E-08 9.30655E-08 9.30655E-08 9.30655E-08 9.30655E-08 9.30655E-08 9.30655E-08 9.30655E-08 9.30655E-08 9.30655E-08	2128.73 5009.93 50.0541 1267.99 1705.90 1705.9	0.155816 0.6118786 0.001768971 0.0611883 0.0401981 0.000303383 0.0001981 0.000344419 0.00594085 0.00844419 0.00594085 0.00894885 0.00898819 0.0236088 0.0133938 0.00590090 0.00373130 0.0015839 0.0089011 0.0089011 0.00		0.157172 0.627446 0.00177938 0.0016818 0.0068818 0.0068818 0.0068818 0.006883983 0.0068229 0.00784713 0.00589710 0.00853983 0.0068229 0.00169484 0.0016988 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00169886 0.00178841 0.00373445 0.00373445 0.00373445 0.00373445 0.00373445 0.00758861 0.0068866 0.0016866 0.0016866 0.0016866 0.0016866 0.0016866 0.0016866 0.0016866 0.0016866 0.00168666 0.00168666 0.00168666 0.001686666 0.001686666 0.0016866666 0.00168666666666666666666666666666666666	525.897* 138.736* 513.399* 8.65016* 223.837* 3.7355* 6.37355* 124.049* 7.6775* 223.466* 3.7478* 3.56733* 4.7206* 86.7472* 4.2206* 86.7472* 4.2206* 86.7472* 4.2206* 86.7472* 4.2206* 86.7472* 4.2206* 86.7472* 4.2206* 86.7472* 4.2206* 11.3388* 12.806.854* 28.6553* 23.007* 12.000* 16.615* 13.38801* 13.38807* 14.2786* 26.553* 26.0034* 27.78788* 27.78788* 29.00375* 14.2786* 20.0375* 20.0375* 2	1417.70** 173.565** 409.111* 48.7778** 1.1549**
Cyclopentane 2,3-Dimethybutane 2-Methybpentane 2-Methybpentane 3-Methybpentane Methyloridopentane Benzene Cyclohexane 2-Methyhexane 3-Methyhexane 3-Methyhexane 3-Methyhexane 1-Heptane 1-Cyclohexane 1-Heptane 1-Cyclohexane 1-Heptane 1-Cyclohexane 1-Heptane 1-Cyclohexane 1-Heptane 1-Cyclohexane 1-Heptane 1-Cyclohexane 1-Heptane 1-S-Dimethybenzene 1-2-Dimethybenzene 1-2-Dime		1369-30 4995.12 49.9071 2037.70 3412.15 59.60071 3412.15 59.60071 1152.49 706.761 2357.66 336.330 331.0385 370.6179 9788.865 69.719 930.004 153.573 3829.32 164.518 205.318 20	486.589 2293.43 26.0908 1395.87 2516.596 48.3393 0 144.944 998.970 621.962 2120.85 302.503 29.5493 333.177 1803.885 147.943 3876.73 162.356 202.804 203.244 128.804 147.943 3256.311 2516.84 2033.24 1689.36 147.943 3256.311 2516.84 2033.24 1689.36 1422.09 1221.85 147.933 323.477 335.254 323.447 220.180 147.220 148.580 147.220 148.580 147.581	173.284 482.759 4.08619 109.076 153.531 1.93625 0 4.53628 29.7962 16.7395 49.5260 6.76834 0.666110 6.74768 10.3863 10.5863 10.	486.589 2233.43 26.9508 1385.87 2516.59 44.9344 989.970 621.962 2120.85 302.503 333.173 751.377 316.25 2120.85		0.00135514 0.00865967 9.609665-06 0.000513447 0.000171360 9.251665-07 9.251676-07 9.251676-07 9.251776-08 0.00143165 0.00351958 0.00351958 0.00351958 0.00351958 0.00351958 0.00351958 0.00351958 0.00351958 0.003566483 1.4897725-06 0.00108412 0.00868323 0.00868323 1.4897725-06 0.00108412 0.00868323 1.48135-08 0.00868323 1.48135-08 0.00868323 1.48135-08 0.00868323 1.48135-08 0.00868323 1.48135-08 0.00868323 1.48135-08 0.00868323	2128.73 6009.93 50.0541 1267.99 1705.00 40.5395 258.439 139.056 375.361 53.5013 5.52882 49.8424 49.8424 69.842	0.155816 0.618786 0.00176971 0.00116831 0.040142779 0.000303586 0.000442779 0.000303586 0.000442779 0.00142779 0.00142779 0.00142779 0.00142779 0.00142779 0.00142779 0.00142779 0.00142779 0.00142779 0.00142779 0.00327898 0.0069101 0.00156839 0.0069101 0.00156839 0.0069101 0.00156839 0.0069101 0.00156839 0.0069101 0.00156839 0.0069101 0.00156839 0.0069101 0.00156839 0.0015689 0.0015689 0.001568		0.157172 0.627446 0.00177388 0.0616818 0.4055641 0.00030940 0.00143713 0.00569710 0.00653983 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00683229 0.00704135 0.00583641 0.00737446 0.007374465 0.00537443 0.00537443 0.00537443 0.00537443 0.00537445 0.00537446 0.005	525.897 138.736 513.399 8.85016 727 274.822 6.37355 0.375 74.4234 124.049 75.6775 255.466 86.7472 40.527 77.206 86.7472 40.527 1	1417.70* 173.565* 468.111* 0.40277* 13.967* 13.967* 14.4301* 3.84803* 20.2021* 11.5441* 32.2622* 0.514.287* 0.592579

			Environments R	eport		
lient Name:	Marcellus Wells			Job: 0		
ocation:	0					
lowsheet:	Exercise 7					
			Day 1 (140 1 - 5			
			Project-Wide Cons			
tmospheric Pressure	14.6959	osia	Ideal Gas Reference Volume	379.484 ft^3/lbmol		
deal Gas Reference Pressure	14.6959		Liquid Reference Temperature	60 °F		
leal Gas Reference Temperature	60	F				
			Environment			
			Environment Set			
umber of Poynting Intervals ibbs Excess Model Evaluation Temperature	0 77	-	Phase Tolerance Emulsion Enabled	1 % FALSE		
reeze Out Temperature Threshold Difference	10		Emdision Enabled	TALGE		
Today Out Turnportation Trindshold Difference	10					
			Components			
omponent	Henry's Law Comp.	Phase Initiator		Henry's Law Comp.	Phase Initiator	
trogen	FALSE	FALSE	Carbon Dioxide	FALSE	FALSE	
lethane	FALSE	FALSE	Ethane	FALSE	FALSE	
ropane	FALSE	FALSE	Isobutane	FALSE	FALSE	
Butane	FALSE	FALSE	2,2-Dimethylpropane	FALSE	FALSE	
opentane	FALSE	FALSE	n-Pentane	FALSE	FALSE	
2-Dimethylbutane	FALSE	FALSE	Cyclopentane	FALSE	FALSE	
3-Dimethylbutane	FALSE	FALSE	2-Methylpentane	FALSE	FALSE	
-Methylpentane	FALSE	FALSE	n-Hexane	FALSE	FALSE	
ethylcyclopentane	FALSE FALSE	FALSE	Benzene	FALSE	FALSE	
yclohexane Methylhexane	FALSE FALSE	FALSE	2-Methylhexane 2,2,4-Trimethylpentane	FALSE FALSE	FALSE FALSE	
Methylnexane Heptane	FALSE	FALSE	2,2,4-1 rimethylpentane Methylcyclohexane	FALSE FALSE	FALSE FALSE	
oluene	FALSE	FALSE	n-Octane	FALSE	FALSE	
thylbenzene	FALSE	FALSE	1,3-Dimethylbenzene	FALSE	FALSE	
4-Dimethylbenzene	FALSE	FALSE	1,2-Dimethylbenzene	FALSE	FALSE	
Nonane	FALSE	FALSE	n-Decane	FALSE	FALSE	
ndecane	FALSE	FALSE	Dodecane	FALSE	FALSE	
ridecane	FALSE	FALSE	Tetradecane	FALSE	FALSE	
entadecane	FALSE	FALSE	Hexadecane	FALSE	FALSE	
eptadecane	FALSE	FALSE	Octadecane	FALSE	FALSE	
Ionadecane	FALSE	FALSE	Eicosane	FALSE	FALSE	
eneicosane	FALSE	FALSE	Docosane	FALSE	FALSE	
ricosane	FALSE	FALSE	Tetracosane	FALSE	FALSE	
entacosane	FALSE	FALSE	Hexacosane	FALSE	FALSE	
leptacosane Ionacosane	FALSE FALSE	FALSE	Octacosane Triacontane	FALSE FALSE	FALSE	
lentriacontane	FALSE	FALSE	Water	FALSE	FALSE TRUE	
entriacontario	TALUL	TALUL	vv arei	TALOE	TRUE	
			Physical Property Met	hod Sets		
quid Molar Volume	COSTALD		Vapor Package	SRK		
verall Package	SRK		Light Liquid Package	SRK		
tability Calculation	SRK		Heavy Liquid Package	SRK		
otes:						
			Well Site Environ	mont		
			Environment Sett			
umber of Poynting Intervals	0		Phase Tolerance	1 %		
ibbs Excess Model Evaluation Temperature	77	c	Emulsion Enabled	FALSE		
reeze Out Temperature Threshold Difference	10		Emaison Enabled	TAESE		
			Components			
omponent	Henry's Law Comp.	Phase Initiator	Component	Henry's Law Comp.	Phase Initiator	
ethane	FALSE	FALSE	Ethane	FALSE	FALSE	
ropane	FALSE	FALSE	Isobutane	FALSE	FALSE	
Butane	FALSE	FALSE	Isopentane	FALSE	FALSE	
Pentane	FALSE	FALSE	n-Hexane	FALSE	FALSE	
Heptane	FALSE	FALSE	n-Octane	FALSE	FALSE	
Nonane	FALSE	FALSE	Benzene	FALSE	FALSE	
oluene 3-Dimethylbenzene	FALSE FALSE	FALSE	Ethylbenzene Water	FALSE FALSE	FALSE TRUE	
3-DimonyiDelizerie	FALSE	FALSE	VV GLGI	1 ALGE	INUE	
			Physical Property Met	hod Sets		
quid Molar Volume	COSTALD		Vapor Package	Peng-Robinson		
verall Package	Peng-Robinson		Light Liquid Package	Peng-Robinson		
tability Calculation	Peng-Robinson		Heavy Liquid Package	Peng-Robinson		
otes:						

	Calculators Report						
Client Name:	Marcellus Wells Job: 0						
Location: Flowsheet:	0 Exercise 7						
i lowsheet.	Lastuise 1						
Minimum End Approach Temperature Solver							
Residual Error (fo	Source Code r CV1) = MEAT/20-1						
rtooladai Eiroi (io							
0	Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!19!Phases!Total!Properties!Temperature						
SourceMoniker Value	Flowax-PromaxiProjectiFlowsheets/Exercise / IPStreams/19/Phases/Total/Properties/Temperature 107.356						
Units	°F						
	Measured Variable [MEAT]						
SourceMoniker Value	ProMax:ProMax!Project!Flowsheets!Exercise 7!Blocks!XCHG-100!QManager!Properties!Minimum End Approach Temperature 19.9998						
Units	19.339 °F						
	Solver Properties						
Status: Solved	·						
Error Calculated Value	-1.24507E-05 Iterations						
Lower Bound	°F Weighting 1*						
Upper Bound Step Size	°F Priority 0 °F Solver Active Active						
Is Minimizer	FALSE Group						
Algorithm	Default Skip Dependency Check FALSE						
Notes:							
	Mult{A20136B5-E985-4EF1-B0C8-00B83634AD77}-Flow						
CV1 = // Deletion	Source Code and/or renaming of related constants and shapes can prevent this calculator from functioning.						
	andor tenaming or related constants and sharpes can prevent this calculation from fundaming. under variables may be required to establish the correct dependencies for this calculator.						
	ax:ProMax").VisioApp.Documents("ProMax Property Stencil.vss").ExecuteLine("ForceUpdate("{A20136B5-E985-4EF1-B0C8-00B83634AD77}")); ax:ProMax").Project.VisioDocument.Pages.ItemFromID(0).Shapes("{A20136B5-E985-4EF1-B0C8-00B83634AD77}").CellsU("User.Var_OutletMolarFlow_V").ResultIU						
	As normal fit reject visioboundent, ages tenir formicly, singest (Azonoundent in Ducoboundent						
	Calculated Variable (CVI)						
SourceMoniker	Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-4!Phases!Total!Properties!Molar Flow						
Value	250.812						
Units	mol/s						
OMaraillar	Measured Variable [MV1]						
SourceMoniker Value	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierBypass-4!Phases!Total!Properties!Gibbs Free Energy 0						
Units	Btu/h Measured Variable [MV2]						
SourceMoniker	ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams!Multiplication Properties Gibbs Free Energy						
Value Units	-3.28377E+07 Btu/h						
Offics	Measured Variable [MV3]						
SourceMoniker Value	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-4!Phases!Total!Properties!Molar Flow 248.826						
Units	2-0-020 Ibmol/h						
CausaManikas	Measured Variable [MV4]						
SourceMoniker Value	ProMax:ProMax!Project!User Value Sets!Inline Flow Multiplier.57!BlockReady!Properties!Parameter						
Units							
Notes:							
	Mult{A20136B5-E985-4EF1-B0C8-00B83634AD77}-H						
0)(4 11)	Source Code						
CV1 = Hin // This script was p	programmatically generated. GUID={A20136B5-E985-4EF1-B0C8-00B83634AD77}						
SourceMoniker	Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-4!Phases!Total!Properties!Mass Enthalpy						
Value	-1.57958E+07						
Units	J/kg						
	Measured Variable [MV1]						
SourceMoniker Value	ProMax:ProMax!Project!User Value Sets!Inline Flow Multiplier.57!BlockReady!Properties!Parameter						
Units							
SourceMoniker	Measured Variable [Hin] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-4!Phases!Total!Properties!Mass Enthalpy						
Value	-1.57958E+07						
Units	J/kg						
Notes:							

	Mult{A20136B5-E985-4EF1-B0C8-00B83634AD77}-P
21/4	Source Code
CV1 = Pin // This script was	programmatically generated. GUID={A20136B5-E985-4EF1-B0C8-00B83634AD77}
	Coloulated Variable ICV41
SourceMoniker	Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-4!Phases!Total!Properties!Pressure
Value Units	8.33367E+06 Pa
SourceMoniker	Measured Variable [Pin] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-4!Phases!Total!Properties!Pressure
Value Units	8.33367E+06 Pa
	Measured Variable [MV1]
SourceMoniker Value	ProMax:ProMax!Project!User Value Sets!Inline Flow Multiplier.57!BlockReady!Properties!Parameter
Units	
Notes:	
	Mult{EF10D7E6-042B-478B-8AF2-EB3FA56F5746}-Flow Source Code
	and/or renaming of related constants and shapes can prevent this calculator from functioning.
	sured variables may be required to establish the correct dependencies for this calculator. ax:ProMax").VisioApp.Documents("ProMax Property Stencil.vss").ExecuteLine('ForceUpdate("{EF10D7E6-042B-478B-8AF2-EB3FA56F5746}")');
	ax:ProMax*).Project.VisioDocument.Pages.ItemFromID(0).Shapes("(EF10D7E6-042B-478B-8AF2-EB3FA56F5746}").CellsU("User.Var_OutletMolarFlow_V").ResultIU programmatically generated. GUID=(EF10D7E6-042B-478B-8AF2-EB3FA56F5746}
231191 1140	
SourceMoniker	Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-3!Phases!Total!Properties!Molar Flow
√alue	119.535 mol/s
Units	
SourceMoniker	Measured Variable [MV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-3!Phases!Total!Properties!Gibbs Free Energy
Value	-6.95958E+07
Units	Btu/h Measured Variable [MV2]
SourceMoniker Value	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierBypass-3!Phases!Total!Properties!Gibbs Free Energy 0
Units	Btu/h
SourceMoniker	Measured Variable [MV3] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-3!Phases!Total!Properties!Molar Flow
Value Units	862.459 bmol/h
Notes:	
Notes.	
	Mult{EF10D7E6-042B-478B-8AF2-EB3FA56F5746}-H
2) //	Source Code
CV1 = Hin // This script was	programmatically generated. GUID=(EF10D7E6-042B-478B-8AF2-EB3FA56F5746)
	Calculated Variable [CV1]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-3!Phases!Total!Properties!Mass Enthalpy
Value Units	-5.77589E+06 J/kg
	Measured Variable [Hin]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-3!Phases!Total!Properties!Mass Enthalpy
Value Units	-5.77589E+06 J/kg
Notes:	
	Mult{EF10D7E6-042B-478B-8AF2-EB3FA56F5746}-P
	Source Code
CV1 = Pin // This script was	programmatically generated. GUID={EF10D7E6-042B-478B-8AF2-EB3FA56F5746}
	Calculated Variable [CV1]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-3!Phases!Total!Properties!Pressure
Value Units	1.59593E+07 Pa
SourceMoniker	Measured Variable [Pin] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-3!Phases!Total!Properties!Pressure
Value Units	1.59593E+07 Pa
	r -
Notes:	

	Mulk(2D476224 4E0C 4025 0E54 4D527502000) Flam
	Mult{2D476221-4F9C-4925-9E51-4D5375038608}-Flow Source Code
	and/or renaming of related constants and shapes can prevent this calculator from functioning.
	sured variables may be required to establish the correct dependencies for this calculator. ax:ProMax").VisioApp.Documents("ProMax Property Stencil.vss").ExecuteLine("ForceUpdate("{2D476221-4F9C-4925-9E51-4D5375038608}"));
GetObject("ProM	ax:ProMax").Project.VisioDocument.Pages.ItemFromID(0).Shapes("{2D476221-4F9C-4925-9E51-4D5375038608}").CellsU("User.Var_OutletMolarFlow_V").ResultIU
/ This script was	programmatically generated. GUID={2D476221-4F9C-4925-9E51-4D5375038608}
	Calculated Variable [CV1]
SourceMoniker Value	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-1!Phases!Total!Properties!Molar Flow 131.706
Jnits	Totruo mol/s
	Measured Variable [MV1]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!Multipliedrilet-1!Phases!Total!Properties!Gibbs Free Energy
/alue	-1.2186E+07
Inits	Btu/h Measured Variable [MV2]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierBypass-1!Phases!Total!Properties!Gibbs Free Energy
/alue Jnits	0 Btu/h
	Measured Variable [MV3]
SourceMoniker /alue	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-1!Phases!Total!Properties!Molar Flow 130.663
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	Calculated Variable [CV1]
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/alue	-2.53477E+06
Jnits	J/kg
	Measured Variable [Hin]
SourceMoniker	ProMax:Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-1!Phases!Total!Properties!Mass Enthalpy
alue nits	-2.53477E+06 J/kg
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This script was ourceMoniker alue nits ourceMoniker alue nits ourceMoniker alue nits otes: V1 = // Deletion Additional meas etObject("ProMetObject("Pro	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-1!Phases!Total!Properties!Pressure 2.67307E-06 Pa Measured Variable [Pin] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-1!Phases!Total!Properties!Pressure 2.67307E-06 Pa Measured Variable [Pin] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-1!Phases!Total!Properties!Pressure 2.67307E-06 Pa Mult{2216A14C-4661-4738-AEFA-53A7EB9C6107}-Flow Source Code and/or renaming of related constants and shapes can prevent this calculator from functioning. used variables may be required to establish the correct dependencies for this calculator. xx:ProMax!Project!VisioDocuments[ProMax Property Stendilvss]:ExecuteLine[PorceUpdate](2216A14C-4661-4738-AEFA-53A7EB9C6107)*); xx:ProMax!Project.VisioDocument.Pages.ltemForceInD(0) Shapes(2216A14C-4681-4738-AEFA-53A7EB9C6107)*); Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-2!Phases!Total!Properties!Molar Flow 3.19940E-07 Bituh Measured Variable [MV2] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-2!Phases!Total!Properties!Gibbs Free Energy 0 Bituh Measured Variable [MV3] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-2!Phases!Total!Properties!Gibbs Free Energy 0 Bituh Measured Variable [MV3] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-2!Phases!Total!Properties!Molar Flow 989.216

	Mult{2216A14C-4661-4738-AEFA-53A7EB9C6107}-H	
	Source Code	
CV1 = Hin		
// This script was	s programmatically generated. GUID={2216A14C-4661-4738-AEFA-53A7EB9C6107}	
	Calculated Variable [CV1]	
SourceMoniker Value	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierOutlet-2!Phases!Total!Properties!Mass Enthalpy -3.84205E+06	
Units	J/kg	
	Measured Variable [Hin]	
SourceMoniker	ProMax:ProJect/Flowsheets!Exercise 7!PStreams!MultiplierInlet:2!Phases!Total!Properties!Mass Enthalpy	
Value Units	-3.84205E+06 J/kg	
	lang	
Notes:		
	Mult{2216A14C-4661-4738-AEFA-53A7EB9C6107}-P Source Code	
CV1 = Pin	Source code	
// This script was	s programmatically generated. GUID=(2216A14C-4661-4738-AEFA-53A7EB9C6107)	
	Calculated Variable [CV1]	
SourceMoniker	ProMax:ProJectlFlowsheets!Exercise 7!PStreams!MultiplierOutlet-2!Phases!Total!Properties!Pressure	
Value Units	2.68686E+06 Pa	
J. 1110		
SourceMoniker	Measured Variable [Pin] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!MultiplierInlet-2!Phases!Total!Properties!Pressure	
Value	2.68686E+06	
Units	Pa	
Notes:		
	Simple Solver 1	
	Source Code	
Residual Error (fo	or CV1) = Solidformation/10-1	
	Calculated Variable [CV1]	
SourceMoniker	ProMax:ProMaxIProject!Flowsheets!Exercise 7!PStreams!10!Phases!Total!Properties!Temperature	
Value Units	99.3745 °F	
SourceMoniker	Measured Variable [Solidformation] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!13!Analyses!Freeze 1!Properties!Degrees above Solids Formation	
Value	9.99984 °F	
Units	I.F.	
	O-bus Brancottes	
Status: Salvad	Solver Properties	
Status: Solved Error		1
Error Calculated Value	-1.64286E-05 Iterations e 99.3745 °F Max Iterations 2	0
Error Calculated Value Lower Bound Upper Bound	-1.64286E-05 Iterations e 99.3745 °F Max Iterations 2	
Error Calculated Value Lower Bound Upper Bound Step Size	-1.64286E-05	0 1 0
Error Calculated Value Lower Bound Upper Bound	-1.64286E-05 Iterations e 99.3745 °F Max Iterations 2	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm	-1.64286E-05 Iterations e 99.3745 °F Max Iterations 2	0 1 0 e
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Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker	-1.64286E-05 Iterations 2 99.3745 °F Max Iterations 2 °F Weighting 9F Priority Active Active	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value	-1.64286E-05	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value	1.64286E-05	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value	-1.64286E-05 Iterations 99.3745 °F Max Iterations 99.3745 °F Weighting °F Priority °F Priority °F Solver Active Active FALSE Group Default Skip Dependency Check FALS Simple Specifier 1 Source Code Calculated Variable [CV1] ProMax:ProMax Project!Flowsheets!Exercise 7!PStreams!3!Phases!Total!Properties!Pressure 373 psig Measured Variable [P2]	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units SourceMoniker Value	### Calculated Variable [CV1] ProMax:ProMaxIProject!Flowsheets!Exercise 7!PStreams!5!Phases!TotalIProperties!Pressure 373	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units SourceMoniker	-1.64286E-05 Iterations 99.3745 °F Max Iterations 99.3745 °F Weighting °F Priority °F Solver Active Active FALSE Group Default Skip Dependency Check FALS Simple Specifier 1 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!3!Phases!Total!Properties!Pressure 373 psig Measured Variable [P2] ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!5!Phases!Total!Properties!Pressure	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units SourceMoniker Value	### Calculated Variable [CV1] ProMax:ProMaxIProject!Flowsheets!Exercise 7!PStreams!5!Phases!TotalIProperties!Pressure 373	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units SourceMoniker Value Units	-1.64286E-05 Iterations 2 99.3745 °F Max Iterations 2 99.3745 °F Weighting 7 9F Veighting 7 9F Solver Active	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units SourceMoniker Value Units	-1.64286E-05 Iterations 9.9.3745 °F Max Iterations 2.0 9.9.3745 °F Weighting	0 1 0 e
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Error Calculated Value Lower Bound Upper Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units Notes: CV1 = P	-1.64286E-05 Iterations 9 93.3745 °F Max Iterations 9 93.745 °F Weighting °F Priority °F Priority FALSE Group Default Skip Dependency Check FALS Simple Specifier 1 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 3 Phases Total Properties Pressure 373 psig Measured Variable [P2] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 psig Simple Specifier 2 Source Code Calculated Variable [CV1]	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units CV1 = P CV1 = P	-1.64286E-05 Iterations 93.745 °F Max Iterations 93.745 °F Max Iterations 93.745 °F Weighting 97 Priority 97 Priority Active Activ	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units Notes: CV1 = P	-1.64286E-05 Iterations 9 93.3745 °F Max Iterations 9 93.745 °F Weighting °F Priority °F Priority FALSE Group Default Skip Dependency Check FALS Simple Specifier 1 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 3 Phases Total Properties Pressure 373 psig Measured Variable [P2] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 psig Simple Specifier 2 Source Code Calculated Variable [CV1]	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Upper Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units Notes: CV1 = P CV1 = P	-1.64286E-05 Iterations 20 99.3745 °F Wack Iterations 20 "FF Weighting FF Priority Active Active Active FALSE Group	0 1 0 e
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Error Calculated Value Lower Bound Upper Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units Notes: CV1 = P SourceMoniker Value Units SourceMoniker Value Units SourceMoniker Value Units	a 1.64286E-0.5 Max Iterations 9.9.3745 °F Max Iterations 9.9.3745 °F Weighting 9.7 °F Weighting 9.7 °F Profity 9.7 °F Profity 9.7 °F Solver Active Solver Active FALSE Group Default Skip Dependency Check FALS Simple Specifier 1 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5!Phases Total Properties Pressure 373 psig Simple Specifier 2 Source Code Simple Specifier 2 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5!Phases Total Properties Pressure 373 psig ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5!Phases Total Properties Pressure 373 psig ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 373	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units Notes: CV1 = P SourceMoniker Value Units SourceMoniker Value Units	a 1.64286E-0.5 Iterations 99.3745 °F Max Iterations 2 99.3745 °F Max Iterations 2 99.3745 °F Max Iterations 2 99.3745 °F Priority 97.5 Nover Active Active Active Active FALSE Group Default Skip Dependency Check FALSE Group Default Skip Dependency Check FALSE Simple Specifier 1 Source Code Skip Dependency Check Skip Dependency Ch	0 1 0 e
Error Calculated Value Lower Bound Upper Bound Upper Bound Step Size Is Minimizer Algorithm Notes: CV1 = P2 SourceMoniker Value Units Notes: CV1 = P SourceMoniker Value Units SourceMoniker Value Units SourceMoniker Value Units	a 1.64286E-0.5 Max Iterations 9.9.3745 °F Max Iterations 9.9.3745 °F Weighting 9.7 °F Weighting 9.7 °F Profity 9.7 °F Profity 9.7 °F Solver Active Solver Active FALSE Group Default Skip Dependency Check FALS Simple Specifier 1 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5!Phases Total Properties Pressure 373 psig Simple Specifier 2 Source Code Simple Specifier 2 Source Code Calculated Variable [CV1] ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5!Phases Total Properties Pressure 373 psig ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5!Phases Total Properties Pressure 373 psig ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 ProMax:ProMax!Project!Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 373 ProMax:ProMax Project Flowsheets Exercise 7!PStreams 5 Phases Total Properties Pressure 373 373	0 1 0 e

	Simple Specifier 6
	Source Code
CV1 = if(P10 > 1)	199)
1200	
else	
P10	
	Odraha Walda (MA)
	Calculated Variable [CV1]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!13!Phases!Total!Properties!Pressure
Value	1200
Units	psig
	Measured Variable [Pwell]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!8!Phases!Total!Properties!Pressure
Value	2300
Units	psig
	Measured Variable [P10]
SourceMoniker	ProMax:ProMax!Project!Flowsheets!Exercise 7!PStreams!10!Phases!Total!Properties!Pressure
Value	2295
Units	psig
Notes:	

	User Value	Sets Report	
	Marcellus Wells	Job:	0
	0		
lowsheet:	Exercise 7		
	User Va	lue Set 1	
	User Value [Sa		
Parameter	61* MMSCFD	Upper Bour	MMSCFD
ower Bound	MMSCFD	Enforce Bo	FALSE
		·	
	User Value [Co		
Parameter Lower Bound	145.833* sgpm	Upper Bour Enforce Bo	sgpm FALSE
ower bound	sgpm	Enlorce Bo	FALSE
lotes:			
	MUI	LT-1	
	User Value [F	lowMultiplier]	
Parameter	8*	Upper Bour	
ower Bound	0*	Enforce Bo	FALSE
	User Value [Ou	ıtletMolarFlow1	
Parameter	131.706* mol/s	Upper Bour	mol/s
ower Bound	mol/s	Enforce Bo	FALSE
		•	
	User Value [
	User Value [Upper Bour	
ower Bound	1*	Upper Bour Enforce Bo	FALSE
ower Bound	1* as programmatically generated. GUI	Upper Bour Enforce Bo D={2D476221-4F9C-4925-9E5	
ower Bound lotes: his User Value Set wa	1* as programmatically generated. GUI	Upper Bour Enforce Bo D={2D476221-4F9C-4925-9E5 v Multiplier BlockReady]	
ower Bound lotes: This User Value Set was	1* as programmatically generated. GUI Inline Flow User Value [Upper Bour Enforce Bo D={2D476221-4F9C-4925-9E5	
ower Bound lotes: This User Value Set was Parameter ower Bound	1* as programmatically generated. GUI Inline Flow User Value [Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 v Multiplier BlockReady]	51-4D5375038608}
Lower Bound Notes: This User Value Set was Parameter Lower Bound	1* as programmatically generated. GUI Inline Flow User Value [1* as programmatically generated. GUI	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5	51-4D5375038608} FALSE
Notes: This User Value Set was Parameter Lower Bound Notes: This User Value Set was	as programmatically generated. GUIIIne Flow User Value [1* as programmatically generated. GUII MUII	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5	51-4D5375038608} FALSE
Notes: This User Value Set was Parameter Lower Bound Notes: This User Value Set was Parameter	as programmatically generated. GUII Inline Flow User Value [1* as programmatically generated. GUII MUII User Value [F 8*	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 [lowMultiplier] Upper Bour	FALSE 51-4D5375038608}
Parameter Chis User Value Set was considered as a considered a	as programmatically generated. GUIIIne Flow User Value [1* as programmatically generated. GUII MUII	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5	51-4D5375038608} FALSE
Parameter Chis User Value Set was	as programmatically generated. GUII Inline Flow User Value [1* as programmatically generated. GUII MUII User Value [F 8*	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 lowMultiplier] Upper Bour Enforce Boi	FALSE 51-4D5375038608}
Jotes: This User Value Set was a constraint of the set was	as programmatically generated. GUII Inline Flow User Value [1* as programmatically generated. GUII MUII User Value [F 8* 0*	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 lowMultiplier] Upper Bour Enforce Boi	FALSE 51-4D5375038608}
ower Bound lotes: his User Value Set water ower Bound lotes: his User Value Set water ower Bound larameter ower Bound	Inline Flow User Value [MUI User Value [F 8* 0* User Value [Output [Institute [Inst	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 TowMultiplier] Upper Bour Enforce Boi utletMolarFlow]	FALSE FALSE FALSE
Notes: This User Value Set was Parameter Lower Bound Notes: This User Value Set was Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound	Inline Flow User Value [User Value [F 8* 0* User Value [Out 573.760* mol/s mol/s	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 IowMultiplier] Upper Bour Enforce Boi utletMolarFlow] Upper Bour Enforce Boi	FALSE FALSE Mol/s
Lower Bound Notes: This User Value Set was Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound	Inline Flow User Value [1* User Value [F 8* 0* User Value [Out 573.760* mol/s mol/s Waser Value [Inline Flow User Value	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 TowMultiplier] Upper Bour Enforce Boi utletMolarFlow] Upper Bour Enforce Boi BlockReady]	FALSE FALSE Mol/s
Parameter Lower Bound Notes: This User Value Set was Parameter Lower Bound	Inline Flow User Value [User Value [F 8* 0* User Value [Out 573.760* mol/s mol/s	Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 V Multiplier BlockReady] Upper Bour Enforce Boi D={2D476221-4F9C-4925-9E5 LT-2 IowMultiplier] Upper Bour Enforce Boi utletMolarFlow] Upper Bour Enforce Boi	FALSE FALSE Mol/s

	User Value	[BlockReady]	
Parameter	1*	Upper Bour	
ower Bound		Enforce Bo	FALSE
otes:			
	s programmatically generated. G	UID={2216A14C-4661-4738-AI	EFA-53A7EB9C6107}
	M	ULT-3	
		[FlowMultiplier]	
Parameter	1.1*	Upper Bour	
ower Bound	0*	Enforce Bo	FALSE
	Hoor Value I	OutlotMolorFlow!	
Parameter	119.535* mol/s	OutletMolarFlow] Upper Bour	mol/s
ower Bound	mol/s	Enforce Bo	FALSE
		e [BlockReady]	
Parameter ₋ower Bound	1*	Upper Bour Enforce Bo	FALSE
OWE DOUIL		Lilloide Bu	I ALUL
lotes: his User Value Set was	s programmatically generated. G		ΔF2-FR3FΔ56F57/6\
Tils Oser value Set was	s programmatically generated. G	OID={LF10D7L0-042D-470D-0	AI 2-LB31 A301 3740)
		Inline Cot 2	
		/alue Set 3	
2000000000	User Value	e [BlockReady]	
			FALSE
ower Bound	User Value	Upper Bour	FALSE
ower Bound	User Value	Upper Bour Enforce Boi	
ower Bound lotes:	User Value	Upper Bour Enforce Boi	
ower Bound	1* s programmatically generated. G	Upper Bour Enforce Bou UID={EF10D7E6-042B-478B-8	
Lower Bound	1* s programmatically generated. G	Upper Bour Enforce Bou UID={EF10D7E6-042B-478B-8	
ower Bound Notes: This User Value Set was	User Value 1* s programmatically generated. G M User Value	Upper Bour Enforce Bou UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	
lotes: his User Value Set was	User Value 1* s programmatically generated. G M User Value 8*	UID={EF10D7E6-042B-478B-8	AF2-EB3FA56F5746)
lotes: This User Value Set was	User Value 1* s programmatically generated. G M User Value	Upper Bour Enforce Bou UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	
Notes:	User Value 1* s programmatically generated. G M User Value 8* 0*	UID={EF10D7E6-042B-478B-8	AF2-EB3FA56F5746)
Notes: This User Value Set was Parameter Lower Bound	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [0] 250.812* mol/s	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier] Upper Bour Enforce Bour Upper Bour Enforce Bour Upper Bour Enforce Bour Upper Bour Enforce Bour Upper Bour Upper Bour Upper Bour	FALSE
lotes: This User Value Set was Parameter Lower Bound	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [6]	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier] Upper Bour Enforce Bour Upper Bour Enforce Bour Enforce Bour Enforce Bour	AF2-EB3FA56F5746)
Lower Bound Notes: This User Value Set was	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [0] 250.812* mol/s mol/s	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier] Upper Bour Enforce Boi	FALSE
lotes: This User Value Set was Parameter Lower Bound Parameter Lower Bound	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [0] 250.812* mol/s mol/s	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE
lotes: This User Value Set was Parameter ower Bound Parameter ower Bound	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [6] 250.812* mol/s mol/s User Value	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier] Upper Bour Enforce Boi	FALSE
ower Bound lotes: his User Value Set was carameter ower Bound carameter ower Bound carameter ower Bound	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [6] 250.812* mol/s mol/s User Value	UID={EF10D7E6-042B-478B-8 UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE mol/s
ower Bound lotes: This User Value Set was Parameter ower Bound Parameter ower Bound Parameter ower Bound	User Value 1* S programmatically generated. G M User Value 8* 0* User Value [0] 250.812* mol/s mol/s User Value 1*	UID={EF10D7E6-042B-478B-8 UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE FALSE FALSE
Parameter Ower Bound Parameter Ower Bound Parameter Ower Bound Parameter Ower Bound	User Value 1* s programmatically generated. G M User Value 8* 0* User Value [6] 250.812* mol/s mol/s User Value	UID={EF10D7E6-042B-478B-8 UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE FALSE FALSE
Parameter Lower Bound	User Value 1* S programmatically generated. G M User Value 8* 0* User Value [4 250.812* mol/s mol/s User Value 1*	UID={EF10D7E6-042B-478B-8 UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE FALSE FALSE
Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound	User Value 1* S programmatically generated. G M User Value 8* 0* User Value [4 250.812* mol/s mol/s User Value 1*	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier] Upper Bour Enforce Boi	FALSE FALSE FALSE
Lower Bound Notes: This User Value Set was Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound Notes: This User Value Set was	User Value 1* S programmatically generated. G M User Value 8* 0* User Value 250.812* mol/s mol/s User Value 1* S programmatically generated. G Inline Flow User Value	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE FALSE FALSE
Parameter Lower Bound	User Value 1* S programmatically generated. G M User Value 8* 0* User Value [4 250.812* mol/s mol/s User Value 1*	UID=(EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier] Upper Bour Enforce Boi Upper Bour Enforce Boi	FALSE FALSE FALSE OC8-00B83634AD77}
Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound Parameter Lower Bound	User Value 1* S programmatically generated. G M User Value 8* 0* User Value 250.812* mol/s mol/s User Value 1* S programmatically generated. G Inline Flow User Value	UID={EF10D7E6-042B-478B-8 ULT-4 [FlowMultiplier]	FALSE FALSE FALSE

	Sum Compone	ent Flow/Frac.60	
	User Value	[CompSum]	
Parameter	15.7226* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
Notes:			
	vas programmatically generated. GUI	D={0C154D43-FFCF-46F5-A	A6D1-C13963CE8BCE}
	, 13	(***	,
		nk-1	
Davagaatan	User value [BlockReady]	
Parameter Lower Bound	1"	Upper Bour Enforce Bo	FALSE
Lower Boaria		Emorec Bo	TALOE
	User Value [ShellLength]	
Parameter	25* ft	Upper Bour	ft
Lower Bound	0* ft	Enforce Bo	FALSE
	Heer Velve	[ChallDiam]	
Doromotor		[ShellDiam]	£1
Parameter Lower Bound	12* ft 0* ft	Upper Bour Enforce Bo	ft FALSE
	-	21110100 00	17.EUL
	User Value	[BreatherVP]	
Parameter	0.0300000* psig	Upper Bour	psig
Lower Bound	psig	Enforce Bo	FALSE
	Heer Value II	Dragthan Vac DI	
		BreatherVacP]	
Parameter Lower Bound	-0.0300000* psig psig	Upper Bour Enforce Bo	psig FALSE
Lower Bound	psig	Lilloice Bo	TALOL
	User Value [DomeRadius]	
Parameter	6* ft	Upper Bour	ft
Lower Bound	ft	Enforce Bo	FALSE
	Heer Volum	· [On Dress]	
Developed		[OpPress]	
Parameter Lower Bound	0* psig psig	Upper Bour Enforce Bo	psig FALSE
Lower Boaria	paig	Ellioree Boi	TALOE
	User Value [A	vgPercentLiq]	
Parameter	50* %	Upper Bour	%
Lower Bound	%	Enforce Bo	FALSE
	Hann Malana FM		
Danamatan		laxPercentLiq]	0/
Parameter Lower Bound	90* % %	Upper Bour Enforce Bo	% FALSE
ECWOI DOUILU	/u	LINOIGO DO	1 / LOL
	User Value	[AnnNetTP]	
Parameter	2451.60* bbl/day	Upper Bour	bbl/day
Lower Bound	0* bbl/day	Enforce Bo	FALSE
	11	[ODE#]	
Demonst		ue [OREff]	0/
Parameter Lower Bound	0* % %	Upper Bour Enforce Bo	% FALSE
LOWEI DOUIIU	/0	Linoice Bo	I ALUL
	User Value	[MaxAvgT]	
Parameter	61.15* °F	Upper Bour	°F
Lower Bound	°F	Enforce Bo	FALSE
		rad'AT'	
		e [MinAvgT]	.=
Parameter Lower Bound	36.9667* °F °F	Upper Bour Enforce Bo	°F FALSE
LOWEI DOUIIU		LINOICE DO	I ALUL

	User Value	[BulkLiqT]	
Parameter	49.0783* °F	Upper Bour	°F
Lower Bound	°F	Enforce Bo	FALSE
	User Valu	ue (AvaP)	
Parameter	13.7315* psia	Upper Bour	psia
Lower Bound	psia	Enforce Bo	FALSE
	Heer Velv	a [The arms]]	
Parameter	User Valu 1193.89* Btu/ft^2/day	Upper Bour	Btu/ft^2/day
Lower Bound	Btu/ft^2/day	Enforce Bo	FALSE
	User Value [Av		
Parameter Lower Bound	6.16667* mi/h mi/h	Upper Bour Enforce Bo	mi/h FALSE
Lower Bound	111/11	Elliolog Bol	TALGE
	User Value [MaxHe	ourlyLoadingRate]	
Parameter	102.150* bbl/hr	Upper Bour	bbl/hr
Lower Bound	0* bbl/hr	Enforce Bo	FALSE
	User Value [En	trainedOilFrac1	
Parameter	1* %	Upper Bour	%
Lower Bound	%	Enforce Bo	FALSE
	Hear Value IT	Turnovor Potol	
Parameter	User Value [T	Upper Bour	
Lower Bound	400.000	Enforce Bo	FALSE
	User Value [LL		
Parameter Lower Bound	0.5*	Upper Bour Enforce Bo	FALSE
Lower Bound		Ellioice Boi	TALOL
	User Value [/	AtmPressure]	
Parameter	13.7315* psia	Upper Bour	psia
Lower Bound	psia	Enforce Bo	FALSE
	User Val	ue [TVP]	
Parameter	0.200593* psia	Upper Bour	psia
Lower Bound	psia	Enforce Bo	FALSE
	User Valu	o [May\/D]	
Parameter	0.244266* psia	Upper Bour	psia
Lower Bound	psia	Enforce Bo	FALSE
	User Valu		
Parameter Lower Bound	0.164361* psia psia	Upper Bour Enforce Bo	psia FALSE
LOWER BOURIU	μοια	LINOIGE DO	I ALUL
	User Value [Av	/gLiqSurfaceT]	
Parameter	50.6729* °F	Upper Bour	°F
Lower Bound	<u>°F</u>	Enforce Bo	FALSE
	User Value [Ma	axLigSurfaceT1	
Parameter	56.4466* °F	Upper Bour	°F
Lower Bound	°F	Enforce Bo	FALSE
	Hear Value P	Totall access	
Parameter	User Value [0.000151671* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	User Value [W	orkingLosses]	

Parameter	3.35690E-05* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
Lower Board	torn yr	Elliotoc Bot	TAEGE
	User Value [St	andingLosses]	
Parameter	4.34873E-06* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	User Value [R	imSealLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	11 1/ 1 5/4/	'41 I II 9	
		ithdrawalLoss]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	Hear Value II	oadingLosses]	
Parameter	0.000403573* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
Lower Board	torry	Emoroc Bo	17,232
	User Value [MaxH	ourlyLoadingLoss]	
Parameter	9.21400E-05* lb/hr	Upper Bour	lb/hr
Lower Bound	lb/hr	Enforce Bo	FALSE
	User Val	ue [PStar]	
Parameter		Upper Bour	
Lower Bound		Enforce Bo	FALSE
		ICTotalLosses]	
Parameter	0.324765* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	Lloor Volue [AllC	LoadingLosses]	
Parameter	0.864149* ton/yr	Upper Bour	to a le un
Lower Bound	0.004149 ton/yr	Enforce Bo	ton/yr FALSE
Lower Bound	ton/yi	Elliotec Bot	TALGE
	User Value [AllCN	laxHLoadingLoss]	
Parameter	0.197294* lb/hr	Upper Bour	lb/hr
Lower Bound	lb/hr	Enforce Bo	FALSE
	User Value [AllC	FlashingLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	Heer Velve IDe	de Eillian de anna 1	
Danasasi		ckFittingLosses]	. ,
Parameter Lower Bound	0* ton/yr	Upper Bour Enforce Bo	ton/yr FALSE
Lower Bound	ton/yr	Enforce Boi	FALSE
	User Value [De	ckSeamLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
Lower Board	tornyi	Emoroc Bo	171202
	User Value [FI	ashingLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
		otalResidual]	
Parameter	156853* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	_	asMoleWeight]	
Parameter	0.0187796* kg/mol	Upper Bour	kg/mol
Lower Bound	kg/mol	Enforce Bo	FALSE

	Hear Valua (Va	apReportableFrac]	
Parameter	0.0467018* %	Upper Bour	%
Lower Bound	0.0407018 % %	Enforce Bo	FALSE
	~		
		qReportableFrac]	
Parameter	0.000488923* %	Upper Bour	%
Lower Bound	<u>%</u>	Enforce Bo	FALSE
	Usor Value (Ela	shReportableFrac]	
Parameter	0* %	Upper Bour	%
Lower Bound	%	Enforce Bo	FALSE
Notes:	was programmatically gaparated. C	LUD_(744699E4 19EE 42D0 AF	736 A962ECC972BE)
This Oser value Set v	vas programmatically generated. G	UID={/44000F4-100F-42DU-AL	J20-A003FCC073B3}
		ank-2	
		[BlockReady]	
Parameter	1*	Upper Bour	E41.05
Lower Bound		Enforce Bo	FALSE
	User Value	[ShellLength]	
Parameter	20* ft	Upper Bour	ft
Lower Bound	0* ft	Enforce Bo	FALSE
	User Valu	e [ShellDiam]	
Parameter	12* ft	Upper Bour	ft
Lower Bound	0* ft	Enforce Bo	FALSE
	Hoor Volus	e [BreatherVP]	
Parameter	0.0300000* psig	Upper Bour	ngig
Lower Bound	psig	Enforce Bo	psig FALSE
20WOI BOGIIG	poig	Zilliolog Bo	17/202
	User Value	[BreatherVacP]	
Parameter	-0.0300000* psig	Upper Bour	psig
Lower Bound	psig	Enforce Bo	FALSE
	Hoor Value	[Dama Padius]	
Doromotor	6* ft	[DomeRadius]	ft
Parameter Lower Bound	σ" π ft	Upper Bour Enforce Bo	π FALSE
Lower Boaria	π	Ellioree Bo	TALOL
	User Valu	ue [OpPress]	
Parameter	0* psig	Upper Bour	psig
Lower Bound	psig	Enforce Bo	FALSE
	Hean Valera	Ava Daga and in	
Damasai		AvgPercentLiq]	0/
Parameter Lower Bound	50* % %	Upper Bour Enforce Bo	% FALSE
Lower Bouria	76	Ellioice Bo	FALSE
	User Value [MaxPercentLiq]	
Parameter	90* %	Upper Bour	%
Lower Bound	%	Enforce Bo	FALSE
		e [AnnNetTP]	
Parameter	3708.26* bbl/day	Upper Bour	bbl/day
Lower Bound	0* bbl/day	Enforce Bo	FALSE
	liser Va	lue [OREff]	
Parameter	0* %	Upper Bour	%
Lower Bound	%	Enforce Bo	FALSE
		,	

	User Value [MaxAvgT]								
Parameter	61.15* °F	Upper Bour	°F							
Lower Bound	<u>°F</u>	Enforce Bo	FALSE							
	User Value [MinAvgT]								
Parameter	36.9667* °F	Upper Bour	°F							
Lower Bound	°F	Enforce Bo	FALSE							
	User Value [Rulki iaTl								
Parameter	49.0783* °F	Upper Bour	°F							
Lower Bound	°F	Enforce Bo	FALSE							
Davagastan	User Value		a a i a							
Parameter Lower Bound	13.7315* psia psia	Upper Bour Enforce Bo	psia FALSE							
	pola	20.00 20	.,							
	User Value									
Parameter	1193.89* Btu/ft^2/day	Upper Bour	Btu/ft^2/day							
Lower Bound	Btu/ft^2/day	Enforce Bo	FALSE							
	User Value [Avg	gWindSpeed]								
Parameter	6.16667* mi/h	Upper Bour	mi/h							
Lower Bound	mi/h	Enforce Bo	FALSE							
	User Value [MaxHo	urlyl gadingPatel								
Parameter	154.511* bbl/hr	Upper Bour	bbl/hr							
Lower Bound	0* bbl/hr	Enforce Bo	FALSE							
D	User Value [Entr		0′							
Parameter Lower Bound	1* % %	Upper Bour Enforce Bo	% FALSE							
	, , , , , , , , , , , , , , , , , , ,	TELIIOIOO DO	17.202							
	User Value [Tu									
Parameter	466.574*	Upper Bour								
Lower Bound		Enforce Bo	FALSE							
	User Value [LLc	ssSatFactor1								
Parameter	0.5*	Upper Bour								
Lower Bound		Enforce Bo	FALSE							
	User Value [At	mDrossuro1								
Parameter	13.7315* psia	Upper Bour	psia							
Lower Bound	psia	Enforce Bo	FALSE							
		•								
	User Valu									
Parameter Lower Bound	7.44658* psia psia	Upper Bour Enforce Bo	psia FALSE							
LOWER DOUNG	μοια	Lilloice Do	IALOL							
	User Value	[MaxVP]								
Parameter	8.27964* psia	Upper Bour	psia							
Lower Bound	psia	Enforce Bo	FALSE							
	User Value	[MinVP1								
Parameter	6.68148* psia	Upper Bour	psia							
Lower Bound	psia	Enforce Bo	FALSE							
		1:00								
Doromotor	User Value [Avg		о Г							
Parameter Lower Bound	50.6729* °F °F	Upper Bour Enforce Bo	°F FALSE							
	·	1=:110100 B0								
	User Value [Max	(LiqSurfaceT]								

Davamatas	56.4466* °F	Unnan David	oF
Parameter Lower Bound	56.4466° °F °F	Upper Bour Enforce Bo	°F FALSE
Lower Bouria	F	Enlorce Bo	FALSE
	User Value [TotalLosses]	
Parameter	72.7729* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	,		
	User Value [W	orkingLosses]	
Parameter	8.12192* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
		andingLosses]	
Parameter	0.974694* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	Hear Value IB	imSealLosses]	
Daramatar	0* ton/yr		toplus
Parameter Lower Bound	ton/yr	Upper Bour Enforce Bo	ton/yr FALSE
Lower Bound	tonyi	Enlorce Bo	FALSE
	User Value IW	ithdrawalLoss]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	User Value [Lo	oadingLosses]	
Parameter	144.237* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	_	ourlyLoadingLoss]	
Parameter	32.9309* lb/hr	Upper Bour	lb/hr
Lower Bound	lb/hr	Enforce Bo	FALSE
	Hoor Val	ue [DCtor]	
Doromotor	Oser van	ue [PStar] Upper Bour	
Parameter Lower Bound		Enforce Bo	FALSE
Lower Bound		Emoree Bo	TAEGE
	User Value [Al	ICTotalLosses]	
Parameter	72.7959* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	User Value [AllC	LoadingLosses]	
Parameter	144.283* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	Hear Value [AllCN	laxHLoadingLoss]	
Parameter	32.9413* lb/hr	Upper Bour	lb/hr
Parameter Lower Bound	32.9413" lb/hr	Enforce Bo	FALSE
	167111	1=1110100 B0	
	User Value [AllC	FlashingLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
		ckFittingLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	Hoor Value ID :	okSooml access	
Doromotor		ckSeamLosses]	to a har
Parameter Lower Bound	0* ton/yr	Upper Bour Enforce Bo	ton/yr FALSE
LOWEI DOUIIG	ton/yr	TELIIOICE DOI	FALSE
	User Value [FI	ashingLosses]	
Parameter	0* ton/yr	Upper Bour	ton/yr
Lower Bound	ton/yr	Enforce Bo	FALSE
	.01,1,1	5.00 50	

	User Value [7	[otalResidual]							
Parameter	169063* ton/yr	Upper Bour	ton/yr						
ower Bound	ton/yr	Enforce Bo	FALSE						
	User Value [G	asMoleWeight]							
Parameter	0.0558405* kg/mol	Upper Bour	kg/mol						
ower Bound	kg/mol	Enforce Bo	FALSE						
	User Value [Vap	ReportableFrac]							
Parameter	99.9685* %	Upper Bour	%						
ower Bound	%	Enforce Bo	FALSE						
User Value [LiqReportableFrac]									
Parameter	99.9997* %	Upper Bour	%						
ower Bound	%	Enforce Bo	FALSE						
	-	hReportableFrac]							
Parameter	0* %	Upper Bour	%						
ower Bound	%	Enforce Bo	FALSE						
• .									
lotes:		ID (FE204CD2 07FD 4CD7 /	ADC0 ADC7D5A70A47)						
nis Oser value Set v	vas programmatically generated. GUI	D={55301CB3-975B-4CD7-F	ADC6-ABC/D5A/0A1/}						
	Sum Compone	nt Flow/Frac.276							
		[CompSum]							
Parameter	0* ton/yr	Upper Bour	ton/yr						
ower Bound	ton/yr	Enforce Bo	FALSE						
	,								
Notes:									

ATTACHMENT U FACILITY-WIDE EMISSION SUMMARY SHEET(S)

General G70-D Permit Application

Greer Well Pad Proctor, West Virginia

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

July 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#	N	O _X	С	0	V	VOC		D_2	PN	1 ₁₀	PM _{2.5}		GHG (CO₂e)	
LITHISSION FOR TOTAL	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	0.10	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
8e	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
9e	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
10e	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
11e	0.49	2.15	0.41	1.80	0.03	0.12	0.00	0.01	0.04	0.16	0.04	0.16	585.05	2562.52
12e	0.55	2.40	2.50	10.96	1.13	4.95	0.16	0.09					934.24	4091.98
13e	1.52	6.66	3.04	13.33	1.06	4.66	0.00	0.01	0.06	0.25	0.06	0.25	850.32	3385.98
14e	0.26	1.14	0.52	2.28	0.18	0.80	0.00	0.00	0.01	0.05	0.01	0.05	137.17	546.21
TOTAL	3.80	16.65	7.30	31.98	2.46	10.77	0.17	0.15	0.18	0.79	0.18	0.79	3676.88	15711.72

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															
ist all sources of emissions in this table. Use extra pages if necessary															
Emission Point ID#	Formal	dehyde	Benze	ene	Tolu	uene	Ethylb	Ethylbenzene		Xylenes		ne	Total HAPs		
LITHSSION FORMERD#	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	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.01	0.00	0.01	
8e	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.01	0.00	0.01	
9e	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.01	0.00	0.01	
10e	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.01	0.00	0.01	
11e	0.00	0.00	0.00	0.00	0.00	0.00					0.01	0.04	0.01	0.04	
12e															
13e	0.64	2.80	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.76	3.32	
14e	0.07	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.09	0.40	
TOTAL	0.71	3.10	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.03	0.15	0.88	3.84	

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

Greer Well Pad Proctor, West Virginia

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

July 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 39.75716 and -80.83611.

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

Pollutant	Tons/yr
PM/PM10/PM2.5	0.79
NO _X	16.65
СО	31.98
VOCs	59.09
Benzene	0.01
Toluene	0.02
Xylenes	0.01
n-Hexane	0.22
Formaldehyde	3.10
Total HAPs	3.91

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 28th day of August, 2017.

By: Tug Hill Operating, LLC
Sean Willis
Vice President

380 Southpointe Blvd., Suite 200

Canonsburg, PA 15317