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20 July 2020

New Mexico Environment Department
Air Quality Bureau – Permits Section
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico, 87505

RE: General Construction Permit – Oil & Gas Permit Application
Black River Gas Processing Plant
DLK Black River Midstream LLC

DLK Black River Midstream LLC (DLK) is submitted an application to modify the current General Construction Permit for Oil & Gas for the Black River Gas Processing Plant. The facility currently operates under the GCP Permit GCP-6567M4.

Two (2) hard copies (original and photocopy) and one compact disc with the files are enclosed per New Mexico Environment Department (NMED) requirements. A check in the amount of $4260.00 USD is included with this submittal package. If you have any questions or need additional information, please contact Gauri Gajewar (technical contact) at 469-294-5945 or Gauri.Gajewar@erm.com.

Sincerely,

Fred Woody
Managing Partner

Mail Registration To:		For Department use only:
New Mexico Environment Department Air Quality Bureau 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone (505) 476-4300 Fax (505) 476-4375 www.env.nm.gov/aqb		

General Construction Permit (GCP-Oil and Gas) Registration Form Section 1

(Locating outside of Bernalillo County, Tribal Lands, and Nonattainment Areas)

This Registration is being submitted as (check all that apply)**:**

☐ An initial GCP-Oil and Gas Registration Form for a new facility (**Registration fee required**).
☒ An updated GCP-Oil and Gas Registration Form for a modification to an existing facility (**Registration fee required**).
☐ A GCP-Oil and Gas Registration Form for an existing facility currently operating under GCP-1 or GCP-4 **(No fee required)**

The Permitting Administrative Multi-Form may be used for administrative changes identified in the GCP O&G Permit Condition C101.A. No public notification is required, and no filing fees or permit fees apply.

Construction Status: ☐ Not Constructed ☐ Existing Permitted (or NOI) Facility ☐ Existing Non-Permitted (or NOI) Facility

Acknowledgements:

☒ I acknowledge that a pre-application meeting is available to me upon request.
☒ An original signed and notarized Certification for Submittal for this GCP-Oil and Gas Registration is included.
☐ Proof of public notice is included, if required.
☒ The Air Emission Calculation Tool (AECT) is included.
☒ The emissions specified in this Registration Form will establish the emission limits in the GCP-Oil and Gas.
☒ **For new registrations or modifications, a check for the registration fee is included for $4190 prior to 1/1/20 or $4260 beginning 1/1/20.** There is an annual fee in addition to the registration fee: www.env.nm.gov/air-quality/permit-fees-2/
Facilities qualifying as a "small business" under 20.2.75.7.F NMAC qualify for reduced fees, provided that NMED has a Small Business Certification Form from your company on file. This form can be found at: www.env.nm.gov/aqb/sbap/Small_Business_Forms.html
Provide your Check Number: **122550** and Amount: **$4260**

If a fee is required and is not submitted with the application, the registration will be denied.

1) Company Information		AI # (if known): 36133	If updating, provide Permit/NOI #: 6567M4
1	Facility Name: Black River Gas Processing Plant	Plant primary SIC Code (4 digits): 1321 Plant NAIC code (6 digits): 211112	
a	Facility Street Address (If no facility street address, check here ☐ and provide directions in Section 4): 978 Bounds Road, Loving, New Mexico		
2	Plant Operator Company Name: DLK Black River Midstream LLC	Phone/Fax: 972-371-5439	
a	Plant Operator Address: 5400 LBJ Freeway, Suite 1500, Dallas, Texas 75240		
3	Plant Owner(s) name(s): DLK Black River Midstream LLC	Phone/Fax: 972-371-5439	
a	Plant Owner(s) Mailing Address(s): 5400 LBJ Freeway, Suite 1500, Dallas, Texas 75240		

4		Bill To (Company): DLK Black River Midstream LLC	Phone/Fax: 972-371-5439
	a	Mailing Address: 5400 LBJ Freeway, Suite 1500, Dallas, Texas 75240	E-mail: csnow@matadorresources.com
5		☐ Preparer: ☑ Consultant: Gauri Gajewar	Phone/Fax: 469-294-5945
	a	Mailing Address: 6221 Chapel Hill Blvd, Suite 300, Plano, TX 75093	E-mail: gauri.gajewar@erm.com
6		Plant Operator Contact: Jason Conway	Phone/Fax:
	a	Mailing Address: 5400 LBJ Freeway, Suite 1500, Dallas, Texas 75240	E-mail: Jason.conway@matadorresources.com
7		Air Permit Contact[1]: Jason Conway and Gauri Gajewar	Title: Senior Consultant
	a	E-mail: Jason.conway@matadorresources.com gauri.gajewar@erm.com	Phone/Fax: 972-371-5439, 46-294-5945
	b	Mailing Address: 5400 LBJ Freeway, Suite 1500, Dallas, Texas 75240	
		[1]The Air Permit Contact will receive official correspondence from the Department.	
8		Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and NOI or permit number (if known) of the other facility?	

2) Applicability

1	Is the facility located in Bernalillo County, on tribal lands, or in a nonattainment area?	☒**No** ☐**Yes**
	If you answered ***Yes*** to the question above, your facility **does not** qualify for this general construction permit.	
2	Is the facility's SIC code 1311, 1321, 4619, 4612 or 4922? (Other SIC codes may be approved provided that all the equipment at the facility is allowed in the GCP-Oil & Gas Permit.)	☐**No** ☒**Yes**
3	Does the regulated equipment under this GCP-Oil and Gas Registration include any combination of Allowable Equipment listed in Table 104 of the GCP Oil & Gas Permit, and no others?	☐**No** ☒**Yes**
4	Will the regulated equipment as specified in this GCP-Oil and Gas Registration emit less than the total emissions in Table 106 of the GCP-Oil and Gas permit?	☐**No** ☒**Yes**
5	Does all equipment comply with the stack parameter requirements as established in the GCP-Oil and Gas Permit?	☐**No** ☒**Yes**
6	Equipment shall be at least 100 meters (m) from any stack to terrain that is five (5) or more meters above the top of the stack. Will the equipment at the facility meet this terrain requirement?	☐**No** ☒**Yes**
7	Is the facility at least 150 m from any source that emits over 25 tons/year of NO_x? This is the distance between the two nearest stacks that emit NOx at each of the facilities. Not the facility boundaries or the center to center distances.	☐**No** ☒**Yes**
8	Is the facility at least 3 miles from any Class I area? This is the distance from the nearest facility boundary to the nearest boundary of the Class I area.	☐**No** ☒**Yes**
	If you answered ***NO*** to any of questions 2-8, your facility **does not** qualify for this general construction permit.	

3) Current Facility Status

1	Has this facility already been constructed? ☒Yes ☐No	If yes, is it currently operating in New Mexico? ☒ Yes ☐ No	
2	Does this facility currently have a construction permit or Notice of Intent (NOI) (20.2.72 NMAC or 20.2.73 NMAC)? ☒Yes ☐No	If yes, the permit No. or NOI No., and whether it will remain active or not: 6567M4	
3	Is this Registration in response to a Notice of Violation (NOV)? ☐Yes ☒No If so, provide current permit #:	If yes, NOV date:	NOV Tracking No.
4	Check if facility is a: Minor Source: ☐ Synthetic Minor Source: ☐ (SM80 = Controlled Emissions > 80 TPY of any regulated air pollutant): ☒		

4) Facility Location Information

1	a) Latitude (decimal degrees): 32.26431	b) Longitude (decimal degrees): -104.13198	c) County: Eddy	d) Elevation (ft): 3139
2	a) UTM Zone: ☐12 or ☒13	b) UTME (to nearest 10 meters) 581750	c) UTMN (to nearest 10 meters): 3570090	

3	e) Specify which datum is used: ☐ NAD 27 ☒ NAD 83 ☐ WGS 84 See this link for more info. http://en.wikipedia.org/wiki/North_American_Datum
4	Name and zip code of nearest New Mexico town and tribal community: Loving, NM 88256
5	Detailed Driving Instructions including direction and distance from nearest NM town and tribal community (attach a road map if necessary). If there is no street address, provide public road mileage marker: From Loving, NM head south on N 4th Street toward W. Cedar St. (0.2 mi), Turn right at the 3rd cross street onto W Ash Road (0.3 mi), turn left onto US-285 S/S 8th St. (0.8 mi), turn right onto Higby Hole road (0.4 mi), turn right onto Bounds Road (1.8 mi), facility entrance will be on the right.
6	The facility is 2.1 (distance) miles SW (direction) of Loving, NM (nearest town).
7	Land Status of facility (check one): ☒ Private ☐ Indian/Pueblo ☐ Government ☐ BLM ☐ Forest Service ☐ Military

5) Other Facility Information

1	Enter the maximum daily and annual throughput of oil, gas, and natural gas liquids (NGL).	**Oil (bbl/day): 1750** **(bbl/yr): 638,750** **Gas (MMscf/day): 460** **(MMscf/yr): 167,900** **NGL (bbl/day): 66000** **(bbl/yr):**
2	The facility, as described in this Registration, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes.	☐**No** ☒**Yes**

6) Submittal Requirements

1	Include one hard copy **original signed and notarized Registration package printed double sided 'head-to-toe' 2-hole punched** as we bind the document on top, not on the side; except landscape tables, which should be head-to-head. If 'head-to-toe printing' is not possible, print single sided. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process.
2	Include one **double sided hard copy, flip on long edge** for Department use. This copy does not need to be 2-hole punched.
3	The entire Registration package should be submitted electronically on one compact disk (CD). Include a single PDF document of the entire Registration as submitted and the individual documents comprising the Registration. The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDFs of files (items that were not created electronically: i.e. brochures, maps, graphics, etc.), submit these items in hard copy format. Spreadsheets must be unlocked since we must be able to review the formulas and inputs. **Ensure all of these are included in both the electronic and hard copies.** ☒Word Document part of the Registration Form (Sections 1 and 3-10) ☒Excel Document part of the Registration Form (Section 2) ☒Air Emissions Calculation Tool (AECT) If there is a justified reason for including other calculations, include the unlocked Excel Spreadsheet. Justification must be provided in Section 5 of the application. ☒PDF of entire application **To avoid errors, it is best to start with both a blank version of this form and the AECT for each application.**

Section 2
Tables

Insert Excel spreadsheet with applicable tables filled out. If applicable to the facility all tables must be filled out completely. The unit numbering system must be consistent throughout this Registration

Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. Equipment that qualifies for an exemption under 20.2.72.202.B NMAC should be included in Table 2-B **Note:** Equipment options **are not authorized.**

Unit Number[1]	Source Description	Manufacturer/Make /Model	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	RICE Ignition Type (CI, SI, 4SLB, 2SLB)[4]	For Each Piece of Equipment, Check Onc
ENG-1	Inlet Gas Compressor Engine	Waukesha P9394GSI	5283705346	2250 HP	2250 HP	2016	Catalyst-1 / ENG-1	20200254	4SLB	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
ENG-2	Inlet Gas Compressor Engine	Waukesha P9394GSI	5283705365	2250 HP	2250 HP	2016	Catalyst-2 / ENG-2	20200254	4SLB	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
ENG-3	Inlet Gas Compressor Engine	Waukesha P9394GSI	5283705405	2250 HP	2250 HP	2016	Catalyst-3 / ENG-3	20200254	4SLB	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
ENG-4	Inlet Gas Compressor Engine	Waukesha P9394GSI	5283705381	2250 HP	2250 HP	2016	Catalyst-4 / ENG-4	20200254	4SLB	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
AM-1	Plant 2 - Amine Unit	Zeeco	N/A	260 MMSCFD	260 MMSCFD	2018	TO-1 / TO-1	31000201		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
AR-1	Plant 2 - Amine Reboiler	Tulsa Heaters	N/A	21.09 MMBtu/hr	21.09 MMBtu/hr	2018	N/A / AR-1	31000228		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
DEHY-1	Plant 2 - Dehydrator Unit	Tryer	N/A	260 MMSCFD	260 MMSCFD	2017	FL-2a / FL-2a	31000227		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
DR-1	Plant 2 - Dehydrator Reboiler	Tryer	N/A	2.9 MMBtu/hr	2.9 MMBtu/hr	2017	N/A / DR-1	31000228		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
AM-2	Plant 3 - Amine Unit	Zeeco	N/A	200 MMSCFD	200 MMSCFD	2019	TO-2 / TO-2	31000201		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
AR-2	Plant 3 - Amine Reboiler	Tulsa Heaters	N/A	23.92 MMBtu/hr	23.92 MMBtu/hr	2019	N/A / AR-2	31000228		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
DEHY-2	Plant 3 - Dehydrator Unit	Tryer	N/A	200 MMSCFD	200 MMSCFD	2019	TO-2 / TO-2	31000227		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
DR-2	Plnat 3 - Dehydrator Reboiler	Tryer	N/A	2.5 MMBtu/hr	2.5 MMBtu/hr	2019	N/A / DR-2	31000228		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
HT-101	Plant 1 - Mole Sieve Heater	Heat Recovery Corp	N/A	6.98 MMBtu/hr	6.98 MMBtu/hr	2016	N/A / HT-1	31000228		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
HT-801	Plant 1 - Stabilizer Heater	Heat Recovery Corp	N/A	6.97 MMBtu/hr	6.97 MMBtu/hr	2019	N/A / HT-801	31000228		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced

Unit Number[1]	Source Description	Manufacturer/Make /Model	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	RICE Ignition Type (CI, SI, 4SLB, 2SLB)[4]	For Each Piece of Equipment, Check Onc
HT-102	Plant 2 - Mole Sieve Heater	Heat Recovery Corp	N/A	9.74 MMBtu/hr	9.74 MMBtu/hr	2016 /	N/A / HT-102	31000228		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
HT-103	Plant 3 - Mole Sieve Heater	Heat Recovery Corp	N/A	9.74 MMBtu/hr	9.74 MMBtu/hr	2019 /	N/A / HT-103	31000228		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
HT-802	Plant 3 - Stabilizer Heater	Heat Recovery Corp	N/A	6.2 MMBtu/hr	6.2 MMBtu/hr	2019 /	N/A / HT-802	31000228		☐ Existing (unchanged) ☑ New/Additional ☐ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TO-1	Plant 2 - Thermal Oxidizer	Zeeco	N/A	9.9 MMBtu/hr	9.9 MMBtu/hr	2018 /	N/A / TO-1	40400312		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TO-2	Plant 3 - Thermal Oxidizer	Zeeco	N/A	9.9 Mmbtu/hr	9.9 MMBtu/hr	2018 /	N/A / TO-2	40400315		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TO-1 SSM	Plant 2 - Thermal Oxidizer SSM	Zeeco	N/A	9.9 MMBtu/hr	9.9 MMBtu/hr	2018 /	N/A / TO-1	40400312		☐ Existing (unchanged) ☑ New/Additional ☐ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TO-2 SMM	Plant 3 - Thermal Oxidizer SSM	Zeeco	N/A	9.9 Mmbtu/hr	9.9 MMBtu/hr	2018 /	N/A / TO-2	40400315		☐ Existing (unchanged) ☑ New/Additional ☐ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
FL-1	Plant 1 - Flare /M	Zeeco	N/A	85 MMBtu/hr	85 MMBtu/hr	2016 /	N/A / FL-1	30600904		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
FL-2a/b	Plant 2 - Dehy -1 / Plant 2 - SSM	Zeeco	N/A	85 MMBtu/hr	85 MMBtu/hr	2016 /	N/A / FL-2a/b	30600904		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
FL-3	Plant 3 - SSM	Zeeco	N/A	85 MMBtu/hr	85 MMBtu/hr	2019 /	N/A / FL-3	30600904		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
VCU-1/ VCU-1 SSM	Vapor Combustion Unit	Kimark Inc	N/A	7.11 MMBtu/hr	7.11 MMBtu/hr	2016 /	N/A / VCU-1	30600904		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TK-702 A-F	Condensate Tanks	N/A	N/A	500 bbl each	500 bbl each	2016 /	VCU-1 / VCU-1	40400312		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TK 701	Produced Water Tank	N/A	N/A	500 bbl each	500 bbl each	2016 /	VCU-1 / VCU-1	40400315		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TL-1	Condensate Tanks Truck Loading	N/A	N/A	N/A	N/A	2016 /	N/A / N/A	40600132		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced
TL-2	Produced Water Tanks Truck Loading	N/A	N/A	N/A	N/A	2016 /	N/A / N/A	40600132		☐ Existing (unchanged) ☐ New/Additional ☑ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ To be Replaced

Unit Number[1]	Source Description	Manufacturer/Make /Model	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	RICE Ignition Type (CI, SI, 4SLB, 2SLB)[4]	For Each Piece of Equipment, Check Onc
FUG	Fugitives	N/A	N/A	N/A	N/A	2016	N/A / N/A	31088811		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
MAL	Malfunction	N/A	N/A	N/A	N/A	2016	N/A / N/A	30600904		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
CRYO-1	Cryo Unit -1	N/A	N/A	60 MMSCFD	60 MMSCFD	2016	N/A / N/A	31000299		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
CRYO-2	Cryo Unit -2	N/A	N/A	200 MMSCFD	200 MMSCFD	2017	N/A / N/A	31000299		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
CRYO-3	Cryo Unit -2	N/A	N/A	200 MMSCFD	200 MMSCFD	2019	N/A / N/A	31000299		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

[1] Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.

[2] Specify dates required to determine regulatory applicability.

[3] To properly account for power conversion efficiencies, generator set rated capacity shall be reported as the rated capacity of the engine in horsepower, not the kilowatt capacity of the generator set.

[4] "4SLB" means four stroke lean burn engine, "4SRB" means four stroke rich burn engine, "2SLB" means two stroke lean burn engine, "CI" means compression ignition, and "SI" means spark ignition

Table 2-B: Exempted Equipment (20.2.72 NMAC)

All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.5, include emissions calculations and emissions totals for 202.B.5 "similar functions" units, operations, and activities in Section 5, Calculations. Unit & stack numbering must be consistent throughout the application package.

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction[1]	For Each Piece of Equipment, Check Onc
			Serial No.	Capacity Units		Date of Installation /Construction[1]	
ST-1	Gycol Storage Tanks			100	20.2.72.202.B.2		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
				bbl			
ST-2	Amine Storage Tanks			300	20.2.72.202.B.2		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
				bbl			
ST-3	Methanol Tanks			500	20.2.72.202.B.2		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
				gallons			
ST-4	Lube Oil Tanks			500 & 2000	20.2.72.202.B.2		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
				gallons			
ST-5	Antifreeze Tanks			1000	20.2.72.202.B.2		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
				gallons			
Haul Roads	Haul Road Emission			N/A	20.2.72.202.B.5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
				N/A			
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

1 Specify date(s) required to determine regulatory applicability.

Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
BTEX-1	Condenser	2018	VOC, HAP	DEHY-1	Varies	Promax Simulation
BTEX-2	Condenser	2019	VOC, HAP	DEHY-2	Varies	Promax Simulation
TO-1	Thermal Oxidizer	2018	VOC, HAP	AM-1	98	Manufacturer Spec
TO-2	Thermal Oxidizer	2019	VOC, HAP	AM-2 and DEHY-2	98	Manufacturer Spec
FL-1	Flare	2016	VOC, H2S, HAP	Plant 1 - SSM/M	98	Manufacturer Spec
FL-2a/b	Flare	2016	VOC, H2S, HAP	DEHY-1/Plant 2 SSM/M	98	Manufacturer Spec
FL-3	Flare	2019	VOC, H2S, HAP	Plant 3 - SSM/M	98	Manufacturer Spec
VCU-1	Vapor Combustion Unit	2016	VOC, H2S, HAP	TK-702-A-F & TK 701	98	Manufacturer Spec
ENG-1	Catalyst, AFR	2016	NOx, CO, VOC, HCOH	Catalyst 1	Varies	Manufacturer Spec
ENG-2	Catalyst, AFR	2016	NOx, CO, VOC, HCOH	Catalyst 2	Varies	Manufacturer Spec
ENG-3	Catalyst, AFR	2016	NOx, CO, VOC, HCOH	Catalyst 3	Varies	Manufacturer Spec
ENG-4	Catalyst, AFR	2016	NOx, CO, VOC, HCOH	Catalyst 4	Varies	Manufacturer Spec

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

Table 2-D: Maximum Emissions (Consider federally enforceable controls under normal operating conditions)

This table must be filled out

Maximum Federally Enforceable Emissions are the emissions at maximum capacity with only federally enforceable methods of reducing emissions. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum facility capacity without pollution controls for 8760 hours per year. Account for federally enforcable controls, such as an NSPS or MACT regulation. Consider federally enforceable controls due to permitting. List Hazardous Air Pollutants (HAP) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
ENG-1	72.42	79.30	47.12	51.60	4.44	4.86	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
ENG-2	72.42	79.30	47.12	51.60	4.44	4.86	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
ENG-3	72.42	79.30	47.12	51.60	4.44	4.86	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
ENG-4	72.42	79.30	47.12	51.60	4.44	4.86	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
HT-101	0.69	3.01	0.58	2.53	0.04	0.17	0.00	0.02	0.05	0.23	0.04	0.17	-	-	-	-
HT-801	0.69	3.00	0.58	2.52	0.04	0.17	0.00	0.02	0.05	0.23	0.04	0.17	-	-	-	-
HT-102	0.96	4.20	0.80	3.52	0.05	0.23	0.01	0.03	0.07	0.32	0.04	0.17	-	-	-	-
AR-1	2.07	9.08	1.74	7.63	0.11	0.50	0.01	0.05	0.16	0.69	0.04	0.17	-	-	-	-
DR-1	0.29	1.25	0.24	1.05	0.02	0.07	0.00	0.01	0.02	0.09	0.04	0.17	-	-	-	-
HT-103	0.96	4.20	0.80	3.52	0.05	0.23	0.01	0.03	0.07	0.32	0.04	0.17	-	-	-	-
HT-802	0.61	2.67	0.51	2.24	0.03	0.15	0.004	0.02	0.05	0.20	0.04	0.17	-	-	-	-
AR-2	2.35	10.30	1.98	8.66	0.13	0.57	0.01	0.06	0.18	0.78	0.04	0.17	-	-	-	-
DR-2	0.25	1.08	0.21	0.90	0.01	0.06	0.001	0.01	0.02	0.08	0.04	0.17	-	-	-	-
Dehy-1	-	-	-	-	179.13	784.60	-	-	-	-	-	-	0.0002	0.0010	-	-
AM-1	-	-	-	-	3.61	15.80	-	-	-	-	-	-	5.59	24.48	-	-
Dehy-2	-	-	-	-	157.81	691.20	-	-	-	-	-	-	0.00	0.00	-	-
AM-2	-	-	-	-	4.16	18.23	-	-	-	-	-	-	4.43	19.42	-	-
TO-1	No emissions from these unit in an uncontrolled scenario															
TO-2	No emissions from these unit in an uncontrolled scenario															
TO-1 SSM	No emissions from these unit in an uncontrolled scenario															
TO-2 SSM	No emissions from these unit in an uncontrolled scenario															
FL-1	No emissions from these unit in an uncontrolled scenario															
FL-2a	No emissions from these unit in an uncontrolled scenario															
FL-2b	No emissions from these unit in an uncontrolled scenario															
FL-3	No emissions from these unit in an uncontrolled scenario															
VCU-1	No emissions from these unit in an uncontrolled scenario															

Unit No.	NOx		CO		VOC		SOx		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
VCU-1 SSM	No emissions from these unit in an uncontrolled scenario															
TK-702A-F	-	-	-	-	131.88	577.63	-	-	-	-	-	-	0.0000	0.0000	-	-
TK-701	-	-	-	-	0.27	1.18	-	-	-	-	-	-	0.0000	0.0000	-	-
TL-1	-	-	-	-	115.92	2.47	-	-	-	-	-	-	0.0000	0.0000	-	-
TL-2	-	-	-	-	77.24	0.08	-	-	-	-	-	-	0.0000	0.0000	-	-
FUG	-	-	-	-	7.43	32.56	-	-	-	-	-	-	0.0000	0.0000	-	-
MAL	287.46	4.46	573.87	8.91	259.43	4.03	1.70	0.03	-	-	-	-	0.02	0.0003	-	-
Totals	586.00	360.46	769.80	247.89	947.69	2116.79	2.64	1.24	1.31	3.65	0.99	2.24	10.07	43.94	0.00	0.00

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source.

Table 2-E: Requested Allowable Emissions

Enter an allowable emission limit for each piece of equipment with either an uncontrolled emission rate greater than 1 lb/hr or 1 ton per year (tpy) or a controlled emission rate of any amount. For H2S please represent all emissions even if they are less than 1 lb/hr and 1 tpy. If selecting combustion SSM emissions, enter lb/hr and tpy values. If selecting up to 10 tpy of Malfunction VOC emissions, enter tpy values. Combustion emissions from malfunction events are **not authorized** under this permit. Fill all cells in this table with the emissions in lb/hr and tpy, or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Total the emissions from all equipment in the Totals row. Add additional rows as necessary. Unit & stack numbering must be consistent throughout the application package. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or $1.41E^{-4}$).

Unit No.	NOx		CO		VOC		SOx		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
ENG-1	1.49	1.63	1.49	1.63	1.31	1.43	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
ENG-2	1.49	1.63	1.49	1.63	1.31	1.43	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
ENG-3	1.49	1.63	1.49	1.63	1.31	1.43	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
ENG-4	1.49	1.63	1.49	1.63	1.31	1.43	0.22	0.24	0.16	0.18	0.16	0.18	0.006	0.007	-	-
HT-101	0.69	3.01	0.58	2.53	0.04	0.17	0.004	0.02	0.05	0.23	0.04	0.17	-	-	-	-
HT-801	0.69	3.00	0.58	2.52	0.04	0.17	0.004	0.02	0.05	0.23	0.04	0.17	-	-	-	-
HT-102	0.96	4.20	0.80	3.52	0.05	0.23	0.01	0.03	0.07	0.32	0.04	0.17	-	-	-	-
AR-1	2.07	9.08	1.74	7.63	0.11	0.50	0.01	0.05	0.16	0.69	0.04	0.17	-	-	-	-
DR-1	0.29	1.25	0.24	1.05	0.02	0.07	0.00	0.01	0.02	0.09	0.04	0.17	-	-	-	-
HT-103	0.96	4.20	0.80	3.52	0.05	0.23	0.01	0.03	0.07	0.32	0.04	0.17	-	-	-	-
HT-802	0.61	2.67	0.51	2.24	0.03	0.15	0.004	0.02	0.05	0.20	0.04	0.17	-	-	-	-
AR-2	2.35	10.30	1.98	8.66	0.13	0.57	0.01	0.06	0.18	0.78	0.04	0.17	-	-	-	-
DR-2	0.25	1.08	0.21	0.90	0.01	0.06	0.00	0.01	0.02	0.08	0.04	0.17	-	-	-	-
Dehy-1	Emissions are controlled by flare, FL-2. Emissions are represented under FL-2a.															
AM-1	Emissions are controlled by thermal oxidizer, TO-1. Emissions are represented under TO-1.															
Dehy-2	Emissions are controlled by thermal oxidizer, TO-2. Emissions are represented under TO-2.															
AM-2	Emissions are controlled by thermal oxidizer, TO-2. Emissions are represented under TO-2.															
TO-1	1.39	6.28	1.29	5.81	0.06	0.25	10.51	46.03	0.81	3.55	0.61	2.66	0.11	0.50	-	-
TO-2	2.17	9.71	2.02	9.00	2.90	12.68	8.34	36.52	0.72	3.15	0.54	2.36	0.09	0.39	-	-
TO-1 SSM	-	-	-	-	3.61	0.32	-	-	-	-	-	-	5.59	0.49	-	-
TO-2 SSM	-	-	-	-	157.81	13.82	-	-	-	-	-	-	0.0002	0.00002	-	-
FL-1	50.76	1.38	101.30	2.56	45.784	1.11	0.30	0.01	-	-	-	-	0.0033	0.0006	-	-
FL-2a	0.54	2.37	1.02	4.48	3.20	14.03	0.00	0.00	-	-	-	-	0.0002	0.0007	-	-
FL-2b	127.84	4.70	255.21	9.38	115.86	4.66	0.77	0.04	-	-	-	-	0.01	0.0004	-	-
FL-3	140.58	5.59	280.62	10.98	127.14	5.19	9.17	0.77	-	-	-	-	0.10	0.01	-	-

Unit No.	NOx		CO		VOC		SOx		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
VCU-1	0.43	1.90	0.87	3.79	2.64	11.58	0.00	0.00	0.01	0.03	0.01	0.03	0.000004	0.00002	-	-
VCU-1 SSM	-	-	-	-	132.15	11.58	-	-	-	-	-	-	0.0000	0.0000	-	-
TK-702A-F	Emissions are controlled by Vapor Combustion Unit, VCU-1. Emissions are represented under VCU-1.															
TK-701	Emissions are controlled by Vapor Combustion Unit, VCU-1. Emissions are represented under VCU-1.															
TL-1	-	-	-	-	115.92	2.47	-	-	-	-	-	-	0.0000	0.0000	-	-
TL-2	-	-	-	-	77.24	0.08	-	-	-	-	-	-	0.0000	0.0000	-	-
FUG	-	-	-	-	7.43	32.56	-	-	-	-	-	-	0.0000	0.0000	-	-
MAL	287.46	4.46	573.87	8.91	259.43	4.03	1.70	0.03	-	-	-	-	0.02	0.0003	-	-
Totals[2]	**625.98**	**81.69**	**1229.58**	**94.01**	**1049.46**	**89.66**	**31.73**	**84.62**	**2.85**	**10.39**	**2.14**	**7.29**	**5.95**	**1.42**	**0.00**	**0.00**

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source.

[2] **VOC Totals** do not include Fugitive emissions

Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions.

Stack Type (Engine, Turbine, Flare, ECD, or Thermal Oxidizer Etc.)	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Height Above Ground (ft)	Temp. (F)	Flow Rate (acfs)	Velocity (ft/sec)	Inside Diameter (ft)
ENG-1	ENG-1	Vertical	26	1085	136.50	102.90	1.30
ENG-2	ENG-2	Vertical	26	1085	136.50	102.90	1.30
ENG-3	ENG-3	Vertical	26	1085	136.50	102.90	1.30
ENG-4	ENG-4	Vertical	26	1085	136.50	102.90	1.30
HT-101	HT-101	Vertical	33	624	48.11	23.10	1.63
HT-801	HT-801	Vertical	33	624	48.04	23.00	1.63
HT-102	HT-102	Vertical	50.67	624	67.13	14.40	2.44
AR-1	AR-1	Vertical	33.83	624	145.37	40.40	2.14
DR-1	DR-1	Vertical	25	624	19.99	6.40	2.00
HT-103	HT-103	Vertical	49.92	624	67.13	14.40	2.44
HT-802	HT-802	Vertical	42.4	624	42.73	14.20	1.96
AR-2	AR-2	Vertical	32.25	624	164.87	37.10	2.38
DR-2	DR-2	Vertical	25.79	624	17.23	13.00	1.30
TO-1	TO-1	Vertical	42.5	1600	15968.28	7.00	6.96
TO-2	TO-2	Vertical	61.17	1600	13739.08	12.90	2.46
FL-1	FL-1	Vertical	76.83	1832	291.77	65.62	1.00
FL-2	FL-2a/2b	Vertical	90.75	1832	557.07	65.62	1.00
FL-3	FL-3	Vertical	55	1832	557.08	65.62	1.00
VCU-1	VCU-1	Vertical	33.17	1400	0.66	3.83	5.33

Table 2-I: Emission Rates for HAPs

HAP In the table below, report the potential emission rate for each HAP from each regulated emission unit listed in Table 1, only if the entire facility emits the HAP. For each such emission unit, HAP shall be reported to the nearest 0.1 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAP shall be the sum of all HAP sources calculated to the nearest 0.1 ton per year. Use the HAP nomenclature as it appears in Section 112 (b) of the 1990 CAAA. Include tank-flashing emissions estimates of HAP in this table. For each HAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected, or the pollutant is emitted in a quantity less than the threshold amounts described above. Add additional rows as necessary.

Stack No.	Unit No.(s)	Total HAPs		Formaldehyde ☐ HAP		Benzene ☐ HAP		Toulene ☐ HAP		Acetladehyde ☐ HAP		Acrolein ☐ HAP		Xylene ☐ HAP		Provide Pollutant Name Here ☐ HAP		Provide Pollutant Name Here ☐ HAP	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
ENG-1	ENG-1	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003				
ENG-2	ENG-2	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003				
ENG-3	ENG-3	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003				
ENG-4	ENG-4	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003				
HT-101	HT-101	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
HT-801	HT-801	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
HT-102	HT-102	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
AR-1	AR-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
DR-1	DR-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
HT-103	HT-103	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
HT-802	HT-802	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
AR-2	AR-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
DR-2	DR-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
TO-1	TO-1	0.02	0.10	-	-	0.02	0.10	-	-	-	-	-	-	-	-				
TO-2	TO-2	0.43	1.86	-	-	0.43	1.86	-	-	-	-	-	-	-	-				
TO-1 SSM	TO-1 SSM	1.10	0.10	-	-	1.10	0.10	-	-	-	-	-	-	-	-				
TO-2 SSM	TO-2 SSM	19.85	1.74	-	-	19.85	1.74	-	-	-	-	-	-	-	-				
FL-1	FL-1	0.07	0.00	-	-	0.07	0.00	-	-	-	-	-	-	-	-				
FL-2a	FL-2a	0.37	1.63	-	-	0.37	1.63	-	-	-	-	-	-	-	-				
FL-2b	FL-2b	0.19	0.01	-	-	0.19	0.01	-	-	-	-	-	-	-	-				
FL-3	FL-3	0.23	0.01	-	-	0.23	0.01	-	-	-	-	-	-	-	-				
VCU-1	VCU-1	0.02	0.07	-	-	0.02	0.07	-	-	-	-	-	-	-	-				
VCU-1 SSM	VCU-1 SSM	0.84	0.07	-	-	0.84	0.07	-	-	-	-	-	-	-	-				
TL-1	TL-1	0.66	0.01	-	-	0.66	0.01	-	-	-	-	-	-	-	-				
TL-2	TL-2	17.91	0.02	-	-	17.91	0.02	-	-	-	-	-	-	-	-				
FUG	FUG	0.01	0.05	-	-	-	-	-	-	-	-	-	-	-	-				
MAL	MAL	0.41	0.01	-	-	0.41	0.01	-	-	-	-	-	-	-	-				
Totals:		**44.31**	**8.09**	**1.27**	**1.39**	**42.13**	**5.66**	**0.03**	**0.03**	**0.53**	**0.58**	**0.33**	**0.36**	**0.01**	**0.01**				

Table 2-J: Allowable Fuels and Fuel Sulfur for Combustion Emission Units:

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

Unit No.	Fuel Type (Natural Gas, Field Gas, Propane, Diesel, …)	Fuel Source (purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas, or other	Specify Units				
			Engines and Turbines: SO2 percentage (%) of the NOx emission rate (except flares)	Diesel Fuel Only: ppm of Sulfur	Lower Heating Value (BTU/SCF)	Annual Fuel Usage (MMSCF/y)	Does the Allowable Fuel and Fuel Sulfur Content meet GCP O&G Condition A110.A?
ENG-1	Natural Gas	Pipeline Quality Natural Gas	14.99	-	1016.8	34.23	☑ Yes ☐ No
ENG-2	Natural Gas	Pipeline Quality Natural Gas	14.99	-	1016.8	34.23	☑ Yes ☐ No
ENG-3	Natural Gas	Pipeline Quality Natural Gas	14.99	-	1016.8	34.23	☑ Yes ☐ No
ENG-4	Natural Gas	Pipeline Quality Natural Gas	14.99	-	1016.8	34.23	☑ Yes ☐ No
HT-101	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	2.51	☑ Yes ☐ No
HT-801	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	2.50	☑ Yes ☐ No
HT-102	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	3.50	☑ Yes ☐ No
AR-1	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	7.57	☑ Yes ☐ No
DR-1	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	1.04	☑ Yes ☐ No
HT-103	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	3.50	☑ Yes ☐ No
HT-802	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	2.23	☑ Yes ☐ No
AR-2	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	8.59	☑ Yes ☐ No
DR-2	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	0.90	☑ Yes ☐ No
TO-1	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	4.11	☑ Yes ☐ No
TO-2	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	4.11	☑ Yes ☐ No
FL-1	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	3.15	☑ Yes ☐ No
FL-2a/b	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	4.47	☑ Yes ☐ No
FL-3	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	3.15	☑ Yes ☐ No
VCU-1	Natural Gas	Pipeline Quality Natural Gas	-	-	1016.8	0.11	☑ Yes ☐ No

Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Unit and stack numbering must correspond throughout the application package.

Tank No.	Date Installed	Materials Stored	Roof Type	Seal Type	Capacity (bbl)	Diameter (M)	Vapor Space (M)	Color		Separator Pressure (psia)	Annual Throughput (gal/yr)	Turn-overs (per year)
								Roof	Shell			
			Vertical - Fixed Roof (FX)	Welded-Liquid-mounted Resilient								
TK-702-A	2016	Condensate			500	3.66		White	White		4,459,810	262.00
TK-702-B	2016	Condensate			500	3.66		White	White		4,459,810	262.00
TK-702-C	2016	Condensate			500	3.66		White	White		4,459,810	262.00
TK-702-D	2016	Condensate			500	3.66		White	White		4,459,810	262.00
TK-702-E	2016	Condensate			500	3.66		White	White		4,459,810	262.00
TK-702-F	2016	Condensate			500	3.66		White	White		4,459,810	262.00
TK-701	2016	Produced Water			500	3.66		White	White		1,230,918	73.00

Section 3
Registration Summary

The Registration Summary: Provide information about the registration submittal. The Registration Summary shall include a brief description of the facility and its process. In case of a modification to a facility, please describe the proposed changes.

Specify Facility Type: Check the appropriate box below:

☐ Production Site

☐ Tank Battery

☐ Compressor Station

☒ Natural Gas Plant

☐ Other, please specify:______________

Registration Summary: Provide Registration summary here. See above instructions.

The Black River Gas Processing Plant (BRGPP) receives inlet gas from multiple gathering pipelines from surrounding well sites. The plant's inlet separation extracts any produced water from the gas stream. Gas is then treated and processed to pipeline quality natural gas specification. The processing recovers, by extraction through refrigeration, natural gas liquids for transportation through pipelines and trucks when pipeline facilities are offline.

The purpose of this application is to correctly represent the equipment on site and update the facility-wide emissions.

The additional source emission calculations are represented as expected/maximum capacity at the plant. The facility meets the emission limitations and general conditions of the GCP O & G Permit utilizing the environmental controls utilized at the facility.

Written description of the routine operations of the facility: Include a detailed description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated.

The primary function of the plant is to remove CO2, water and natural gas liquids from sweet field gas so that the gas can meet pipeline specifications. The plant has been designated a primary Standard Industrial Classification (SIC) Code of 1321.

Stabilizer

The stabilizer system is a distillation process to lower the Reid Vapor Pressure (RVP) of field condensate/ pipeline hydrocarbon liquids that are swept into the plant slug catchers from the gas pipeline. This process uses heat from a hot oil system to drive off volatile components in the condensate and reduce the RVP to less than 9. The liquid in the tank is then stable and thus does not give off significant vapors. The tank is equipped with a fuel gas blanket for further protection.

Amine Treating

The amine unit is designed to remove CO2 and H2S from the natural gas stream to meet pipeline specifications. In addition, carbon dioxide can freeze in the cryogenic unit, forming dry ice and forcing the shutdown of the facility. Amine treating is an exothermic chemical reaction process. This aqueous mixture is regenerated and reused. Lean MDEA solution is pumped to the top of the contactor and allowed to flow downward. Wet gas is fed into the bottom of the contactor and flows upward. As the lean MDEA solution flows down through the contactor, it comes into contact with the wet gas. The CO2 and H2S reacts with the amine to form an amine carbonate. The reacted amine, known as "sour" or "rich" amine is returned to a regeneration unit, and the processed ("sweet") gas continues to the dehydration system. Emissions from amine units AM-1 and AM-2 are controlled by the thermal oxidizers unit TO-1 and TO-2 respectively. The amine reboiler is heated by a natural gas fired hot oil heater.

Glycol Dehydration

Triethylene glycol (TEG) dehydration is used to remove water from the natural gas stream and is accomplished by reducing the inlet water dew point (temperature at which vapor begins to condense into a liquid) to the outlet dew point temperature which will contain a specified amount of water. The wet gas is brought into contact with dry "lean" glycol in a countercurrent contactor tower. Water vapor is absorbed in the TEG solution and consequently, its dew point reduces. Wet gas passing through the contactor tower is dehydrated, then passed to the mole sieve beds. The wet (or "rich") glycol then flows from the absorber to a regeneration system in which it is partially decompressed, then heated to remove water vapor, resulting in "lean" glycol that is reintroduced to the contactor tower. Emissions from glycol dehydrator units, DEHY-1 and DEHY-2, are controlled by flare, FL-2a and thermal oxidizer, TO-2, respectively.

Molecular Sieve Dehydration
Molecular sieve dehydration is used upstream of the cryogenic units to achieve a gas stream dew point of -150°F. The process uses three molecular sieve vessels with one vessel in service absorbing moisture from the gas stream, one vessel in regeneration mode, and one vessel in standby. During the regeneration mode, hot, dry gas (regen gas) is passed up through the vessel to drive off the absorbed moisture from the molecular sieve. The gas comes from the discharge of the residue compressors and it is passed through a direct fired heater to achieve a temperature of approximately 500°F. After the gas passes through the bed it is cooled in an air-cooled exchanger. The water in the gas condenses and is separated from the gas stream in a separator. The regen gas is routed back to the inlet of the plant.

Cryogenic Unit
The cryogenic unit is designed to liquefy natural gas components from the sweet, dehydrated inlet gas by removing work (heat) from the gas by means of the turbo expander. The cryogenic unit recovers natural gas liquids (NGL) by cooling the gas stream to extremely cold temperatures (-150°F and lower) and condensing components such as ethane, propane, butanes and heavier. The gas is cooled by a series of heat exchangers and by rapidly lowering the pressure of the gas from around 1000 PSIG to approximately 300 PSIG. Once the gas has passed through the system of heat exchangers and expansion, it is re-compressed using the energy obtained from expanding the gas. The gas is sent to residue compressors and pipelined out of the facility.

Storage and Loading Operations
The natural gas liquids are transferred to a third party pipeline. In the event that the pipeline is not available, bullet storage tanks are used to store NGL and load pressurized tanker trucks. Stabilized condensate is stored in condensate tanks TK-702-A-F, and produced water tanks, TK-701. Both the condensate and produced water tanks are controlled by the vapor combustion unit, VCU-1.

Flares
The plant flares are used as control equipment and during startup, shutdown, maintenance and upset conditions. Flares, FL-1, FL-2b and FL-3 operate during startup, shutdown, maintenance and upset conditions. The only steady state operations associated with these flares are from the pilot and purge gas streams and flare, FL-2a which controls the DEHY-1 condenser overhead off gases. SSM emissions from the plant flare result from maintenance activities per manufacturer-recommended or other preventative maintenance schedules. These maintenance activities include, but are not limited to compressor catalyst changes, blowdowns for associated maintenance throughout the facility, instrument calibrations, and process safety device maintenance.

Routine or predictable emissions during Startup, Shutdown and Maintenance (SSM): Provide an overview of how SSM emissions are accounted for in this Registration.

Emissions from routine start-up, shutdown and maintenance activities have been accounted for in the facility-wide emissions. These include emissions from engine, thermal oxidizer, amine and dehydrator maintenance and repair that are routed to flares or atmosphere.

Malfunction Emissions (M): Provide an overview of how malfunction emissions are accounted for in this Registration. The permit does not authorize combustion emissions for malfunctions.

The permit does not authorize emissions from SSM and Malfunction to be combined as 10 TPY VOC. However, they may be permitted separately. In the allowable emissions table in Section 2, these two events are separate line items and must be kept separate.

Allowable Operations: Check the appropriate box below:

☒ Facility operates continuously (8760 hours per year)

☒ The following regulated equipment will operate less than 8760 hours per year. Add additional rows as necessary. These units are subject to Condition A108.C of the Permit.

Table A – Equipment Operating Less Than 8760 hours per year

Unit #	Requested Annual Operating Hours
ENG-1	2190
ENG-2	2190
ENG-3	2190
ENG-4	2190

Verification of Compliance with Stack Parameter Requirements:

Please use the Stack Calculator and Stack Requirements Explained Guidance on our website: All of the verification information below is required to be filled out.

www.env.nm.gov/air-quality/air-quality-oil-and-gas-gcp-application-forms/

Check the box for each type of equipment at this facility:

☒ Engine(s)
☐ Turbine(s)
☒ Flares(s)
☒ Enclosed Combustion Device (s)
☒ Heater(s)
☐ Reboiler(s)

For each type of equipment checked above, complete the applicable section below.

Engines

1. Calculate the pound per hour (lb/hr) NO_x emission rate according to GCP O&G Condition A202.I Step 1 on page 15 of the GCP O&G. Enter this value in the top row of the table below.
2. Based on the calculated facility total NO_x emission rate, determine the minimum stack parameter requirements for engines and heaters from Table 1: Engines (page 17) of the GCP O&G and enter the minimum parameters from Table 1 (page 17) of the GCP O&G in the bottom row of the table below.
3. Enter the stack parameters from each engine and heater in the blank rows of the table below. Add rows as necessary.

Table B: Engine/Generator/Heater/Reboiler Stack Parameter Verification:

Calculated Facility Total NOx Emission Rate: _____lb/hr				
Engine/Generator/Heater/Reboiler Unit Number	**Height (ft)**	**Temperature (°F)**	**Velocity (ft/s)**	**Diameter (ft)**
ENG-1	26.00	1085.00	102.9	1.30
ENG-2	26.00	1085.00	102.9	1.30
ENG-3	26.00	1085.00	102.9	1.30
ENG-4	26.00	1085.00	102.9	1.30
HT-101	33.00	624.00	23.1	1.63
HT-801	33.00	624.00	23.00	1.63
HT-102	50.67	624.00	14.4	2.44
AR-1	33.83	624.00	40.4	2.14
DR-1	25.00	624.00	6.4	2
HT-103	49.92	624.00	14.4	2.44
HT-802	42.40	624.00	14.2	1.96
AR-2	32.25	624.00	37.1	2.38
DR-2	25.79	624.00	13.00	1.3

Calculated Facility Total NOx Emission Rate: _____lb/hr				
Engine/Generator/Heater/Reboiler Unit Number	**Height (ft)**	**Temperature (°F)**	**Velocity (ft/s)**	**Diameter (ft)**
Table 1 Minimum Parameters: For verification, list the minimum parameters based on the NOx lb/hr emission rate from the GCP O&G Table 1.				

4. Do all engines and heaters comply with the minimum stack parameters from Table 1 (page 17) of the GCP O&G?

☒ Yes. Skip step 5 below.

☐ No. Go to step 5 below.

5. For engines and heaters that do not comply with the minimum stack parameters in Table 1 of the GCP O&G, explain and demonstrate in detail how the engines and heaters will be authorized according to the steps on page 16 of the GCP O&G or Condition A203.C of the GCP O&G. Show all calculations.

Turbines

1. Calculate the pound per hour (lb/hr) NO_x emission rate according to GCP O&G Condition A202.I Step 1 on page 17 of the GCP O&G. Enter this value in the top row of the table below.
2. Based on the calculated facility total NO_x emission rate, determine the minimum stack parameter requirements for turbines and heaters from Table 2: Turbines (page 18) of the GCP O&G. Enter the minimum parameters from Table 2 (page 18) of the GCP O&G in the bottom row of the table below.
3. Enter the stack parameters from each turbine and heater in the blank rows of the table below. Add rows as necessary.

Table C: Turbine/Heater/Reboiler Stack Parameter Verification:

Calculated Facility Total NOx Emission Rate: _____lb/hr				
Turbine/Heater/Reboiler Unit Number	**Height (ft)**	**Temperature (°F)**	**Velocity (ft/s)**	**Diameter (ft)**
Table 2 Minimum Parameters: For verification, list the minimum parameters based on the NOx lb/hr emission rate from the GCP O&G Table 2.				

4. Do all turbines and heaters comply with the minimum stack parameters from Table 2 (page 18) of the GCP O&G?

☐ Yes. Skip step 5 below.

☐ No. Go to step 5 below.

5. For turbines and heaters that do not comply with the minimum stack parameters in Table 2 of the GCP O&G, explain and demonstrate in detail how the turbines and heaters will be authorized according to the steps on page 18 of the GCP O&G or Condition A203.C of the GCP O&G. Show all calculations.

Flares

1. Enter SO_2 emission rates (lb/hr) for each flare in the second column of the table below.

2. Based on the SO_2 emission rates, determine the minimum stack height requirements for flares from Table 3 (page 26) of the GCP O&G and enter the minimum stack height requirements for flares from Table 3 (page 26) of the GCP O&G in the last column of the table below.
3. Enter the stack height of each flare in the third column of the table below. Add rows as necessary.

Table D: Flare Stack Height Parameter Verification:

Flare Unit Number	**SO_2 Emission Rate (lb/hr)**	**Height (ft)**	**Table 3 Minimum Stack Height:** For verification, list the minimum height parameters based on the SO2 emission rate from the GCP O&G Table 3.
FL-1	0.3	76.83	6.6
FL-2	0.77	90.75	6.6
FL-3	9.17	55.00	13.1

4. Do all flares comply with minimum stack height requirements?
   ☒ Yes
   ☐ No

5. Does the flare gas contain 6% H_2S or less by volume (pre-combustion)?
   ☒ Yes. Skip step 6 below.
   ☐ No. Go to step 6 below.

6. Explain in detail how assist gas will be added to reduce the gas composition to 6% H_2S or less by volume.

<u>Enclosed Combustion Device(s) (ECD):</u>

According to GCP O&G Condition A208.A, the facility must meet one of the following options if an ECD is installed at the facility:

<u>Option 1:</u>

1. Will the ECD(s) meet the SO_2 emission limit of 0.7 lb/hr and operate with a velocity of at least one (1) foot per second?
   ☒ Yes. Skip Option 2 below.
   ☐ No. Go to Option 2 below.

<u>Option 2:</u>

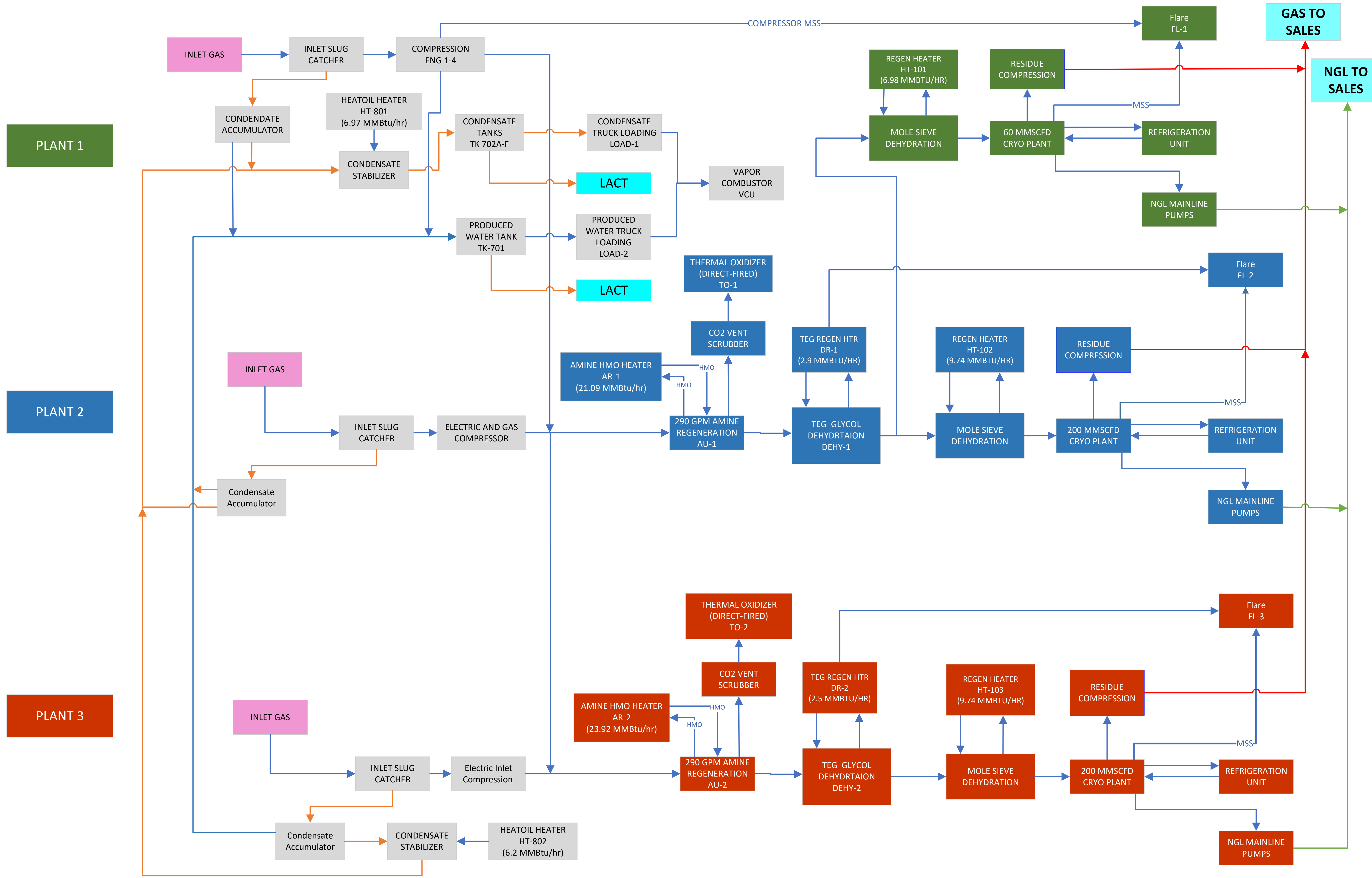
2. Will the ECD(s) meet the SO_2 emission limit of 0.9 lb/hr and operate with a velocity of at least two (2) feet per second?
   ☐ Yes
   ☐ No

Section 4

Process Flow Sheet

Attach a **process flow sheet** indicating all individual equipment, all emission points, and types of control applied to those points. All units must be labeled, and the unit numbering system must be consistent throughout this Registration. Identify all sources of emissions with a vertical arrow. Label each of the different material streams (e.g. crude oil, gas, water). The process flow sheet must be a legible size.

Please see attached the process flow diagram.


PLANT 1
PLANT 2
PLANT 3
INLET GAS
INLET SLUG CATCHER
COMPRESSION ENG 1-4
COMPRESSOR MSS
Flare FL-1
GAS TO SALES
NGL TO SALES
CONDENDATE ACCUMULATOR
HEATOIL HEATER HT-801 (6.97 MMBtu/hr)
CONDENSATE STABILIZER
CONDENSATE TANKS TK 702A-F
CONDENSATE TRUCK LOADING LOAD-1
LACT
VAPOR COMBUSTOR VCU
PRODUCED WATER TANK TK-701
PRODUCED WATER TRUCK LOADING LOAD-2
LACT
REGEN HEATER HT-101 (6.98 MMBTU/HR)
MOLE SIEVE DEHYDRATION
RESIDUE COMPRESSION
60 MMSCFD CRYO PLANT
MSS
REFRIGERATION UNIT
NGL MAINLINE PUMPS
THERMAL OXIDIZER (DIRECT-FIRED) TO-1
CO2 VENT SCRUBBER
AMINE HMO HEATER AR-1 (21.09 MMBtu/hr)
HMO
HMO
290 GPM AMINE REGENERATION AU-1
INLET GAS
INLET SLUG CATCHER
ELECTRIC AND GAS COMPRESSOR
Condensate Accumulator
TEG REGEN HTR DR-1 (2.9 MMBTU/HR)
TEG GLYCOL DEHYDRTAION DEHY-1
REGEN HEATER HT-102 (9.74 MMBTU/HR)
MOLE SIEVE DEHYDRATION
RESIDUE COMPRESSION
200 MMSCFD CRYO PLANT
MSS
REFRIGERATION UNIT
Flare FL-2
NGL MAINLINE PUMPS
THERMAL OXIDIZER (DIRECT-FIRED) TO-2
CO2 VENT SCRUBBER
AMINE HMO HEATER AR-2 (23.92 MMBtu/hr)
HMO
HMO
290 GPM AMINE REGENERATION AU-2
INLET GAS
INLET SLUG CATCHER
Electric Inlet Compression
Condensate Accumulator
CONDENSATE STABILIZER
HEATOIL HEATER HT-802 (6.2 MMBtu/hr)
TEG REGEN HTR DR-2 (2.5 MMBTU/HR)
TEG GLYCOL DEHYDRTAION DEHY-2
REGEN HEATER HT-103 (9.74 MMBTU/HR)
MOLE SIEVE DEHYDRATION
RESIDUE COMPRESSION
200 MMSCFD CRYO PLANT
MSS
REFRIGERATION UNIT
Flare FL-3
NGL MAINLINE PUMPS

Section 5

Emissions Calculation Forms

The Department has developed the Air Emissions Calculation Tool (AECT), which is required to be used in the GCP-Oil and Gas Registration. If the AECT, for a piece of equipment is under development, provide alternate calculations. **Do not include alternative calculations unless there is an issue being resolved with the AECT. This will delay review of the application.** The AECT and this Registration Form may be updated as needed.

Tank Emissions Calculations: Provide the method used to estimate tank-flashing emissions, the input and output summary from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Pro-Max or Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation. **The inputs must match the gas analyses information submitted. Inputs that don't match may be grounds for denial of the application submittal.**

SSM Calculations: In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Table 2, and the rational for why the others are reported as zero (or left blank).

Control Devices: Report all control devices and list each pollutant controlled by the control device. Indicate in this section if you chose to not take credit for the reduction in emission rates. Only uncontrolled emission rates can be considered to determine applicability unless the state or federal acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

Calculation Details: The AECT is required for all emission calculations. If the AECT is not functioning, alternative calculations may be submitted only for the portions of the AECT with issues being resolved. Utilize this section to explain in detail, on an equipment-by-equipment basis, why alternative calculations are necessary.

Explain here: Alternate calculation spreadsheet has been submitted along with AECT.

Equipment Forms Submitted in this Section (add additional rows as necessary):

Equipment Type	Quantity	Check Box to Indicate Units that are Controlled	Enter Control Device Type and Pollutant Controlled
Engine	4	☒	Catalyst, AFR, NOx, CO, VOC, HCOH
Turbine		☐	
Tanks	7	☒	ECD, VOC, H2S, HAPs
Generator		☐	
VRU		☐	
VRT		☐	
ULPS		☐	
Glycol Dehydrator	2	☒	Flare and Thermal Oxidizer, VOC, H2S, HAPs
Flare	3	☐	*List all streams controlled by flare:* ***Dehydrator, Facility SSM, Amine***
Amine Unit	2	☒	Thermal Oxidizer, VOC, NOx, CO, H2S
Cryogenic Unit	3	☒	Flare
Fugitive Emissions	1	☐	
Heater	9	☐	
Truck Loading	2	☐	*List control device or vapor balancing*
Enclosed Combustion Device (ECD)	1	☒	*List all streams controlled by the ECD:* ***Oil and Produced water tanks***

Thermal Oxidizer (TO)	**2**	☒	*List all streams controlled by the TO:* ***Amine, AM-1 and AM-2 and dehydrator, DEHY-2***
Other		☐	
Other		☐	

For each scenario below, if there are more than one emissions unit, control device, or gas combustion scenario. Please copy and paste each applicable section and label the unit number(s) if the scenarios vary.

Vapor Recovery Tower, Ultra Low-Pressure Separator, or Flash Tower Located Upstream of Storage Vessels: If the facility contains one of the following units located upstream of the storage vessels and is used to flash and capture flashing emissions, check the appropriate box.
Unit number:
☐ Vapor Recovery Tower and VRU Compressor
☐ ULPS and VRU Compressor
☐ Flash Tower and VRU Compressor

Vapor Recovery Unit (VRU) located upstream of Storage Vessels: Check the box below if the facility is using a VRU to capture flashing emissions prior to any storage vessels to limit the PTE of the storage vessels to below applicability thresholds of NSPS OOOO or NSPS OOOOa. A process vs control determination should be prepared for this type of VRU application.
Unit number:
☐ VRU capturing emissions prior to any storage vessel and routing directly to the sales pipeline

Vapor Recovery Unit (VRU) attached to Storage Vessels: Check the box below if this facility is using a VRU to reduce storage vessel emissions to limit the PTE to below NSPS OOOO or NSPS OOOOa applicability thresholds:
Unit number:
☐ VRU controlling Storage Vessel emissions and the facility is subject to the requirements under NSPS OOOO, 40 CFR 60.5411
☐ VRU controlling Storage Vessel emissions and the facility is subject to the requirements under NSPS OOOOa, 40 CFR 60.5411a

Gas Combustion Scenarios: Read through the scenarios below and check the boxes next to any appropriate facility operating scenarios. Flares shall assume a destruction efficiency of 95%, unless the facility is subject to requirements for flares under 40 CFR 60.18, or a higher destruction efficiency (up to 98%) is supported by a manufacturer specification sheet (MSS) for that unit. If so, include the MSS.

A flare, vapor combustion unit (VCU), enclosed combustion device (ECD), thermal oxidizer (TO):
Unit number: VCU-1, FL-1, FL-2, FL-3, TO-1, TO-2
☒ Controls storage vessels in accordance with 40 CFR 60, Subpart OOOO or OOOOa.
☐ Provides a federally enforceable control for the storage vessels to limit the PTE to below applicability thresholds of 40 CFR 60, Subpart OOOO or OOOOa.
☒ Controls the glycol dehydrator
☒ Controls the amine unit
☐ Controls truck loading
☐ Operates only during maintenance events, such as VRU downtime, check one below:
  ☐ The emissions during VRU downtime are represented as uncontrolled VOC emissions from the compressor
  ☐ The combustion emissions during VRU downtime are represented as controlled emissions from the combustion device

☒ Controls the facility during plant turnaround

Amine Unit: Provide the following information for each amine unit.

Design Capacity in MMscf/day	**260 & 200**
Rich Amine Flowrate in gal/min	
Lean Amine Flowrate in gal/min	**290 & 290**
Mole Loading H_2S	**0.0006 & 0.0006**
Sour Gas Input in MMscf/day	**0.0 & 0.0**

Glycol Dehydration Unit(s): Provide the following information for each glycol dehydration unit:
Please include an extended gas analysis in Section 6 of this application.

Unit #	Glycol Pump Circulation Rate
DEHY-1	51
DEHY-2	42

Voluntary Monitoring in Accordance with §40 CFR 60.5416(a): Check the box(s) to implement a program that meets the requirements of 40 CFR 60.5416(a). This monitoring program will be conducted in lieu of the monitoring requirements established in the GCP-Oil and Gas for individual equipment. Ceasing to implement this alternative monitoring must be reported in an updated Registration Form to the Department.

☐ Condition A205.B Control Device Options, Requirements, and Inspections for Tanks
☐ Condition A206.B Truck Loading Control Device Inspection
☐ Condition A206.C Vapor Balancing During Truck Loading
☐ Condition A209.A Vapor Recovery Unit or Department-approved Equivalent
☐ Condition A210.B Amine Unit Control Device Inspection

Fugitive H_2S Screening Threshold and Monitoring in accordance with Condition A212: Check the box that applies.

☒ Condition A212.A does not apply because the facility is below the fugitive H_2S screening threshold in Condition A212, or

☐ Condition A212.A applies. Because the facility is above the fugitive H_2S screening threshold in Condition A212, or the facility is voluntarily complying with Condition A212.A, and Condition A212.A applies

DLK Black River Midstream LLC
Black River Gas Processing Plant

Uncontrolled Emissions

		NO_X		CO		VOC		TSP[2]		PM_{10}[2]		$PM_{2.5}$[2]		SO_2		H_2S		Total HAP		Formaldehyde		Benzene		Toulene		Acetaldehyde		Acrolein		Xylene		CO_2	CH_4	N_2O
Unit ID	Equipment Description	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	ton/yr	ton/yr	ton/yr
ENG-1	Waukesha P9394GSI	72.42	79.30	47.12	51.60	4.44	4.86	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	2.93	3.21	2.70	2.96	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.00	0.00	9768.01	0.18	0.02
ENG-2	Waukesha P9394GSI	72.42	79.30	47.12	51.60	4.44	4.86	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	2.93	3.21	2.70	2.96	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.00	0.00	9768.01	0.18	0.02
ENG-3	Waukesha P9394GSI	72.42	79.30	47.12	51.60	4.44	4.86	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	2.93	3.21	2.70	2.96	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.00	0.00	9768.01	0.18	0.02
ENG-4	Waukesha P9394GSI	72.42	79.30	47.12	51.60	4.44	4.86	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	2.93	3.21	2.70	2.96	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.00	0.00	9768.01	0.18	0.02
HT-101	Plant 1 - Mole Sieve Heater	0.69	3.01	0.58	2.53	0.04	0.17	0.05	0.23	0.05	0.23	0.04	0.17	0.004	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3576.24	0.07	0.01
HT-801	Plant 1 - Stabilizer Heater	0.69	3.00	0.58	2.52	0.04	0.17	0.05	0.23	0.05	0.23	0.04	0.17	0.004	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3576.24	0.07	0.01
HT-102	Plant 2 - Mole Sieve Heater	0.96	4.20	0.80	3.52	0.05	0.23	0.07	0.32	0.07	0.32	0.04	0.17	0.01	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00
AR-1	Plant 2 - Amine Reboiler	2.07	9.08	1.74	7.63	0.11	0.50	0.16	0.69	0.16	0.69	0.04	0.17	0.01	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10805.57	0.20	0.02
DR-1	Plant 2 - Dehy Regen Heater	0.29	1.25	0.24	1.05	0.02	0.07	0.02	0.09	0.02	0.09	0.04	0.17	0.002	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1485.83	0.03	0.00
HT-103	Plant 3 - Mole Sieve Heater	0.96	4.20	0.80	3.52	0.05	0.23	0.07	0.32	0.07	0.32	0.04	0.17	0.01	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4990.34	0.09	0.01
HT-802	Plant 3 - Stabilizer Heater	0.61	2.67	0.51	2.24	0.03	0.15	0.05	0.20	0.05	0.20	0.04	0.17	0.004	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3176.60	0.06	0.01
AR-2	Plant 3 - Amine Reboiler	2.35	10.30	1.98	8.66	0.13	0.57	0.18	0.78	0.18	0.78	0.04	0.17	0.01	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11118.15	0.23	0.023
DR-2	Plant 3 - Dehy Regen Heater	0.25	1.08	0.21	0.90	0.01	0.06	0.02	0.08	0.02	0.08	0.04	0.17	0.00	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1162.01	0.02	0.00
Dehy-1	Plant 2 - Dehy Unit	-	-	-	-	179.13	784.60	-	-	-	-	-	-	-	-	0.0002	0.001	18.58	81.36	-	-	18.58	81.36	-	-	-	-	-	-	-	-	0.00	0.00	0.00
AM-1	Plant 2 - Amine Unit	-	-	-	-	3.61	15.80	-	-	-	-	-	-	-	-	5.59	24.48	1.10	4.80	-	-	1.10	4.80	-	-	-	-	-	-	-	-	0.00	0.00	0.00
Dehy-2	Plant 3 - Dehy Unit	-	-	-	-	157.81	691.20	-	-	-	-	-	-	-	-	0.0002	0.0009	19.85	86.95	-	-	19.85	86.95	-	-	-	-	-	-	-	-	0.00	0.00	0.00
AM-2	Plant 3 - Amine Unit	-	-	-	-	4.16	18.23	-	-	-	-	-	-	-	-	4.43	19.42	1.43	6.24	-	-	1.43	6.24	-	-	-	-	-	-	-	-	0.00	0.00	0.00
TO-1	Plant 2 -Thermal Oxidizer	No emissions from these unit in an uncontrolled scenario																														5021.08	0.09	0.01
TO-2	Plant 3 -Thermal Oxidizer	No emissions from these unit in an uncontrolled scenario																														5021.08	0.09	0.01
TO-1 SSM	Plant 2 -Thermal Oxidizer	No emissions from these unit in an uncontrolled scenario																														0.00	0.00	0.00
TO-2 SSM	Plant 3 -Thermal Oxidizer	No emissions from these unit in an uncontrolled scenario																														0.00	0.00	0.00
FL-1	Plant 1 - SSM	No emissions from these unit in an uncontrolled scenario																														30.18	0.00	0.00
FL-2a	Plant 2 - Dehy Control	No emissions from these unit in an uncontrolled scenario																														2085.29	0.04	0.00
FL-2b	Plant 2 - SSM	No emissions from these unit in an uncontrolled scenario																														1871.12	0.04	0.00
FL-3	Plant 3 - SSM	No emissions from these unit in an uncontrolled scenario																														1895.71	0.04	0.00
VCU-1	Tanks Control	No emissions from these unit in an uncontrolled scenario																														3642.85	0.07	0.01
VCU-1 SSM	Tanks Control SSM	No emissions from these unit in an uncontrolled scenario																														0.00	0.00	0.00
TK-702A-F	Condensate Tanks	-	-	-	-	131.88	577.63	-	-	-	-	-	-	-	-	0.00	0.00	0.78	3.42	-	-	0.78	3.42	-	-	-	-	-	-	-	-	2.08	42.32	0.11
TK-701	Produced Water Tanks	-	-	-	-	0.27	1.18	-	-	-	-	-	-	-	-	0.00	0.00	0.06	0.02	-	-	0.06	0.02	-	-	-	-	-	-	-	-	0.002	0.03	0.00
TL-1	Condensate Truck Loading	-	-	-	-	115.92	2.47	-	-	-	-	-	-	-	-	0.00	0.00	0.66	0.01	-	-	0.66	0.01	-	-	-	-	-	-	-	-	0.91	9.59	0.00
TL-2	Produced Water Truck Loading	-	-	-	-	77.24	0.08	-	-	-	-	-	-	-	-	0.00	0.00	17.91	0.02	-	-	17.91	0.02	-	-	-	-	-	-	-	-	0.03	0.02	0.00
FUG	Fugitives	-	-	-	-	7.43	32.56	-	-	-	-	-	-	-	-	0.00	0.00	0.01	0.05	-	-	-	-	-	-	-	-	-	-	-	-	1.12	103.24	0.00
MAL	Malfunction	287.46	4.46	573.87	8.91	259.43	4.03	-	-	-	-	-	-	1.70	0.03	0.02	0.00	0.41	0.01	-	-	0.41	0.01	-	-	-	-	-	-	-	-	-	-	-
Totals		**586.00**	**360.46**	**769.80**	**247.89**	**947.69**	**2116.79**	**1.31**	**3.65**	**1.31**	**3.65**	**0.99**	**2.24**	**2.64**	**1.24**	**10.07**	**43.94**	**72.51**	**195.72**	**10.81**	**11.83**	**60.80**	**182.85**	**0.03**	**0.03**	**0.53**	**0.58**	**0.33**	**0.36**	**0.01**	**0.01**	**98534.46**	**157.06**	**0.30**

Controlled Emissions

		NO_X		CO		VOC		TSP[2]		PM_{10}[2]		$PM_{2.5}$[2]		SO_2		H_2S		Total HAP		Formaldehyde		Benzene		Toulene		Acetaldehyde		Acrolein		Xylene		CO_2	CH_4	N_2O
Unit ID	Equipment Description	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	ton/yr	ton/yr	ton/yr
ENG-1	Waukesha P9394GSI	1.49	1.63	1.49	1.63	1.31	1.43	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003	9768.01	0.18	0.02
ENG-2	Waukesha P9394GSI	1.49	1.63	1.49	1.63	1.31	1.43	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003			
ENG-3	Waukesha P9394GSI	1.49	1.63	1.49	1.63	1.31	1.43	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003			
ENG-4	Waukesha P9394GSI	1.49	1.63	1.49	1.63	1.31	1.43	0.16	0.18	0.16	0.18	0.16	0.18	0.22	0.24	0.01	0.01	0.55	0.60	0.32	0.35	0.01	0.01	0.01	0.01	0.13	0.15	0.08	0.09	0.003	0.003			
HT-101	Plant 1 - Mole Sieve Heater	0.69	3.01	0.58	2.53	0.04	0.17	0.05	0.23	0.05	0.23	0.04	0.17	0.004	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3576.24	0.07	0.01
HT-801	Plant 1 - Stabilizer Heater	0.69	3.00	0.58	2.52	0.04	0.17	0.05	0.23	0.05	0.23	0.04	0.17	0.00	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3576.24	0.07	0.01
HT-102	Plant 2 - Mole Sieve Heater	0.96	4.20	0.80	3.52	0.05	0.23	0.07	0.32	0.07	0.32	0.04	0.17	0.006	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00
AR-1	Plant 2 - Amine Reboiler	2.07	9.08	1.74	7.63	0.11	0.50	0.16	0.69	0.16	0.69	0.04	0.17	0.01	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10805.57	0.20	0.02
DR-1	Plant 2 - Dehy Regen Heater	0.29	1.25	0.24	1.05	0.02	0.07	0.02	0.09	0.02	0.09	0.04	0.17	0.002	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1485.83	0.03	0.00
HT-103	Plant 3 - Mole Sieve Heater	0.96	4.20	0.80	3.52	0.05	0.23	0.07	0.32	0.07	0.32	0.04	0.17	0.01	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4990.34	0.09	0.01
HT-802	Plant 3 - Stabilizer Heater	0.61	2.67	0.51	2.24	0.03	0.15	0.05	0.20	0.05	0.20	0.04	0.17	0.004	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3176.60	0.06	0.01
AR-2	Plant 3 - Amine Reboiler	2.35	10.30	1.98	8.66	0.13	0.57	0.18	0.78	0.18	0.78	0.04	0.17	0.01	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11118.15	0.23	0.02
DR-2	Plant 3 - Dehy Regen Heater	0.25	1.08	0.21	0.90	0.01	0.06	0.02	0.08	0.02	0.08	0.04	0.17	0.001	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1162.01	0.02	0.00
Dehy-1	Plant 2 - Dehy Unit	Emissions are controlled by flare, FL-2. Emissions are represented under FL-2a.																														0.00	0.00	0.00
AM-1	Plant 2 - Amine Unit	Emissions are controlled by thermal oxidizer, TO-1. Emissions are represented under TO-1.																														0.00	0.00	0.00
Dehy-2	Plant 3 - Dehy Unit	Emissions are controlled by thermal oxidizer, TO-2. Emissions are represented under TO-2.																														0.00	0.00	0.00
AM-2	Plant 3 - Amine Unit	Emissions are controlled by thermal oxidizer, TO-2. Emissions are represented under TO-2.																														0.00	0.00	0.00
TO-1	Plant 2 -Thermal Oxidizer	1.39	6.28	1.29	5.81	0.06	0.25	0.81	3.55	0.81	3.55	0.61	2.66	10.51	46.03	0.11	0.50	0.02	0.096	-	-	0.02	0.096	-	-	-	-	-	-	-	-	5021.08	0.09	0.01
TO-2	Plant 3 -Thermal Oxidizer	2.17	9.71	2.02	9.00	2.90	12.68	0.72	3.15	0.72	3.15	0.54	2.36	8.34	36.52	0.09	0.39	0.43	1.86	-	-	0.43	1.86	-	-	-	-	-	-	-	-	5021.08	0.09	0.01
TO-1 SSM	Plant 2 -Thermal Oxidizer	-	-	-	-	3.61	0.32	-	-	-	-	-	-	-	-	5.59	0.49	1.10	0.10	-	-	1.10	0.10	-	-	-	-	-	-	-	-	0.00	0.00	0.00
TO-2 SSM	Plant 3 -Thermal Oxidizer	-	-	-	-	157.81	13.82	-	-	-	-	-	-	-	-	0.00	0.00	19.85	1.74	-	-	19.85	1.74	-	-	-	-	-	-	-	-	0.00	0.00	0.00
FL-1	Plant 1 - SSM	50.76	1.38	101.30	2.56	45.78	1.11	-	-	-	-	-	-	0.30	0.01	0.003	0.001	0.07	0.00	-	-	0.07	0.00	-	-	-	-	-	-	-	-	30.18	0.00	0.00
FL-2a	Plant 2 - Dehy Control	0.54	2.37	1.02	4.48	3.20	14.03	-	-	-	-	-	-	0.00	0.00	0.0002	0.0007	0.37	1.63	-	-	0.37	1.63	-	-	-	-	-	-	-	-	2085.29	0.04	0.00
FL-2b	Plant 2 - SSM	127.84	4.70	255.21	9.38	115.86	4.66	-	-	-	-	-	-	0.77	0.04	0.01	0.0004	0.19	0.01	-	-	0.19	0.01	-	-	-	-	-	-	-	-	1871.12	0.04	0.00
FL-3	Plant 3 - SSM	140.58	5.59	280.62	10.98	127.14	5.19	-	-	-	-	-	-	9.17	0.77	0.10	0.01	0.23	0.01	-	-	0.23	0.01	-	-	-	-	-	-	-	-	1895.71	0.04	0.00
VCU-1	Tanks Control	0.43	1.90	0.87	3.79	2.64	11.58	0.01	0.03	0.01	0.03	0.01	0.03	0.00	0.00	0.0000	0.0000	0.02	0.07	-	-	0.02	0.07	-	-	-	-	-	-	-	-	3642.85	0.07	0.01
VCU-1 SSM	Tanks Control SSM	-	-	-	-	132.15	11.58	-	-	-	-	-	-	-	-	0.000	0.000	0.84	0.07	-	-	0.84	0.07	-	-	-	-	-	-	-	-	0.00	0.00	0.00
TK-702A-F	Condensate Tanks	Emissions are controlled by Vapor Combustion Unit, VCU-1. Emissions are represented under VCU-1.																														2.08	42.32	0.11
TK-701	Produced Water Tanks	Emissions are controlled by Vapor Combustion Unit, VCU-1. Emissions are represented under VCU-1.																														0.00	0.03	0.00
TL-1	Condensate Truck Loading	-	-	-	-	115.92	2.47	-	-	-	-	-	-	-	-	0.000	0.000	0.66	0.01	-	-	0.66	0.01	-	-	-	-	-	-	-	-	0.91	9.59	0.00
TL-2	Produced Water Truck Loading	-	-	-	-	77.24	0.08	-	-	-	-	-	-	-	-	0.000	0.000	17.91	0.02	-	-	17.91	0.02	-	-	-	-	-	-	-	-	0.03	0.02	0.00
FUG	Fugitives	-	-	-	-	7.43	32.56	-	-	-	-	-	-	-	-	0.000	0.000	0.01	0.05	-	-	-	-	-	-	-	-	-	-	-	-	1.12	103.24	0.00
MAL	Malfunction	287.46	4.46	573.87	8.91	259.43	4.03	-	-	-	-	-	-	1.70	0.03	0.02	0.0003	0.41	0.01	-	-	0.41	0.01	-	-	-	-	-	-	-	-	-	-	-
Totals		**625.98**	**81.69**	**1,229.58**	**94.01**	**1,049.46**	**89.66**	**2.85**	**10.39**	**2.85**	**10.39**	**2.14**	**7.29**	**31.73**	**84.62**	**5.95**	**1.42**	**44.31**	**8.09**	**1.27**	**1.39**	**42.13**	**5.66**	**0.03**	**0.03**	**0.53**	**0.58**	**0.33**	**0.36**	**0.01**	**0.01**	**69,230.44**	**156.51**	**0.24**

DLK Black River Midstream LLC
Black River Gas Processing Plant
RECIPROCATING ENGINES

Unit Numbers:	ENG-1, ENG-2, ENG-3 , ENG-4		
Source description:	4	Stroke	Lean Burn Natural Gas Engine
Manufacturer:	Waukesha		
Model:	P9394GSI		
Aspiration:	Turbo-charged		

Engine Horsepower and RPM			
Engine speed:	1,200.0	rpm	Mfg data
Sea level hp:	2,250.0	hp	Mfg data

Fuel Consumption			
Hours of Operation	2,190.0	Hours per engine	
BSFC:	7,063.0	Btu/hp-hr	Mfd data for LHV
Fuel heat value:	1,016.8	Btu/scf	Fuel Gas Analysis
Heat input:	15.89	MMBtu/hr	BSFC * site hp
Fuel consumption:	15.629	Mscf/hr	Heat input / fuel heat value
Annual fuel usage:	34.23	MMscf/yr	8760 hrs/yr operation

Exhaust Parameters			
Exhaust temp (Tstk):	1085	°F	Mfg data
Stack height:	26.00	ft	Engineering Estimate
Stack diameter:	1.30	ft	Engineering Estimate
Exhaust flow:	8190.0	acfm	Mfg data
Exhaust flow:	136.50	acfs	Mfg data
Exhaust velocity:	102.9	ft/sec	Exhaust flow ÷ stack area

Emission Calculations

Uncontrolled Emissions [3]

NO_x	CO	NMNEHC	SO_2 [1]	H_2S [1]			
14.6	9.5	0.35	0.045	0.001	g/hp-hr	Mfg data	Engine data
			5		gr Total Sulfur/Msc	Pipeline specification	
72.42	**47.12**	**4.44**	**0.22**	**0.01**	lb/hr	Hourly emission rate	
79.30	**51.60**	**4.86**	**0.24**	**0.01**	tpy	Annual emission rate (8760 hrs/yr)	

PM[2]	HCOH	Total HAPs		
0.010	0.17		lb/MMBtu	AP-42 Table 3.2-2
			g/hp-hr	Mfg data
0.16	**2.70**	**0.73**	lb/hr	Hourly emission rate
0.18	**2.96**	**3.21**	tpy	Annual emission rate (8760 hrs/yr)

Controlled Emissions

NO_x	CO	NMNEHC	SO_2	H_2S		
0.30	0.30	0.20	0.045	0.001	g/hp-hr	Catalyst data with 25% safety factor
			5		gr Total Sulfur/Msc	Pipeline specification
1.488	**1.488**	**1.310**	**0.223**	**0.006**	lb/hr	Hourly emission rate
1.63	**1.63**	**1.43**	**0.24**	**0.01**	tpy	Annual emission rate (8760 hrs/yr)

PM[2]	HCOH[3]	Total HAPs		
0.010	0.02		lb/MMBtu	AP-42 Table 3.2-2
			g/hp-hr	Mfg data
0.16	**0.32**	**0.14**	lb/hr	Hourly emission rate
0.18	**0.35**	**0.60**	tpy	Annual emission rate (8760 hrs/yr)

[1] SO_2 emissions based on fuel sulfur content of 5 gr S/100 scf, or 0.00714 lb S/Mscf
0.00714 lb S/Mscf * fuel consumption (Mscf/hr) * 64 lb SO_2/32 lb S = lb SO2/hr
H_2S emissions based on 0.25 g H2S/100 scf, or 0.0004 lb H2S/Mscf in fuel
0.0004 lb H2S/Mscf fuel * fuel consumption (Mscf/hr) = lb H2S/hr
[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$. The emission factor used is filterable plus condensable PM.
[3] Emission factor provided in Catalyst Spec sheet

DLK Black River Midstream LLC
Greenhouse Gas Emissions

Capacity:

15.9	MMBtu/hr.	Nameplate heat rate	(Manufacturers data)
19.07	MMBtu/hr.	Heat rate, max firing rate (20% safety factor added)	

Greenhouse Gases Emissions from Natural Gas Combustion

Tier 1

40 CFR 98 (b)(1)(v) The Tier 1 Calculation Methodology: (v) May be used for natural gas combustion in a unit of any size, in cases where the annual natural gas consuption is obtained from fuel billing records in units of therm or mmBtu.

Subpart C- General Stationary Fuel Combustion Sources 98.30

$CO_2 = 1 \times 10^{-3} \times Gas \times EF$ (Eq. C-1a)

where:

CO_2 = Annual CO_2 mass emission from natural gas combustion (metric ton).

Gas = Annual natural gas usage, from billing records (mmBtu)

EF = Fuel-specific default CO_2 emission factor for natural gas (kg CO_2/mmBtu)

Table C1 of this subpart = 53.02 (kg Co2/mmBtu)

Annual gas usage =

19.07	MMBtu	8,760	hrs	53.06	kg CO_2	1	Metric Ton
	hr		yr		MMBtu	1000	kg

CO_2 =	8,863.9	metric ton/yr
	9,768.0	ton (US)/yr

CH_4 or N_2O = 1 x 10-3 x Fuel x EF (Eq. C-8b)

where:

CH_4 or N_2O = Annual Emission from the combustion of natural gas (metric tons)

CH_4 = 1.0 x 10-3 kg CH_4/mmBtu

From Table C-2 To Subpart C of Part 68 - Default CH4 and N2O Emission Factors for Various Types of Fuel: Natural Gas

Annual gas usage =	19.07	MMBtu	8,760	hrs	1.00E-03	kg CH_4	1	Metric Ton
		hr		yr		MMBtu	1000	kg

CH_4 =	0.17	metric ton/yr
	0.18	ton (US)/yr

Converted to CO_{2e}	0.18	25	=	4.6	tons/yr CO_{2e}

N_2O = 1.0 x 10-4 kg N_20/mmBtu

From Table C-2 To Subpart C of Part 68 - Default CH4 and N2O Emission Factors for Various Types of Fuel: Natural Gas

Annual gas usage =	19.07	MMBtu	8,760	hrs	1.00E-04	kg N_2O	1	Metric Ton
		hr		yr		MMBtu	1000	kg

N_2O=	0.017	metric ton/yr
	0.018	ton (US)/yr

Converted to CO_{2e}	0.02	298	=	5.5	tons/yr CO_{2e}

Total Engine CO_{2e} 9,778.1 tons/yr CO_{2e}

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Black River Gas Processing Plant

Unit Numbers:	ENG-1, ENG-2, ENG-3 , ENG-4	
Source description:	4 Stroke	Lean Burn Natural Gas Engine
Manufacturer:	Waukesha	
Model:	P9394GSI	
Aspiration:	Turbo-charged	
Hours of Operation	2190	
Rated Horsepower	2250	
Heat Input	15.89	Mmbtu/hr
Fuel Type	Natural Gas	

HAPs	**Emission Factor[1]**	**Emissions**	
	lb/MMBtu	**pph**	**tpy**
Benzene	0.0004	0.0070	0.0077
Toluene	0.0004	0.0065	0.0071
Acetaldehyde	0.0084	0.1329	0.1455
Acrolein	0.0051	0.0817	0.0894
Xylenes	0.0002	0.0029	0.0032
	Total:	**0.231**	**0.253**

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Black River Gas Processing Plant

Heater Treater/Bioler Calculations

Unit No.	HT-101	
Heater/Boiler rating (MMBtu/hr):	6.98	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
NO_x	100.000	0.686	3.007
CO	84.000	0.577	2.526
VOC	5.500	0.038	0.165
PM_{10}	7.600	0.052	0.229
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.004	0.018

If the heater/boiler is fueled by Sour Gas, cannot use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0000**
SO_2 produced (lb/hr) =	**0.0000**
SO_2 produced (tpy) =	**0.0000**

assumptions:		
SO2 MW	64.06	lb/lb-mole
Ideal Gas Law	378.61	SCF/lb-mole

Unit No.	HT-801	
Heater/Boiler rating (MMBtu/hr):	6.97	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
NO_x	100.000	0.685	3.002
CO	84.000	0.576	2.522
VOC	5.500	0.038	0.165
PM_{10}	7.600	0.052	0.228
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.004	0.018

If the heater/boiler is fueled by Sour Gas, cannot use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0000**
SO_2 produced (lb/hr) =	**0.0000**
SO_2 produced (tpy) =	**0.0000**

assumptions:		
SO2 MW	64.06	lb/lb-mole
Ideal Gas Law	378.61	SCF/lb-mole

Unit No.	HT-102	
Heater/Boiler rating (MMBtu/hr):	9.74	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	**Emission Factor (lb/MMCF)**	**lb/hr**	**tpy**
NO_x	100.000	0.958	4.196
CO	84.000	0.805	3.524
VOC	5.500	0.053	0.231
PM_{10}	7.600	0.073	0.319
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.006	0.025

If the heater/boiler is fueled by Sour Gas, <u>cannot</u> use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:				
Fuel H_2S content (mol %) =	**0.0000**	assumptions:		
SO_2 produced (lb/hr) =	**0.0000**	SO2 MW	64.06	lb/lb-mole
SO_2 produced (tpy) =	**0.0000**	Ideal Gas Law	378.61	SCF/lb-mole

Unit No.	AR-1	
Heater/Boiler rating (MMBtu/hr):	21.09	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	**Emission Factor (lb/MMCF)**	**lb/hr**	**tpy**
NO_x	100.000	2.074	9.085
CO	84.000	1.742	7.631
VOC	5.500	0.114	0.500
PM_{10}	7.600	0.158	0.690
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.012	0.055

If the heater/boiler is fueled by Sour Gas, <u>cannot</u> use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:				
Fuel H_2S content (mol %) =	**0.0000**	assumptions:		
SO_2 produced (lb/hr) =	**0.0000**	SO2 MW	64.06	lb/lb-mole
SO_2 produced (tpy) =	**0.0000**	Ideal Gas Law	378.61	SCF/lb-mole

Unit No.	DR-1	
Heater/Boiler rating (MMBtu/hr):	2.9	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
NO_x	100.000	0.285	1.249
CO	84.000	0.240	1.049
VOC	5.500	0.016	0.069
PM_{10}	7.600	0.022	0.095
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.002	0.007

If the heater/boiler is fueled by Sour Gas, cannot use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:			
Fuel H_2S content (mol %) =	**0.0000**	assumptions:	
SO_2 produced (lb/hr) =	**0.0000**	SO2 MW	64.06 lb/lb-mole
SO_2 produced (tpy) =	**0.0000**	Ideal Gas Law	378.61 SCF/lb-mole

Unit No.	HT-103	
Heater/Boiler rating (MMBtu/hr):	9.74	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
NO_x	100.000	0.958	4.196
CO	84.000	0.805	3.524
VOC	5.500	0.053	0.231
PM_{10}	7.600	0.073	0.319
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.006	0.025

If the heater/boiler is fueled by Sour Gas, cannot use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:			
Fuel H_2S content (mol %) =	**0.0000**	assumptions:	
SO_2 produced (lb/hr) =	**0.0000**	SO2 MW	64.06 lb/lb-mole
SO_2 produced (tpy) =	**0.0000**	Ideal Gas Law	378.61 SCF/lb-mole

Unit No.	HT-802	
Heater/Boiler rating (MMBtu/hr):	6.2	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	**Emission Factor (lb/MMCF)**	**lb/hr**	**tpy**
NO_x	100.000	0.610	2.671
CO	84.000	0.512	2.243
VOC	5.500	0.034	0.147
PM_{10}	7.600	0.046	0.203
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.004	0.016

If the heater/boiler is fueled by Sour Gas, <u>cannot</u> use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:				
Fuel H_2S content (mol %) =	**0.0000**	assumptions:		
SO_2 produced (lb/hr) =	**0.0000**	SO2 MW	64.06	lb/lb-mole
SO_2 produced (tpy) =	**0.0000**	Ideal Gas Law	378.61	SCF/lb-mole

Unit No.	AR-2	
Heater/Boiler rating (MMBtu/hr):	23.92	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	**Emission Factor (lb/MMCF)**	**lb/hr**	**tpy**
NO_x	100.000	2.352	10.304
CO	84.000	1.976	8.655
VOC	5.500	0.129	0.567
PM_{10}	7.600	0.179	0.783
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.014	0.062

If the heater/boiler is fueled by Sour Gas, <u>cannot</u> use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:				
Fuel H_2S content (mol %) =	**0.0000**	assumptions:		
SO_2 produced (lb/hr) =	**0.0000**	SO2 MW	64.06	lb/lb-mole
SO_2 produced (tpy) =	**0.0000**	Ideal Gas Law	378.61	SCF/lb-mole

Unit No.	DR-2	
Heater/Boiler rating (MMBtu/hr):	2.5	
Rating above is **(select from list)**:	*below 100 MMBtu/hr, uncontrolled*	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value, LHV (Btu/SCF):	1016.8	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
NO_x	100.000	0.246	1.077
CO	84.000	0.207	0.905
VOC	5.500	0.014	0.059
PM_{10}	7.600	0.019	0.082
$PM_{2.5}$	5.700	0.039	0.171
SO_2	0.600	0.001	0.006

If the heater/boiler is fueled by Sour Gas, cannot use emission factors above to calculate SO_2 emissions, must use SO_2 mass balance:

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0000**
SO_2 produced (lb/hr) =	**0.0000**
SO_2 produced (tpy) =	**0.0000**

assumptions:		
SO2 MW	64.06	lb/lb-mole
Ideal Gas Law	378.61	SCF/lb-mole

DLK Black River Midstream LLC
Black River Gas Processing Plant

Glycol Dehydrator Emissions

Calculated Using GRI-GLYCalc or a Process Simulator
A) Enter information into the yellow boxes.
B) VOC and H2S control efficiencies may be entered (if applicable). VOC, benzene, and H2S regenerator condenser efficiencies may also be entered (if applicable).
C) There are two separate areas to enter information about the two emissions points, the flash tank and the regenerator. Then underneath, there is a table of the sum of flash tank and regenerator emissions.
D) The program results and any lab analysis results used as the calculation basis must be provided.

E) Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).

F) Make sure to answer the control device question.

G) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

EPN	Dehy-1
Identifier	Plant 2 - Dehy Unit

Glycol Dehydrator Unit Information	
Are you using GLYCalc or a Process Simulator?	Process Simulator
GLYCalc Calculation Method (if using GLYCalc)	NA
Type of Glycol Used:	TEG
Annual Hours of Operation (hrs/yr):	8760
Dry Gas Flow Rate (MMscf/day)	260
Laboratory Wet Gas Analysis Provided? If not, explain why. (Use notes box below if more space needed.)	Yes
Date of Sample:	2/21/2020
Is sample site specific or representative? If representative, please justify. (Use notes box below if more space needed.)	Site specific
At what point in the process was the sample taken?	Dehy Inlet
Wet Gas Temperature (°F)	105.00
Wet Gas Pressure (psig)	900.00
Lean Glycol Pump Type	Pneumatic
Lean Glycol Pump Make and Model	Pnuematic
Lean Glycol Flow Rate (gpm)	51.00
Number of Pump Stokes per Minute for the Lean Glycol Pump (pump strokes/min, if applicable)	NA
Flash Tank Temperature (°F)	109.74
Flash Tank Pressure (psig)	80.00

Flash Tank		
Is there a flash tank? (If no, leave the inputs in this block blank.)	Yes	-
	lb/hr	tpy
Emissions Uncontrolled VOC,(lb/hr, tpy)	81.256	355.901
Emissions Uncontrolled Benzene, (lb/hr, tpy)	0.163	0.712
Emissions Uncontrolled H2S, (lb/hr, tpy)	0.000	0.000
Are flash tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(C) controlled by another type of control device	
VOC Control Efficiency (%)	100	
H2S Control Efficiency (%)	100	
VOC Results, (lb/hr, tpy)	0	0
Benzene Results, (lb/hr, tpy)	0	0
H2S Results, (lb/hr, tpy)	0	0

Regenerator		
	lb/hr	tpy
Emissions Uncontrolled VOC (lb/hr, tpy)	184.932	810.001
Emissions Uncontrolled Benzene, (lb/hr, tpy)	19.356	84.778
Emissions Uncontrolled H2S, (lb/hr, tpy)	0.000	0.001
Are regenerator vapors controlled by a condenser?	Yes	
VOC Condenser Efficiency (%) - if applicable	3.14	
Benzene Condenser Efficiency (%) - if applicable	4.03	
H2S Condenser Efficiency (%) - if applicable	1.23	
Are regenerator vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(B) cont. by flare/ VC/TO/VRU	
VOC Results, (lb/hr, tpy)	179.132	784.598
Benzene Results, (lb/hr, tpy)	18.575	81.360
H2S Results, (lb/hr, tpy)	0.000	0.001

Sum of Flash Tank and Regenerator Results		
	lb/hr	tpy
VOC Results	0	0
Benzene Results	0	0
H2S Results	0	0

Federal Applicability	
40 CFR Part 63 - Subpart HH	
All area sources, with TEG dehydration units, will have some requirements under the rule. Emission reduction requirements may apply or only recordkeeping requirements may apply.	
Is this subpart applicable?	Yes
If yes, how will compliance be achieved? If no, please explain why.	The permittee shall monitor as required by 40 CFR 63.772(b)(2) to demonstrate facility is exempt from general standards. The permittee shall generate and maintain the records required by 40 CFR 63.774(d)(1)(ii) to demonstrate compliance with the general standard exemptions found in 40 CFR 63.764(e).

Enter any notes here:
TEG Flash routed back to the process. Regenerator stream is routed to Flare, FL-2a

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Black River Gas Processing Plant

Glycol Dehydrator Emissions

Calculated Using GRI-GLYCalc or a Process Simulator
A) Enter information into the yellow boxes.
B) VOC and H2S control efficiencies may be entered (if applicable). VOC, benzene, and H2S regenerator condenser efficiencies may also be entered (if applicable).
C) There are two separate areas to enter information about the two emissions points, the flash tank and the regenerator. Then underneath, there is a table of the sum of flash tank and regenerator emissions.
D) The program results and any lab analysis results used as the calculation basis must be provided.

E) Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).

F) Make sure to answer the control device question.

G) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

EPN	Dehy-2
Identifier	Plant 3 - Dehy Unit

Glycol Dehydrator Unit Information	
Are you using GLYCalc or a Process Simulator?	Process Simulator
GLYCalc Calculation Method (if using GLYCalc)	NA
Type of Glycol Used:	TEG
Annual Hours of Operation (hrs/yr):	8760
Dry Gas Flow Rate (MMscf/day)	200
Laboratory Wet Gas Analysis Provided? If not, explain why. (Use notes box below if more space needed.)	Yes
Date of Sample:	2/21/2020
Is sample site specific or representative? If representative, please justify. (Use notes box below if more space needed.)	Site specific
At what point in the process was the sample taken?	Dehy Inlet
Wet Gas Temperature (°F)	86.58
Wet Gas Pressure (psig)	900.27
Lean Glycol Pump Type	Pneumatic
Lean Glycol Pump Make and Model	
Lean Glycol Flow Rate (gpm)	42.00
Number of Pump Stokes per Minute for the Lean Glycol Pump (pump strokes/min, if applicable)	NA
Flash Tank Temperature (°F)	90.67
Flash Tank Pressure (psig)	80.00

Flash Tank		
Is there a flash tank? (If no, leave the inputs in this block blank.)	Yes	-
	lb/hr	tpy
Emissions Uncontrolled VOC,(lb/hr, tpy)	63.283	277.180
Emissions Uncontrolled Benzene, (lb/hr, tpy)	0.114	0.497
Emissions Uncontrolled H2S, (lb/hr, tpy)	0.000	0.000
Are flash tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(C) controlled by another type of control device	
VOC Control Efficiency (%)	100	
H2S Control Efficiency (%)	100	
VOC Results, (lb/hr, tpy)	0	0
Benzene Results, (lb/hr, tpy)	0	0
H2S Results, (lb/hr, tpy)	0	0

Regenerator		
	lb/hr	tpy
Emissions Uncontrolled VOC (lb/hr, tpy)	163.580	716.480
Emissions Uncontrolled Benzene, (lb/hr, tpy)	20.621	90.318
Emissions Uncontrolled H2S, (lb/hr, tpy)	0.000	0.001
Are regenerator vapors controlled by a condenser?	Yes	
VOC Condenser Efficiency (%) - if applicable	3.53	
Benzene Condenser Efficiency (%) - if applicable	3.73	
H2S Condenser Efficiency (%) - if applicable	0.65	
Are regenerator vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(B) cont. by flare/ VC/TO/VRU	
VOC Results, (lb/hr, tpy)	157.809	691.202
Benzene Results, (lb/hr, tpy)	19.851	86.948
H2S Results, (lb/hr, tpy)	0.000	0.001

Sum of Flash Tank and Regenerator Results		
	lb/hr	tpy
VOC Results	0	0
Benzene Results	0	0
H2S Results	0	0

Federal Applicability	
40 CFR Part 63 - Subpart HH	
All area sources, with TEG dehydration units, will have some requirements under the rule. Emission reduction requirements may apply or only recordkeeping requirements may apply.	
Is this subpart applicable?	Yes
If yes, how will compliance be achieved? If no, please explain why.	The permittee shall monitor as required by 40 CFR 63.772(b)(2) to demonstrate facility is exempt from general standards. The permittee shall generate and maintain the records required by 40 CFR 63.774(d)(1)(ii) to demonstrate compliance with the general standard exemptions found in 40 CFR 63.764(e).

Enter any notes here:
TEG Flash routed back to the process. Regenerator stream is routed to thermal oxidizer TO-2

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Black River Gas Processing Plant

Glycol Dehydrator Emissions

Calculated Using GRI-GLYCalc or a Process Simulator
A) Enter information into the yellow boxes.
B) VOC and H2S control efficiencies may be entered (if applicable). VOC, benzene, and H2S regenerator condenser efficiencies may also be entered (if applicable).
C) There are two separate areas to enter information about the two emissions points, the flash tank and the regenerator. Then underneath, there is a table of the sum of flash tank and regenerator emissions.
D) The program results and any lab analysis results used as the calculation basis must be provided.

E) Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).

F) Make sure to answer the control device question.

G) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

EPN	AM-1
Identifier	Plant 2 - Amine Unit

Amine Unit Information	
Are you using AmineCalc or a Process Simulator?	Process Simulator
AmineCalc Model Selection (if using AmineCalc):	NA
Type of Amine Used:	DEA
Annual Hours of Operation (hrs/yr):	8760
Feed Gas Flow Rate (MMscf/day):	260
Laboratory Feed Gas Analysis Provided? If not, explain why. (Use notes box below if more space needed.)	Yes
Date of Sample:	2/21/2020
Is sample site specific or representative? If representative, please justify. (Use notes box below if more space needed.)	Site specific
At what point in the process was the sample taken?	Amine inlet
Feed Gas Temperature (°F)	89.69
Feed Gas Pressure (psia)	900.00
Lean Amine Flow Rate (gpm)	290.00
Flash Tank Temperature (°F)	95.09
Flash Tank Pressure (psia)	84.70

Flash Tank		
Is there a flash tank? (If no, leave the inputs in this block blank.)	Yes	-
	lb/hr	tpy
Emissions Uncontrolled VOC,(lb/hr, tpy)	14.4932	63.4802
Emissions Uncontrolled Benzene, (lb/hr, tpy)	0.0537	0.2351
Emissions Uncontrolled H2S, (lb/hr, tpy)	0.0093	0.0407
Are flash tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(C) controlled by another type of control device	
VOC Control Efficiency (%)	100	
H2S Control Efficiency (%)	100	
VOC Results, (lb/hr, tpy)	0	0
Benzene Results, (lb/hr, tpy)	0	0
H2S Results, (lb/hr, tpy)	0	0

Regenerator		
	lb/hr	tpy
Emissions Uncontrolled VOC (lb/hr, tpy)	3.6067	15.7972
Emissions Uncontrolled Benzene, (lb/hr, tpy)	1.0957	4.7991
Emissions Uncontrolled H2S, (lb/hr, tpy)	5.5898	24.4831
Are regenerator vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(B) cont. by flare/ VC/TO/VRU	
VOC Results, (lb/hr, tpy)	3.6067	15.7972
Benzene Results, (lb/hr, tpy)	1.0957	4.7991
H2S Results, (lb/hr, tpy)	5.5898	24.4831

Sum of Flash Tank and Regenerator Results		
	lb/hr	tpy
VOC Results	0	0
Benzene Results	0	0
H2S Results	0	0

Federal Applicability	
40 CFR Part 60 - Subpart LLL	
Is this subpart applicable?	No
If yes, how will compliance be achieved? If no, please explain why.	The facility is a natural gas processing plant, however, there is not sulfur recovery plant, thus this location does not meet the applicability criteria of 40 CFR 60.640.

Enter any notes here:
Amine flash is routed back to the process or burned as fuel and regenerator stream is routed to the thermal oxidizer, TO-1.

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Black River Gas Processing Plant

Amine Unit Emissions

Calculated Using AmineCalc or a Process Simulator
A) Enter information into the yellow boxes.
B) VOC and H2S control efficiencies may be entered (if applicable).

C) There are two separate areas to enter information about the two emissions points, the flash tank and the regenerator. Then underneath, there is a table of the sum of flash tank and regenerator emissions.

D) The program results and any lab analysis results used as the calculation basis must be provided.

E) Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).

F) Make sure to answer the control device question.

EPN	AM-2
Identifier	Plant 3 - Amine Unit

Amine Unit Information	
Are you using AmineCalc or a Process Simulator?	Process Simulator
AmineCalc Model Selection (if using AmineCalc):	NA
Type of Amine Used:	DEA
Annual Hours of Operation (hrs/yr):	8760
Feed Gas Flow Rate (MMscf/day):	200
Laboratory Feed Gas Analysis Provided? If not, explain why. (Use notes box below if more space needed.)	Yes
Date of Sample:	2/21/2020
Is sample site specific or representative? If representative, please justify. (Use notes box below if more space needed.)	Site specific
At what point in the process was the sample taken?	Amine inlet
Feed Gas Temperature (°F)	70.00
Feed Gas Pressure (psia)	1000.00
Lean Amine Flow Rate (gpm)	290.00
Flash Tank Temperature (°F)	84.63
Flash Tank Pressure (psia)	909.69

Flash Tank		
Is there a flash tank? (If no, leave the inputs in this block blank.)	Yes	
	lb/hr	tpy
Emissions Uncontrolled VOC,(lb/hr, tpy)	17.3123	75.8277
Emissions Uncontrolled Benzene, (lb/hr, tpy)	0.0785	0.3438
Emissions Uncontrolled H2S, (lb/hr, tpy)	0.0070	0.0309
Are flash tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(C) controlled by another type of control device	
VOC Control Efficiency (%)	100	
H2S Control Efficiency (%)	100	
VOC Results, (lb/hr, tpy)	0	0
Benzene Results, (lb/hr, tpy)	0	0
H2S Results, (lb/hr, tpy)	0	0

Regenerator		
	lb/hr	tpy
Emissions Uncontrolled VOC (lb/hr, tpy)	4.1626	18.2322
Emissions Uncontrolled Benzene, (lb/hr, tpy)	1.4251	6.2420
Emissions Uncontrolled H2S, (lb/hr, tpy)	4.4347	19.4241
Are regenerator vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(B) cont. by flare/ VC/TO/VRU	
VOC Results, (lb/hr, tpy)	4.1626	18.2322
Benzene Results, (lb/hr, tpy)	1.4251	6.2420
H2S Results, (lb/hr, tpy)	4.4347	19.4241

Sum of Flash Tank and Regenerator Results		
	lb/hr	tpy
VOC Results	0	0
Benzene Results	0	0
H2S Results	0	0

Federal Applicability	
40 CFR Part 60 - Subpart LLL	
Is this subpart applicable?	No
If yes, how will compliance be achieved? If no, please explain why.	The facility is a natural gas processing plant, however, there is not sulfur recovery plant, thus this location does not meet the applicability criteria of 40 CFR 60.640.

Enter any notes here:
Amine flash is routed back to the process or burned as fuel and regenerator stream is routed to the thermal oxidizer, TO-2.

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Tank Emissions - Process Simulator

A) Enter information into the yellow boxes.
B) VOC and H2S control efficiencies may be entered (if applicable).
C) A reduction for produced water tank emissions calculated as oil/condensate may be entered.
D) Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).
E) Make sure to answer the control device question.
F) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

Process Simulator

EPN	Tank Identifier	Throughput (gal/year)	Stream Identification	Turnovers per year	Mixture/Component	RVP (psia)	Temperature (°F)	Emissions Uncontrolled VOC (lb/hr)	Emissions Uncontrolled VOC (ton/yr)	Emissions Uncontrolled Benzene (lb/hr)	Emissions Uncontrolled Benzene (ton/yr)	Emissions Uncontrolled H2S (lb/hr)	Emissions Uncontrolled H2S (ton/yr)	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H2S Control Efficiency (%)	Reduction for Produced Water Tank Calc. as Oil/Cond. (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H2S Results (lb/hr)	H2S Results (tpy)
TK-702A	Condensate Storage Tanl	4459810	T-702 CONDENSATE STOR	262	Condensate	15.02	75.87	21.98	96.27	0.13	0.57	0.00	0.00	(B) cont. by flare/ VC/TO/VRU	98	98	0.00	21.98	96.27	0.13	0.57	0.00	0.00
TK-702B	Condensate Storage Tanl	4459810	T-702 CONDENSATE STOR	262	Condensate	15.02	75.87	21.98	96.27	0.13	0.57	0.00	0.00	(B) cont. by flare/ VC/TO/VRU	98	98	0.00	21.98	96.27	0.13	0.57	0.00	0.00
TK-702C	Condensate Storage Tanl	4459810	T-702 CONDENSATE STOR	262	Condensate	15.02	75.87	21.98	96.27	0.13	0.57	0.00	0.00	(B) cont. by flare/ VC/TO/VRU	98	98	0.00	21.98	96.27	0.13	0.57	0.00	0.00
TK-702D	Condensate Storage Tanl	4459810	T-702 CONDENSATE STOR	262	Condensate	15.02	75.87	21.98	96.27	0.13	0.57	0.00	0.00	(B) cont. by flare/ VC/TO/VRU	98	98	0.00	21.98	96.27	0.13	0.57	0.00	0.00
TK-702E	Condensate Storage Tanl	4459810	T-702 CONDENSATE STOR	262	Condensate	15.02	75.87	21.98	96.27	0.13	0.57	0.00	0.00	(B) cont. by flare/ VC/TO/VRU	98	98	0.00	21.98	96.27	0.13	0.57	0.00	0.00
TK-702F	Condensate Storage Tanl	4459810	T-702 CONDENSATE STOR	262	Condensate	15.02	75.87	21.98	96.27	0.13	0.57	0.00	0.00	(B) cont. by flare/ VC/TO/VRU	98	98	0.00	21.98	96.27	0.13	0.57	0.00	0.00
																	Totals:	131.88	577.63	0.78	3.42	0.00	0.00

VOC Type:
Crude Oil or Condensate VOC

Emission Type:
Steady State (continuous)

Enter any notes here:

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Tank Emissions - Process Simulator

A) Enter information into the yellow boxes.
B) VOC and H2S control efficiencies may be entered (if applicable).
C) A reduction for produced water tank emissions calculated as oil/condensate may be entered.
D) Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).
E) Make sure to answer the control device question.
F) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

Process Simulator

EPN	Tank Identifier	Throughput (gal/year)	Stream Identification	Turnovers per year	Mixture/Component	RVP (psia)	Temperature (°F)	Emissions Uncontrolled VOC (lb/hr)	Emissions Uncontrolled VOC (ton/yr)	Emissions Uncontrolled Benzene (lb/hr)	Emissions Uncontrolled Benzene (ton/yr)	Emissions Uncontrolled H2S (lb/hr)	Emissions Uncontrolled H2S (ton/yr)	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H2S Control Efficiency (%)	Reduction for Produced Water Tank Calc. as Oil/Cond. (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H2S Results (lb/hr)	H2S Results (tpy)
TK-701	Produced Water Tank	1230918	T-701 PRODUCED WATER TAI	73	Produced Water	5.08	75.56	0.27	1.18	0.06	0.02	0.00	0.00	(B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU)	98	98	0	0.27	1.18	0.06	0.02	0.00	0.00
																	Totals:	**0.27**	**1.18**	**0.06**	**0.02**	**0.00**	**0.00**

VOC Type:
Crude Oil or Condensate VOC

Emission Type:
Steady State (continuous)

Enter any notes here:

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Black River Gas Processing Plant

Thermal Oxidizer Emissions

General Information

Flare functions as emergency control device. When streams are fed to flare it will be treated as an emission event.

(1) Control Equipment:	Thermal Oxidizer	
(2) EPN:	TO-1	
(3) What kind of device is this? Pick from list.	Thermal Oxidizer	
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)	
	NOx	0.14
	CO	0.13
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes	
	Enter pilot stream information into the boxes in the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.	
	Emission Factors for Pilot Stream (lb/MMscf)	
	NOx	100
	CO	84
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Pilot Stream (ppmv)	
	NOx	0
	CO	0
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes	
	Enter added fuel stream information into the boxes in the column for Steam No. 2 below.	
	Emission Factors for Added Fuel Stream (ppmv)	
	NOx	
	CO	

Emission Factors

[1] Emission Factors from Zeeco Guarantee (lb/MMBtu)

NOx	0.14	lb/MMBtu
CO	0.13	lb/MMBtu

[4] Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

PM10	7.6	lb/MMscf
PM2.5	5.7	lb/MMscf

Zeeco Guarantee (MMBtu/hr)

Maximum Heating Value Acid Gas	9.9	MMBtu/hr
Maximum Heating Value Glycol Gas	5.6	MMBtu/hr

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Added Fuel Stream (lb/MMBtu) NOx 0 CO 0	
(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	99	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	automatic ignition system	

Thermal Oxidizer No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Thermal Oxidizer Name (Enter Names of Each Stream Here)	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-1 (stream 217)**											-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	470	106482											**106952.0833**
Amount of Time Stream Fired (hrs/yr)	8760	8760											-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	4,117,200	932,783,050											**936,900,250**
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1016.80	8.02											-
propane weight percent of total stream (%) *OPTIONAL*	0.16	0.01											-
VOC weight percent of total stream (%) *OPTIONAL*	0.18	0.03											-

Hourly (lb/hr)													
Stream Sent to Thermal Oxidizer No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Thermal Oxidizer Name	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-1 (stream 217)**											**-**
H2S	-	5.59											**5.59**
Crude or Condensate VOC	-												**0.00**
Natural Gas VOC	-	3.61											**3.61**
Total VOC	-	3.61											**3.61**
Benzene	-	1.10											**1.10**
Annual (tpy)													
H2S	-	24											**24.48**
Crude or Condensate VOC	-												**0.00**
Natural Gas VOC	-	15.80											**15.80**
Total VOC	-	15.80											**15.80**
Benzene	-	4.80											**4.80**

Controlled Emissions

Hourly (lb/hr)

Stream Sent to Thermal Oxidizer No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Thermal Oxidizer Name	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-1 (stream 217)**											**-**
NOx	0.000	1.386	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.39**
CO	0.000	1.287	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.29**
PM2.5	0.000	0.607	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.61**
PM10	0.000	0.809	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.81**
H2S	0.001	0.112	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.11**
SO2	0.003	10.507	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**10.51**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	`	0.000	**0.00**
Natural Gas VOC	0.00	0.06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.06**
Total VOC	0.00	0.06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.06**
Benzene	0.000	0.02191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**

Annual (tpy)													
Stream Sent to Thermal Oxidizer No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Thermal Oxidizer Name	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-1 (stream 217)**											**-**
NOx	0.206	6.071	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**6.28**
CO	0.173	5.637	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**5.81**
PM2.5	0.002	2.658	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.66**
PM10	0.003	3.545	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**3.55**
H2S	0.006	0.490	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.50**
SO2	0.012	46.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**46.03**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.249	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.25**
Total VOC	0.000	0.249	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.25**
Benzene	0.000	0.0960	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.10**

[1] CO and NOx emissions calculated based on the emission gurantees from manufacturer and the exhaust flue from the TO.

[2] $PM_{10}/PM_{2.5}$ AP-42 Factors

Thermal Oxidizer Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	0.00	0.00
Natural Gas VOC	0.06	0.25
Total VOC	0.06	0.25
NO_x	1.39	6.28
CO	1.29	5.81
$PM_{2.5}$	0.61	2.66
PM_{10}	0.81	3.55
H_2S	0.11	0.50
SO_2	10.51	46.03
Benzene	0.02	0.10

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Thermal Oxidizer SSM

A) Enter information into the yellow boxes.

B) Please provide a separate detailed calculation for these emissions; also include any necessary supplemental information and notes (such as the source/justification for any calculation inputs).

C) Since these emissions fall into the category of "Other", which does not have a pre-made emission estimation sheet with pre-approved methods, the time to review this project cannot be guaranteed to be as quick as if only pre-made sheets had been used.
D) VOC and H2S control efficiencies may be entered (if applicable).
E) Make sure to answer the control device question.

F) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

EPN:	TO-1 SSM
Name:	Thermal Oxidizer SSM

Are these vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(A) uncontrolled

Uncontrolled Emissions			
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Control Efficiency
Total VOC	3.607	0.316	0
NO_x	0.000	0.000	0
CO	0.000	0.000	0
$PM_{2.5}$	0.000	0.000	0
PM_{10}	0.000	0.000	0
H_2S	5.590	0.490	0
SO_2	0.000	0.000	0
Benzene	1.096	0.096	0
Formaldehyde	0.000	0.000	0

Total Emissions (control efficiencies factored in if applicable)		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	3.61	0.32
NO_x	0.00	0.00
CO	0.00	0.00
$PM_{2.5}$	0.00	0.00
PM_{10}	0.00	0.00
H_2S	5.59	0.49
SO_2	0.00	0.00
Benzene	1.10	0.10
Formaldehyde	0.00	0.00

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Thermal Oxidizer Emissions

General Information

Flare functions as emergency control device. When streams are fed to flare it will be treated as an emission event.

(1) Control Equipment:	Thermal Oxidizer	
(2) EPN:	TO-2	
(3) What kind of device is this? Pick from list.	Thermal Oxidizer	
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)	
	NOx	0.14
	CO	0.13
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes	
	Enter pilot stream information into the boxes in the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.	
	Emission Factors for Pilot Stream (lb/MMscf)	
	NOx	100
	CO	84
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Pilot Stream (ppmv)	
	NOx	0
	CO	0
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Added Fuel Stream (ppmv)	
	NOx	
	CO	

Emission Factors

[1]Emission Factors from Zeeco Guarantee (lb/MMBtu)

NOx	0.14	lb/MMBtu
CO	0.13	lb/MMBtu

[2]Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

PM10	7.6	lb/MMscf
PM2.5	5.7	lb/MMscf

Zeeco Guarantee (MMBtu/hr)

Maximum Heating Value Acid Gas	9.9	MMBtu/hr
Maximum Heating Value Glycol Gas	5.6	MMBtu/hr

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Added Fuel Stream (lb/MMBtu) NOx 0 CO 0	
(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	99	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	automatic ignition system	

Stream Sent to Thermal Oxidizer No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Thermal Oxidizer Name	Pilot + Sweep Gas	Waste Gas from Amine, AM-2 (Stream 94)	Waste gas from Dehy, DEHY-2 (Stream Condenser OVHD2)										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	470	93348	1308										95126.20833
Amount of Time Stream Fired (hrs/yr)	8760	8760	8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	4,117,200	817,731,400	11,456,985										833,305,585
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1016.80	8.52	2538.86										-
propane weight percent of total stream (%) *OPTIONAL*	0.16	0.02	17.17										-
VOC weight percent of total stream (%) *OPTIONAL*	0.18	0.04	82.51										-

Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-2 (Stream 94)**	**Waste gas from Dehy, DEHY-2 (Stream Condenser OVHD2)**										**-**
H2S	-	4.43	0.00										**4.43**
Crude or Condensate VOC	-												**0.00**
Natural Gas VOC	-	4.16	157.81										**161.97**
Total VOC	-	4.16	157.81										**161.97**
Benzene	-	1.43	19.85										**21.28**
Annual (tpy)													
H2S	-	19	0										**19.43**
Crude or Condensate VOC	-	0.00	0.00										**0.00**
Natural Gas VOC	-	18.23	691.20										**709.43**
Total VOC	-	18.23	691.20										**709.43**
Benzene	-	6.24	86.95										**93.19**

Controlled Emissions

Hourly (lb/hr)													
Stream Sent to Thermal Oxidizer No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Thermal Oxidizer Name	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-2 (Stream 94)**	**Waste gas from Dehy, DEHY-2 (Stream Condenser OVHD2)**										**-**
NOx	0.000	1.386	0.784	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.17**
CO	0.000	1.287	0.728	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.02**
PM2.5	0.000	0.532	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.54**
PM10	0.000	0.709	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.72**
H2S	0.001	0.089	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.09**
SO2	0.003	8.336	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**8.34**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	`	0.000	**0.00**
Natural Gas VOC	0.00	0.07	2.828	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.90**
Total VOC	0.00	0.07	2.828	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.90**
Benzene	0.000	0.02850	0.397	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.43**

Annual (tpy)													
Stream Sent to Thermal Oxidizer No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Thermal Oxidizer Name	**Pilot + Sweep Gas**	**Waste Gas from Amine, AM-2 (Stream 94)**	**Waste gas from Dehy, DEHY-2 (Stream Condenser OVHD2)**										**-**
NOx	0.206	6.071	3.434	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**9.71**
CO	0.173	5.637	3.189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**9.00**
PM2.5	0.002	2.331	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.36**
PM10	0.003	3.107	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**3.15**
H2S	0.006	0.388	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.39**
SO2	0.012	36.511	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**36.52**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.297	12.386	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**12.68**
Total VOC	0.000	0.297	12.386	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**12.68**
Benzene	0.000	0.1248	1.739	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.86**

[1] CO and NOx emissions calculated based on the emission gurantees from manufacturer and the exhaust flue from the TO.

[2] PM_{10}/$PM_{2.5}$ AP-42 Factors

Thermal Oxidizer Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	0.00	0.00
Natural Gas VOC	2.90	12.68
Total VOC	2.90	12.68
NO_x	2.17	9.71
CO	2.02	9.00
$PM_{2.5}$	0.54	2.36
PM_{10}	0.72	3.15
H_2S	0.09	0.39
SO_2	8.34	36.52
Benzene	0.43	1.86

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Thermal Oxidizer SSM

A) Enter information into the yellow boxes.

B) Please provide a separate detailed calculation for these emissions; also include any necessary supplemental information and notes (such as the source/justification for any calculation inputs).
C) Since these emissions fall into the category of "Other", which does not have a pre-made emission estimation sheet with pre-approved methods, the time to review this project cannot be guaranteed to be as quick as if only pre-made sheets had been used.

D) VOC and H2S control efficiencies may be entered (if applicable).
E) Make sure to answer the control device question.

F) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

EPN:	TO-2 SSM
Name:	Thermal Oxidizer SSM

Are these vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(A) uncontrolled

Uncontrolled Emissions			
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Control Efficiency
Total VOC	157.809	13.824	0
NOx	0.000	0.000	0
CO	0.000	0.000	0
PM2.5	0.000	0.000	0
PM10	0.000	0.000	0
H2S	0.000	0.000	0
SO2	0.000	0.000	0
benzene	19.851	1.739	0
formaldehyde	0.000	0.000	0

Total Emissions (control efficiencies factored in if applicable)		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	157.81	13.82
NOx	0.00	0.00
CO	0.00	0.00
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.00	0.00
benzene	19.85	1.74
formaldehyde	0.00	0.00

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Flare/Vapor Combustor Emissions

General Information

Flare functions as emergency control device. When streams are fed to flare it will be treated as an emission event.

(1) Control Equipment:	Plant 1 SSM/M	
(2) EPN:	FL-1	
(3) What kind of device is this? Pick from list.	Flare	
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)	
	NOx	0.138
	CO	0.2755
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes	
	Enter pilot stream information into the boxes in the column for Stream No. 1 below. If	
	Emission Factors for Pilot Stream (lb/MMscf)	
	NOx	100
	CO	84
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Pilot Stream (ppmv)	
	NOx	0
	CO	0
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Added Fuel Stream (ppmv)	
	NOx	
	CO	
(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No	
	Please move on to next question below.	
	Emission Factors for Added Fuel Stream (lb/MMBtu)	
	NOx	0
	CO	0

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100
CO	84

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.2755	CO	0.3503
Non-steam assisted, low Btu		Steam assisted, low Btu	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

Emission Factors from AP-42 Table 1.4-2 and 1.4-3 (lb/MMscf)

SO_2	0.6
VOC	5.5
benzene	0.002

(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	99	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	continuous pilot	

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	Pilot + Sweep Gas	Compressor Blowdowns	Plant 1 Malfunction										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	360	300000	450000										750360
Amount of Time Stream Fired (hrs/yr)	8760	48	24										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	3,153,600	14,400,000	10,800,000										28,353,600
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1016.80	1225.30	1,225.30										-
propane weight percent of total stream (%) *OPTIONAL*	0.164579979	10.70655266	10.71										-
VOC weight percent of total stream (%) *OPTIONAL*	0.18	19.64	19.645										-

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas	Compressor Blowdowns	Plant 1 Malfunction										
Hourly (lb/hr)													
H2S	-	0.1593	0.24										0.40
Crude or Condensate VOC	-												0.00
Natural Gas VOC	-	3146.56	4719.84										7866.40
Total VOC	-	3146.56	4719.84										7866.40
Benzene	-	3.65	5.48										9.13
Annual (tpy)													
H2S	-	0.00382	0.00										0.01
Crude or Condensate VOC	-												0.00
Natural Gas VOC	-	75.52	56.64										132.16
Total VOC	-	75.52	56.64										132.16
Benzene	-	0.0876	0.07										0.15

Controlled Emissions													
						Hourly (lb/hr)							
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**Pilot + Sweep Gas**	**Compressor Blowdowns**	**Plant 1 Malfunction**										
NOx	0.036	50.727	76.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**126.85**
CO	0.030	101.271	151.907	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**253.21**
H2S	0.000	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
SO2	0.000	0.300	0.449	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.75**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	`	0.000	**0.00**
Natural Gas VOC	0.00	45.78	68.673	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**114.46**
Total VOC	0.00	45.78	68.673	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**114.46**
Benzene	0.000	0.07304	0.110	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.18**
						Annual (tpy)							
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**Pilot + Sweep Gas**	**Compressor Blowdowns**	**Plant 1 Malfunction**										-
NOx	0.158	1.217	0.913	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.29**
CO	0.132	2.431	1.823	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**4.39**
H2S	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.001	0.007	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.009	1.099	0.824	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.93**
Total VOC	0.009	1.099	0.824	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.93**
Benzene	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions				
	SSM Emissionson		**Malfunction Emissions**	
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	0.000	0.000	0.000	0.000
Natural Gas VOC	45.78	1.11	68.67	0.82
Total VOC	45.78	1.11	68.67	0.82
NO_x	50.76	1.38	76.09	0.91
CO	101.30	2.56	151.91	1.82
H_2S	0.00	0.00	0.00	0.00
SO_2	0.30	0.01	0.45	0.01
Benzene	0.07	0.00	0.11	0.001

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Flare/Vapor Combustor Emissions

General Information

Flare functions as a control device. When streams are fed to flare it will be treated as an emission event.

(1) Control Equipment:	Flare		
(2) EPN:	FL-2a		
(3) What kind of device is this? Pick from list.	Flare		
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)		
	NOx	0.138	
	CO	0.2755	
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes		
	Enter pilot stream information into the boxes in the column for Stream No. 1 below. If		
	Emission Factors for Pilot Stream (lb/MMscf)		
	NOx	100	
	CO	84	
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Pilot Stream (ppmv)		
	NOx	0	
	CO	0	
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (ppmv)		
	NOx		
	CO		
(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (lb/MMBtu)		
	NOx	0	
	CO	0	

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100
CO	84

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.2755	CO	0.3503
Non-steam assisted, low Btu		Steam assisted, low Btu	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

Emission Factors from AP-42 Table 1.4-2 and 1.4-3 (lb/MMscf)

SO_2	0.6
VOC	5.5
benzene	2.10E-03

(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	99	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	continuous pilot	

Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	**Pilot + Sweep Gas**	**Dehy Overhead, DEHY-1 (Stream Condenser Ovhd)**											-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	510	1427											**1937.383333**
Amount of Time Stream Fired (hrs/yr)	8760	8760											-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	4,467,600	12,503,878											**16,971,478**
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1016.80	2490											-
propane weight percent of total stream (%) *OPTIONAL*	0.164579979	17.36											-
VOC weight percent of total stream (%) *OPTIONAL*	0.18	81.33											-

							Hourly (lb/hr)						
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**Pilot + Sweep Gas**	**Dehy Overhead, DEHY-1 (Stream Condenser Ovhd)**											-
H2S	-	0.0002											**0.00**
Crude or Condensate VOC	-												**0.00**
Natural Gas VOC	-	179.13											**179.13**
Total VOC	-	179.13											**179.13**
Benzene	-	18.58											**18.58**
							Annual (tpy)						
H2S	-	0.00098											**0.00**
Crude or Condensate VOC	-												**0.00**
Natural Gas VOC	-	784.60											**784.60**
Total VOC	-	784.60											**784.60**
Benzene	-	81.3599											**81.36**

Controlled Emissions

	Hourly (lb/hr)												
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**Pilot + Sweep Gas**	**Dehy Overhead, DEHY-1 (Stream Condenser Ovhd)**											**-**
NOx	0.051	0.490	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.54**
CO	0.043	0.979	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.02**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	`	0.000	**0.00**
Natural Gas VOC	0.00	3.20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**3.20**
Total VOC	0.00	3.20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**3.20**
Benzene	0.000	0.37151	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.37**
	Annual (tpy)												
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**Pilot + Sweep Gas**	**Dehy Overhead, DEHY-1 (Stream Condenser Ovhd)**											**-**
NOx	0.223	2.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.37**
CO	0.188	4.288	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**4.48**
H2S	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.012	14.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**14.03**
Total VOC	0.012	14.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**14.03**
Benzene	0.000	1.627	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.63**

Flare/Vapor Combustor Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	0.00	0.00
Natural Gas VOC	3.20	14.03
Total VOC	3.20	14.03
NO_x	0.54	2.37
CO	1.02	4.48
H_2S	0.00	0.00
SO_2	0.00	0.00
Benzene	0.37	1.63

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Flare/Vapor Combustor Emissions

General Information

Flare functions as emergency control device. When streams are fed to flare it will be treated as an emission event.

(1) Control Equipment:	Plant 2 SSM/M		
(2) EPN:	FL-2b		
(3) What kind of device is this? Pick from list.	Flare		
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)		
	NOx	0.138	
	CO	0.2755	
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Pilot Stream (lb/MMscf)		
	NOx	0	
	CO	0	
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Pilot Stream (ppmv)		
	NOx	0	
	CO	0	
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (ppmv)		
	NOx		
	CO		
(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (lb/MMBtu)		
	NOx	0	
	CO	0	

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100
CO	84

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.2755	CO	0.3503
Non-steam assisted, low Btu		Steam assisted, low Btu	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

Emission Factors from AP-42 Table 1.4-2 and 1.4-3 (lb/MMscf)

SO_2	0.6
VOC	5.5
benzene	2.10E-03

(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	99	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	automatic ignition system	

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	Pilot + Sweep Gas (accounted for in FL-2)	Dehy-1 SSM Flash Gas - Stream 16	AM-1 SSM Flash Gas Stream220	Compressor Blowdowns	Plant 2 Malfunction								-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)		3081	2359	750000.00	1000000.00								1755439.717
Amount of Time Stream Fired (hrs/yr)		1752	1752	60.00	36.00								-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	-	5,397,839	4,132,545	45000000.00	36000000.00								90,530,384
Heat Value of Stream - from program results or gas analysis (Btu/scf)		1521.90	1,146.87	1225.30	1225.30								-
propane weight percent of total stream (%) *OPTIONAL*		19.96	7.81	10.71	10.71								-
VOC weight percent of total stream (%) *OPTIONAL*		38.88	11.680	19.64	19.64								-

						Hourly (lb/hr)							
Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas (accounted for in FL-2)	Dehy-1 SSM Flash Gas - Stream 16	AM-1 SSM Flash Gas Stream220	Compressor Blowdowns	Plant 2 Malfunction								-
H2S	-	0.0000	0.01	0.40	0.53								0.94
Crude or Condensate VOC	-												0.00
Natural Gas VOC	-	81.26	14.49	7866.40	10488.54								18450.69
Total VOC	-	81.26	14.49	7866.40	10488.54								18450.69
Benzene	-	0.16	0.05	9.13	12.17								21.52
						Annual (tpy)							
H2S	-	0.00004	0.00814	0.01195	0.00956								0.03
Crude or Condensate VOC	-												0.00
Natural Gas VOC	-	71.18	12.70	235.99	188.79								508.66
Total VOC	-	71.18	12.70	235.99	188.79								508.66
Benzene	-	0.1424	0.0470	0.2739	0.2191								0.68

Controlled Emissions													
	Hourly (lb/hr)												
Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas (accounted for in FL-2)	Dehy-1 SSM Flash Gas - Stream 16	AM-1 SSM Flash Gas Stream220	Compressor Blowdowns	Plant 2 Malfunction								-
NOx	0.000	0.647	0.373	126.819	169.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**296.93**
CO	0.000	1.292	0.745	253.178	337.570	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**592.78**
H2S	0.000	0.000	0.000	0.008	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
SO2	0.000	0.000	0.017	0.749	0.998	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.76**
Crude or Condensate VOC	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	`	0.000	**0.00**
Natural Gas VOC	0.00	1.21	0.193	114.455	152.607	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**268.46**
Total VOC	0.00	1.21	0.193	114.455	152.607	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**268.46**
Benzene	0.000	0.00325	0.001	0.183	0.243	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.43**
	Annual (tpy)												
Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas (accounted for in FL-2)	Dehy-1 SSM Flash Gas - Stream 16	AM-1 SSM Flash Gas Stream220	Compressor Blowdowns	Plant 2 Malfunction								-
NOx	0.000	0.567	0.327	3.805	3.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**7.74**
CO	0.000	1.132	0.653	7.595	6.076	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**15.46**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.015	0.022	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.06**
Crude or Condensate VOC	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	1.058	0.169	3.434	2.747	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**7.41**
Total VOC	0.000	1.058	0.169	3.434	2.747	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**7.41**
Benzene	0.000	0.003	0.001	0.005	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**

Flare/Vapor Combustor Total Emissions				
	SSM Emissions		Malfunction Emissions	
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	0.00	0.00	-	-
Natural Gas VOC	115.86	4.66	152.61	2.75
Total VOC	115.86	4.66	152.61	2.75
NO_x	127.84	4.70	169.09	3.04
CO	255.21	9.38	337.57	6.08
H_2S	0.01	0.00	0.01	0.00
SO_2	0.77	0.04	1.00	0.02
Benzene	0.19	0.01	0.24	0.00

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Flare/Vapor Combustor Emissions

General Information

Flare functions as emergency control device. When streams are fed to flare it will be treated as an emission event.

(1) Control Equipment:	Plant 3 SSM/M		
(2) EPN:	FL-3		
(3) What kind of device is this? Pick from list.	Flare		
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)		
	NOx	0.138	
	CO	0.2755	
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes		
	Enter pilot stream information into the boxes in the column for Stream No. 1 below. If		
	Emission Factors for Pilot Stream (lb/MMscf)		
	NOx	100	
	CO	84	
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Pilot Stream (ppmv)		
	NOx	0	
	CO	0	
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (ppmv)		
	NOx		
	CO		
(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (lb/MMBtu)		
	NOx	0	
	CO	0	

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100
CO	84

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.2755	CO	0.3503
Non-steam assisted, low Btu		Steam assisted, low Btu	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

Emission Factors from AP-42 Table 1.4-2 and 1.4-3 (lb/MMscf)

SO_2	0.6
VOC	5.5
benzene	2.10E-03

(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	99	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	continuous pilot	

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	Pilot + Sweep Gas	Dehy-2 SSM Flash Gas - Stream 30	AM-2 SSM Flash Gas Stream 95	Compressor Blowdowns	Plant 3 Malfunction	AM-2 To Thermal Oxidizer Stream							-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	360	2440	2667	825,000	250000	93348.33							1173815.413
Amount of Time Stream Fired (hrs/yr)	8760	1752	1752	66	24	175.2							-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	3,153,600	4,275,610	4,672,000	54,450,000	6,000,000	16,354,627							88,905,837
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1016.80	1520	1,160.12	1,225	1,225.30	8.52							-
propane weight percent of total stream (%) *OPTIONAL*	0.164579979	20.21	8.05	10.70655266	10.70655266	0.015							-
VOC weight percent of total stream (%) *OPTIONAL*	0.18	38.34	12.390	19.64	19.64455735	0.04							-

					Hourly (lb/hr)								
Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas	Dehy-2 SSM Flash Gas - Stream 30	AM-2 SSM Flash Gas Stream 95	Compressor Blowdowns	Plant 3 Malfunction	AM-2 To Thermal Oxidizer Stream							-
H2S	-	0.0000	0.01	0.44	0.13	4.43							5.01
Crude or Condensate VOC	-												0.00
Natural Gas VOC	-	63.28	17.31	8653.04	2622.13	4.16							11359.93
Total VOC	-	63.28	17.31	8653.04	2622.13	4.16							11359.93
Benzene	-	0.11	0.08	10.04	3.04	1.43							14.70
					Annual (tpy)								
H2S	-	0.00003	0.00617	0.01446	0.00159	0.39							0.41
Crude or Condensate VOC	-												0.00
Natural Gas VOC	-	55.44	15.17	285.55	31.47	0.36							387.98
Total VOC	-	55.44	15.17	285.55	31.47	0.36							387.98
Benzene	-	0.0995	0.0688	0.3314	0.0365	0.12							0.66

Controlled Emissions													
	Hourly (lb/hr)												
Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas	Dehy-2 SSM Flash Gas - Stream 30	AM-2 SSM Flash Gas Stream 95	Compressor Blowdowns	Plant 3 Malfunction	AM-2 To Thermal Oxidizer Stream							-
NOx	0.036	0.512	0.427	139.500	42.273	0.110	0.000	0.000	0.000	0.000	0.000	0.000	**182.86**
CO	0.030	1.022	0.852	278.495	84.393	0.219	0.000	0.000	0.000	0.000	0.000	0.000	**365.01**
H2S	0.000	0.000	0.000	0.009	0.003	0.089	0.000	0.000	0.000	0.000	0.000	0.000	**0.10**
SO2	0.000	0.000	0.013	0.824	0.250	8.336	0.000	0.000	0.000	0.000	0.000	0.000	**9.42**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000`		0.000	**0.00**
Natural Gas VOC	0.00	0.93	0.234	125.901	38.152	0.068	0.000	0.000	0.000	0.000	0.000	0.000	**165.29**
Total VOC	0.00	0.93	0.234	125.901	38.152	0.068	0.000	0.000	0.000	0.000	0.000	0.000	**165.29**
Benzene	0.000	0.00227	0.002	0.201	0.061	0.029	0.000	0.000	0.000	0.000	0.000	0.000	**0.29**
	Annual (tpy)												
Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot + Sweep Gas	Dehy-2 SSM Flash Gas - Stream 30	AM-2 SSM Flash Gas Stream 95	Compressor Blowdowns	Plant 3 Malfunction	AM-2 To Thermal Oxidizer Stream							-
NOx	0.158	0.448	0.374	4.604	0.507	0.010	0.000	0.000	0.000	0.000	0.000	0.000	**6.10**
CO	0.132	0.895	0.747	9.190	1.013	0.019	0.000	0.000	0.000	0.000	0.000	0.000	**12.00**
H2S	0.001	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
SO2	0.001	0.000	0.012	0.027	0.003	0.730	0.000	0.000	0.000	0.000	0.000	0.000	**0.77**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.009	0.817	0.205	4.155	0.458	0.006	0.000	0.000	0.000	0.000	0.000	0.000	**5.65**
Total VOC	0.009	0.817	0.205	4.155	0.458	0.006	0.000	0.000	0.000	0.000	0.000	0.000	**5.65**
Benzene	0.000	0.002	0.001	0.007	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**

Flare/Vapor Combustor Total Emissions				
	SSM Emissions		Malfunction Emissions	
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	0.00	0.00	0.00	0.00
Natural Gas VOC	127.14	5.19	38.15	0.46
Total VOC	127.14	5.19	38.15	0.46
NO_x	140.58	5.59	42.27	0.51
CO	280.62	10.98	84.39	1.01
H_2S	0.10	0.01	0.00	0.00
SO_2	9.17	0.77	0.25	0.00
Benzene	0.23	0.01	0.06	0.00

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Flare/Vapor Combustor Emissions

General Information			
Flare functions as emergency control device. When streams are fed to flare it will be treated as an emission event.			
(1) Control Equipment:	Vapor Combustion Unit		
(2) EPN:	VCU-1		
(3) What kind of device is this? Pick from list.	Vapor Combustor		
	Emission Factors for Waste Gas Stream(s) (lb/MMbtu)		
	NOx	0.138	
	CO	0.2755	
(4) Is there one or more pilot streams fired with pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	Yes		
	Enter pilot stream information into the boxes in the column for Stream No. 1 below. If		
	Emission Factors for Pilot Stream (lb/MMscf)		
	NOx	100	
	CO	84	
(5) Is there one or more pilot streams fired with field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Pilot Stream (ppmv)		
	NOx	0	
	CO	0	
(6) Is there an added fuel stream made up of pipeline quality natural gas or propane? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (ppmv)		
	NOx		
	CO		
(7) Is there an added fuel stream made up of field gas? Pick Yes or No. Follow instructions below.	No		
	Please move on to next question below.		
	Emission Factors for Added Fuel Stream (lb/MMBtu)		
	NOx	0	
	CO	0	

Emission Factors

Emission Factors from AP-42 Table 1.4-1 and 1.4-2 (lb/MMscf)

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.2755	CO	0.3503
Non-steam assisted, low Btu		Steam assisted, low Btu	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

Emission Factors from AP-42 Table 1.4-2 and 1.4-3 (lb/MMscf)

SO_2	0.6
VOC	5.5
benzene	2.10E-03

(8) VOC percent destruction efficiency (%)	98	
(9) propane percent destruction efficiency (%) *OPTIONAL*	98	
(10) H_2S percent destruction efficiency (%)	98	
(11) Which is utilized for this device?	automatic ignition system	

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	Pilot	Condensate Tanks	Produced Water Tanks										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	12	1046.03	1.85										1059.88
Amount of Time Stream Fired (hrs/yr)	8760	8760	8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	105,120	9,163,223	16,206										9,284,549
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1016.8	2993	3053										-
propane weight percent of total stream (%) *OPTIONAL*	0.164579979	13.84	2.52										-
VOC weight percent of total stream (%) *OPTIONAL*	0.18	89.00	91.53										-

Hourly (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	Pilot	Condensate Tanks	Produced Water Tanks										-
H2S	-	0.0000	0.0000										0.00
Crude or Condensate VOC	-	131.88	0.27										132.15
Natural Gas VOC	-												0.00
Total VOC	-	131.88	0.27										132.15
Benzene	-	0.78	0.06										0.84
Annual (tpy)													
H2S	-	0.00000	0.00000										0.00
Crude or Condensate VOC	-	577.63	1.18260										578.82
Natural Gas VOC	-	0.00	0.00										0.00
Total VOC	-	577.63	1.18										578.82
Benzene	-	3.4164	0.2628										3.68

Controlled Emissions

Hourly (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	**Pilot**	**Condensate Tanks**	**Produced Water Tanks**										-
NOx	0.001	0.432	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.43**
CO	0.001	0.863	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.87**
PM2.5	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM10	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Crude or Condensate VOC	0.000	2.638	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.64**
Natural Gas VOC	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.00	2.64	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.64**
Benzene	0.000	0.01560	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**

Annual (tpy)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	**Pilot**	**Condensate Tanks**	**Produced Water Tanks**										-
NOx	0.005	1.892	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.90**
CO	0.004	3.778	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**3.79**
PM2.5	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.03**
PM10	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.03**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Crude or Condensate VOC	-	-	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	11.553	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**11.58**
Benzene	0.000	0.068	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.07**

Flare/Vapor Combustor Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude or Condensate VOC	2.64	0.02
Natural Gas VOC	0.00	0.00
Total VOC	2.64	11.58
NO_x	0.43	1.90
CO	0.87	3.79
$PM_{2.5}$	0.01	0.03
PM_{10}	0.01	0.03
H_2S	0.00	0.00
SO_2	0.00	0.00
Benzene	0.02	0.07

DLK Black River Midstream LLC
Black River Gas Processing Plant

Flare/Vapor Combustor SSM Emissions

A) Enter information into the yellow boxes.

B) Please provide a separate detailed calculation for these emissions; also include any necessary supplemental information and notes (such as the source/justification for any calculation inputs).
C) Since these emissions fall into the category of "Other", which does not have a pre-made emission estimation sheet with pre-approved methods, the time to review this project cannot be guaranteed to be as quick as if only pre-made sheets had been used.

D) VOC and H2S control efficiencies may be entered (if applicable).
E) Make sure to answer the control device question.

F) Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

EPN:	VCU-1 SSM
Name:	Vapor Combustion Unit SSM

Are these vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(A) uncontrolled

Uncontrolled Emissions			
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Control Efficiency
Total VOC	132.150	11.576	0
NOx	0.000	0.000	0
CO	0.000	0.000	0
PM2.5	0.000	0.000	0
PM10	0.000	0.000	0
H2S	0.000	0.000	0
SO2	0.000	0.000	0
benzene	0.840	0.074	0
formaldehyde	0.000	0.000	0

Total Emissions (control efficiencies factored in if applicable)		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	132.15	11.58
NOx	0.00	0.00
CO	0.00	0.00
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.00	0.00
benzene	0.84	0.07
formaldehyde	0.00	0.00

DLK Black River Midstream LLC
Black River Gas Processing Plant

Truck Hourly Loading Emission Calculations
Condensate Truck Loading: TL-1

Using equation L_L = 12.46* SPM/T from AP-42, Chapter 5, Section 5.2-4

S =	0.60	Saturation Factor
P =	20.36	True vapor pressure of liquid loaded (psia)
M =	53.28	Molecular Weight of Vapors (lb/lb-mole)
T =	559.67	Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	8000.00	Gallons Loaded per Hour
L_L =	14.49	Loading Loss (lb VOC released/1000 gal liquid loaded)
	115.92	VOC Uncontrolled Emissions (lb/hr)
	Tank Vapor Weight Percents	
VOC	89.00	Tank Vapor VOC wt%
benzene	0.51	Tank Vapor Benzene wt%
H_2S	0.00	Tank Vapor H2S wt%
	Produced Water Reduction	
	0.00	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)
	Uncontrolled Emissions	
VOC	115.92	Emissions Uncontrolled VOC (lb/hr)
benzene	0.66	Emissions Uncontrolled Benzene (lb/hr)
H_2S	0.00	Emissions Uncontrolled H_2S (lb/hr)
	Collection Efficiency (only fill out if loading vapors are routed to a control device)	
VOC	0.00	VOC Collection Efficiency (%)
H_2S	0.00	H_2S Collection Efficiency (%)
	Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)	
VOC	115.92	VOC Uncaptured Vapors (lb/hr)
benzene	0.66	benzene Uncaptured Vapors (lb/hr)
H_2S	0.00	H_2S Uncaptured Vapors (lb/hr)
	Control Efficiency (only fill out if loading vapors are routed to a control device)	
VOC	0.00	VOC Control Efficiency (%)
H_2S	0.00	H_2S Control Efficiency (%)
	Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)	
VOC	0.00	VOC Results (lb/hr)
benzene	0.00	Benzene Results (lb/hr)
H_2S	0.00	H_2S Results (lb/hr)

Enter temperature in Fahrenheit °F):	Temperature in Rankine (°R):
100	559.67

Enter Barrels of	Gallons of liquid:
8000	336000

Gallons per Year	Barrels per day:
	0

Enter any notes here:

Truck Annual Loading Emission Calculations
Using equation L_L = 12.46* SPM/T from AP-42, Chapter 5, Section 5.2-4

S =	0.60	= Saturation Factor
P =	12.64	= True vapor pressure of liquid loaded (psia)
M =	53.28	= Molecular Weight of Vapors (lb/lb-mole)
T =	524.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Annual Loading Rate	514,500	= Gallons Loaded per Year
L_L =	9.60	Loading Loss (lb VOC released/1000 gal liquid loaded)
	2.47	VOC Uncontrolled Emissions (ton/yr)
		Tank Vapor Weight Percents
VOC	89.00	Tank Vapor VOC wt%
benzene	0.51	Tank Vapor Benzene wt%
H_2S	0.00	Tank Vapor H2S wt%
		Produced Water Reduction
	0.00	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)
		Uncontrolled Emissions
VOC	2.47	Emissions Uncontrolled VOC (ton/yr)
benzene	0.01	Emissions Uncontrolled Benzene (ton/yr)
H_2S	0.00	Emissions Uncontrolled H_2S (ton/yr)
		Collection Efficiency (only fill out if loading vapors are routed to a control device)
VOC	0.00	VOC Collection Efficiency (%)
H_2S	0.00	H_2S Collection Efficiency (%)
		Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)
VOC	2.47	VOC Uncaptured Vapors (ton/yr)
benzene	0.01	benzene Uncaptured Vapors (ton/yr)
H_2S	0.00	H_2S Uncaptured Vapors (ton/yr)
		Control Efficiency (only fill out if loading vapors are routed to a control device)
VOC	0.00	VOC Control Efficiency (%)
H_2S	0.00	H_2S Control Efficiency (%)
		Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)
VOC	0.00	VOC Results (ton/yr)
benzene	0.00	Benzene Results (ton/yr)
H_2S	0.00	H_2S Results (ton/yr)

Enter temperature in Fahrenheit °F):	Temperature in Rankine (°R):
65	524.67

Enter Barrels of Liquid	Gallons of liquid:
1750	73500

Enter gallons per year	Barrels per day:
514,500	33.56164384

Enter any notes here:

The condensate liquids have LACT to transfer the liquids out of the facility. Truck loading equal to 7 days condensate production is included in case the LACT is down.

Loading Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	115.92	2.47
benzene	0.66	0.01
H2S	0.00	0.00

DLK Black River Midstream LLC
Black River Gas Processing Plant

Truck Hourly Loading Emission Calculations
Produced Water Truck Loading: TL-2

Using equation L_L = 12.46* SPM/T from AP-42, Chapter 5, Section 5.2-4

S =	0.60	Saturation Factor
P =	11.88	True vapor pressure of liquid loaded (psia)
M =	60.84	Molecular Weight of Vapors (lb/lb-mole)
T =	559.67	Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	8000.00	Gallons Loaded per Hour
L_L =	9.65	Loading Loss (lb VOC released/1000 gal liquid loaded)
	77.24	VOC Uncontrolled Emissions (lb/hr)
Tank Vapor Weight Percents		
VOC	91.53	Tank Vapor VOC wt%
benzene	21.22	Tank Vapor Benzene wt%
H_2S	0.00	Tank Vapor H2S wt%
Produced Water Reduction		
	0.00	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)
Uncontrolled Emissions		
VOC	77.24	Emissions Uncontrolled VOC (lb/hr)
benzene	17.91	Emissions Uncontrolled Benzene (lb/hr)
H_2S	0.00	Emissions Uncontrolled H_2S (lb/hr)
Collection Efficiency (only fill out if loading vapors are routed to a control device)		
VOC	0.00	VOC Collection Efficiency (%)
H_2S	0.00	H_2S Collection Efficiency (%)
Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)		
VOC	77.24	VOC Uncaptured Vapors (lb/hr)
benzene	17.91	benzene Uncaptured Vapors (lb/hr)
H_2S	0.00	H_2S Uncaptured Vapors (lb/hr)
Control Efficiency (only fill out if loading vapors are routed to a control device)		
VOC	0.00	VOC Control Efficiency (%)
H_2S	0.00	H_2S Control Efficiency (%)
Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)		
VOC	0.00	VOC Results (lb/hr)
benzene	0.00	Benzene Results (lb/hr)
H_2S	0.00	H_2S Results (lb/hr)

Enter temperature in Fahrenheit °F):	Temperature in Rankine (°R):
100	559.67

Enter Barrels of	Gallons of liquid:
8000	336000

Gallons per Year	Barrels per day:
	0

Enter any notes here:

Truck Annual Loading Emission Calculations

Using equation L_L = 12.46* SPM/T from AP-42, Chapter 5, Section 5.2-4

S =	0.60	= Saturation Factor
P =	7.87	= True vapor pressure of liquid loaded (psia)
M =	60.84	= Molecular Weight of Vapors (lb/lb-mole)
T =	524.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Annual Loading Rate	23520.00	= Gallons Loaded per Year
L_L =	6.82	Loading Loss (lb VOC released/1000 gal liquid loaded)
	0.08	VOC Uncontrolled Emissions (ton/yr)
Tank Vapor Weight Percents		
VOC	91.53	Tank Vapor VOC wt%
benzene	21.22	Tank Vapor Benzene wt%
H_2S	0.00	Tank Vapor H2S wt%
Produced Water Reduction		
	0.00	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)
Uncontrolled Emissions		
VOC	0.08	Emissions Uncontrolled VOC (ton/yr)
benzene	0.02	Emissions Uncontrolled Benzene (ton/yr)
H_2S	0.00	Emissions Uncontrolled H_2S (ton/yr)
Collection Efficiency (only fill out if loading vapors are routed to a control device)		
VOC	0.00	VOC Collection Efficiency (%)
H_2S	0.00	H_2S Collection Efficiency (%)
Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)		
VOC	0.08	VOC Uncaptured Vapors (ton/yr)
benzene	0.02	benzene Uncaptured Vapors (ton/yr)
H_2S	0.00	H_2S Uncaptured Vapors (ton/yr)
Control Efficiency (only fill out if loading vapors are routed to a control device)		
VOC	0.00	VOC Control Efficiency (%)
H_2S	0.00	H_2S Control Efficiency (%)
Vapors Uncaptured by Control Device (only fill out if loading vapors are routed to a control device)		
VOC	0.00	VOC Results (ton/yr)
benzene	0.00	Benzene Results (ton/yr)
H_2S	0.00	H_2S Results (ton/yr)

Enter temperature in Fahrenheit °F):	Temperature in Rankine (°R):
65	524.67

Enter Barrels of Liquid	Gallons of liquid:
80	3360

Enter gallons per year	Barrels per day:
23,520	1.534246575

Enter any notes here:

The produced water liquids have LACT to transfer the liquids out of the facility. Truck loading equal to 7 days produced water production is included in case the LACT is down.

Loading Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	77.24	0.08
benzene	17.91	0.02
H2S	0.00	0.00

DLK Black River Midstream LLC
Black River Gas Processing Plant

Fugitive Emissions

Equip Cat	Type	Monitor Frequency	Component Count	Emission Factor[1] (kg/hr/source)	Control (%)	Inlet Gas % VOC	Inlet Gas % HAP	Inlet Gas % H_2S	Inlet Gas % CH4	Inlet Gas % CO2	Uncontrolled Rate (lb/hr)	Controlled Rate (lb/hr)
Connector	Vapor	Yearly (SS)	6611	2.00E-04	0%	19.64%	0.03%	0.00%	62.29%	0.68%	2.9149	2.9149
Press Relief Device	Vapor	Yearly (SS)	51	8.80E-03	0%						0.9894	0.9894
Valve	Vapor	Monthly (SS)	3408	4.50E-03	0%						33.8097	33.8097
Pumps	Vapor	Monthly (SS)	24	2.40E-03	0%						0.1270	0.1270
Hourly Total											37.84	37.84
Annual											165.7	165.7

		VOC		**Total HAP**		**H_2S**		**CH_4**		**CO_2**	
Equip Cat	Type	Uncontrolled Rate (lb/hr)	Controlled Rate (lb/hr)	Uncontrolled Rate (lb/hr)	Controlled Rate (lb/hr)	Uncontrolled Rate (lb/hr)	Controlled Rate (lb/hr)	Uncontrolled Rate (lb/hr)	Controlled Rate (lb/hr)	Uncontrolled Rate (lb/hr)	Controlled Rate (lb/hr)
Connector	Vapor	0.57	0.57	9.26E-04	9.26E-04	0.00E+00	0.00E+00	1.82E+00	1.82E+00	1.97E-02	1.97E-02
Press Relief Device	Vapor	0.194	0.194	3.14E-04	3.14E-04	0.00E+00	0.00E+00	6.16E-01	6.16E-01	6.69E-03	6.69E-03
Valve	Vapor	6.64	6.64	1.07E-02	1.07E-02	0.00E+00	0.00E+00	2.11E+01	2.11E+01	2.29E-01	2.29E-01
Pumps	Vapor	0.02	0.02	4.03E-05	4.03E-05	0.00E+00	0.00E+00	7.91E-02	7.91E-02	8.59E-04	8.59E-04
Hourly Total		**7.43**	**7.43**	**0.01**	**0.01**	**0.00**	**0.00**	**23.57**	**23.57**	**0.26**	**0.26**
Annual Total (tpy)		**32.6**	**32.6**	**0.05**	**0.053**	**0.00E+00**	**0.00E+00**	**103.24**	**103.24**	**1.12**	**1.12**

Notes
[1] Emission factors from Table 2-4 of the EPA Protocol for Equipment Leak Emission Estimates, November 1995

GHG Emissions from Natural Gas Combustion

Emission Source	Source Description	Heat Rate	CO_2 EF	CO_2 Emissions		CH_4 EF	CH_4 Emissions		N_2O EF	N_2O Emissions	
		MMBtu/hr	kg/mmbtu	metric TPY	short tpy	kg/mmbtu	metric TPY	short tpy	kg/mmbtu	metric TPY	short tpy
HT-1	Plant 1 - Mole Sieve Heater	6.98	53.06	3244.34	3576.24	0.001	0.061	0.067	0.0001	0.006	0.007
HT-801	Plant 1 - Stabilizer Heater	6.98	53.06	3244.34	3576.24	0.001	0.061	0.067	0.0001	0.006	0.007
AR-1	Plant 2 - Amine Reboiler	21.09	53.06	9802.75	10805.57	0.001	0.185	0.204	0.0001	0.018	0.020
DR-1	Plant 2 - Dehy Regen Heater	2.9	53.06	1347.94	1485.83	0.001	0.025	0.028	0.0001	0.003	0.003
HT-102	Plant 3 - Mole Sieve Heater	9.74	53.06	4527.21	4990.34	0.001	0.085	0.094	0.0001	0.009	0.009
HT-802	Plant 3 - Stabilizer Heater	6.2	53.06	2881.79	3176.60	0.001	0.054	0.060	0.0001	0.005	0.006
AR-2	Plant 3 - Amine Reboiler	23.92	53.06	11118.15	12255.54	0.001	0.210	0.231	0.0001	0.021	0.023
DR-2	Plant 3 - Dehy Regen Heater	2.5	53.06	1162.01	1280.89	0.001	0.022	0.024	0.0001	0.002	0.002
TO-1	Plant 2 -Thermal Oxidizer	9.80	53.06	4555.09	5021.08	0.001	0.086	0.095	0.0001	0.009	0.009
TO-2	Plant 3 -Thermal Oxidizer	9.80	53.06	4555.09	5021.08	0.001	0.086	0.095	0.0001	0.009	0.009
FL-1	Plant 1 - Flare	4.30	53.06	27.38	30.18	0.001	0.001	0.001	0.0001	0.000	0.000
FL-2a	Plant 2 - Flare	4.07	53.06	1891.76	2085.29	0.001	0.036	0.039	0.0001	0.004	0.004
FL-2b	Plant 2 - Flare	18.26	53.06	1697.47	1871.12	0.001	0.032	0.035	0.0001	0.003	0.004
FL-3	Plant 3 - Flare	18.50	53.06	1719.78	1895.71	0.001	0.032	0.036	0.0001	0.003	0.004
VCU-1	Tanks Control	7.11	53.06	3304.77	3642.85	0.001	0.062	0.069	0.0001	0.006	0.007

Emission Factors (EF) from Tables C-1 and C-2 to 40 CFR 98 Subpart C

Haul Road Inputs

Unpaved haul road emissions from trucking operations for condensate tanks - Exempt under NMAC 20.2.72.202.B.5

Site-Wide

Description	Value	Unit
Liquid Throughput	6,081	bbl/day
Annual Operating Hours:	168	hr
Daily Operating Hours:	24	hr

Unpaved Haul Road

Parameter	Value	Unit
Empty Vehicle Weight[1]	16	ton
Load Size [2]	21.2	ton
Loaded Vehicle Weight[3]	37.2	ton
Mean Vehicle Weight[4]	26.6	ton
Vehicles Per Day [5]	12	VPD
Vehicles Per Year	4380	VPY
Segment Length	0.04	mile
Trips per Segment	2	-
Effective Segment Length[6]	0.08	mile
Trips per Hour[7]	1.00	-
Wet Days[8]	60	day
Surface Silt Content[9]	4.8	%
Control Efficiency	0	%

[1] Empty vehicle weight includes driver and occupants and full fuel load.
[2] Include cargo, transported materials, etc. (5.6 lb/gal RVP10 *7560 gal truck/ 2000lb/ton)
[3] Loaded vehicle weight = Empty + Load Size
[4] Mean Vehicle weight = (Loaded Weight + Empty Weight) / 2
[5] Vehicles per day = (Turnovers/year) / (365 days/year)
[6] Effective segment length = trips per segment * segment length
[7] Trips per hour = Vehicles per day * Segments per trip ÷ Hours of Operation per Day
[8] Wet days is the NM default allowed by NMED without additional justification
[9] Surface silt content based on AP-42 Section 13.2.2.3

Unpaved Road Emission Factors

Route	Calculation Parameters [1]												Hourly Emission Factors			Annual Emission Factors		
	s	W	P	k			a			b			E [2]			E_{ext} [5]		
	Silt Content [1]	Mean Vehicle Weight	Wet Days	PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30} [3]	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$
	%	tons	day	lb/VMT	lb/VMT	lb/VMT							lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT	lb/VMT
Trucks	4.8	26.6	60	4.9	1.5	0.15	0.70	0.90	0.90	0.45	0.45	0.45	6.9	1.8	0.18	5.8	1.5	0.15

[1] Emission factors calculated per AP-42 Sec. 13.2.2.3 November, 2006, Equation 2.

Unpaved Road Emissions

Route	Calculation Inputs						Uncontrolled Emissions						Controlled Emissions [6]					
	Annual Operation	Segment Length	Trips per Segment	Number of Trucks per Year	Effective Segment Length	Average VMT/yr [4]	PM_{30}		PM_{10}		$PM_{2.5}$		PM_{30}		PM_{10}		$PM_{2.5}$	
	hr	mi		trucks/yr	mi	mi/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Trucks	8,760	0.04	2	4380	0.08	350	0.28	1.0	0.07	0.26	0.007	0.026	0.28	1.0	0.07	0.26	0.007	0.026
						Totals	***0.28***	***1.0***	***0.07***	***0.26***	***0.007***	***0.026***	***0.28***	***1.0***	***0.07***	***0.26***	***0.007***	***0.026***

[1] Surface silt = % of 75 micron diameter and smaller particles

[2] E = k x (s/12)^a x (W/3)^b (AP-42 page 13.2.2-4 Equation 1a, November 2006)

E= Size Specific Emission Factor (lb/VMT)

s = surface material silt content (%)

k, a, b = constants from AP-42 Table 13.2.2-2

W = Weighted Mean Vehicle Weight from Haul Road Inputs (tons)

[3] PM_{30} emission factor in equation is assumed as a surrogate for TSP emissions

[4] VMT/yr = Vehicle Miles Travelled per year= Trips per year * Segment Length

[5] Wet Day Emission Factor = E * (365 - Wet Days)/365. Wet days value is the NM default allowed by NMED without additional justification.

[6] Controlled Emissions = Uncontrolled Emissions * (1 - Control Factor/100%)

Control Efficiency = 0%

Black River Gas Processing Plant

Analysis Identifier/Name	Fuel gas
Where was the sample taken?	Black River Gas Processing Plant
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	NA
Where in the process was the sample taken?	Residue Gas
What is the temperature and pressure of the sample (include units)?	965 PSI and 92° F
Who analyzed the sample?	Laboratory Services
Date of sample:	2/19/2020

Component	**mole %**	**Molecular Weight (grams/mole, lb/lb-mol)**	**grams per 100 moles of gas**	**weight %**
hydrogen	0.0000	2.01588	0.0000	0.0000
helium	0.0000	4.00260	0.0000	0.0000
nitrogen	1.4310	28.01340	40.0872	2.4132
CO2	0.0100	44.00950	0.4401	0.0265
H2S	0.0000	34.08188	0.0000	0.0000
methane (C1)	95.8130	16.04246	1537.0762	92.5306
ethane (C2)	2.6800	30.06904	80.5850	4.8511
propane (C3)	0.0620	44.09562	2.7339	0.1646
butanes (C4)	0.0040	58.12220	0.2325	0.0140
pentanes (C5)	0.0000	72.14878	0.0000	0.0000
benzene	0.0000	78.11000	0.0000	0.0000
other hexanes (C6)	0.0000	86.18000	0.0000	0.0000
toluene	0.0000	92.14000	0.0000	0.0000
other heptanes (C7)	0.0000	100.20000	0.0000	0.0000
ethylbenzene	0.0000	106.17000	0.0000	0.0000
xylenes (o, m, p)	0.0000	106.17000	0.0000	0.0000
other octanes (C8)	0.0000	114.23000	0.0000	0.0000
nonanes (C9)	0.0000	128.26000	0.0000	0.0000
decanes plus (C10+)	0.0000	142.28000	0.0000	0.0000
Totals:	100.0000	16.6115	1661.1549	100.0000

VOC (Non-methane, Non-ethane hydrocarbons)			
VOC content of total sample			
VOC weight% =	0.18		
VOC weight fraction =	0.00		
VOC content of hydrocarbon fraction only			
VOC weight% =	0.18		
VOC weight fraction =	0.00		
Hydrogen Sulfide		Constants:	
H2S weight% =	0.00	453.592	mol/lb-mol
H2S weight fraction =	0.00	0.065	grams/grain
H2S ppmV =	0.00	385.483	scf/lb-mol
H2S ppmWT=	0.00		
H2S grains/100 SCF =	0.00		
	SWEET GAS		
Benzene			
Benzene content of total sample			
Benzene weight% =	0.00		
Benzene weight fraction =	0.00		
Benzene content of hydrocarbon fraction only			
Benzene weight% =	0.00		
Benzene weight fraction =	0.00		
		Constants:	
Gas Molecular Weight =	16.61	28.970	air mw
Gas Specific Gravity =	0.57	385.483	scf/lb-mol
Heat Value of Gas, Btu/scf=	1016.80		

Black River Gas Processing Plant

Analysis Identifier/Name	Plant Inlet
Where was the sample taken?	Black River Gas Processing Plant
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	NA
Where in the process was the sample taken?	Plant Inlet
What is the temperature and pressure of the sample (include units)?	317 PSI and 90° F
Who analyzed the sample?	Laboratory Services
Date of sample:	2/21/2020

Component	**mole %**	**Molecular Weight (grams/mole, lb/lb-mol)**	**grams per 100 moles of gas**	**weight %**
hydrogen	0.0000	2.01588	0.0000	0.0000
helium	0.0000	4.00260	0.0000	0.0000
nitrogen	1.1480	28.01340	32.1594	1.5645
CO2	0.3160	44.00950	13.9070	0.6766
H2S	0.0006	34.08188	0.0204	0.0010
methane (C1)	79.8090	16.04246	1280.3327	62.2859
ethane (C2)	10.8200	30.06904	325.3470	15.8275
propane (C3)	4.9910	44.09562	220.0812	10.7066
butanes (C4)	2.1530	58.12220	125.1371	6.0877
pentanes (C5)	0.5740	72.14878	41.4134	2.0147
benzene	0.0060	78.11000	0.4687	0.0228
other hexanes (C6)	0.1220	86.18000	10.5140	0.5115
toluene	0.0020	92.14000	0.1843	0.0090
other heptanes (C7)	0.0520	100.20000	5.2104	0.2535
ethylbenzene	0.0000	106.17000	0.0000	0.0000
xylenes (o, m, p)	0.0000	106.17000	0.0000	0.0000
other octanes (C8)	0.0070	114.23000	0.7996	0.0389
nonanes (C9)	0.0000	128.26000	0.0000	0.0000
decanes plus (C10+)	0.0000	142.28000	0.0000	0.0000
Totals:	100.0006	20.5558	2055.5752	100.0000

VOC (Non-methane, Non-ethane hydrocarbons)			
VOC content of total sample			
VOC weight% =	19.64		
VOC weight fraction =	0.20		
VOC content of hydrocarbon fraction only			
VOC weight% =	20.10		
VOC weight fraction =	0.20		
Hydrogen Sulfide		Constants:	
H2S weight% =	0.001	453.592	mol/lb-mol
H2S weight fraction =	0.000	0.065	grams/grain
H2S ppmV =	6.00	385.483	scf/lb-mol
H2S ppmWT=	9.95		
H2S grains/100 SCF =	0.37		
	SWEET GAS		
Benzene			
Benzene content of total sample			
Benzene weight% =	0.02		
Benzene weight fraction =	0.00		
Benzene content of hydrocarbon fraction only			
Benzene weight% =	0.02		
Benzene weight fraction =	0.00		
		Constants:	
Gas Molecular Weight =	20.56	28.970	air mw
Gas Specific Gravity =	0.71	385.483	scf/lb-mol
Heat Value of Gas, Btu/scf=	1225.30		

Black River Gas Processing Plant

Analysis Identifier/Name	Amine Inlet
Where was the sample taken?	Black River Gas Processing Plant
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	NA
Where in the process was the sample taken?	Amine Inlet
What is the temperature and pressure of the sample (include units)?	900 PSI and 90° F
Who analyzed the sample?	Laboratory Services
Date of sample:	2/24/2020

Component	**mole %**	**Molecular Weight (grams/mole, lb/lb-mol)**	**grams per 100 moles of gas**	**weight %**
hydrogen	0.0000	2.01588	0.0000	0.0000
helium	0.0000	4.00260	0.0000	0.0000
nitrogen	1.3120	28.01340	36.7536	1.7913
CO2	0.3450	44.00950	15.1833	0.7400
H2S	0.0000	34.08188	0.0000	0.0000
methane (C1)	79.5940	16.04246	1276.8836	62.2319
ethane (C2)	10.9430	30.06904	329.0455	16.0368
propane (C3)	5.0420	44.09562	222.3301	10.8358
butanes (C4)	2.1250	58.12220	123.5097	6.0195
pentanes (C5)	0.5260	72.14878	37.9503	1.8496
benzene	0.0040	78.11000	0.3124	0.0152
other hexanes (C6)	0.0790	86.18000	6.8082	0.3318
toluene	0.0010	92.14000	0.0921	0.0045
other heptanes (C7)	0.0260	100.20000	2.6052	0.1270
ethylbenzene	0.0000	106.17000	0.0000	0.0000
xylenes (o, m, p)	0.0000	106.17000	0.0000	0.0000
other octanes (C8)	0.0030	114.23000	0.3427	0.0167
nonanes (C9)	0.0000	128.26000	0.0000	0.0000
decanes plus (C10+)	0.0000	142.28000	0.0000	0.0000
Totals:	100.0000	20.5182	2051.8167	100.0000

VOC (Non-methane, Non-ethane hydrocarbons)			
VOC content of total sample			
VOC weight% =	19.20		
VOC weight fraction =	0.19		
VOC content of hydrocarbon fraction only			
VOC weight% =	19.70		
VOC weight fraction =	0.20		
Hydrogen Sulfide		Constants:	
H2S weight% =	0.00	453.592	mol/lb-mol
H2S weight fraction =	0.00	0.065	grams/grain
H2S ppmV =	0.00	385.483	scf/lb-mol
H2S ppmWT=	0.00		
H2S grains/100 SCF =	0.00		
	SWEET GAS		
Benzene			
Benzene content of total sample			
Benzene weight% =	0.02		
Benzene weight fraction =	0.00		
Benzene content of hydrocarbon fraction only			
Benzene weight% =	0.02		
Benzene weight fraction =	0.00		
		Constants:	
Gas Molecular Weight =	20.52	28.970	air mw
Gas Specific Gravity =	0.71	385.483	scf/lb-mol
Heat Value of Gas, Btu/scf=	1220.10		

Black River Gas Processing Plant

Analysis Identifier/Name	Dehy Inlet
Where was the sample taken?	Black River Gas Processing Plant
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	NA
Where in the process was the sample taken?	Dehy Inlet
What is the temperature and pressure of the sample (include units)?	900 PSI and 80° F
Who analyzed the sample?	Laboratory Services
Date of sample:	2/21/2020

Component	**mole %**	**Molecular Weight (grams/mole, lb/lb-mol)**	**grams per 100 moles of gas**	**weight %**
hydrogen	0.0000	2.01588	0.0000	0.0000
helium	0.0000	4.00260	0.0000	0.0000
nitrogen	1.1700	28.01340	32.7757	1.5863
CO2	0.0220	44.00950	0.9682	0.0469
H2S	0.0000	34.08188	0.0000	0.0000
methane (C1)	79.5030	16.04246	1275.4237	61.7308
ethane (C2)	10.9860	30.06904	330.3385	15.9885
propane (C3)	5.1530	44.09562	227.2247	10.9977
butanes (C4)	2.3160	58.12220	134.6110	6.5152
pentanes (C5)	0.6520	72.14878	47.0410	2.2768
benzene	0.0080	78.11000	0.6249	0.0302
other hexanes (C6)	0.1350	86.18000	11.6343	0.5631
toluene	0.0020	92.14000	0.1843	0.0089
other heptanes (C7)	0.0470	100.20000	4.7094	0.2279
ethylbenzene	0.0000	106.17000	0.0000	0.0000
xylenes (o, m, p)	0.0000	106.17000	0.0000	0.0000
other octanes (C8)	0.0050	114.23000	0.5712	0.0276
nonanes (C9)	0.0000	128.26000	0.0000	0.0000
decanes plus (C10+)	0.0000	142.28000	0.0000	0.0000
Totals:	99.9990	20.6611	2066.1068	100.0000

VOC (Non-methane, Non-ethane hydrocarbons)			
VOC content of total sample			
VOC weight% =	20.65		
VOC weight fraction =	0.21		
VOC content of hydrocarbon fraction only			
VOC weight% =	20.99		
VOC weight fraction =	0.21		
Hydrogen Sulfide		Constants:	
H2S weight% =	0.00	453.592	mol/lb-mol
H2S weight fraction =	0.00	0.065	grams/grain
H2S ppmV =	0.00	385.483	scf/lb-mol
H2S ppmWT=	0.00		
H2S grains/100 SCF =	0.00		
	SWEET GAS		
Benzene			
Benzene content of total sample			
Benzene weight% =	0.03		
Benzene weight fraction =	0.00		
Benzene content of hydrocarbon fraction only			
Benzene weight% =	0.03		
Benzene weight fraction =	0.00		
		Constants:	
Gas Molecular Weight =	20.66	28.970	air mw
Gas Specific Gravity =	0.71	385.483	scf/lb-mol
Heat Value of Gas, Btu/scf=	1238.00		

Section 6

Information Used to Determine Emissions

Check the box for each type of information submitted. This documentation is required. If applicable to the facility.

Failure to include applicable supporting documentation may result in application denial.

☒ Specifications for control equipment, including control efficiency specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.

☒ Engine or Generator Manufacturer specifications

☒ Catalyst Manufacturer specifications (If a catalyst is being utilized to reduce emissions, the catalyst manufacturer emission factors must be used in all emission calculations. A 25% safety factor may be applied to each pollutant.

☐ NSPS JJJJ emission factors **may not** be utilized in lieu of catalyst manufacture specifications when a catalyst is installed, and the catalysts manufacturer achieves higher control efficiency.

☒ Flare Manufacturer specifications

☒ Oil/Liquid Analysis: This data is required to match the inputs in all applicable emission calculations. For facilities that have not been constructed and a representative analysis is used it cannot be older than 1 year. For existing facilities, the gas analyses required by Condition A201.A (must be 1 year old or less).

☒ Gas Analysis (must be 1 year old or less) This data is required to match the inputs in all applicable emission calculations.

☒ Extended Gas Analysis (must be 1 year old or less) This data is required to match the inputs in all applicable emission calculations.

☐ If requesting to use a representative gas sample, include a discussion of why the sample is representative for this facility and an explanation of how it is representative (e.g., same reservoir, same similar API gravity, similar composition).

☐ If test data are used, to support emissions calculations or to establish allowable emission limits, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.

☒ Fuel specifications sheet.

☒ If computer models are used to estimate emissions, include an input summary and a detailed report, and a disk containing the input file used to run the model.

☐ For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, accuracy of the model, the **input and output** summary from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

Representative Gas Analysis Justification:

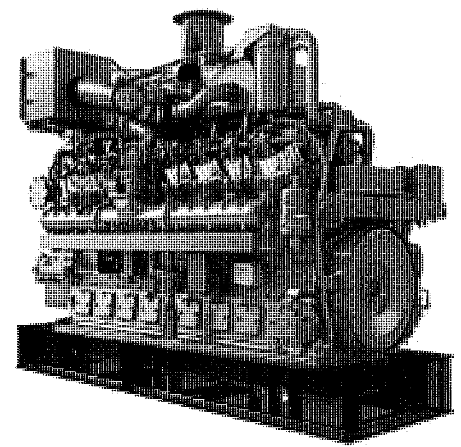
GE Power & Water
Distributed Power

ENGINE #1 - #4

Waukesha* gas engines VHP* Series Four*

P9394GSI

1500 - 2250 BHP (1119 - 1678 kWb)



GE's Waukesha P9394GSI gas engine combines proven features common to other Waukesha VHP engines with a series of design enhancements and packaging improvements, resulting in the highest horsepower output in GE's Waukesha Series Four rich-burn engine portfolio.

Components such as the Waukesha ESM control system, emPact emission control system, cylinder heads, valves, liners, bearings, and connecting rods are common with those found on other Series Four engines, allowing for simpler operation and servicing.

An enhanced combustion system provides lower exhaust temperatures and improved fuel efficiency for decreased service and operation costs while still maintaining the application flexibility associated with rich-burn engines.

Packaging improvements include an engine-mounted lube oil cooling and filter system, deep sump oil pan, single fuel inlet connection, simplifi ed cooling connections and a high-capacity oil pump.

Waukesha's emPact Emission Control System combines an engine, catalyst, and air/fuel ratio control, factory-designed for optimal interaction and maximum performance. It consists of a GE-supplied catalyst, pre- and post-catalyst oxygen sensing, and differential temperature and pressure sensors. emPact's closed-loop control system measures the engine exhaust and automatically adjusts the air/fuel ratio to keep the catalyst operating at maximum efficiency, even as speed, load, fuel, and ambient conditions change.

A full-color display panel provides real-time engine operating parameters, including faults, alarms, and shutdowns. A logging function allows all data—including catalyst temperature and pressure differential—to be saved to a USB device to simplify emissions reporting.

Series Four engines can reliably produce more power on the hottest field gases, at the highest altitudes, and in the most remote locations, all while delivering the lowest available emissions when paired with a 3-way catalyst (NSCR).

technical data

Cylinders	V16
Piston displacement	9388 cu. in. (154 L)
Compression ratio	9.7:1
Bore & stroke	9.375" x 8.5" (238 x 216)
Jacket water system capacity	148 gal. (560 L)
Lube oil capacity	239 gal. (904 L)
Starting system	2 electric starters, 24V each

Dimensions l x w x h inch (mm)
168 (4273) x 78 (1971) x 101 (2565)

Weights lb (kg)
34,000 (15,422)

Cypress Engine Accessories

MIRATECH

Equipment Specification

Proposal Information

Proposal Number:	CEA-20-004000	Date:	**6/25/2020**
Project Reference:	Matador Resources		

Engine Information

Engine Make:	Waukesha	Speed:	Rated
Engine Model:	P9394GSI	Power Output:	2,250 bhp
Rated Speed:	1200 RPM	Exhaust Flow Rate:	13,650 lb/hr
Fuel Description:	Natural Gas	Exhaust Temperature:	1,085 F
Hours Of Operation:	8760 Hours per year	O_2:	0.3%
Load:	100%	H_2O:	20%

Emission Data (100% Load)

Emission	Raw Engine Emissions						Target Outlet Emissions						Calculated Reduction
	g/bhp-hr	*tons/yr*	*ppmvd @ 15% O_2*	*ppmvd*	*g/kW-hr*	*lb/MW-hr*	*g/bhp-hr*	*tons/yr*	*ppmvd @ 15% O_2*	*ppmvd*	*g/kW-hr*	*lb/MW-hr*	
NO_x*	*14.6*	317.21	1,198	4,184	19.579	43.16	*0.3*	6.52	25	86	0.402	0.89	97.9%
CO	*9.5*	206.4	1,281	4,471	12.74	28.09	*0.3*	6.52	40	141	0.402	0.89	96.8%
THC**	*1.69*	36.72	398	1,389	2.266	5							
NMNEHC***	*0.35*	7.6	82	288	0.469	1.03	0.2	4.35	47	164	0.268	0.59	42.9%
CH_2O	*0.17*	3.69	21	75	0.228	0.5	*0.02*	0.43	3	9	0.027	0.06	88.2%

System Specifications

Catalyst (Replacement Catalyst)

Design Exhaust Flow Rate:	13,650 lb/hr
Design Exhaust Temperature:	1,085°F
Element Model Number:	MECB-TW-SQ-1500-3600-350
Number of Catalyst Layers:	2
Number of Catalyst Per Layer:	3
Catalyst Back Pressure:	3.0 inches of WC (Clean) (7.5 mBar)
Dimensions:	15 x 36
Exhaust Temperature Limits†:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet) 399 – 677°C (catalyst inlet); 732°C (catalyst outlet)

* MW referenced as NO_2

** MW referenced as CH_4

*** MW referenced as CH_4. Propane in the exhaust shall not exceed 15% by volume of the NMNEHC compounds in the exhaust, excluding aldehydes. The 15% (vol.) shall be established on a wet basis, reported on a methane molecular weight basis. The measurement of exhaust NMNEHC composition shall be based upon EPA method 320 (FTIR), and shall exclude formaldehyde.

† General catalyst temperature operating range. Performance is based on the Design Exhaust Temperature.

Extended Gas Analysis Report

9692G	Black River Plant 2 Amine Inlet Gas	Black River Plant 2 Amine Inlet Gas
Sample Point Code	Sample Point Name	Sample Point Location

Laboratory Services	2020029686	1691	D Jett - Spot
Source Laboratory	Lab File No	Container Identity	Sampler
USA	USA	USA	New Mexico
District	Area Name	Field Name	Facility Name
Feb 21, 2020	Feb 21, 2020	Feb 24, 2020 08:25	Feb 26, 2020
Date Sampled	Date Effective	Date Received	Date Reported
36.00		BH	@ 90
Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions

San Mateo Midstream	NG
Operator	Lab Source Description

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.3120	1.339701	
Carbon Dioxide (CO2)	0.3450	0.351904	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.5940	81.294439	
Ethane (C2)	10.9430	11.177097	2.9260
Propane (C3)	5.0420	5.149165	1.3890
IsoButane (IC4)	0.6670	0.681187	0.2180
n-Butane (NC4)	1.4580	1.488743	0.4600
IsoPentane (IC5)	0.2720	0.277611	0.0990
n-Pentane (NC5)	0.2540	0.259897	0.0920
Hexanes (C6's)	0.1130	0.11	0.0440
TOTAL	100.0000	102.1297	5.2280

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information

Device Type:	Gas Chromatograph	Device Make:	Agilent
Device Model:	7890B	Last Cal Date:	Jan 28, 2020

Gross Heating Values (Real, BTU/ft³)

14.696 PSI @ 60.00 °F	14.73 PSI @ 60.00 °F	
Dry	Dry	Saturated
1,220.1	1,226.9	1,206.1

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density Real	Relative Density Ideal
0.7104	0.7083

Molecular Weight
20.5150

C6+ Group Properties

Assumed Composition

C6 - 67.406% C7 - 27.572% C8 - 5.022%

Field H2S
0 PPM

PROTREND STATUS:
Passed By Validator on Feb 27, 2020

DATA SOURCE:
Imported

PASSED BY VALIDATOR REASON:
First sample taken @ this point, composition looks reasonable

VALIDATOR:
Dustin Armstrong

VALIDATOR COMMENTS:
OK

Sample Point Code - Name @ Location

Operator

9692G - Black River Plant 2 Amine Inlet Gas - Black River Plant 2 Amine Inlet (San Mateo Midstream

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.3120	1.3397	
Carbon Dioxide (CO2)	0.3450	0.351904	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.5940	81.2944	
Ethane (C2)	10.9430	11.1771	2.9260
Propane (C3)	5.0420	5.14917	1.3890
IsoButane (IC4)	0.6670	0.681187	0.2180
n-Butane (NC4)	1.4580	1.48874	0.4600
IsoPentane (IC5)	0.2720	0.277611	0.0990
n-Pentane (NC5)	0.2540	0.259897	0.0920
Hexanes (C6's)	0.0790	0.076	0.0320
Heptanes (C7's)	0.0260	0.026	0.0100
Octanes (C8's)	0.0030	0.003	0.0010
Nonanes (C9's)	0.0000	0	0.0000
Decanes (C10's)	0.0000	0	0.0000
Undecanes (C11's)	0.0000	0	0.0000
Dodecanes (C12's)	0.0000	0	0.0000

BTEX

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Benzene	0.0040	0.004	0.0010
Toluene	0.0010	0.001	0.0000
EthylBenzene	0.0000	0	0.0000
M+P Xylene	0.0000	0	0.0000
O Xylene	0.0000	0	0.0000

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Extended Liquid Analysis Report

9695L	Black River Plant 2 Condensate Accumilator	ck River Plant 2 Condensate Accumila
Sample Point Code	Sample Point Name	Sample Point Location

Laboratory Services	2020029689	Piston Cylinder	D Jett - Spot
Source Laboratory	Lab File No	Container Identity	Sampler
USA	USA	USA	New Mexico
District	Area Name	Field Name	Facility Name
Feb 19, 2020 11:30	Feb 19, 2020 11:30	Feb 24, 2020 08:54	Feb 25, 2020
Date Sampled	Date Effective	Date Received	Date Reported

49.00		BH	
Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions

San Mateo Midstream	NGL
Operator	Lab Source Description

Component	Mol %	Mass %	Liquid %
Nitrogen (N2)	0.0270	0.0120	0.0090
Carbon Dioxide (CO2)	0.1090	0.0760	0.0560
Methane (C1)	8.3530	2.1100	4.2520
Ethane (C2)	8.7650	4.1500	7.0380
Propane (C3)	14.4970	10.0670	11.9930
Isobutane (IC4)	4.6560	4.2620	4.5760
n-Butane (NC4)	14.9890	13.7200	14.1910
Isopentane (IC5)	7.8140	8.8780	8.5810
n-Pentane (NC5)	10.4920	11.9210	11.4210
2-methylpentane (2MC5)	3.3940	4.6070	4.2320
3-methylpentane (3MC5)	1.9000	2.5780	2.3280
Benzene	0.7970	0.9810	0.6700
Ethylbenzene	0.0410	0.0680	0.0470
M + P Xylenes	0.2730	0.4880	0.3580
O-Xylene	0.0580	0.0980	0.0670
Toluene	0.8330	1.2080	0.8370
Hexanes (C6's)	6.0930	8.1560	7.3560
Heptanes (C7's)	10.9200	15.9910	13.3140
Octanes (C8's)	4.9060	8.5350	7.0170
Nonanes (C9's)	0.8400	1.5880	1.2660
Decanes (C10's)	0.1800	0.3720	0.2880
Undecanes (C11's)	0.0550	0.1130	0.0840
Dodecanes (C12's)	0.0080	0.0210	0.0190
TOTAL	100.0000	100.0000	100.0000

Gross Heating Values @ 14.65 PSI

BTU/ft³	BTU/Gal	BTU/lb
3,512.9	64250.9	21059.0

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density	Absolute Density (lb/gal)	API Gravity
0.6043	3.051	102.7
Molecular Weight	Vapor Volume (ft³/gal)	Vapor Pressure (PSI)
63.5000	18.290	528.9

Ratios

C1 to C2	CO2 to C2
37.66:1	0.79:1

C6+ Group Properties

Assumed Composition

C6 - 37.597% C7 - 38.671% C8 - 23.732%

Field H2S

0 PPM

PROTREND STATUS:
Passed By Validator on Feb 26, 2020

DATA SOURCE:
Imported

PASSED BY VALIDATOR REASON:
First sample taken @ this point, composition looks reasonable

VALIDATOR:
Dustin Armstrong

VALIDATOR COMMENTS:
OK

GPA Method(s): C6+ Liquid 2177-13, Extended Liquids 2186-14, Calculations 2145-16, 2172-09

LABORATORY SERVICES Natural Gas Analysis

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Extended Gas Analysis Report

9696G	Black River Plant 2 Dehy Inlet Gas	Black River Plant 2 Dehy Inlet Gas
Sample Point Code	Sample Point Name	Sample Point Location

Laboratory Services	2020029690	0803	D Jett - Spot
Source Laboratory	Lab File No	Container Identity	Sampler
USA	USA	USA	New Mexico
District	Area Name	Field Name	Facility Name
Feb 21, 2020 10:00	Feb 21, 2020 10:00	Feb 24, 2020 09:02	Feb 26, 2020
Date Sampled	Date Effective	Date Received	Date Reported

36.00		BH	900 @
Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions

San Mateo Midstream	NG
Operator	Lab Source Description

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.1700	1.190191	
Carbon Dioxide (CO2)	0.0220	0.022116	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.5030	80.852715	
Ethane (C2)	10.9860	11.172351	2.9370
Propane (C3)	5.1530	5.240028	1.4190
IsoButane (IC4)	0.7140	0.726599	0.2340
n-Butane (NC4)	1.6020	1.629417	0.5050
IsoPentane (IC5)	0.3300	0.335758	0.1210
n-Pentane (NC5)	0.3220	0.32722	0.1170
Hexanes (C6's)	0.1980	0.196	0.0780
TOTAL	100.0000	101.6924	5.4110

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information

Device Type:	Gas Chromatograph	Device Make:	Agilent
Device Model:	7890B	Last Cal Date:	Jan 28, 2020

Gross Heating Values (Real, BTU/ft³)

14.696 PSI @ 60.00 °F	14.73 PSI @ 60.00 °F	
Dry	Dry	Saturated
1,238.0000	1,245.1	1,223.9

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density Real	Relative Density Ideal
0.7153	0.7132

Molecular Weight
20.6570

C6+ Group Properties

Assumed Composition

C6 - 66.672% C7 - 27.975% C8 - 5.353%

Field H2S
0 PPM

PROTREND STATUS:
Passed By Validator on Feb 27, 2020

DATA SOURCE:
Imported

PASSED BY VALIDATOR REASON:
First sample taken @ this point, composition looks reasonable

VALIDATOR:
Dustin Armstrong

VALIDATOR COMMENTS:
OK

Extended Gas Analysis Report

Sample Point Code - Name @ Location

Operator

9696G - Black River Plant 2 Dehy Inlet Gas - Black River Plant 2 Dehy Inlet GasSan Mateo Midstream

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.1700	1.19019	
Carbon Dioxide (CO2)	0.0220	0.022116	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.5030	80.8527	
Ethane (C2)	10.9860	11.1724	2.9370
Propane (C3)	5.1530	5.24003	1.4190
IsoButane (IC4)	0.7140	0.726599	0.2340
n-Butane (NC4)	1.6020	1.62942	0.5050
IsoPentane (IC5)	0.3300	0.335758	0.1210
n-Pentane (NC5)	0.3220	0.32722	0.1170
Hexanes (C6's)	0.1350	0.133	0.0560
Heptanes (C7's)	0.0470	0.047	0.0160
Octanes (C8's)	0.0050	0.005	0.0020
Nonanes (C9's)	0.0000	0	0.0000
Decanes (C10's)	0.0000	0	0.0000
Undecanes (C11's)	0.0000	0	0.0000
Dodecanes (C12's)	0.0010	0.001	0.0010

BTEX

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Benzene	0.0080	0.008	0.0020
Toluene	0.0020	0.002	0.0010
EthylBenzene	0.0000	0	0.0000
M+P Xylene	0.0000	0	0.0000
O Xylene	0.0000	0	0.0000

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Extended Gas Analysis Report

Sample Point Code	Sample Point Name	Sample Point Location
9694G	Black River Plant 2 Inlet Gas	Black River Plant 2 Inlet Gas

Source Laboratory	Lab File No	Container Identity	Sampler
Laboratory Services	2020029688	1148	D Jett - Spot

District	Area Name	Field Name	Facility Name
USA	USA	USA	New Mexico

Date Sampled	Date Effective	Date Received	Date Reported
Feb 21, 2020 10:00	Feb 21, 2020 10:00	Feb 24, 2020 08:46	Feb 26, 2020

Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions
36.00		BH	317 @ 61

Operator	Lab Source Description
San Mateo Midstream	NG

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.1480	1.168437	
Carbon Dioxide (CO2)	0.3160	0.321787	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.8090	81.256745	
Ethane (C2)	10.8200	11.015947	2.8930
Propane (C3)	4.9910	5.081461	1.3750
IsoButane (IC4)	0.6700	0.682286	0.2190
n-Butane (NC4)	1.4830	1.509781	0.4670
IsoPentane (IC5)	0.2910	0.29638	0.1060
n-Pentane (NC5)	0.2830	0.288031	0.1030
Hexanes (C6's)	0.1890	0.186	0.0730
TOTAL	100.0000	101.8069	5.2360

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information

Device Type:	Gas Chromatograph	Device Make:	Agilent
Device Model:	7890B	Last Cal Date:	Jan 28, 2020

Gross Heating Values (Real, BTU/ft³)

14.696 PSI @ 60.00 °F Dry	14.73 PSI @ 60.00 °F Dry	14.73 PSI @ 60.00 °F Saturated
1,225.3	1,232.3	1,211.3

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density Real	Relative Density Ideal
0.7116	0.7095

Molecular Weight
20.5490

C6+ Group Properties

Assumed Composition

C6 - 63.531% C7 - 30.179% C8 - 6.290%

Field H2S
0 PPM

PROTREND STATUS:
Passed By Validator on Feb 27, 2020

DATA SOURCE:
Imported

PASSED BY VALIDATOR REASON:
First sample taken @ this point, composition looks reasonable

VALIDATOR:
Dustin Armstrong

VALIDATOR COMMENTS:
OK

Extended Gas Analysis Report

Sample Point Code - Name @ Location

9694G - Black River Plant 2 Inlet Gas - Black River Plant 2 Inlet Gas

Operator

San Mateo Midstream

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.1480	1.16844	
Carbon Dioxide (CO2)	0.3160	0.321787	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.8090	81.2567	
Ethane (C2)	10.8200	11.0159	2.8930
Propane (C3)	4.9910	5.08146	1.3750
IsoButane (IC4)	0.6700	0.682286	0.2190
n-Butane (NC4)	1.4830	1.50978	0.4670
IsoPentane (IC5)	0.2910	0.29638	0.1060
n-Pentane (NC5)	0.2830	0.288031	0.1030
Hexanes (C6's)	0.1220	0.119	0.0490
Heptanes (C7's)	0.0520	0.052	0.0180
Octanes (C8's)	0.0070	0.007	0.0030
Nonanes (C9's)	0.0000	0	0.0000
Decanes (C10's)	0.0000	0	0.0000
Undecanes (C11's)	0.0000	0	0.0000
Dodecanes (C12's)	0.0000	0	0.0000

BTEX

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Benzene	0.0060	0.006	0.0020
Toluene	0.0020	0.002	0.0010
EthylBenzene	0.0000	0	0.0000
M+P Xylene	0.0000	0	0.0000
O Xylene	0.0000	0	0.0000

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Extended Gas Analysis Report

9693G	Black River Plant 2 Mole Sieve Inlet Gas	lack River Plant 2 Mole Sieve Inlet Ga
Sample Point Code	Sample Point Name	Sample Point Location

Laboratory Services	2020029687	0559	D Jett - Spot
Source Laboratory	Lab File No	Container Identity	Sampler
USA	USA	USA	New Mexico
District	Area Name	Field Name	Facility Name
Feb 21, 2020 11:00	Feb 21, 2020 11:00	Feb 24, 2020 08:42	Feb 26, 2020
Date Sampled	Date Effective	Date Received	Date Reported
36.00		BH	900 @
Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions

San Mateo Midstream	NG
Operator	Lab Source Description

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.1770	1.17265	
Carbon Dioxide (CO2)	0.0590	0.058702	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.2720	78.94663	
Ethane (C2)	10.9740	10.929293	2.9340
Propane (C3)	5.1510	5.129844	1.4190
IsoButane (IC4)	0.6950	0.691898	0.2270
n-Butane (NC4)	1.5420	1.535264	0.4860
IsoPentane (IC5)	0.3310	0.32951	0.1210
n-Pentane (NC5)	0.3290	0.327698	0.1190
Hexanes (C6's)	0.4700	0.47	0.2020
TOTAL	100.0000	99.5915	5.5080

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information

Device Type:	Gas Chromatograph	Device Make:	Agilent
Device Model:	7890B	Last Cal Date:	Jan 28, 2020

Gross Heating Values (Real, BTU/ft³)

14.696 PSI @ 60.00 °F	14.73 PSI @ 60.00 °F	
Dry	Dry	Saturated
1,248.0000	1,255.3	1,233.9

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density Real	Relative Density Ideal
0.7228	0.7206

Molecular Weight
20.8690

C6+ Group Properties

Assumed Composition

C6 - 49.160% C7 - 27.621% C8 - 23.219%

Field H2S
0 PPM

PROTREND STATUS:
Passed By Validator on Feb 27, 2020

DATA SOURCE:
Imported

PASSED BY VALIDATOR REASON:
First sample taken @ this point, composition looks reasonable

VALIDATOR:
Dustin Armstrong

VALIDATOR COMMENTS:
OK

Sample Point Code - Name @ Location | Operator

9693G - Black River Plant 2 Mole Sieve Inlet Gas - Black River Plant 2 Mole Sie San Mateo Midstream

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.1770	1.17265	
Carbon Dioxide (CO2)	0.0590	0.058702	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	79.2720	78.9466	
Ethane (C2)	10.9740	10.9293	2.9340
Propane (C3)	5.1510	5.12984	1.4190
IsoButane (IC4)	0.6950	0.691898	0.2270
n-Butane (NC4)	1.5420	1.53526	0.4860
IsoPentane (IC5)	0.3310	0.32951	0.1210
n-Pentane (NC5)	0.3290	0.327698	0.1190
Hexanes (C6's)	0.2300	0.23	0.0940
Heptanes (C7's)	0.1170	0.117	0.0460
Octanes (C8's)	0.0300	0.03	0.0140
Nonanes (C9's)	0.0130	0.013	0.0080
Decanes (C10's)	0.0250	0.025	0.0150
Undecanes (C11's)	0.0230	0.023	0.0120
Dodecanes (C12's)	0.0030	0.003	0.0030

BTEX

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Benzene	0.0120	0.012	0.0030
Toluene	0.0070	0.007	0.0020
EthylBenzene	0.0020	0.002	0.0010
M+P Xylene	0.0060	0.006	0.0030
O Xylene	0.0020	0.002	0.0010

LABORATORY SERVICES Natural Gas Analysis

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Extended Gas Analysis Report

Sample Point Code	Sample Point Name	Sample Point Location
5603G	900-30012	BR Plant 2 Residue

Source Laboratory	Lab File No	Container Identity	Sampler
Laboratory Services	2020029691	0804	D Jett - Spot

District	Area Name	Field Name	Facility Name
USA	USA	USA	New Mexico

Date Sampled	Date Effective	Date Received	Date Reported
Feb 19, 2020 12:03	Feb 19, 2020 12:03	Feb 24, 2020 09:08	Feb 26, 2020

Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions
49.00		BH	965 @ 92

Operator	Lab Source Description
San Mateo Midstream	NG

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.4310	1.450984	
Carbon Dioxide (CO2)	0.0100	0.01007	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	95.8130	97.170745	
Ethane (C2)	2.6800	2.717611	0.7170
Propane (C3)	0.0620	0.062584	0.0170
IsoButane (IC4)	0.0010	0.001328	0.0000
n-Butane (NC4)	0.0030	0.002641	0.0010
IsoPentane (IC5)	0.0000	0	0.0000
n-Pentane (NC5)	0.0000	0	0.0000
Hexanes (C6's)	0.0000	0	0.0000
TOTAL	100.0000	101.4160	0.7350

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information

Device Type:	Gas Chromatograph	Device Make:	Agilent
Device Model:	7890B	Last Cal Date:	Jan 28, 2020

Gross Heating Values (Real, BTU/ft³)

14.696 PSI @ 60.00 °F Dry	14.73 PSI @ 60.00 °F Dry	14.73 PSI @ 60.00 °F Saturated
1,016.8	1,021.3	1,003.9

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density Real	Relative Density Ideal
0.5745	0.5735

Molecular Weight
16.6120

C6+ Group Properties

Assumed Composition

C6 - 0.000% C7 - 3.385% C8 - 96.615%

Field H2S
0 PPM

PROTREND STATUS: Meets ProTrend Criteria on Feb 26, 2020

DATA SOURCE: Imported

VALIDATOR COMMENTS:

Extended Gas Analysis Report

Sample Point Code - Name @ Location

5603G - 900-30012 - BR Plant 2 Residue

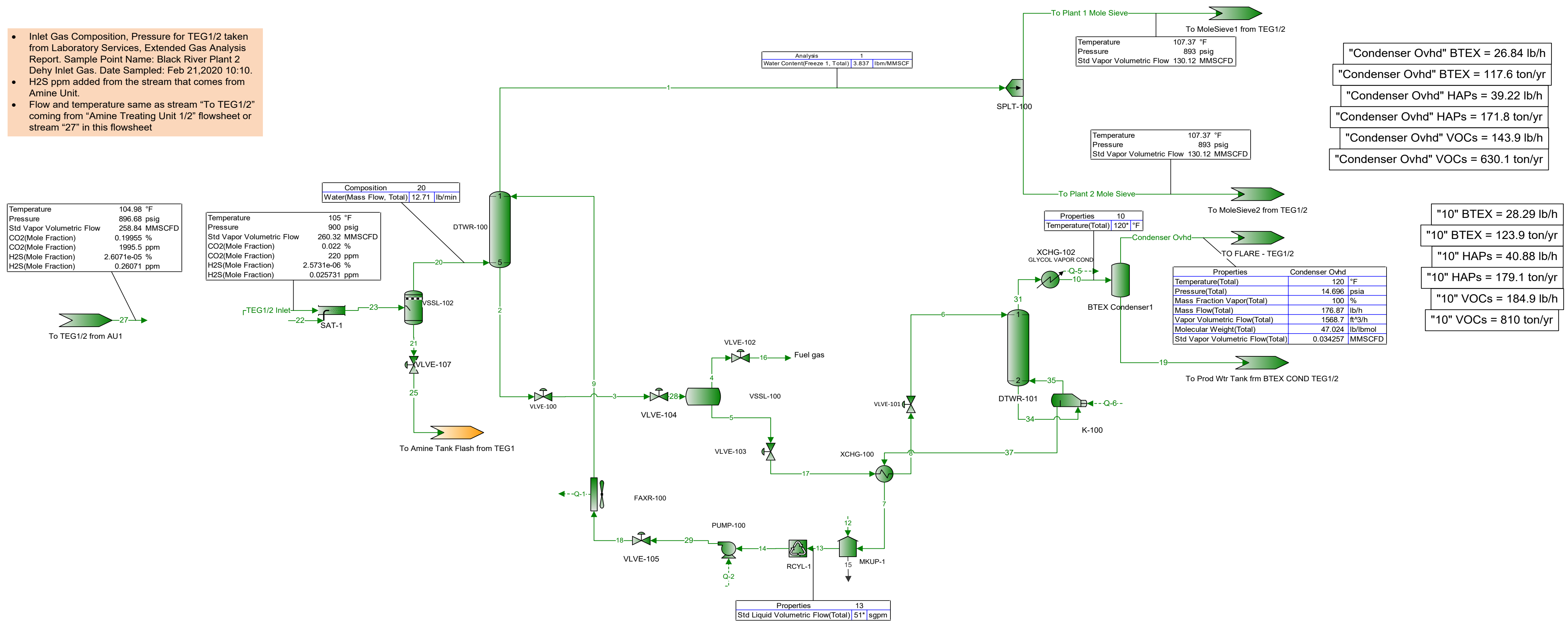
Operator

San Mateo Midstream

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Nitrogen (N2)	1.4310	1.45098	
Carbon Dioxide (CO2)	0.0100	0.01007	
Hydrogen Sulfide (H2S)	0.0000	0	
Methane (C1)	95.8130	97.1707	
Ethane (C2)	2.6800	2.71761	0.7170
Propane (C3)	0.0620	0.062584	0.0170
IsoButane (IC4)	0.0010	0.001328	0.0000
n-Butane (NC4)	0.0030	0.002641	0.0010
IsoPentane (IC5)	0.0000	0	0.0000
n-Pentane (NC5)	0.0000	0	0.0000
Hexanes (C6's)	0.0000	0	0.0000
Heptanes (C7's)	0.0000	0	0.0000
Octanes (C8's)	0.0000	0	0.0000
Nonanes (C9's)	0.0000	0	0.0000
Decanes (C10's)	0.0000	0	0.0000
Undecanes (C11's)	0.0000	0	0.0000
Dodecanes (C12's)	0.0000	0	0.0000

BTEX

Component	Normalized Mol %	Un-Normalized Mol %	GPM
Benzene	0.0000	0	0.0000
Toluene	0.0000	0	0.0000
EthylBenzene	0.0000	0	0.0000
M+P Xylene	0.0000	0	0.0000
O Xylene	0.0000	0	0.0000



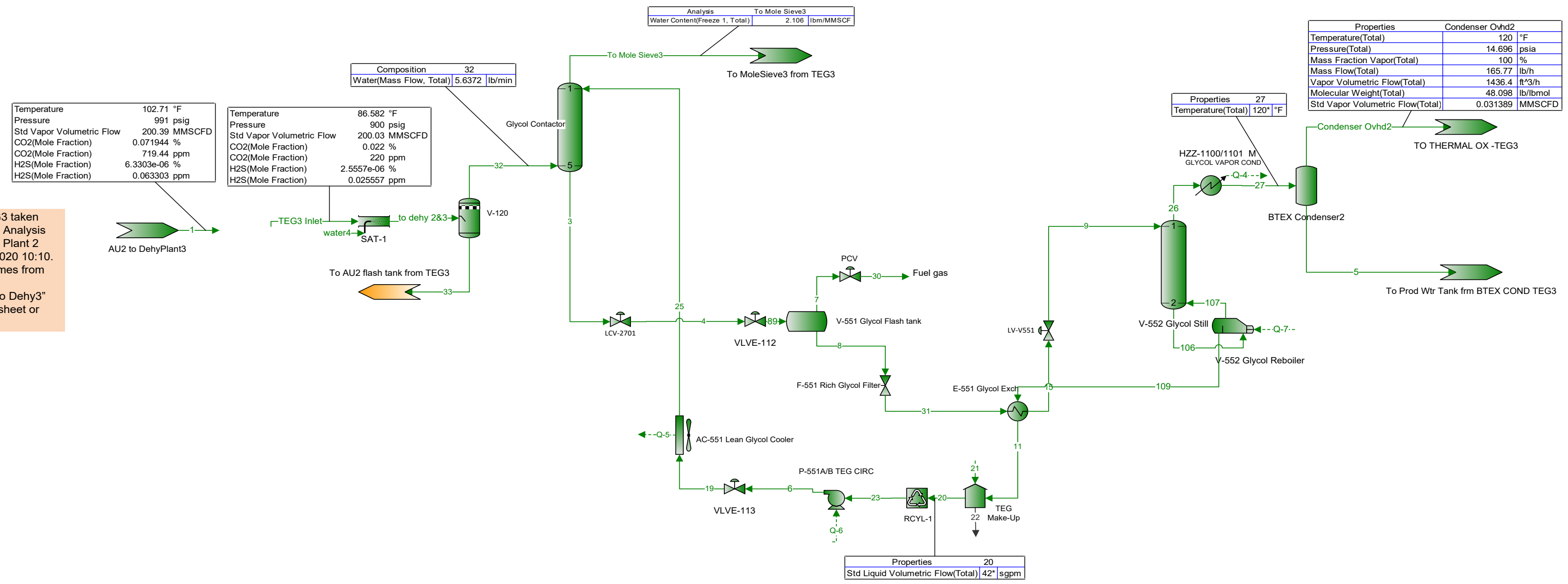
Inlet Gas Composition, Pressure for TEG1/2 taken from Laboratory Services, Extended Gas Analysis Report. Sample Point Name: Black River Plant 2 Dehy Inlet Gas. Date Sampled: Feb 21,2020 10:10.
H2S ppm added from the stream that comes from Amine Unit.
Flow and temperature same as stream “To TEG1/2” coming from “Amine Treating Unit 1/2” flowsheet or stream “27” in this flowsheet
Temperature 104.98 °F
Pressure 896.68 psig
Std Vapor Volumetric Flow 258.84 MMSCFD
CO2(Mole Fraction) 0.19955 %
CO2(Mole Fraction) 1995.5 ppm
H2S(Mole Fraction) 2.6071e-05 %
H2S(Mole Fraction) 0.26071 ppm
27
To TEG1/2 from AU1
Temperature 105 °F
Pressure 900 psig
Std Vapor Volumetric Flow 260.32 MMSCFD
CO2(Mole Fraction) 0.022 %
CO2(Mole Fraction) 220 ppm
H2S(Mole Fraction) 2.5731e-06 %
H2S(Mole Fraction) 0.025731 ppm
TEG1/2 Inlet
22
SAT-1
23
VSSL-102
21
VLVE-107
25
To Amine Tank Flash from TEG1
Composition 20
Water(Mass Flow, Total) 12.71 lb/min
20
DTWR-100
1
5
2
Analysis 1
Water Content(Freeze 1, Total) 3.837 lbm/MMSCF
1
SPLT-100
To Plant 1 Mole Sieve
To MoleSieve1 from TEG1/2
Temperature 107.37 °F
Pressure 893 psig
Std Vapor Volumetric Flow 130.12 MMSCFD
Temperature 107.37 °F
Pressure 893 psig
Std Vapor Volumetric Flow 130.12 MMSCFD
To Plant 2 Mole Sieve
To MoleSieve2 from TEG1/2
"Condenser Ovhd" BTEX = 26.84 lb/h
"Condenser Ovhd" BTEX = 117.6 ton/yr
"Condenser Ovhd" HAPs = 39.22 lb/h
"Condenser Ovhd" HAPs = 171.8 ton/yr
"Condenser Ovhd" VOCs = 143.9 lb/h
"Condenser Ovhd" VOCs = 630.1 ton/yr
"10" BTEX = 28.29 lb/h
"10" BTEX = 123.9 ton/yr
"10" HAPs = 40.88 lb/h
"10" HAPs = 179.1 ton/yr
"10" VOCs = 184.9 lb/h
"10" VOCs = 810 ton/yr
Properties 10
Temperature(Total) 120* °F
Condenser Ovhd
TO FLARE - TEG1/2
XCHG-102
GLYCOL VAPOR COND
Q-5
10
31
BTEX Condenser1
Properties Condenser Ovhd
Temperature(Total) 120 °F
Pressure(Total) 14.696 psia
Mass Fraction Vapor(Total) 100 %
Mass Flow(Total) 176.87 lb/h
Vapor Volumetric Flow(Total) 1568.7 ft^3/h
Molecular Weight(Total) 47.024 lb/lbmol
Std Vapor Volumetric Flow(Total) 0.034257 MMSCFD
19
To Prod Wtr Tank frm BTEX COND TEG1/2
6
DTWR-101
35
Q-6
K-100
34
37
VLVE-101
8
XCHG-100
VLVE-102
16
Fuel gas
4
VLVE-100
9
3
VLVE-104
28
VSSL-100
5
VLVE-103
17
7
FAXR-100
Q-1
PUMP-100
12
18
VLVE-105
29
Q-2
14
RCYL-1
13
MKUP-1
15
Properties 13
Std Liquid Volumetric Flow(Total) 51* sgpm

Process Streams		Condenser Ovhd	TEG1/2 Inlet	To Plant 1 Mole Sieve	To Plant 2 Mole Sieve	1	5	10	14	15	16	37
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	BTEX Condenser1	--	SPLT-100	SPLT-100	DTWR-100	VSSL-100	XCHG-102	RCYL-1	MKUP-1	VLVE-102	K-100
	To Block:	TO FLARE - TEG1/2	SAT-1	To MoleSieve1 from TEG1/2	To MoleSieve2 from TEG1/2	SPLT-100	VLVE-103	BTEX Condenser1	PUMP-100	--	--	XCHG-100
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%
CO2		0.198357	0.0220000*	0.0219557	0.0219557	0.0219557	0.00300129	0.0171661	0	5.45509E-09	0.0882619	5.45509E-09
H2S		0.000174038	2.57310E-06*	2.54642E-06	2.54642E-06	2.54642E-06	2.65576E-06	1.51888E-05	0	2.17984E-10	1.51554E-05	2.17984E-10
N2		0.0124072	1.17000*	1.17030	1.17030	1.17030	0.000187008	0.00106960	0	4.69022E-13	0.260258	4.69022E-13
C1		12.3834	79.5030*	79.5096	79.5096	79.5096	0.186679	1.06772	0	6.45425E-09	60.4875	6.45425E-09
C2		15.4152	10.9860*	10.9819	10.9819	10.9819	0.232439	1.32945	1.18619E-07	8.73931E-08	19.5389	8.73931E-08
C3		18.5147	5.15300*	5.14890	5.14890	5.14890	0.279258	1.59724	5.57066E-07	4.09891E-07	11.6522	4.09891E-07
iC4		3.48841	0.714000*	0.713318	0.713318	0.713318	0.0526554	0.301166	2.16656E-07	1.58740E-07	1.58425	1.58740E-07
nC4		13.8868	1.60200*	1.59950	1.59950	1.59950	0.209752	1.19969	1.72299E-06	1.27153E-06	4.14710	1.27153E-06
iC5		4.18879	0.330000*	0.329331	0.329331	0.329331	0.0634319	0.362799	1.41535E-06	1.04228E-06	0.776618	1.04228E-06
nC5		5.31418	0.322000*	0.321168	0.321168	0.321168	0.0805756	0.460849	2.49233E-06	1.83211E-06	0.812320	1.83211E-06
C6		3.81951	0.135000*	0.134445	0.134445	0.134445	0.0585744	0.334959	1.77309E-05	1.29815E-05	0.306137	1.29815E-05
C7		2.25782	0.0470000*	0.0466768	0.0466768	0.0466768	0.0356978	0.204137	1.12040E-05	8.26478E-06	0.0933253	8.26478E-06
Benzene		6.32225	0.00800000*	0.00713025	0.00713025	0.00713025	0.100141	0.567860	0.00134174	0.00103923	0.0256287	0.00103923
Toluene		2.38467	0.00200000*	0.00166239	0.00166239	0.00166239	0.0398282	0.222088	0.00154162	0.00121037	0.00522666	0.00121037
o-Xylene		0	0*	0	0	0	0	0	0	0	0	0
p-Xylene		0	0*	0	0	0	0	0	0	0	0	0
C8		0.321248	0.00500000*	0.00495065	0.00495065	0.00495065	0.00556974	0.0318417	4.25130E-06	3.14564E-06	0.00818823	3.14564E-06
Water		11.4495	0*	0.00808234	0.00808234	0.00808234	22.6676	91.7141	8.03591	8.03776	0.213470	8.03776
Triethylene Glycol		3.46596E-06	0*	5.97266E-05	5.97266E-05	5.97266E-05	75.9788	0.555577	91.9609	91.9598	6.15969E-05	91.9598
Ethylbenzene		0	0*	0	0	0	0	0	0	0	0	0
C9		0	0*	0	0	0	0	0	0	0	0	0
C10		0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane		0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane		0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane		0	0*	0	0	0	0	0	0	0	0	0
Undecane		0	0*	0	0	0	0	0	0	0	0	0
Dodecane		0.0426114	0.001000000*	0.000951261	0.000951261	0.000951261	0.00580541	0.0322857	0.000255428	0.000194681	0.000680703	0.000194681
Argon		0	0*	0	0	0	0	0	0	0	0	0
O2		0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0	0*	0	0	0	0	0	0	0	0	0
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
CO2		0.00746096	6.28820*	3.13677	3.13677	6.27355	0.00749073	0.00749072	0	0	0.00716575	1.12346E-08
H2S		6.54622E-06	0.000735463*	0.000363802	0.000363802	0.000727604	6.62834E-06	6.62789E-06	0	0	1.23042E-06	4.48931E-10
N2		0.000466680	334.418*	167.198	167.198	334.396	0.000466740	0.000466740	0	0	0.0211296	9.65937E-13
C1		0.465789	22724.1*	11359.4	11359.4	22718.8	0.465919	0.465919	0	0	4.91081	1.32923E-08
C2		0.579823	3140.10*	1568.97	1568.97	3137.93	0.580129	0.580129	2.44624E-07	0	1.58631	1.79983E-07
C3		0.696409	1472.87*	735.613	735.613	1471.23	0.696983	0.696982	1.14882E-06	0	0.946007	8.44158E-07
iC4		0.131212	204.081*	101.910	101.910	203.821	0.131419	0.131419	4.46802E-07	0	0.128621	3.26920E-07
nC4		0.522334	457.895*	228.518	228.518	457.035	0.523507	0.523505	3.55327E-06	0	0.336692	2.61867E-06
iC5		0.157556	94.3230*	47.0508	47.0508	94.1017	0.158316	0.158314	2.91883E-06	0	0.0630515	2.14654E-06
nC5		0.199886	92.0364*	45.8847	45.8847	91.7694	0.201103	0.201100	5.13984E-06	0	0.0659500	3.77317E-06
C6		0.143666	38.5867*	19.2078	19.2078	38.4157	0.146192	0.146165	3.65658E-05	0	0.0248545	2.67351E-05
C7		0.0849253	13.4339*	6.66862	6.66862	13.3372	0.0890958	0.0890787	2.31055E-05	0	0.00757683	1.70211E-05
Benzene		0.237804	2.28662*	1.01868	1.01868	2.03737	0.249936	0.247796	0.00276702	0	0.00208073	0.00214026
Toluene		0.0896965	0.571655*	0.237502	0.237502	0.475005	0.0994046	0.0969119	0.00317924	0	0.000424338	0.00249272
o-Xylene		0	0*	0	0	0	0	0	0	0	0	0
p-Xylene		0	0*	0	0	0	0	0	0	0	0	0
C8		0.0120834	1.42914*	0.707290	0.707290	1.41458	0.0139012	0.0138947	8.76731E-06	0	0.000664780	6.47835E-06
Water		0.430659	0*	1.15471	1.15471	2.30942	56.5745	40.0210	16.5722	0	0.0173311	16.5535
Triethylene Glycol		1.30368E-07	0*	0.00853301	0.00853301	0.0170660	189.631	0.242435	189.648	0	5.00089E-06	189.388
Ethylbenzene		0	0*	0	0	0	0	0	0	0	0	0
C9		0	0*	0	0	0	0	0	0	0	0	0
C10		0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane		0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane		0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane		0	0*	0	0	0	0	0	0	0	0	0
Undecane		0	0*	0	0	0	0	0	0	0	0	0
Dodecane		0.00160278	0.285827*	0.135905	0.135905	0.271810	0.0144894	0.0140884	0.000526760	0	5.52645E-05	0.000400940
Argon		0	0*	0	0	0	0	0	0	0	0	0
O2		0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0	0*	0	0	0	0	0	0	0	0	0
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%
CO2		0.185643	0.0468577*	0.0467752	0.0467752	0.0467752	0.00111107	0.0354026	0	1.72037E-09	0.150922	1.72037E-09
H2S		0.000126136	4.24404E-06*	4.20109E-06	4.20109E-06	4.20109E-06	7.61352E-07	2.42578E-05	0	5.32364E-11	2.00683E-05	5.32364E-11
N2		0.00739133	1.58622*	1.58703	1.58703	1.58703	4.40667E-05	0.00140413	0	9.41527E-14	0.283272	9.41527E-14
C1		4.22471	61.7257*	61.7464	61.7464	61.7464	0.0251913	0.802687	0	7.41976E-10	37.7025	7.41976E-10
C2		9.85715	15.9871*	15.9853	15.9853	15.9853	0.0587914	1.87331	2.55588E-08	1.88309E-08	22.8272	1.88309E-08
C3		17.3619	10.9968*	10.9908	10.9908	10.9908	0.103583	3.30052	1.76023E-07	1.29520E-07	19.9635	1.29520E-07
iC4		4.31175	2.00841*	2.00700	2.00700	2.00700	0.0257437	0.820285	9.02359E-08	6.61153E-08	3.57767	6.61153E-08
nC4		17.1643	4.50626*	4.50037	4.50037	4.50037	0.102550	3.26759	7.17617E-07	5.29591E-07	9.36527	5.29591E-07
iC5		6.42690	1.15227*	1.15022	1.15022	1.15022	0.0384966	1.22663	7.31746E-07	5.38873E-07	2.17706	5.38873E-07
nC5		8.15359	1.12434*	1.12172	1.12172	1.12172	0.0489010	1.55814	1.28855E-06	9.47226E-07	2.27714	9.47226E-07
C6		6.99963	0.563026*	0.560852	0.560852	0.560852	0.0424597	1.35267	1.09492E-05	8.01645E-06	1.02502	8.01645E-06
C7		4.81116	0.227922*	0.226411	0.226411	0.226411	0.0300887	0.958551	8.04479E-06	5.93445E-06	0.363337	5.93445E-06
Benzene		10.5020	0.0302425*	0.0269614	0.0269614	0.0269614	0.0657983	2.07862	0.000751019	0.000581704	0.0777817	0.000581704
Toluene		4.67254	0.00891830*	0.00741473	0.00741473	0.00741473	0.0308686	0.958921	0.00101785	0.000799157	0.0187111	0.000799157
o-Xylene		0	0*	0	0	0	0	0	0	0	0	0
p-Xylene		0	0*	0	0	0	0	0	0	0	0	0
C8		0.780368	0.0276411*	0.0273753	0.0273753	0.0273753	0.00535175	0.170447	3.47987E-06	2.57488E-06	0.0363411	2.57488E-06
Water		4.38643	0*	0.00704855	0.00704855	0.00704855	3.43504	77.4273	1.03739	1.03765	0.149421	1.03765
Triethylene Glycol		1.10688E-05	0*	0.000434191	0.000434191	0.000434191	95.9777	3.90978	98.9605	98.9607	0.000359405	98.9607
Ethylbenzene		0	0*	0	0	0	0	0	0	0	0	0
C9		0	0*	0	0	0	0	0	0	0	0	0
C10		0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane		0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane		0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane		0	0*	0	0	0	0	0	0	0	0	0
Undecane		0	0*	0	0	0	0	0	0	0	0	0
Dodecane		0.154352	0.00824356*	0.00784376	0.00784376	0.00784376	0.00831806	0.257710	0.000311773	0.000237629	0.00450500	0.000237629
Argon		0	0*	0	0	0	0	0	0	0	0	0
O2		0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0	0*	0	0	0	0	0	0	0	0	0

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
CO2	0.328353	276.741*	138.048	138.048	276.096	0.329663	0.329663	0	0	0.315361	4.94429E-07
H2S	0.000223101	0.0250652*	0.0123987	0.0123987	0.0247974	0.000225900	0.000225884	0	0	4.19339E-05	1.53000E-08
N2	0.0130733	9368.19*	4683.79	4683.79	9367.58	0.0130750	0.0130750	0	0	0.591912	2.70592E-11
C1	7.47239	364551*	182232	182232	364465	7.47449	7.47449	0	0	78.7815	2.13242E-07
C2	17.4347	94419.8*	47177.3	47177.3	94354.6	17.4439	17.4439	7.35561E-06	0	47.6987	5.41193E-06
C3	30.7086	64947.1*	32437.3	32437.3	64874.6	30.7339	30.7339	5.06578E-05	0	41.7148	3.72237E-05
iC4	7.62635	11861.6*	5923.25	5923.25	11846.5	7.63837	7.63835	2.59691E-05	0	7.47574	1.90013E-05
nC4	30.3592	26613.9*	13281.9	13281.9	26563.9	30.4274	30.4273	0.000206524	0	19.5693	0.000152203
iC5	11.3675	6805.29*	3394.66	3394.66	6789.32	11.4223	11.4221	0.000210590	0	4.54909	0.000154871
nC5	14.4216	6640.32*	3310.52	3310.52	6621.05	14.5094	14.5091	0.000370833	0	4.75822	0.000272230
C6	12.3805	3325.22*	1655.24	1655.24	3310.49	12.5982	12.5958	0.00315107	0	2.14184	0.00230390
C7	8.50968	1346.10*	668.209	668.209	1336.42	8.92757	8.92586	0.00231522	0	0.759213	0.00170554
Benzene	18.5753	178.612*	79.5713	79.5713	159.143	19.5229	19.3558	0.216137	0	0.162529	0.167180
Toluene	8.26450	52.6714*	21.8831	21.8831	43.7662	9.15898	8.92931	0.292930	0	0.0390979	0.229675
o-Xylene	0	0*	0	0	0	0	0	0	0	0	0
p-Xylene	0	0*	0	0	0	0	0	0	0	0	0
C8	1.38027	163.248*	80.7927	80.7927	161.585	1.58791	1.58717	0.00100148	0	0.0759369	0.000740012
Water	7.75844	0*	20.8024	20.8024	41.6048	1019.21	720.990	298.553	0	0.312224	298.216
Triethylene Glycol	1.95778E-05	0*	1.28143	1.28143	2.56286	28477.4	36.4073	28480.0	0	0.000750998	28441.0
Ethylbenzene	0	0*	0	0	0	0	0	0	0	0	0
C9	0	0*	0	0	0	0	0	0	0	0	0
C10	0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
Undecane	0	0*	0	0	0	0	0	0	0	0	0
Dodecane	0.273009	48.6864*	23.1493	23.1493	46.2986	2.46804	2.39975	0.0897255	0	0.00941346	0.0682940
Argon	0	0*	0	0	0	0	0	0	0	0	0
O2	0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814	0	0*	0	0	0	0	0	0	0	0	0

Process Streams		Condenser Ovhd	TEG1/2 Inlet	To Plant 1 Mole Sieve	To Plant 2 Mole Sieve	1	5	10	14	15	16	37
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	BTEX Condenser1	--	SPLT-100	SPLT-100	DTWR-100	VSSL-100	XCHG-102	RCYL-1	MKUP-1	VLVE-102	K-100
	To Block:	TO FLARE - TEG1/2	SAT-1	To MoleSieve1 from TEG1/2	To MoleSieve2 from TEG1/2	SPLT-100	VLVE-103	BTEX Condenser1	PUMP-100	--	--	XCHG-100
Property	Units											
Temperature	°F	120	105*	107.368	107.368	107.368	109.743	120*	209.969		108.325	390
Pressure	psia	14.6959	914.696*	907.696	907.696	907.696	94.6959	14.6959	14.1959	14.1959	79.6959*	15.1959
Mole Fraction Vapor	%	100	100	100	100	100	0	8.61976	0		100	0
Mole Fraction Light Liquid	%	0	0	0	0	0	100	0.0806335	100		0	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	91.2996	0		0	0
Molecular Weight	lb/lbmol	47.0236	20.6628	20.6575	20.6575	20.6575	118.881	21.3394	139.551	139.549	25.7375	139.549
Mass Density	lb/ft^3	0.112752	3.74874	3.68615	3.68615	3.68615	68.3922	0.589033	65.3505		0.345398	58.4760
Molar Flow	lbmol/h	3.76138	28582.7	14286.8	14286.8	28573.6	249.584	43.6367	206.227	0	8.11873	205.947
Mass Flow	lb/h	176.874	590598	295130	295130	590260	29670.9	931.183	28779.1	0	208.956	28739.7
Vapor Volumetric Flow	ft^3/h	1568.70	157546	80064.6	80064.6	160129	433.834	1580.87	440.381	0	604.971	491.478
Liquid Volumetric Flow	gpm	195.578	19642.1	9982.08	9982.08	19964.2	54.0884	197.095	54.9047	0	75.4250	61.2752
Std Vapor Volumetric Flow	MMSCFD	0.0342572	260.321*	130.119	130.119	260.237	2.27311	0.397427	1.87823	0	0.0739423	1.87569
Std Liquid Volumetric Flow	sgpm	0.625609	3431.04	1714.71	1714.71	3429.42	53.0582	2.12811	51	0	1.09262	50.9300
Compressibility		0.985248	0.831997	0.835930	0.835930	0.835930	0.0269369	0.0855847	0.00421837		0.974260	0.00397707
Specific Gravity		1.62360	0.713432	0.713252	0.713252	0.713252	1.09658		1.04781		0.888648	0.937586
API Gravity							-5.32778		-6.66761			-6.66793
Enthalpy	Btu/h	-177330	-9.75184E+08	-4.86971E+08	-4.86971E+08	-9.73942E+08	-7.23487E+07	-5.10113E+06	-6.54668E+07	0	-294490	-6.18754E+07
Mass Enthalpy	Btu/lb	-1002.58	-1651.18	-1650.02	-1650.02	-1650.02	-2438.37	-5478.12	-2274.80	-2275.92	-1409.34	-2152.96
Mass Cp	Btu/(lb*°F)	0.412666	0.629567	0.626885	0.626885	0.626885	0.609232	0.868961	0.641381		0.477493	0.709029
Ideal Gas CpCv Ratio		1.11481	1.24239	1.24182	1.24182	1.24182	1.04032	1.26647	1.03023		1.19766	1.02644
Dynamic Viscosity	cP	0.00911879	0.0129905	0.0129897	0.0129897	0.0129897	15.1233		3.59573		0.0106202	0.798004
Kinematic Viscosity	cSt	5.04886	0.216332	0.219990	0.219990	0.219990	13.8044		3.43493		1.91952	0.851935
Thermal Conductivity	Btu/(h*ft*°F)	0.0118248	0.0223687	0.0224034	0.0224034	0.0224034	0.115985		0.113685?		0.0170573	0.107260?
Surface Tension	lbf/ft						0.00298398		0.00266905			0.00204985
Net Ideal Gas Heating Value	Btu/ft^3	2300.09	1123.05	1122.70	1122.70	1122.70	2905.24	224.515	3473.31	3473.24	1387.31	3473.24
Net Liquid Heating Value	Btu/lb	18365.8	20567.9	20566.8	20566.8	20566.8	8987.34	3132.66	9177.11	9177.04	20356.2	9177.04
Gross Ideal Gas Heating Value	Btu/ft^3	2489.74	1238.45	1238.08	1238.08	1238.08	3186.79	288.820	3800.90	3800.82	1521.90	3800.82
Gross Liquid Heating Value	Btu/lb	19896.8	22687.7	22686.7	22686.7	22686.7	9886.09	4276.29	10067.9	10067.8	22341.2	10067.8

- Inlet Gas Composition, Pressure for TEG3 taken from Laboratory Services, Extended Gas Analysis Report. Sample Point Name: Black River Plant 2 Dehy Inlet Gas. Date Sampled: Feb 21,2020 10:10.
- H2S ppm added from the stream that comes from Amine Unit.
- Flow and temperature same as stream "to Dehy3" coming from "Amine Treating Unit3" flowsheet or stream 1 in this flowsheet



"Condenser Ovhd2" BTEX = 28.56 lb/h
"Condenser Ovhd2" BTEX = 125.1 ton/yr
"Condenser Ovhd2" HAPs = 39.38 lb/h
"Condenser Ovhd2" HAPs = 172.5 ton/yr
"Condenser Ovhd2" VOCs = 136.8 lb/h
"Condenser Ovhd2" VOCs = 599 ton/yr

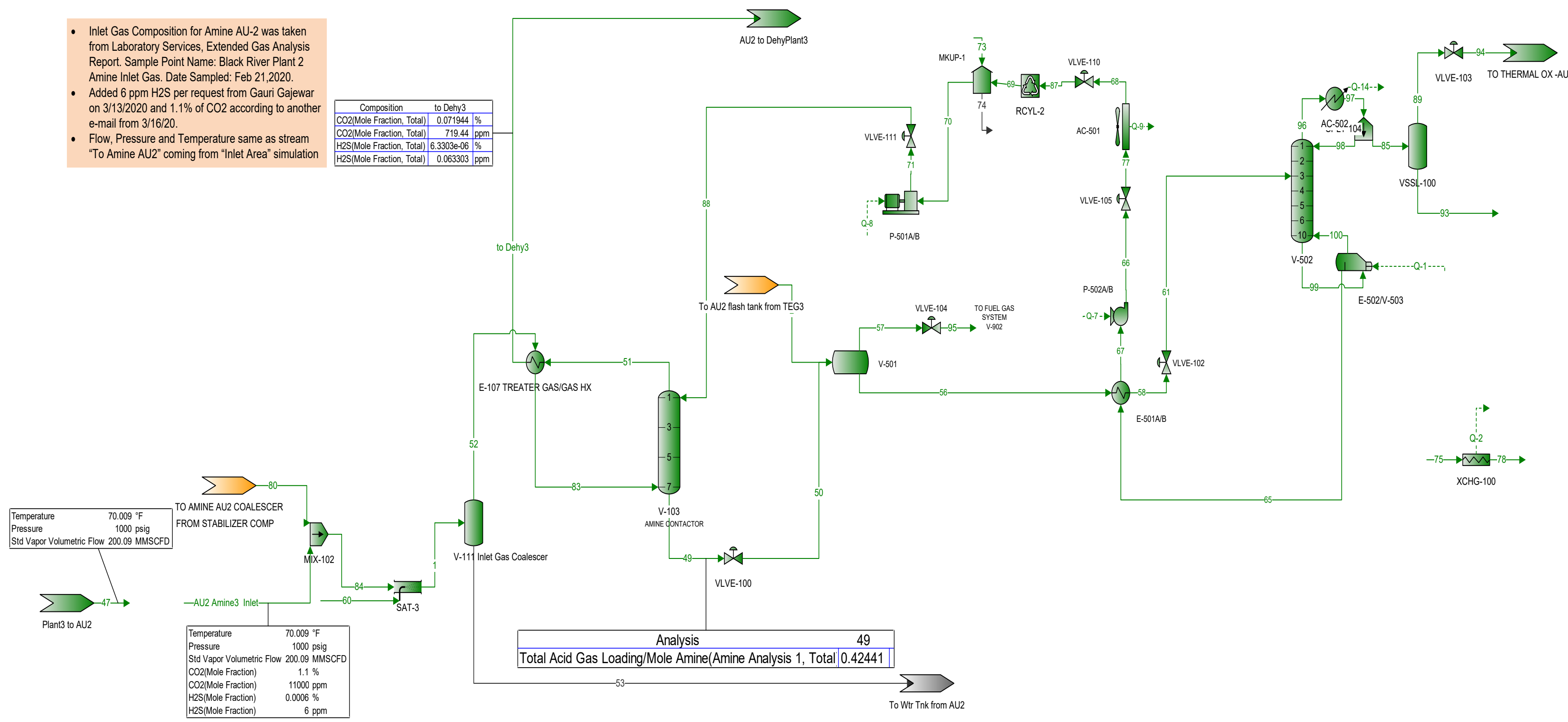
"27" BTEX = 30.13 lb/h
"27" BTEX = 132 ton/yr
"27" HAPs = 41.2 lb/h
"27" HAPs = 180.5 ton/yr
"27" VOCs = 163.6 lb/h
"27" VOCs = 716.5 ton/yr

Process Streams	Condenser Ovhd2	TEG3 Inlet	to dehy 2&3	To Mole Sieve3	1	7	25	26	27	30	109
Composition Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total** From Block:	BTEX Condenser2	--	SAT-1	Glycol Contactor	AU2 to DehyPlant3	V-551 Glycol Flash tank	C-551 Lean Glycol Cool	V-552 Glycol Still	HZZ-1100/1101 M	PCV	-552 Glycol Reboil
To Block:	TO THERMAL OX -TEG3	SAT-1	V-120	To MoleSieve3 from TEG3	--	PCV	Glycol Contactor	HZZ-1100/1101 M	BTEX Condenser2	--	E-551 Glycol Exch
Mole Fraction	%	%	%	%	%	%	%	%	%	%	%
CO2	0.209955	0.0220000*	0.0219810	0.0219484	0.0719444	0.0925585	1.64016E-08	0.0344629	0.0344629	0.0925585	1.63874E-08
H2S	0.000179568	2.55567E-06*	2.55347E-06	2.52391E-06	6.33032E-06	1.49248E-05	0	2.96072E-05	2.96072E-05	1.49248E-05	6.17767E-10
N2	0.00932728	1.17000*	1.16899	1.17038	1.30028	0.243518	0	0.00152794	0.00152794	0.243518	1.08420E-12
C1	10.7878	79.5030*	79.4345	79.5146	78.9929	60.3277	1.69148E-08	1.76736	1.76736	60.3277	1.68986E-08
C2	15.0665	10.9860*	10.9765	10.9820	11.0127	20.0403	2.52390E-07	2.46898	2.46898	20.0403	2.52148E-07
C3	18.7371	5.15300*	5.14856	5.14861	5.28098	11.7690	1.21457E-06	3.07185	3.07185	11.7690	1.21340E-06
iC4	3.52967	0.714000*	0.713385	0.713266	0.747154	1.56034	4.72501E-07	0.579274	0.579274	1.56034	4.72036E-07
nC4	14.1395	1.60200*	1.60062	1.59922	1.68236	4.02772	3.74228E-06	2.32235	2.32235	4.02772	3.73870E-06
iC5	4.19756	0.330000*	0.329716	0.329254	0.313925	0.720962	3.01892E-06	0.691740	0.691740	0.720962	3.01600E-06
nC5	5.45200	0.322000*	0.321723	0.321042	0.295548	0.754382	5.39898E-06	0.899962	0.899962	0.754382	5.39371E-06
C6	3.64493	0.135000*	0.134884	0.134389	0.0858895	0.268938	3.58466E-05	0.610312	0.610312	0.268938	3.58109E-05
C7	2.32181	0.0470000*	0.0469595	0.0466076	0.0303423	0.0794095	2.42014E-05	0.404276	0.404276	0.0794095	2.41781E-05
Benzene	7.37389	0.00800000*	0.00799311	0.00679409	0.00498092	0.0226157	0.00309816	1.25467	1.25467	0.0226157	0.00309597
Toluene	2.74119	0.00200000*	0.00199828	0.00152917	0.00128484	0.00448533	0.00348944	0.490764	0.490764	0.00448533	0.00348719
o-Xylene	0	0*	0	0	5.13131E-06	0	0	0	0	0	0
p-Xylene	0	0*	0	0	2.91571E-05	0	0	0	0	0	0
C8	0.327484	0.00500000*	0.00499569	0.00493863	0.00360193	0.00671194	9.18999E-06	0.0640189	0.0640189	0.00671194	9.18126E-06
Water	11.4245	0*	0.0861379	0.00443552	0.175685	0.0807073	8.01868	84.5823	84.5823	0.0807073	8.02549
Triethylene Glycol	4.52518E-06	0*	0	2.64173E-05	0	2.24789E-05	91.9741	0.690265	0.690265	2.24789E-05	91.9673
Ethylbenzene	0	0*	0	0	4.80793E-06	0	0	0	0	0	0
C9	0	0*	0	0	0	0	0	0	0	0	0
C10	0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
Undecane	0	0*	0	0	0	0	0	0	0	0	0
Dodecane	0.0366765	0.00100000*	0.000999139	0.000937152	0	0.000488024	0.000533799	0.0658424	0.0658424	0.000488024	0.000533410
Argon	0	0*	0	0	0	0	0	0	0	0	0
O2	0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814	0	0*	0	0	0.000285064	0	0	0	0	0	0
Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
CO2	0.00723601	4.83185*	4.83185	4.81865	15.8299	0.00595044	2.78511E-08	0.00725115	0.00725115	0.00595044	2.78023E-08
H2S	6.18875E-06	0.000561300*	0.000561300	0.000554110	0.00139286	9.59490E-07	0	6.22947E-06	6.22947E-06	9.59490E-07	1.04808E-09
N2	0.000321461	256.966*	256.966	256.950	286.101	0.0156554	0	0.000321485	0.000321485	0.0156554	1.83941E-12
C1	0.371797	17461.2*	17461.2	17457.0	17380.8	3.87837	2.87226E-08	0.371861	0.371861	3.87837	2.86695E-08
C2	0.519259	2412.85*	2412.85	2411.04	2423.13	1.28836	4.28578E-07	0.519483	0.519483	1.28836	4.27785E-07
C3	0.645765	1131.75*	1131.75	1130.35	1161.97	0.756613	2.06244E-06	0.646330	0.646330	0.756613	2.05860E-06
iC4	0.121649	156.815*	156.815	156.593	164.396	0.100312	8.02344E-07	0.121882	0.121882	0.100312	8.00838E-07
nC4	0.487311	351.846*	351.846	351.099	370.170	0.258936	6.35468E-06	0.488631	0.488631	0.258936	6.34293E-06
iC5	0.144667	72.4777*	72.4777	72.2858	69.0728	0.0463495	5.12636E-06	0.145545	0.145545	0.0463495	5.11683E-06
nC5	0.187901	70.7207*	70.7207	70.4828	65.0293	0.0484980	9.16789E-06	0.189356	0.189356	0.0484980	9.15077E-06
C6	0.125621	29.6500*	29.6500	29.5043	18.8982	0.0172896	6.08703E-05	0.128412	0.128412	0.0172896	6.07554E-05
C7	0.0800204	10.3226*	10.3226	10.2324	6.67622	0.00510511	4.10959E-05	0.0850615	0.0850615	0.00510511	4.10197E-05
Benzene	0.254138	1.75704*	1.75704	1.49160	1.09595	0.00145393	0.00526093	0.263987	0.263987	0.00145393	0.00525251
Toluene	0.0944739	0.439259*	0.439259	0.335721	0.282704	0.000288355	0.00592535	0.103259	0.103259	0.000288355	0.00591624
o-Xylene	0	0*	0	0	0.00112904	0	0	0	0	0	0
p-Xylene	0	0*	0	0	0.00641543	0	0	0	0	0	0
C8	0.0112866	1.09815*	1.09815	1.08425	0.792532	0.000431499	1.56053E-05	0.0134698	0.0134698	0.000431499	1.55766E-05
Water	0.393741	0*	18.9347	0.973793	38.6559	0.00518854	13.6164	17.7965	17.7965	0.00518854	13.6157
Triethylene Glycol	1.55958E-07	0*	0	0.00579976	0	1.44513E-06	156.179	0.145235	0.145235	1.44513E-06	156.028
Ethylbenzene	0	0*	0	0	0.00105789	0	0	0	0	0	0
C9	0	0*	0	0	0	0	0	0	0	0	0
C10	0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
Undecane	0	0*	0	0	0	0	0	0	0	0	0
Dodecane	0.00126404	0.219629*	0.219629	0.205746	0	3.13742E-05	0.000906433	0.0138535	0.0138535	3.13742E-05	0.000904963
Argon	0	0*	0	0	0	0	0	0	0	0	0
O2	0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814	0	0*	0	0	0.0627226	0	0	0	0	0	0
Mass Fraction	%	%	%	%	%	%	%	%	%	%	%
CO2	0.192109	0.0468577*	0.0468225	0.0467616	0.152915	0.158678	5.17172E-09	0.0630543	0.0630543	0.158678	5.16760E-09
H2S	0.000127237	4.21528E-06*	4.21212E-06	4.16413E-06	1.04194E-05	1.98141E-05	0	4.19492E-05	4.19492E-05	1.98141E-05	1.50857E-10
N2	0.00543245	1.58622*	1.58503	1.58721	1.75918	0.265737	0	0.00177946	0.00177946	0.265737	2.17623E-13
C1	3.59814	61.7257*	61.6793	61.7529	61.2022	37.7001	1.94420E-09	1.17873	1.17873	37.7001	1.94247E-09
C2	9.41902	15.9871*	15.9751	15.9861	15.9927	23.4736	5.43744E-08	3.08640	3.08640	23.4736	5.43258E-08
C3	17.1780	10.9968*	10.9886	10.9907	11.2465	20.2158	3.83726E-07	5.63133	5.63133	20.2158	3.83380E-07
iC4	4.26532	2.00841*	2.00690	2.00693	2.09730	3.53279	1.96765E-07	1.39972	1.39972	3.53279	1.96584E-07
nC4	17.0864	4.50626*	4.50287	4.49976	4.72247	9.11920	1.55841E-06	5.61158	5.61158	9.11920	1.55702E-06
iC5	6.29651	1.15227*	1.15141	1.15001	1.09386	2.02627	1.56057E-06	2.07485	2.07485	2.02627	1.55916E-06
nC5	8.17823	1.12434*	1.12349	1.12132	1.02983	2.12019	2.79090E-06	2.69941	2.69941	2.12019	2.78835E-06
C6	6.53051	0.563026*	0.562603	0.560642	0.357463	0.902797	2.21327E-05	2.18651	2.18651	0.902797	2.21121E-05
C7	4.83702	0.227922*	0.227750	0.226085	0.146836	0.309959	1.73748E-05	1.68411	1.68411	0.309959	1.73592E-05
Benzene	11.9753	0.0302425*	0.0302198	0.0256914	0.0187903	0.0688149	0.00173390	4.07438	4.07438	0.0688149	0.00173279
Toluene	5.25115	0.00891830*	0.00891161	0.00682083	0.00571741	0.0160987	0.00230356	1.87987	1.87987	0.0160987	0.00230223
o-Xylene	0	0*	0	0	2.63098E-05	0	0	0	0	0	0
p-Xylene	0	0*	0	0	0.000149497	0	0	0	0	0	0
C8	0.777748	0.0276411*	0.0276204	0.0273099	0.0198709	0.0298660	7.52130E-06	0.304017	0.304017	0.0298660	7.51464E-06
Water	4.27911	0*	0.0751095	0.00386835	0.152856	0.0566381	1.03502	63.3485	63.3485	0.0566381	1.03596
Triethylene Glycol	1.41287E-05	0*	0	0.000192052	0	0.000131499	98.9602	4.30946	4.30946	0.000131499	98.9593
Ethylbenzene	0	0*	0	0	2.46517E-05	0	0	0	0	0	0
C9	0	0*	0	0	0	0	0	0	0	0	0
C10	0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
Undecane	0	0*	0	0	0	0	0	0	0	0	0
Dodecane	0.129887	0.00824356*	0.00823737	0.00772775	0	0.00323817	0.000651456	0.466257	0.466257	0.00323817	0.000651022
Argon	0	0*	0	0	0	0	0	0	0	0	0
O2	0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814	0	0*	0	0	0.00128882	0	0	0	0	0	0
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
CO2	0.318453	212.647*	212.647	212.066	696.666	0.261876	1.22571E-06	0.319119	0.319119	0.261876	1.22357E-06
H2S	0.000210918	0.0191296*	0.0191296	0.0188846	0.0474698	3.27003E-05	0	0.000212306	0.000212306	3.27003E-05	3.57195E-08
N2	0.00900521	7198.50*	7198.50	7198.06	8014.65	0.438560	0	0.00900588	0.00900588	0.438560	5.15281E-11
C1	5.96454	280121*	280121	280052	278831	62.2186	4.60781E-07	5.96556	5.96556	62.2186	4.59930E-07
C2	15.6136	72552.1*	72552.1	72497.7	72861.2	38.7397	1.28869E-05	15.6204	15.6204	38.7397	1.28631E-05
C3	28.4754	49905.2*	49905.2	49843.4	51237.9	33.3633	9.09444E-05	28.5003	28.5003	33.3633	9.07753E-05
iC4	7.07049	9114.46*	9114.46	9101.54	9555.06	5.83035	4.66340E-05	7.08403	7.08403	5.83035	4.65465E-05
nC4	28.3236	20450.1*	20450.1	20406.6	21515.1	15.0499	0.000369348	28.4003	28.4003	15.0499	0.000368665
iC5	10.4375	5229.18*	5229.18	5215.33	4983.52	3.34406	0.000369861	10.5009	10.5009	3.34406	0.000369173
nC5	13.5568	5102.41*	5102.41	5085.25	4691.79	3.49907	0.000661452	13.6618	13.6618	3.49907	0.000660217
C6	10.8254	2555.10*	2555.10	2542.54	1628.56	1.48994	0.00524552	11.0660	11.0660	1.48994	0.00523562
C7	8.01819	1034.34*	1034.34	1025.31	668.970	0.511542	0.00411789	8.52332	8.52332	0.511542	0.00411025
Benzene	19.8512	137.245*	137.245	116.512	85.6067	0.113569	0.410941	20.6205	20.6205	0.113569	0.410283
Toluene	8.70468	40.4726*	40.4726	30.9328	26.0479	0.0265685	0.545953	9.51410	9.51410	0.0265685	0.545113
o-Xylene	0	0*	0	0	0.119864	0	0	0	0	0	0
p-Xylene	0	0*	0	0	0.681094	0	0	0	0	0	0
C8	1.28925	125.440*	125.440	123.852	90.5298	0.0492895	0.00178257	1.53864	1.53864	0.0492895	0.00177929
Water	7.09336	0*	341.114	17.5431	696.396	0.0934729	245.302	320.608	320.608	0.0934729	245.291
Triethylene Glycol	2.34207E-05	0*	0	0.870967	0	0.000217020	23453.9	21.8103	21.8103	0.000217020	23431.2
Ethylbenzene	0	0*	0	0	0.112311	0	0	0	0	0	0
C9	0	0*	0	0	0	0	0	0	0	0	0
C10	0	0*	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0*	0	0	0	0	0	0	0	0	0
2-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
3-Methylpentane	0	0*	0	0	0	0	0	0	0	0	0
Undecane	0	0*	0	0	0	0	0	0	0	0	0
Dodecane	0.215310	37.4105*	37.4105	35.0457	0	0.00534412	0.154397	2.35974	2.35974	0.00534412	0.154147
Argon	0	0*	0	0	0	0	0	0	0	0	0
O2	0	0*	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814	0	0*	0	0	5.87172	0	0	0	0	0	0

Process Streams		Condenser Ovhd2	TEG3 Inlet	to dehy 2&3	To Mole Sieve3	1	7	25	26	27	30	109
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	BTEX Condenser2	--	SAT-1	Glycol Contactor	AU2 to DehyPlant3	V-551 Glycol Flash tank	:-551 Lean Glycol Cool	V-552 Glycol Still	HZZ-1100/1101 M	PCV	-552 Glycol Reboil
	To Block:	TO THERMAL OX -TEG3	SAT-1	V-120	To MoleSieve3 from TEG3	--	PCV	Glycol Contactor	HZZ-1100/1101 M	BTEX Condenser2	--	E-551 Glycol Exch
Property	Units											
Temperature	°F	120	86.5816*	86.5816	88.9534	102.708	90.6691	120*	302.476	120*	89.1423	390
Pressure	psia	14.6959	914.696*	914.696	907.696	1005.70	94.6959*	1014.70	14.6959	14.6959	79.6959*	15.1959
Mole Fraction Vapor	%	100	100	100	100	99.9525	100	0	100	16.3802	100	0
Mole Fraction Light Liquid	%	0	0	0	0	0.0474740	0	100	0	0.198915	0	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	83.4209	0	0
Molecular Weight	lb/lbmol	48.0978	20.6628	20.6605	20.6567	20.7058	25.6711	139.571	24.0538	24.0538	25.6711	139.562
Mass Density	lb/ft^3	0.115404	3.98870	3.98821	3.91748	4.23449	0.425966	68.6846	0.0434668	0.350999	0.357595	58.4751
Molar Flow	lbmol/h	3.44646	21962.9	21981.9	21954.4	22003.0	6.42884	169.808	21.0404	21.0404	6.42884	169.656
Mass Flow	lb/h	165.767	453815	454156	453505	455589	165.035	23700.3	506.103	506.103	165.035	23677.6
Vapor Volumetric Flow	ft^3/h	1436.40	113775	113875	115765	107590	387.438	345.060	11643.4	1441.89	461.515	404.918
Liquid Volumetric Flow	gpm	179.084	14184.9	14197.4	14433.0	13413.8	48.3039	43.0205	1451.65	179.769	57.5396	50.4833
Std Vapor Volumetric Flow	MMSCFD	0.0313890	200.030*	200.203	199.952	200.395	0.0585514	1.54655	0.191628	0.191628	0.0585514	1.54516
Std Liquid Volumetric Flow	sgpm	0.577892	2636.41	2637.09	2635.00	2638.34	0.866006	42	1.25640	1.25640	0.866006	41.9598
Compressibility		0.984592	0.808308	0.808319	0.812937	0.814828	0.966289	0.331458	0.994312	0.161895	0.971410	0.00397751
Specific Gravity		1.66069	0.713432	0.713353	0.713221		0.886358	1.10127	0.830516		0.886358	0.937571
API Gravity								-6.80937				-6.66681
Enthalpy	Btu/h	-159635	-7.54648E+08	-7.56625E+08	-7.53549E+08	-7.56653E+08	-233805	-5.51662E+07	-1.96763E+06	-2.33935E+06	-233805	-5.09736E+07
Mass Enthalpy	Btu/lb	-963.008	-1662.90	-1666.00	-1661.61	-1660.82	-1416.69	-2327.65	-3887.82	-4622.29	-1416.69	-2152.81
Mass Cp	Btu/(lb*°F)	0.408901	0.644003	0.643932	0.640257	0.648230	0.472052	0.596494	0.479508	0.786650	0.469192	0.709014
Ideal Gas CpCv Ratio		1.11313	1.24725	1.24730	1.24669	1.24301	1.20271	1.03366	1.20901	1.23426	1.20310	1.02644
Dynamic Viscosity	cP	0.00905991	0.0128400	0.0128431	0.0128324		0.0103576	14.2738	0.0142868		0.0103072	0.797936
Kinematic Viscosity	cSt	4.90095	0.200962	0.201035	0.204494		1.51797	12.9735	20.5190		1.79940	0.851875
Thermal Conductivity	Btu/(h*ft*°F)	0.0116163	0.0218591	0.0218590	0.0218816		0.0164022	0.113685	0.0176891		0.0162862	0.107255?
Surface Tension	lbf/ft							0.00295271				0.00204971
Net Ideal Gas Heating Value	Btu/ft^3	2347.79	1123.05	1122.08	1122.70	1120.33	1385.57	3473.98	422.365	422.365	1385.57	3473.73
Net Liquid Heating Value	Btu/lb	18327.0	20567.9	20551.7	20567.6	20473.5	20384.3	9177.57	5929.67	5929.67	20384.3	9177.47
Gross Ideal Gas Heating Value	Btu/ft^3	2538.86	1238.45	1237.42	1238.08	1235.51	1520.02	3801.62	498.499	498.499	1520.02	3801.34
Gross Liquid Heating Value	Btu/lb	19835.0	22687.7	22670.6	22687.6	22584.7	22372.3	10068.4	7130.93	7130.93	22372.3	10068.3

- Inlet Gas Composition for Amine AU-2 was taken from Laboratory Services, Extended Gas Analysis Report. Sample Point Name: Black River Plant 2 Amine Inlet Gas. Date Sampled: Feb 21,2020.
- Added 6 ppm H2S per request from Gauri Gajewar on 3/13/2020 and 1.1% of CO2 according to another e-mail from 3/16/20.
- Flow, Pressure and Temperature same as stream “To Amine AU2” coming from “Inlet Area” simulation

Composition	to Dehy3	
CO2(Mole Fraction, Total)	0.071944	%
CO2(Mole Fraction, Total)	719.44	ppm
H2S(Mole Fraction, Total)	6.3303e-06	%
H2S(Mole Fraction, Total)	0.063303	ppm



Temperature	70.009	°F
Pressure	1000	psig
Std Vapor Volumetric Flow	200.09	MMSCFD

Temperature	70.009	°F
Pressure	1000	psig
Std Vapor Volumetric Flow	200.09	MMSCFD
CO2(Mole Fraction)	1.1	%
CO2(Mole Fraction)	11000	ppm
H2S(Mole Fraction)	0.0006	%
H2S(Mole Fraction)	6	ppm

Analysis	49
Total Acid Gas Loading/Mole Amine(Amine Analysis 1, Total	0.42441

"94" HAPs = (

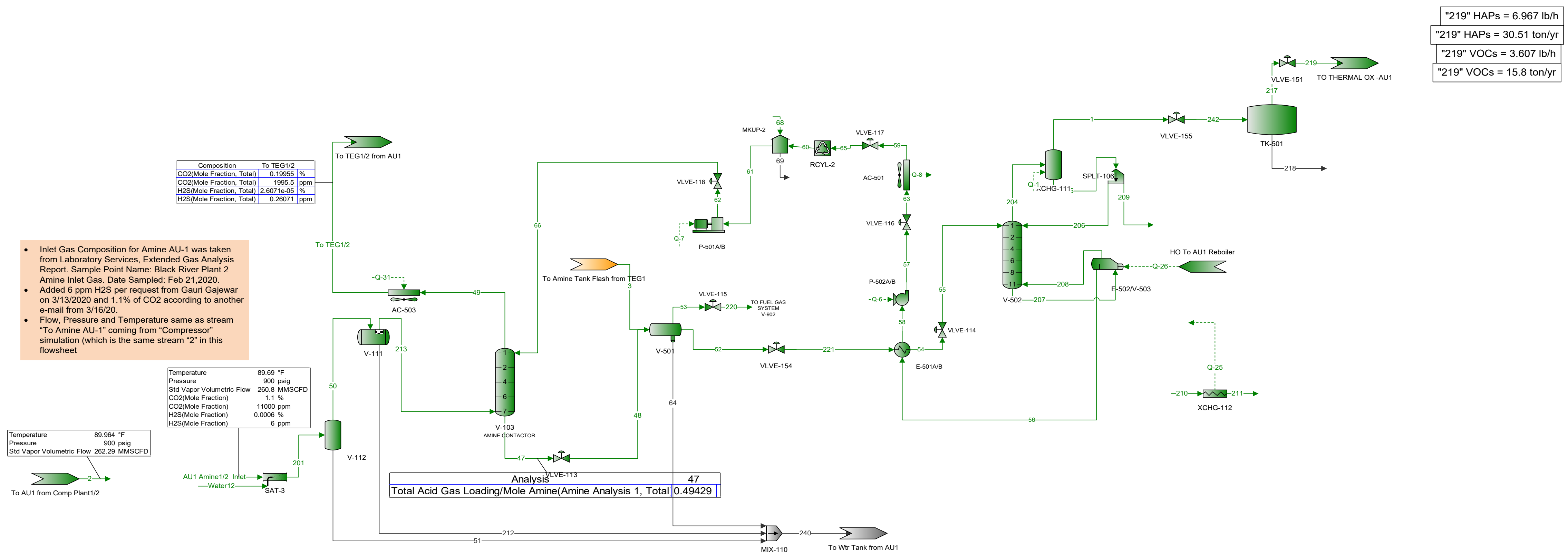
"94" HAPs = 27

"94" VOCs = 4

"94" VOCs = 18

Process Streams		AU2 Amine3 Inlet	to Dehy3	2	47	49	88	89	93	94	95	96	100
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	107 TREATER GAS/GAS I	To AU2 flash tank from TEG3	Plant3 to AU2	V-103	VLVE-111	VSSL-100	VSSL-100	VLVE-103	VLVE-104	V-502	E-502/V-503
	To Block:	MIX-102	AU2 to DehyPlant3	V-501	--	VLVE-100	V-103	VLVE-103	--	TO THERMAL OX -AU2	--	AC-502	V-502
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%
CO2		1.10000*	0.0719444	0.000430243	0.315851	4.76908	0.358948	91.9353	0.0497844	91.9353	1.32833	62.1420	3.25496
H2S		0.000600000*	6.33032E-06	1.32458E-07	0	0.00298118	0.000449285	0.0528983	9.04866E-05	0.0528983	0.00293671	0.0357757	0.00226099
N2		1.30205*	1.30028	0.000831479	1.14746	0.00878366	0	0.000644765	9.15486E-09	0.000644765	0.615626	0.000435706	0
C1		78.9905*	78.9929	0.0942072	79.7713	0.121364	0	0.235572	6.46286E-06	0.235572	79.9423	0.159191	0
C2		10.8600*	11.0127	0.0127350	10.8149	0.0193738	0	0.0585524	1.79264E-06	0.0585524	12.0295	0.0395677	0
C3		5.00377*	5.28098	0.00310158	4.98864	0.00569009	0	0.0145110	3.41301E-07	0.0145110	3.62690	0.00980602	0
iC4		0.661943*	0.747154	0.000216190	0.669683	0.000450976	0	0.000862719	1.27983E-08	0.000862719	0.297496	0.000582991	0
nC4		1.44695*	1.68236	0.000653071	1.48230	0.00142208	0	0.00382958	8.56047E-08	0.00382958	0.899347	0.00258789	0
iC5		0.269938*	0.313925	6.47210E-05	0.290862	0.000129853	0	0.000244465	2.75688E-09	0.000244465	0.0857981	0.000165200	0
nC5		0.252074*	0.295548	2.81829E-05	0.282866	0.000151555	0	0.000339552	4.72771E-09	0.000339552	0.0982411	0.000229456	0
C6		0.0784010*	0.0858895	5.76396E-06	0.121942	2.55664E-05	0	4.54553E-05	3.58252E-10	4.54553E-05	0.0169860	3.07168E-05	0
C7		0.0258029*	0.0303423	1.05945E-06	0.0519754	3.97171E-06	0	4.26130E-06	1.94018E-11	4.26130E-06	0.00273659	2.87960E-06	0
Benzene		0.00396967*	0.00498092	0.000289525	0.00599716	0.000376725	0	0.00741687	1.57082E-05	0.00741687	0.0142755	0.00501709	0
Toluene		0.000992418*	0.00128484	4.10017E-05	0.00199905	8.12373E-05	0	0.00160675	2.55986E-06	0.00160675	0.00283418	0.00108660	0
o-Xylene		0*	5.13131E-06	0	0	3.49052E-07	0	7.02728E-06	1.36658E-08	7.02728E-06	7.81194E-06	4.75316E-06	0
p-Xylene		0*	2.91571E-05	0	0	2.11474E-06	0	4.25801E-05	8.28006E-08	4.25801E-05	4.71506E-05	2.88006E-05	0
C8		0.00297725*	0.00360193	3.64353E-08	0.00699669	3.01464E-07	0	2.83840E-07	1.11039E-12	2.83840E-07	0.000209098	1.91807E-07	0
Water		0*	0.175685	99.8874	0.0472799	83.8341	87.9197	7.68812	99.9501	7.68812	1.03640	37.6035	96.5649
Triethylene Glycol		0*	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	4.80793E-06	0	0	2.06480E-07	0	4.08202E-06	5.29831E-09	4.08202E-06	7.28620E-06	2.76016E-06	0
Cyclohexane		0*	0	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	0.000285064	0	0	11.2439	11.7209	7.93640E-16	3.53512E-07	7.93640E-16	3.37050E-05	1.14624E-07	0.177879
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
CO2		241.670*	15.8299	6.88693E-07	69.3925	243.916	17.6133	226.150	0.0587611	226.150	0.0935132	251.343	25.4022
H2S		0.131820*	0.00139286	2.12027E-10	0	0.152473	0.0220460	0.130123	0.000106802	0.130123	0.000206742	0.144700	0.0176451
N2		286.061*	286.101	1.33096E-06	252.097	0.0449242	0	0.00158604	1.08056E-08	0.00158604	0.0433395	0.00176228	0
C1		17354.2*	17380.8	0.000150798	17525.8	6.20720	0	0.579478	7.62819E-06	0.579478	5.62786	0.643873	0
C2		2385.95*	2423.13	2.03851E-05	2376.03	0.990877	0	0.144032	2.11587E-06	0.144032	0.846864	0.160038	0
C3		1099.33*	1161.97	4.96473E-06	1096.01	0.291021	0	0.0356954	4.02841E-07	0.0356954	0.255330	0.0396620	0
iC4		145.429*	164.396	3.46057E-07	147.130	0.0230653	0	0.00212218	1.51060E-08	0.00212218	0.0209434	0.00235800	0
nC4		317.894*	370.170	1.04538E-06	325.661	0.0727325	0	0.00942032	1.01040E-07	0.00942032	0.0633131	0.0104671	0
iC5		59.3054*	69.0728	1.03599E-07	63.9025	0.00664136	0	0.000601355	3.25398E-09	0.000601355	0.00604010	0.000668176	0
nC5		55.3808*	65.0293	4.51126E-08	62.1458	0.00775130	0	0.000835258	5.58016E-09	0.000835258	0.00691608	0.000928070	0
C6		17.2247*	18.8982	9.22641E-09	26.7908	0.00130760	0	0.000111815	4.22848E-10	0.000111815	0.00119580	0.000124239	0
C7		5.66890*	6.67622	1.69587E-09	11.4190	0.000203134	0	1.04823E-05	2.29002E-11	1.04823E-05	0.000192654	1.16470E-05	0
Benzene		0.872138*	1.09595	4.63444E-07	1.31758	0.0192677	0	0.0182446	1.85406E-05	0.0182446	0.00100498	0.0202924	0
Toluene		0.218034*	0.282704	6.56317E-08	0.439193	0.00415490	0	0.00395242	3.02143E-06	0.00395242	0.000199524	0.00439494	0
o-Xylene		0*	0.00112904	0	0	1.78523E-05	0	1.72863E-05	1.61299E-08	1.72863E-05	5.49953E-07	1.92249E-05	0
p-Xylene		0*	0.00641543	0	0	0.000108159	0	0.000104742	9.77304E-08	0.000104742	3.31935E-06	0.000116489	0
C8		0.654103*	0.792532	5.83223E-11	1.53717	1.54185E-05	0	6.98213E-07	1.31060E-12	6.98213E-07	1.47203E-05	7.75793E-07	0
Water		0*	38.6559	0.159891	10.3874	4287.72	4314.15	18.9118	117.972	18.9118	0.0729614	152.093	753.607
Triethylene Glycol		0*	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	0.00105789	0	0	1.05605E-05	0	1.00413E-05	6.25365E-09	1.00413E-05	5.12941E-07	1.11639E-05	0
Cyclohexane		0*	0	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	0.0627226	0	0	575.072	575.134	1.95226E-15	4.17254E-07	1.95226E-15	2.37280E-06	4.63615E-07	1.38820
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%
CO2		2.33910*	0.152915	0.00105096	0.676277	7.04580	0.543124	96.4814	0.121531	96.4814	2.94567	80.0036	7.54023
H2S		0.000988032*	1.04194E-05	2.50564E-07	0	0.00341074	0.000526446	0.0429900	0.000171057	0.0429900	0.00504316	0.0356678	0.00405605
N2		1.76239*	1.75918	0.00129284	1.56386	0.000826020	0	0.000430707	1.42254E-08	0.000430707	0.868988	0.000357057	0
C1		61.2287*	61.2022	0.0838848	62.2607	0.0653597	0	0.0901174	5.75099E-06	0.0901174	64.6217	0.0747080	0
C2		15.7783*	15.9927	0.0212544	15.8211	0.0195561	0	0.0419835	2.98992E-06	0.0419835	18.2262	0.0348047	0
C3		10.6611*	11.2465	0.00759114	10.7022	0.00842293	0	0.0152584	8.34794E-07	0.0152584	8.05863	0.0126493	0
iC4		1.85897*	2.09730	0.000697437	1.89369	0.000879922	0	0.00119571	4.12611E-08	0.00119571	0.871272	0.000991247	0
nC4		4.06353*	4.72247	0.00210684	4.19155	0.00277469	0	0.00530772	2.75985E-07	0.00530772	2.63390	0.00440014	0
iC5		0.941026*	1.09386	0.000259180	1.02097	0.000314507	0	0.000420592	1.10330E-08	0.000420592	0.311916	0.000348671	0
nC5		0.878752*	1.02983	0.000112861	0.992902	0.000367069	0	0.000584185	1.89202E-08	0.000584185	0.357152	0.000484291	0
C6		0.326448*	0.357463	2.75697E-05	0.511251	7.39609E-05	0	9.34076E-05	1.71245E-09	9.34076E-05	0.0737571	7.74349E-05	0
C7		0.124929*	0.146836	5.89229E-06	0.253379	1.33599E-05	0	1.01820E-05	1.07836E-10	1.01820E-05	0.0138171	8.44086E-06	0
Benzene		0.0149824*	0.0187903	0.00125525	0.0227908	0.000987848	0	0.0138151	6.80598E-05	0.0138151	0.0561876	0.0114643	0
Toluene		0.00441819*	0.00571741	0.000209686	0.00896111	0.000251273	0	0.00353024	1.30829E-05	0.00353024	0.0131583	0.00292880	0
o-Xylene		0*	2.63098E-05	0	0	1.24400E-06	0	1.77903E-05	8.04755E-08	1.77903E-05	4.17899E-05	1.47619E-05	0
p-Xylene		0*	0.000149497	0	0	7.53682E-06	0	0.000107796	4.87597E-07	0.000107796	0.000252231	8.94460E-05	0
C8		0.0164323*	0.0198709	2.31007E-07	0.0388833	1.15600E-06	0	7.73149E-07	7.03551E-12	7.73149E-07	0.00120353	6.40939E-07	0
Water		0*	0.152856	99.8803	0.0414394	50.7003	54.4563	3.30275	99.8782	3.30275	0.940803	19.8174	91.5700
Triethylene Glycol		0*	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	2.46517E-05	0	0	7.35882E-07	0	1.03341E-05	3.12008E-08	1.03341E-05	3.89774E-05	8.57224E-06	0
Cyclohexane		0*	0	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	0.00128882	0	0	42.1506	45	1.98740E-15	1.87759E-06	1.98740E-15	0.000193139	3.21073E-07	0.885675
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
CO2		10635.8*	696.666	3.03090E-05	3053.93	10734.6	775.151	9952.74	2.58604	9952.74	4.11547	11061.5	1117.94
H2S		4.49255*	0.0474698	7.22607E-09	0	5.19642	0.751348	4.43472	0.00363992	4.43472	0.00704593	4.93151	0.601361
N2		8013.55*	8014.65	3.72846E-05	7062.08	1.25848	0	0.0444305	3.02701E-07	0.0444305	1.21409	0.0493675	0
C1		278405*	278831	0.00241917	281156	99.5787	0	9.29625	0.000122375	9.29625	90.2848	10.3293	0
C2		71743.3*	72861.2	0.000612960	71445.0	29.7947	0	4.33090	6.36223E-05	4.33090	25.4644	4.81218	0
C3		48475.6*	51237.9	0.000218923	48329.0	12.8327	0	1.57401	1.77635E-05	1.57401	11.2589	1.74892	0
iC4		8452.65*	9555.06	2.01136E-05	8551.49	1.34060	0	0.123346	8.77991E-07	0.123346	1.21728	0.137052	0
nC4		18476.7*	21515.1	6.07596E-05	18928.2	4.22737	0	0.547530	5.87267E-06	0.547530	3.67990	0.608373	0
iC5		4278.81*	4983.52	7.47457E-06	4610.49	0.479166	0	0.0433870	2.34771E-07	0.0433870	0.435786	0.0482081	0
nC5		3995.65*	4691.79	3.25482E-06	4483.74	0.559247	0	0.0602628	4.02602E-07	0.0602628	0.498987	0.0669591	0
C6		1484.35*	1628.56	7.95090E-07	2308.70	0.112683	0	0.00963566	3.64391E-08	0.00963566	0.103048	0.0107063	0
C7		568.034*	668.970	1.69929E-07	1144.21	0.0203544	0	0.00105034	2.29464E-09	0.00105034	0.0193043	0.00116705	0
Benzene		68.1243*	85.6067	3.62005E-05	102.918	1.50503	0	1.42512	0.00144824	1.42512	0.0785012	1.58508	0
Toluene		20.0894*	26.0479	6.04720E-06	40.4665	0.382826	0	0.364170	0.000278390	0.364170	0.0183838	0.404942	0
o-Xylene		0*	0.119864	0	0	0.00189529	0	0.00183520	1.71243E-06	0.00183520	5.83857E-05	0.00204101	0
p-Xylene		0*	0.681094	0	0	0.0114827	0	0.0111199	1.03756E-05	0.0111199	0.000352399	0.0123670	0
C8		74.7173*	90.5298	6.66207E-09	175.589	0.00176123	0	7.97558E-05	1.49708E-10	7.97558E-05	0.00168148	8.86177E-05	0
Water		0*	696.396	2.88047	187.132	77244.4	77720.5	340.702	2125.30	340.702	1.31442	2740.00	13576.4
Triethylene Glycol		0*	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	0.112311	0	0	0.00112115	0	0.00106603	6.63919E-07	0.00106603	5.44564E-05	0.00118522	0
Cyclohexane		0*	0	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	5.87172	0	0	64218.5	64224.4	2.05015E-13	3.99531E-05	2.05015E-13	0.000269840	4.43923E-05	131.313

Process Streams		AU2 Amine3 Inlet	to Dehy3	2	47	49	88	89	93	94	95	96	100
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	107 TREATER GAS/GAS I	To AU2 flash tank from TEG3	Plant3 to AU2	V-103	VLVE-111	VSSL-100	VSSL-100	VLVE-103	VLVE-104	V-502	E-502/V-503
	To Block:	MIX-102	AU2 to DehyPlant3	V-501	--	VLVE-100	V-103	VLVE-103	--	TO THERMAL OX -AU2	--	AC-502	V-502
Property	**Units**												
Temperature	°F	70.0087*	102.724	84.6352	70.0086	94.6209	121.188	120	120	119.181	97.8291	184.694	245.709
Pressure	psia	1014.70*	1005.70	909.696	1014.70	1011.70	1020*	22.3	22.3	15.6959*	79.6959*	22.3	25.3
Mole Fraction Vapor	%	100	99.9510	100	99.9993	0	0	100	0	100	100	100	100
Mole Fraction Light Liquid	%	0	0.0490271	0	0.000664912	100	100	0	100	0	0	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	20.6962	20.7058	18.0166	20.5543	29.7887	29.0856	41.9358	18.0282	41.9358	19.8458	34.1839	18.9980
Mass Density	lb/ft^3	4.80321	4.23432	52.7264?	4.77810	69.8693	64.4254	0.151396	61.6892	0.106489	0.268480	0.111006	0.0643112
Molar Flow	lbmol/h	21970.0	22003.0	0.160071	21970.0	5114.52	4906.92	245.988	118.031	245.988	7.03990	404.466	780.415
Mass Flow	lb/h	454696	455589	2.88393	451579	152355	142721	10315.7	2127.89	10315.7	139.713	13826.2	14826.3
Vapor Volumetric Flow	ft^3/h	94665.2	107594	0.0546961?	94510.3	2180.57	2215.29	68137.4	34.4938	96870.7	520.385	124553	230540
Liquid Volumetric Flow	gpm	11802.4	13414.4	0.00681925?	11783.1	271.863	276.192	8495.06	4.30052	12077.4	64.8791	15528.7	28742.6
Std Vapor Volumetric Flow	MMSCFD	200.095*	200.395	0.00145786	200.095	46.5811	44.6903	2.24036	1.07498	2.24036	0.0641168	3.68372	7.10772
Std Liquid Volumetric Flow	sgpm	2621.65	2638.34	0.00577928	2626.27	314.321	290	25.1393	4.25497	25.1393	0.825358	32.6603	30.2046
Compressibility		0.769165	0.814838	0.0532150?	0.767907	0.0725126	0.0738734	0.992961	0.00104762	0.995029	0.984660	0.993081	0.987314
Specific Gravity		0.714587		0.622065		1.12026	1.03298	1.44794	0.989105	1.44794	0.685225	1.18028	0.655950
API Gravity						-5.55819	3.46676		9.95904				
Enthalpy	Btu/h	-7.89824E+08	-7.56653E+08	-19621.7	-7.69326E+08	-6.61185E+08	-6.16727E+08	-4.01642E+07	-1.44054E+07	-4.01642E+07	-250516	-5.79919E+07	-8.16408E+07
Mass Enthalpy	Btu/lb	-1737.04	-1660.82	-6803.80	-1703.63	-4339.77	-4321.21	-3893.50	-6769.80	-3893.50	-1793.08	-4194.34	-5506.49
Mass Cp	Btu/(lb*°F)	0.679401	0.648219	0.978896?	0.687205	0.705472	0.831051	0.217513	0.997568	0.216917	0.497445	0.265244	0.447007
Ideal Gas CpCv Ratio		1.25470	1.24301	1.32506	1.25360	1.17339	1.16354	1.28101	1.32345	1.28119	1.25724	1.28310	1.30983
Dynamic Viscosity	cP	0.0132222		0.256622?		11.1674	3.03303	0.0161138	0.569558	0.0160819	0.0112754	0.0168760	0.0136754
Kinematic Viscosity	cSt	0.171851		0.303840?		9.97806	2.93899	6.64453	0.576378	9.42778	2.62180	9.49078	13.2750
Thermal Conductivity	Btu/(h*ft*°F)	0.0220492		0.423049		0.191912	0.209033	0.0106867	0.366904	0.0106455	0.0187240	0.0128840	0.0164784
Surface Tension	lbf/ft					0.00367977	0.00372612		0.00466052				
Net Ideal Gas Heating Value	Btu/ft^3	1097.89	1120.33	1.17675	1110.71	393.850	408.837	4.23927	0.00132003	4.23927	1050.09	2.86514	5.84858
Net Liquid Heating Value	Btu/lb	20074.7	20473.5	-1033.76	20450.0	4337.02	4609.63	-69.0792	-1058.53	-69.0792	20019.6	-238.278	-861.748
Gross Ideal Gas Heating Value	Btu/ft^3	1211.06	1235.51	51.5533	1225.14	471.008	489.355	8.51648	50.2863	8.51648	1160.12	22.0601	54.9129
Gross Liquid Heating Value	Btu/lb	22150.2	22584.7	27.3284	22563.1	5319.94	5660.16	-30.3730	-0.0618891	-30.3730	22123.9	-25.1897	118.311


"219" HAPs = 6.967 lb/h
"219" HAPs = 30.51 ton/yr
"219" VOCs = 3.607 lb/h
"219" VOCs = 15.8 ton/yr
Composition | To TEG1/2
CO2(Mole Fraction, Total) | 0.19955 | %
CO2(Mole Fraction, Total) | 1995.5 | ppm
H2S(Mole Fraction, Total) | 2.6071e-05 | %
H2S(Mole Fraction, Total) | 0.26071 | ppm
Inlet Gas Composition for Amine AU-1 was taken from Laboratory Services, Extended Gas Analysis Report. Sample Point Name: Black River Plant 2 Amine Inlet Gas. Date Sampled: Feb 21,2020.
Added 6 ppm H2S per request from Gauri Gajewar on 3/13/2020 and 1.1% of CO2 according to another e-mail from 3/16/20.
Flow, Pressure and Temperature same as stream "To Amine AU-1" coming from "Compressor" simulation (which is the same stream "2" in this flowsheet
Temperature 89.69 °F
Pressure 900 psig
Std Vapor Volumetric Flow 260.8 MMSCFD
CO2(Mole Fraction) 1.1 %
CO2(Mole Fraction) 11000 ppm
H2S(Mole Fraction) 0.0006 %
H2S(Mole Fraction) 6 ppm
Temperature 89.964 °F
Pressure 900 psig
Std Vapor Volumetric Flow 262.29 MMSCFD
Analysis | 47
Total Acid Gas Loading/Mole Amine(Amine Analysis 1, Total) | 0.49429
To TEG1/2 from AU1
To TEG1/2
To AU1 from Comp Plant1/2
AU1 Amine1/2 Inlet
Water12
SAT-3
V-112
V-111
AC-503
V-103
AMINE CONTACTOR
VLVE-113
To Amine Tank Flash from TEG1
V-501
VLVE-115
TO FUEL GAS SYSTEM V-902
VLVE-154
P-501A/B
VLVE-118
MKUP-2
RCYL-2
VLVE-117
AC-501
VLVE-116
P-502A/B
E-501A/B
VLVE-114
V-502
XCHG-111
SPLT-106
E-502/V-503
HO To AU1 Reboiler
XCHG-112
VLVE-155
TK-501
VLVE-151
TO THERMAL OX -AU1
MIX-110
To Wtr Tank from AU1

Process Streams		AU1 Amine1/2 Inlet	To TEG1/2	Water12	1	2	3	47	66	217	219	220	221	242
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	AC-503	--	XCHG-111	To AU1 from Comp Plant1/2	Amine Tank Flash from TE	V-103	VLVE-118	TK-501	VLVE-151	VLVE-115	VLVE-154	VLVE-155
	To Block:	SAT-3	To TEG1/2 from AU1	SAT-3	VLVE-155	--	V-501	VLVE-113	V-103	VLVE-151	TO THERMAL OX -AU1	--	E-501A/B	TK-501
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%
CO2		1.10000*	0.199554	0*	91.9660	0.314840	0.000369312	5.52890	0.523778	91.9660	91.9660	2.15840	5.53272	91.9660
H2S		0.000600000*	2.60710E-05	0*	0.0584518	0	1.15978E-07	0.00386038	0.000691298	0.0584518	0.0584518	0.00438692	0.00385955	0.0584518
N2		1.30205*	1.31177	0*	0.000639067	1.13829	0.000752890	0.000800309	0	0.000639067	0.000639067	0.632337	3.49624E-05	0.000639067
C1		78.9905*	79.5690	0*	0.216698	79.2269	0.0864852	0.108289	0	0.216698	0.216698	79.6813	0.0118553	0.216698
C2		10.8600*	10.9392	0*	0.0512972	10.8569	0.0112527	0.0171319	0	0.0512972	0.0512972	11.8378	0.00280642	0.0512972
C3		5.00377*	5.04076	0*	0.0125246	5.16171	0.00279564	0.00496533	0	0.0125246	0.0125246	3.53669	0.000685207	0.0125246
iC4		0.661943*	0.666888	0*	0.000685427	0.727819	0.000181625	0.000368841	0	0.000685427	0.000685427	0.273774	3.74987E-05	0.000685427
nC4		1.44695*	1.45770	0*	0.00292158	1.64384	0.000610549	0.00112753	0	0.00292158	0.00292158	0.799615	0.000159836	0.00292158
iC5		0.269938*	0.271963	0*	0.000189530	0.322409	5.83610E-05	0.000105202	0	0.000189530	0.000189530	0.0783565	1.03689E-05	0.000189530
nC5		0.252074*	0.253961	0*	0.000259745	0.314513	2.93899E-05	0.000121478	0	0.000259745	0.000259745	0.0886317	1.42103E-05	0.000259745
C6		0.0784010*	0.0789906	0*	3.70980E-05	0.126830	5.96530E-06	2.22158E-05	0	3.70980E-05	3.70980E-05	0.0166785	2.02957E-06	3.70980E-05
C7		0.0258029*	0.0259976	0*	3.32353E-06	0.0549640	1.05685E-06	3.30013E-06	0	3.32353E-06	3.32353E-06	0.00257633	1.81825E-07	3.32353E-06
Benzene		0.00396967*	0.00394791	0*	0.00499902	0.00679921	0.000236238	0.000286787	0	0.00499902	0.00499902	0.0110535	0.000273737	0.00499902
Toluene		0.000992418*	0.000989055	0*	0.00105246	0.00221496	3.48579E-05	6.02038E-05	0	0.00105246	0.00105246	0.00219311	5.76177E-05	0.00105246
o-Xylene		0*	0	0*	0	3.67971E-06	0	0	0	0	0	0	0	0
p-Xylene		0*	0	0*	0	2.10457E-05	0	0	0	0	0	0	0	0
C8		0.00297725*	0.00299975	0*	2.07511E-07	0.00738905	4.00840E-08	2.42740E-07	0	2.07511E-07	2.07511E-07	0.000191168	1.13526E-08	2.07511E-07
Water		0*	0.176095	100*	7.68424	0.0945867	99.8972	83.1406	87.7269	7.68424	7.68424	0.875942	83.2411	7.68424
Triethylene Glycol		0*	0	0*	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	0	0*	0	3.45920E-06	0	0	0	0	0	0	0	0
Cyclohexane		0*	0	0*	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	0.000166488	0*	1.87691E-08	0	0	11.1934	11.7487	1.87691E-08	1.87691E-08	2.07756E-05	11.2064	1.87691E-08
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
CO2		314.994*	56.7146	0*	258.054	90.6693	9.20045E-07	283.906	25.6266	258.054	258.054	0.134160	283.772	258.054
H2S		0.171815*	0.00740954	0*	0.164014	0	2.88929E-10	0.198228	0.0338228	0.164014	0.164014	0.000272678	0.197956	0.164014
N2		372.854*	372.813	0*	0.00179321	327.810	1.87563E-06	0.0410954	0	0.00179321	0.00179321	0.0393041	0.00179322	0.00179321
C1		22619.6*	22614.0	0*	0.608049	22816.1	0.000215456	5.56059	0	0.608049	0.608049	4.95275	0.608056	0.608049
C2		3109.86*	3108.98	0*	0.143939	3126.63	2.80331E-05	0.879714	0	0.143939	0.143939	0.735802	0.143941	0.143939
C3		1432.87*	1432.62	0*	0.0351438	1486.49	6.96462E-06	0.254967	0	0.0351438	0.0351438	0.219830	0.0351442	0.0351438
iC4		189.553*	189.534	0*	0.00192329	209.601	4.52472E-07	0.0189398	0	0.00192329	0.00192329	0.0170170	0.00192330	0.00192329
nC4		414.345*	414.287	0*	0.00819788	473.402	1.52102E-06	0.0578980	0	0.00819788	0.00819788	0.0497016	0.00819796	0.00819788
iC5		77.2990*	77.2936	0*	0.000531816	92.8489	1.45391E-07	0.00540207	0	0.000531816	0.000531816	0.00487040	0.000531819	0.000531816
nC5		72.1836*	72.1774	0*	0.000728839	90.5749	7.32173E-08	0.00623784	0	0.000728839	0.000728839	0.00550907	0.000728843	0.000728839
C6		22.4508*	22.4497	0*	0.000104096	36.5250	1.48610E-08	0.00114077	0	0.000104096	0.000104096	0.00103669	0.000104096	0.000104096
C7		7.38887*	7.38870	0*	9.32573E-06	15.8288	2.63287E-09	0.000169460	0	9.32573E-06	9.32573E-06	0.000160137	9.32575E-06	9.32573E-06
Benzene		1.13675*	1.12202	0*	0.0140271	1.95807	5.88525E-07	0.0147264	0	0.0140271	0.0140271	0.000687053	0.0140399	0.0140271
Toluene		0.284187*	0.281096	0*	0.00295318	0.637875	8.68394E-08	0.00309143	0	0.00295318	0.00295318	0.000136317	0.00295520	0.00295318
o-Xylene		0*	0	0*	0	0.00105970	0	0	0	0	0	0	0	0
p-Xylene		0*	0	0*	0	0.00606083	0	0	0	0	0	0	0	0
C8		0.852562*	0.852550	0*	5.82270E-07	2.12793	9.98589E-11	1.24646E-05	0	5.82270E-07	5.82270E-07	1.18824E-05	5.82271E-07	5.82270E-07
Water		0*	50.0475	27.1045*	21.5618	27.2395	0.248868	4269.23	4292.17	21.5618	21.5618	0.0544459	4269.42	21.5618
Triethylene Glycol		0*	0	0*	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	0	0*	0	0.000996196	0	0	0	0	0	0	0	0
Cyclohexane		0*	0	0*	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	0.0473169	0*	5.26658E-08	0	0	574.773	574.821	5.26658E-08	5.26658E-08	1.29135E-06	574.773	5.26658E-08
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%
CO2		2.33909*	0.428823	0*	96.5011	0.667975	0.000902137	8.12748	0.790656	96.5011	96.5011	4.75892	8.12997	96.5011
H2S		0.000988032*	4.33850E-05	0*	0.0474971	0	2.19391E-07	0.00439452	0.000808109	0.0474971	0.0474971	0.00749033	0.00439189	0.0474971
N2		1.76239*	1.79430	0*	0.000426846	1.53724	0.00117066	0.000748849	0	0.000426846	0.000426846	0.887451	3.27018E-05	0.000426846
C1		61.2287*	62.3285	0*	0.0828866	61.2726	0.0770098	0.0580265	0	0.0828866	0.0828866	64.0409	0.00635020	0.0828866
C2		15.7783*	16.0611	0*	0.0367766	15.7380	0.0187805	0.0172066	0	0.0367766	0.0367766	17.8328	0.00281758	0.0367766
C3		10.6611*	10.8533	0*	0.0131680	10.9727	0.00684243	0.00731331	0	0.0131680	0.0131680	7.81309	0.00100884	0.0131680
iC4		1.85897*	1.89263	0*	0.000949865	2.03933	0.000585937	0.000716065	0	0.000949865	0.000949865	0.797195	7.27717E-05	0.000949865
nC4		4.06353*	4.13696	0*	0.00404873	4.60602	0.00196968	0.00218897	0	0.00404873	0.00404873	2.32837	0.000310185	0.00404873
iC5		0.941026*	0.958098	0*	0.000326036	1.12140	0.000233714	0.000253527	0	0.000326036	0.000326036	0.283227	2.49784E-05	0.000326036
nC5		0.878752*	0.894680	0*	0.000446823	1.09393	0.000117696	0.000292751	0	0.000446823	0.000446823	0.320367	3.42323E-05	0.000446823
C6		0.326448*	0.332377	0*	7.62241E-05	0.526899	2.85330E-05	6.39463E-05	0	7.62241E-05	7.62241E-05	0.0720064	5.83971E-06	7.62241E-05
C7		0.124926*	0.127198	0*	7.94024E-06	0.265508	5.87792E-06	1.10453E-05	0	7.94024E-06	7.94024E-06	0.0129333	6.08321E-07	7.94024E-06
Benzene		0.0149824*	0.0150576	0*	0.00931023	0.0256035	0.00102423	0.000748251	0	0.00931023	0.00931023	0.0432561	0.000713927	0.00931023
Toluene		0.00441819*	0.00444972	0*	0.00231209	0.00983852	0.000178269	0.000185283	0	0.00231209	0.00231209	0.0101235	0.000177256	0.00231209
o-Xylene		0*	0	0*	0	1.88329E-05	0	0	0	0	0	0	0	0
p-Xylene		0*	0	0*	0	0.000107713	0	0	0	0	0	0	0	0
C8		0.0164323*	0.0167314	0*	5.65163E-07	0.0406899	2.54143E-07	9.26161E-07	0	5.65163E-07	5.65163E-07	0.00109400	4.32985E-08	5.65163E-07
Water		0*	0.154903	100*	3.30066	0.0821474	99.8912	50.0294	54.2085	3.30066	3.30066	0.790581	50.0706	3.30066
Triethylene Glycol		0*	0	0*	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	0	0*	0	1.77043E-05	0	0	0	0	0	0	0	0
Cyclohexane		0*	0	0*	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	0.000783481	0*	4.64131E-08	0	0	41.7510	45	4.64131E-08	4.64131E-08	0.000120363	41.7835	4.64131E-08
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
CO2		13862.7*	2495.98	0*	11356.8	3990.31	4.04907E-05	12494.6	1127.82	11356.8	11356.8	5.90430	12488.7	11356.8
H2S		5.85561*	0.252524	0*	5.58975	0	9.84697E-09	6.75580	1.15271	5.58975	5.58975	0.00929309	6.74651	5.58975
N2		10444.9*	10443.8	0*	0.0502338	9183.07	5.25428E-05	1.15122	0	0.0502338	0.0502338	1.10104	0.0502341	0.0502338
C1		362874*	362785	0*	9.75460	366027	0.00345644	89.2055	0	9.75460	9.75460	79.4542	9.75471	9.75460
C2		93510.6*	93484.1	0*	4.32810	94014.6	0.000842929	26.4522	0	4.32810	4.32810	22.1248	4.32816	4.32810
C3		63183.4*	63172.2	0*	1.54969	65547.9	0.000307109	11.2429	0	1.54969	1.54969	9.69353	1.54970	1.54969
iC4		11017.2*	11016.1	0*	0.111786	12182.5	2.62987E-05	1.10082	0	0.111786	0.111786	0.989064	0.111787	0.111786
nC4		24082.7*	24079.3	0*	0.476479	27515.2	8.84053E-05	3.36516	0	0.476479	0.476479	2.88877	0.476483	0.476479
iC5		5577.03*	5576.64	0*	0.0383699	6698.94	1.04898E-05	0.389753	0	0.0383699	0.0383699	0.351393	0.0383701	0.0383699
nC5		5207.96*	5207.51	0*	0.0525848	6534.87	5.28254E-06	0.450053	0	0.0525848	0.0525848	0.397473	0.0525851	0.0525848
C6		1934.71*	1934.61	0*	0.00897052	3147.56	1.28065E-06	0.0983061	0	0.00897052	0.00897052	0.0893368	0.00897055	0.00897052
C7		740.379*	740.362	0*	0.000934456	1586.08	2.63819E-07	0.0169802	0	0.000934456	0.000934456	0.0160460	0.000934458	0.000934456
Benzene		88.7936*	87.6433	0*	1.09569	152.949	4.59708E-05	1.15030	0	1.09569	1.09569	0.0536670	1.09668	1.09569
Toluene		26.1846*	25.8997	0*	0.272101	58.7728	8.00124E-06	0.284840	0	0.272101	0.272101	0.0125600	0.272288	0.272101
o-Xylene		0*	0	0*	0	0.112503	0	0	0	0	0	0	0	0
p-Xylene		0*	0	0*	0	0.643448	0	0	0	0	0	0	0	0
C8		97.3869*	97.3855	0*	6.65119E-05	243.071	1.14067E-08	0.00142381	0	6.65119E-05	6.65119E-05	0.00135731	6.65120E-05	6.65119E-05
Water		0*	901.620	488.294*	388.442	490.728	4.48342	76911.3	77324.7	388.442	388.442	0.980858	76914.8	388.442
Triethylene Glycol		0*	0	0*	0	0	0	0	0	0	0	0	0	0
Ethylbenzene		0*	0	0*	0	0.105761	0	0	0	0	0	0	0	0
Cyclohexane		0*	0	0*	0	0	0	0	0	0	0	0	0	0
UCARSOL™ AP-814		0*	4.56027	0*	5.46218E-06	0	0	64184.8	64189.3	5.46218E-06	5.46218E-06	0.000149332	64184.8	5.46218E-06

Process Streams		AU1 Amine1/2 Inlet	To TEG1/2	Water12	1	2	3	47	66	217	219	220	221	242
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	AC-503	--	XCHG-111	To AU1 from Comp Plant1/2	Amine Tank Flash from TE	V-103	VLVE-118	TK-501	VLVE-151	VLVE-115	VLVE-154	VLVE-155
	To Block:	SAT-3	To TEG1/2 from AU1	SAT-3	VLVE-155	--	V-501	VLVE-113	V-103	VLVE-151	TO THERMAL OX -AU1	--	E-501A/B	TK-501
Property	**Units**													
Temperature	°F	89.6901*	105*	533.942	120*	89.9644	101.250	92.3224	121.398	119.181	119.181	94.7237	95.1299	119.181
Pressure	psia	914.696*	911.375	914.696	22.3	914.696	84.6959	919.375	944.696*	15.6959	15.6959*	79.6959*	74.6959	15.6959*
Mole Fraction Vapor	%	100	99.9705	76.5620	100	100	0.0919294	0	0	100	100	100	0.00187110	100
Mole Fraction Light Liquid	%	0	0.0295301	23.4380	0	0	99.9081	100	100	0	0	0	99.9981	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	20.6962	20.4799	18.0153	41.9413	20.7433	18.0164	29.9384	29.1545	41.9413	41.9413	19.9604	29.9499	41.9413
Mass Density	lb/ft^3	3.92966	3.68044	2.52073	0.151415	3.95960	50.7480	70.5822	64.6686	0.106503	0.106503	0.271594	70.3545	0.106503
Molar Flow	lbmol/h	28635.9	28420.7	27.1045	280.597	28798.5	0.249124	5134.95	4892.65	280.597	280.597	6.21569	5128.98	280.597
Mass Flow	lb/h	592654	582053	488.294	11768.6	597374	4.48831	153732	142643	11768.6	11768.6	124.068	153613	11768.6
Vapor Volumetric Flow	ft^3/h	150816	158148	193.712	77724.1	150867	0.0884432	2178.06	2205.75	110500	110500	456.815	2183.41	110500
Liquid Volumetric Flow	gpm	18803.0	19717.1	24.1511	9690.27	18809.4	0.0110267	271.550	275.003	13776.6	13776.6	56.9535	272.218	13776.6
Std Vapor Volumetric Flow	MMSCFD	260.804*	258.845	0.246857	2.55557	262.286	0.00226893	46.7672	44.5604	2.55557	2.55557	0.0566102	46.7128	2.55557
Std Liquid Volumetric Flow	sgpm	3417.07	3390.26	0.976136	28.6742	3454.35	0.00899248	317.796	290	28.6742	28.6742	0.727450	317.077	28.6742
Compressibility		0.817132	0.836889	0.613072	0.992961	0.812391	0.00499513	0.0658309	0.0682990	0.995028	0.995028	0.984475	0.00534074	0.995028
Specific Gravity		0.714587			1.44812	0.716211		1.13169	1.03687	1.44812	1.44812	0.689182		1.44812
API Gravity								-6.74152	3.01292					
Enthalpy	Btu/h	-1.01923E+09	-9.74757E+08	-2.83037E+06	-4.58261E+07	-1.00225E+09	-30458.9	-6.66809E+08	-6.15597E+08	-4.58261E+07	-4.58261E+07	-227384	-6.66612E+08	-4.58261E+07
Mass Enthalpy	Btu/lb	-1719.77	-1674.69	-5796.44	-3893.93	-1677.76	-6786.27	-4337.46	-4315.65	-3893.93	-3893.93	-1832.74	-4339.56	-3893.93
Mass Cp	Btu/(lb*°F)	0.630854	0.625474	0.775177	0.217460	0.639240	0.997210	0.684634	0.826466	0.216864	0.216864	0.491612	0.685696	0.216864
Ideal Gas CpCv Ratio		1.24950	1.24526	1.30392	1.28105	1.24628	1.32428	1.17431	1.16327	1.28123	1.28123	1.25929	1.17345	1.28123
Dynamic Viscosity	cP	0.0129342			0.0161156	0.0128900		13.5777	3.13565	0.0160836	0.0160836	0.0112814		0.0160836
Kinematic Viscosity	cSt	0.205477			6.64438	0.203227		12.0091	3.02701	9.42757	9.42757	2.59312		9.42757
Thermal Conductivity	Btu/(h*ft*°F)	0.0218740			0.0106843	0.0219234		0.189139	0.208110	0.0106431	0.0106431	0.0185638		0.0106431
Surface Tension	lbf/ft							0.00365947	0.00371612					
Net Ideal Gas Heating Value	Btu/ft^3	1097.89	1105.94	0	3.78556	1119.83	1.07077	391.902	409.806	3.78556	3.78556	1038.02	391.100	3.78556
Net Liquid Heating Value	Btu/lb	20074.7	20435.3	-1059.76	-73.1660	20428.0	-1036.10	4294.83	4612.09	-73.1660	-73.1660	19676.7	4282.25	-73.1660
Gross Ideal Gas Heating Value	Btu/ft^3	1211.06	1220.03	50.3100	8.02163	1234.92	51.4413	468.535	490.314	8.02163	8.02163	1146.87	467.693	8.02163
Gross Liquid Heating Value	Btu/lb	22150.2	22549.8	0	-34.8371	22533.9	24.8724	5266.19	5660.00	-34.8371	-34.8371	21746.5	5252.73	-34.8371

	UOM	Gas	T-701 PRODUCED WATER TANK	T-702 CONDENSATE STORAGE TANKS
Daily Rate	MMSCFD			
Daily Throughput	bbl/d		80	1746
Annual Throughput	gal/yr		1230918	26758859
Per Tank Throughput	gal/yr		1230918	4459810
# of Tanks			1	6
Turnover Per Tank	per year		73	262
Total Flow	lb/hr		0.30	148.21
VOC [C3+] total	lb/hr		0.27	131.91
VOC [C3+] per tank	lb/hr		0.27	21.98
Bz total	lb/hr		0.06	0.76
Bz per tank	lb/hr		0.06	0.13
H2S total	lb/hr		0.00	0.00
H2S per tank	lb/hr		0.00	0.00
Temperature	°F		75.56	75.87
VOC [C3+] wt %	%		91.53	89.00
Bz wt %	%		21.22	0.51
H2S wt %	%		0.00	0.00
MW Vapors	lb/lbmol		60.84	53.28
SCF/hr	SCF/hr		1.85	1046.03
HV	btu/ft^3		3052.88	2993.04
C3 % (mass)	%		2.52	13.84
			17	3
RVP	psi		5.08	15.20
Vapor Pressure @ 100 °F	psia		11.88	20.36
Vapor Pressure @ 65 °F	psia		7.87	12.64

*Results for vapor streams are for flashing, working ,and breathing combined unless otherwise noted in cell comments

BURNER DATA SHEET

PROJECT TITLE	:
LOCATION	:
OWNER	: Matador Resources Co
OWNER REFERENCE	: H-801
PURCHASER	: Tulsa Heaters Midstream
PURCHASER REFERENCE	: MJ18-325
UNIT	:
HEATER SERVICE	: Hot Oil Heater
ITEM NUMBER	:
CALLIDUS REFERENCE	: BB-9024982
CALLIDUS DOCUMENT #	: BB-9024982-DS

APPROVED BY THM

Rev.	Date	Description	Prepared	Approved
0	3/22/2018	ISSUED FOR APPROVAL	SM	DW

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A Honeywell Company

Document Number: BB-9024982-DS

Rev 0

				REV
1	**GENERAL DATA**			REV
2	TYPE OF HEATER		Hot Oil Heater	
3	ALTITUDE ABOVE SEA LEVEL	ft.	3051	
4	AIR SUPPLY		Ambient	
5	TEMPERATURE (MIN/MAX/DESIGN)	°F	MINIMUM = -20 MAXIMUM = 110 DESIGN = 60	
6	RELATIVE HUMIDITY	%	50	
7	DRAFT TYPE		Forced Draft, Ambient	
8	REQUIRED TURNDOWN		5:1	
9	DRAFT AVAILABLE			
10	ACROSS BURNER	in. W.C.	7.00	
11	ACROSS PLENUM	in. W.C.		
12	DISTANCE BURNER C_L:			
13	TO TUBE C_L (HORIZ./VERT.)	in.	51	
14	TO BURNER C_L (HORIZ.)	in.	n/a	
15	TO UNSHIELDED REFRACTORY	in.		
16	BURNER FLOOR LINING THICKNESS	in.	6	
17	HEATER CASING THICKNESS	in.	0.1875	
18	FURNACE HEIGHT	ft.	10.5	
19	FURNACE WIDTH	ft.	10.5	
20	FURNACE LENGTH	ft.	19	
21	TUBE CIRCLE DIAMETER	ft.	8.5	
22	BURNER CIRCLE DIAMETER	in.	n/a	
23	**BURNER DATA**			
24	TYPE OF BURNER		GAS ONLY	
25	DIRECTION OF FIRING		HORIZONTALLY FIRED	
26	LOCATION		WALL	
27	BURNER MODEL		CUBL-5W-HC-HZ	
28	NUMBER REQ'D / HEATER		1	
29	PILOTS :			
30	NUMBER REQUIRED		1	
31	TYPE		Standard	
32	IGNITION METHOD		Electric	
33	FLAME DETECTION		None	
34	FUEL		Natural Gas	
35	FUEL PRESSURE RANGE	psig	**Minimum = 10.0 to Maximum = 15.0**	
36	FUEL CONNECTION SIZE		1/2" 150# RFSW	
37	CAPACITY	Btu/hr	100,000	
38	**BURNER OPERATING DATA**			
39	OPERATING CASE		Design	
40	HEAT RELEASE (LHV)			
41	MAXIMUM	MMBtu/hr	21.09	
42	NORMAL	MMBtu/hr	19.17	
43	MINIMUM	MMBtu/hr	4.22	
44	EXCESS AIR	%	15%	
45	COMB. AIR TEMPERATURE	°F	Ambient	
46	AIR SIDE DP @ MAXIMUM	in. W.C.	7.00	
47	AIR SIDE DP @ NORMAL	in. W.C.		
48	AIR SIDE DP @ MINIMUM	in. W.C.		
49	VISIBLE FLAME LENGTH (EXPECTED)	ft.	16.00	
50	VISIBLE FLAME DIAMETER (EXPECTED)	ft.	3.00	
51	FLAME SHAPE		ROUND	
52				
53	NOTES :			
54				
55				
56				

OWNER:	Matador Resources Co	**CALLIDUS REF:**	**BB-9024982**
OWNER REF.:	H-801	**DOCUMENT NUMBER:**	**BB-9024982-DS**
PURCHASER:	Tulsa Heaters Midstream		
PURCHASER REF.:	MJ18-325		
HEATER SERVICE	Hot Oil Heater		
UNIT:			
ITEM NO.:			

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BURNER DATA SHEET

FIRED HEATER DATA SHEET CUSTOMARY UNITS			
	Unit		Plant Loc.	
	Service	Regeneration Gas Heater	Equip.No.	H-101
	Type	Horizontal	No. Req.	1
	Owner		Client No.	J-387
	Purchaser	EPC, Inc.	Model No.	4HE-14-4HE-4-6-E
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	HRC 15400
Approved: LC/JB	Date	8/6/2015	Page 1 of 5	

Process Design Conditions

*	1 Total duty per heater, MM Btu/Hr	4.870			
*	2 Heater section	Rad+Conv			
*	3 Service	Regen. Gas			
*	4 Heat Absorption, MM Btu/Hr	4.87			
*	5 Fluid name	Natural Gas			
*	6 Flow rate, lb/hr	15,568			
	7 Flow rate, bpd				
*	8 Pressure drop (allowable, clean), psi	5			
	9 Pressure drop (calculated, clean), psi ..with 1/8" coke	4			
*	10 Average flux density (allowable), Btu/hr-ft²				
	11 Average flux density (calculated), Btu/hr-ft²	11,978			
	12 Maximum flux density, Btu/hr-ft²	20,519			
	13 Velocity Limitations				
	14 Maximum allowable inside film temperature, °F				
	15 Fouling Factor	0.001			
	16 Corrosion or Erosion Characteristics				
Inlet Conditions:					
*	17 Temperature, °F	100			
*	18 Pressure, psig	1020			
*	19 Vapor flow, lb/hr	15,568			
	20 Vapor, molecular weight	21.48			
	21 Vapor Viscosity, Cp	0.014			
*	22 Vapor, Specific Heat, Btu/lb-F	0.65			
*	23 Vapor Thermal Conductivity, Btu/hr-ft-F	0.022			
Outlet Conditions:					
*	23 Temperature, °F	550			
*	24 Pressure, psig	1016			
*	25 Vapor flow, lb/hr	15,568			
*	26 Vapor molecular weight	21.48			
*	27 Vapor Viscosity, Cp	0.02			
*	28 Vapor, Specific Heat, Btu/hr-F	0.74			
*	29 Vapor Thermal Conductivity, Btu/hr-ft-F	0.0425			
Remarks and Special Requirements:					
*	30 Distillation Data or Composition Attached				

Combustion Design Conditions

*	1 Type of fuel	Natural Gas			
*	2 Excess air, percent	15%			
	3 Guaranteed Efficiency, Percent (LHV)	86.30			
	4 Calculated Efficiency, Percent (LHV)	87.30			
	5 Radiation loss, percent of heat release (LHV)	2.00			
	6 Flue gas temperature leaving radiant section, °F	1,734			
	7 Flue gas temperature leaving convection section, °F	493			
	8 Flue Gas Mass Velocity Thru Convection Section, lb/sq ft-s	0.22			
	9 Draft at Bridge Wall, In. H20	0.010			
	10 Draft at Burners, In. H20	0.040			
*	11 Ambient Air Temperature, °F comb/draft	60/80			
*	12 Altitude, Ft. Above Sea Level	2,000			
	13 Calculated Heat Release, MM BTU per Hr (LHV)	5.58			
	14 Volumetric Heat Release, Btu/hr-ft³ (LHV)				

Note: A fuel savings of ________ MM Btu/hr will offset a $1,000 increase in furnace cost (erected)

FIRED HEATER DATA SHEET	Service		Plant Loc.		
CUSTOMARY UNITS	Unit	Regeneration Gas Heater	Equip.No.	H-101	
	Type	Horizontal	No. Req.	1	
	Owner		Job No.	J-387	
	Purchaser	EPC, Inc.	Model No.	4HE-14-4HE-4-6-E	
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	HRC 15400	
Approved: LC/JB	Date	8/6/2015		Page 2	of 5

Fuel Characteristics

			Composition	Composition	
*	1 Type of fuel	Natural Gas			
*	2 Heating value (HHV)				
*	3 Heating value (LHV)	901 Btu/SCF			
*	4 Specific gravity				
*	5 H/C ratio (by weight)				
*	6 Temperature at Burner, °F				
*	7 Viscosity, @ ______ °F,				
*	8 Viscosity, @ ______ °F,				
*	9 Fuel Pressure Available @ burner, psig				
*	10 Atomizing Steam Pressure, psig				
*	11 Vanadium Content, ppm for Liquid Fuels				
*	12 Sodium Content, ppm for Liquid Fuels				
*	13 Sulfur Content, Percent by Weight				
*	14 Gases: Molecular weight				
*	Composition, Mole Percent				

Mechanical Design Conditions

General

*	1 Plot limitations		* Stack Limitations	
*	2 Tube limitations		Other Limitations	
	3 Required Drawings			
	4 Structural Design Data: Wind Load		Seismic Factor	
	5 List of Applicable Standards or Specifications:	1	3	
		2	4	

Coil Design:

		Radiant	Shield	Conv.	
*	6 Heater Section	Radiant	Shield	Conv.	
*	7 Design Pressure, psig	1100	1100	1100	
*	8 Design Fluid Temperature, °F	600	600	600	
*	9 Corrosion Allowance: Tubes	0.063	0.063	0.063	
	Fittings	0.063	0.063	0.063	
	10 Hydrostatic Test Pressure, psig	1,750	1,750	1,750	
	11 Number of Passes	1	1	1	
	12 Overall Tube Length, Ft	14.230	14.230	14.230	
	13 Effective Tube length, ft	13.000	13.000	13.000	
	14 Bare Tubes, number	14	4		
	15 Bare tubes, total exposed surface, ft²	214	61		
	16 Extended surface tubes, number	--	--	6	
	17 Extended surface tubes, total expsoed surface, ft²	--	--	895	
	18 Tube spacing, center-to-center (staggered), in	8	8	8	
	19 Tube Center to furnace wall In. Min.	6	4	4	
*	20 Stress Relieve	←	No	→	
*	21 Weld Inspection Requirements, X-Ray or Other	10% of buttwelds will be 100% X-rayed			

Tubes:

*	22 Vertical or Horizontal	Horizontal	Horizontal	Horizontal	
	23 Tube Material (ASTM Specifications & Grade)	←	SA 106 Gr B	→	
	24 Outside Diameter, in	4.5	4.5	4.5	
	25 Wall Thickness (minimum) (average), in	←	Sch 80	→	
	26 Maximum Tube Wall Temp., °F (Calculated)	716			
	27 Inside Film Coefficient (Calculated)	175			
	28 Maximum Tube Wall Temperature, °F (Design)	←	730	→	
	27 Design Basis for Tube Wall Thickness	←	ASME SECT VIII Div I	→	

FIRED HEATER DATA SHEET CUSTOMARY UNITS			
	Service		Plant Loc.	
	Unit: Regeneration Gas Heater	Equip.No.	H-101
	Type: Horizontal	No. Req.	1
	Owner:	Client No.	J-387
	Purchaser: EPC, Inc.	Model No.	4HE-14-4HE-4-6-E
Revision: 0	Vendor: Heat Recovery Corporation	Ref. No.	HRC 15400
Approved: LC/JB	Date: 8/6/2015	Page 3	of 5

Mechanical Design Conditions (continued)

Item		Radiant	Shield	Conv.	
Description of Extended Surface:					
28 Type		None	None	Serrated	
29 Fin Material				C.S.	
30 Fin Dimensions	ht/thck			3/4" x 0.05	
31 Fin Spacing	#/in			5	
32 Maximum Fin Temperature	°F			763	
33 Extension ratio					
Plug-Type Headers:					
34 Manufacturer and Type		←	None	→	
* 35 Material (ASTM specification and grade)					
36 Nominal Rating					
* 37 Location					
38 Welded or Rolled					
Return Bends:					
39 Manufacturer and Type		←	SR 180° WPB	→	
* 40 Material (ASTM specification and grade)		←	WPB	→	
41 Nominal Rating or Schedule		←	Same as Tubes	→	
* 42 Location		←	Header Box	→	
Terminals: NOTE:					
43 Manufacturer and Type		←	Flanged	→	
* 44 Material (ASTM specification and grade)		←	Same as Tubes	→	
45 Nominal Rating		←	Same as Tubes	→	
* 46 Location		heater outlets		heater inlets	
47 Welded or Rolled		welded		welded	
48 Flange: Size and Rating		4"-600# RFWN		4"-600# RFWN	
Location		Radiant		Top Conv.	
Crossovers:					
* 49 Welded or Flanged		←	Welded	→	
* 50 Pipe material (ASTM specification and grade)		←	Same as Tubes	→	
51 Pipe Size and Wall Thicknes		←	Same as Tubes	→	
* 52 Location		←	Header Box	→	
53 Flange Rating					
Tube Supports:					
54 Ends, Top, Bottom:			← Ends	→	
Material			CS		
Thickness			3/8"		
Type and Thickness of Insulation			4"-8# 2300 F	Ceramic Fiber	
Insulation Reinforcement			310 SS anchors		
55 Intermediate:					
Material		←	None	→	
Spacing					
Type and Thickness of Coating					
56 Guides: Location					
Material					

Header Boxes

1 Location: Radiant and Convection Ends — Material: CS — Thickness: 3/16"

2 Insulation: Material: 2"-6# 2300°F Ceramic Fiber — Thickness: 2"

Anchoring Material: 304 SS

3 Are Header Box Doors Bolted or Hinged? Bolted

Burners

4 Manufacturer and Type: Universal Combustion TPS-4-4 — Number: 1

5 Location: One End

6 Size and Type of Pilots: Electric

7 Heat Release per Burner at Design Excess Air and Draft:

Normal: 5.580 MM BTU per Hr; Maximum: 6.98 MM Btu per Hr.

8 Minimum Distance Burner Centerline to Tube Centerline:

Horizontal: 2'-2 5/8" — Vertical: 3.3'

FIRED HEATER DATA SHEET	Service		Plant Loc.		
CUSTOMARY UNITS	Unit	Regeneration Gas Heater	Equip.No.	H-101	
	Type	Horizontal	No. Req.	1	
	Owner		Client No.	J-387	
	Purchaser	EPC, Inc.	Model No.	4HE-14-4HE-4-6-E	
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	HRC 15400	
Approved: LC/JB	Date	8/6/2015		Page 4	of 5

Mechanical Design Conditions (continued)

Settings:

1 Exposed Vertical Walls: N/A

Thickness 4" Hot-Face Temp.: Design 2300°F Calculated 1690

Wall Construction 2"-8# 2300°F + 2"-6# 2300°F Ceramic Fiber

Outside Casing: Thickness 3/16" Material C.S. Outside Temperature

Tieback Material 310 SS

Support Material C.S.

Method of Fastening Tiebacks to Structure Welded

2 Shielded Vertical Walls:

Thickness 3" Hot-Face Temp.: Design 2300°F Calculated

Wall Construction 1"-8# 2300°F + 2"-6# 2300°F Ceramic Fiber

Outside Casing: Thickness 3/16" Material CS Outside Temperature

Tieback Material 304 SS

Support Material C.S.

Method of Fastening Tiebacks to Structure Welded

3 Arch: None

Thickness Hot-Face Temp.: Design Calculated

Arch Construction

Outside Casing: Thickness Material Outside Temperature

Tieback Material

Support Material

Method of Fastening Tiebacks to Structure

4 Floor:

Thickness 7.5" Hot-Face Temp.: Design 1900°F Calculated

Floor Construction 5" 1:2:4 LHV Castable plus 2.5" 1st. Quality FireBrick

Minimum Floor Elevation

Outside Casing: Thickness 1/4" Material CS Outside Temperature

5 Convection Section:

Thickness 3" Design Hot-Face Temperature 2300 F

Construction 1"-8# 2300°F + 2"-6# 2300°F Ceramic Fiber

Outside Casing: Thickness 3/16" Material CS Outside Temperature

Tieback Material 304 SS

Support Material C.S.

Method of Fastening Tiebacks to Structure Welded

6 Internal Wall: N/A

Type Dimensions Material

FIRED HEATER DATA SHEET	Service		Plant Loc.		
CUSTOMARY UNITS	Unit	Regeneration Gas Heater	Equip No	H-101	
	Type	Horizontal	No Rqd	1	
	Owner		Job No	J-387	
	Purchaser	EPC, Inc.	Model No	4HE-14-4HE-4-6-E	
Revision: 0	Vendor	Heat Recovery Corporation	Ref No	HRC 15400	
Approved: LC/JB	Date	8/6/2015		Page 5	of 5

Mechanical Design Conditions (continued)

Stack:

1 Number 1 Self-Supporting or Guyed Self-Supporting Location Top Convection

2 Material C.S. Thickness Min. Thickness 3/16"

3 Inside Metal Diameter 20" OD Pipe Sch10 Height Above Grade Stack Length 20'-0"

4 Lining: Material None Thickness --

Type of Material or Reinforcement --

Extent of Lining --

Dampers:

1 Location: Stack or Bottom Air Plenum

2 Material Multiple or Single Leaf

3 Description of Provision for Operation from Grade

Breeching, Flues None

1 Material ASTM Specification Size

2 Insulation: Thickness

Type of Anchoring Material

3 Size of Access Door into Breeching

Air Ducts and Plenum

1 Material N/A ASTM Specification Size

Miscellaneous

1 Overall Dimensions of Furnace Refer to drawing 15400-001

2 Platforms: Location None

Width

Type of Floor

3 Stairs: Location None

4 Ladders: Location None

5 Access Doors: Location and Size One End 18" x 18"

6 Observation Doors: Location and Size Each End 3" x 6"

7 Miscellaneous Connections (Number and Size): Couplings Only

Draft (3) 3/4"-3000# Cplgs. Flue Gas Sample (2) 3/4"-3000# Cplgs

Temp. (3) 3/4"-3000# Cplgs. Smothering Steam (1) 1"-3000# Cplgs.

Header Box Drain (3) 3/4"-3000# Cplgs. Stack Drain --

Coil Drains Other TWO (2) Scanner Connections

8 Painting and Galvanizing Requirements Heater and Stack commercial sandblasted cleaned, SP-6, and painted with one coat of Sherwin Williams KEM HI-Temp 850 No.1 Black 2-3 mils dft

9 Are Painter's Trolley and Rail Included? N/A

10 Extent of Tube-Handling Facilities Removable Header Boxes

11 Explosion Doors: Location and Size None

Special Equipment (Soot Blower, Air Preheaters, Noise Suppressors, Fans, Etc.)

HRC - HEAT RECOVERY CORP.

FIRED HEATER DATA SHEET
CUSTOMARY UNITS

Date: 12/17/2015
Revision: 0
Approved: LJC

Unit	Condensate Stablizer	Plant Loc.	
Service	Hot Oil	Equip.No.	H-801
Type	Horizontal	No. Req.	1
Owner	Matador	Job No.	387
Purchaser	EPC, Inc.	Model No.	4HE-14-4HE-4-6-E
Vendor	Heat Recovery Corp.	Ref. No.	15405
Date	12/17/2015		

Process Design Conditions

*	1 Total duty per heater, MM Btu/Hr	4.19 x 1.1			
*	2 Heater section	Rad+Conv			
*	3 Service	Condensate Stablizer			
*	4 Heat Absorption, MM Btu/Hr	4.609			
*	5 Fluid name	Chemitherm 550			
*	6 Flow rate, lb/hr	74,938			
	7 Flow rate, bpd				
*	8 Pressure drop (allowable, clean), psi	10			
	9 Pressure drop (calculated, clean), psi ..with 1/8" coke	3			
*	10 Average flux density (allowable), Btu/hr-ft²				
	11 Average flux density (calculated), Btu/hr-ft²	11,366			
	12 Maximum flux density, Btu/hr-ft²	19,021			
	13 Velocity Limitations				
	14 Maximum allowable inside film temperature, °F	600 (564 Calc)			
	15 Fouling Factor	0.0015			
	16 Corrosion or Erosion Characteristics				
	Inlet Conditions:				
*	17 Temperature, °F	350			
*	18 Pressure, psig	40			
*	19 Liquid flow, lb/hr	74,938			
*	20 Thermal Conductivity Btu / hr ft oF	0.069			
	21 Specific Gravity	0.908			
	22 Specific Heat Btu / lbm oF	0.59			
*	23 Liquid Viscosity, Cp	1.27			
	Outlet Conditions:				
*	23 Temperature, °F	450			
*	24 Pressure, psig	37			
*	25 Liquid flow, lb/hr	74,938			
*	26 Thermal Conductivity Btu / hr ft oF	0.067			
*	27 Specific Gravity	0.908			
*	28 Specific Heat Btu / lbm oF	0.64			
*	29 Liquid Viscosity, Cp	0.727			
	Remarks and Special Requirements:				
*	30 Distillation Data or Composition Attached				

Combustion Design Conditions

*	1 Type of fuel	Natural Gas			
*	2 Excess air, percent	15			
	3 Guaranteed Efficiency, Percent (LHV)	83.38			
	4 Calculated Efficiency, Percent (LHV)	84.38			
	5 Radiation loss, percent of heat release (LHV)	1.50			
	6 Flue gas temperature leaving radiant section, °F	1,790			
	7 Flue gas temperature leaving convection section, °F	606			
	8 Flue Gas Mass Velocity Thru Convection Section, lb/sq ft-s	0.23			
	9 Draft at Bridge Wall, In. H20	-0.010			
	10 Draft at Burners, In. H20	-0.050			
*	11 Ambient Air Temperature, °F ... comb/draft	60/95			
*	12 Altitude, Ft. Above Sea Level	3,000			
	13 Calculated Heat Release, MM BTU per Hr (LHV)	5.46			
	14 Volumetric Heat Release, Btu/hr-ft³ (LHV)				

Note: A fuel savings of ________ MM Btu/hr will offset a $1,000 increase in furnace cost (erected)

HRC - HEAT RECOVERY CORP.

FIRED HEATER DATA SHEET		Service	Condensate Stablizer	Plant Loc.	
CUSTOMARY UNITS		Unit	Hot Oil	Equip No.	H-801
		Type	Horizontal	No. Req.	1
		Owner	Matador	Job No.	387
Date:	12/17/2015	Purchaser	EPC, Inc.	Model No.	4HE-14-4HE-4-6-E
Revision:	0	Vendor	Heat Recovery Corp.	Ref. No.	15405
Approved:	LJC	Date	12/17/2015	Page 2 of 5	

Fuel Characteristics

			Composition	Volume %	
*	1 Type of fuel	Natural Gas			
*	2 Heating value (HHV)				
*	3 Heating value (LHV)	901 btu/scf			
*	4 Specific gravity				
*	5 H/C ratio (by weight)				
*	6 Temperature at Burner, °F				
*	7 Viscosity, @ °F,				
*	8 Viscosity, @ °F,				
*	9 Fuel Pressure Available @ burner, psig				
*	10 Atomizing Steam Pressure, psig				
*	11 Vanadium Content, ppm for Liquid Fuels				
*	12 Sodium Content, ppm for Liquid Fuels				
*	13 Sulfur Content, Percent by Weight				
*	14 Gases: Molecular weight				
*	Composition, Mole Percent				

Mechanical Design Conditions

General

*	1 Plot limitations	* Stack Limitations	
*	2 Tube limitations	Other Limitations	
*	3 Required Drawings		
*	4 Structural Design Data: Wind Load	Seismic Factor	
	5 List of Applicable Standards or Specifications:	1	3
		2	4

Coil Design:

*	6 Heater Section	Radiant	Shield	Conv.	
*	7 Design Pressure, psig	150	150	150	
*	8 Design Fluid Temperature, °F	500	500	500	
*	9 Corrosion Allowance: Tubes	0.063	0.063	0.063	
	Fittings	0.063	0.063	0.063	
	10 Hydrostatic Test Pressure, psig	215	215	215	
	11 Number of Passes	1	1	1	
	12 Overall Tube Length, Ft.	14.230	14.230	14.230	
	13 Effective Tube length, ft.	13.000	13.000	13.000	
	14 Bare Tubes, number	14	4		
	15 Bare tubes, total exposed surface, ft²	214	61		
	16 Extended surface tubes, number	--	--	6	
	17 Extended surface tubes, total expsoed surface, ft²	--	--	1,167	
	18 Tube spacing, center-to-center (staggered), in	8	8	8	
	19 Tube Center to furnace wall In. Min.	6	4	4	
*	20 Stress Relieve	←	No	→	
*	21 Weld Inspection Requirements, X-Ray or Other	100% of 10%			

Tubes:

*	22 Vertical or Horizontal	Horizontal	Horizontal	Horizontal	
	23 Tube Material (ASTM Specifications & Grade)	←	SA 106 Gr B	→	
	24 Outside Diameter, in	4.5	4.5	4.5	
	25 Wall Thickness (minimum) (average), in	←	Sch 40	→	
	26 Maximum Tube Wall Temp., °F (Calculated)	611			
	27 Inside Film Coefficient (Calculated)	173			
	28 Maximum Tube Wall Temperature, °F (Design)	←	636	→	
	27 Design Basis for Tube Wall Thickness	←	ASME SEC. VIII DIV.1	→	

HRC - HEAT RECOVERY CORP.

FIRED HEATER DATA SHEET		Service	Condensate Stablizer	Plant Loc.	
CUSTOMARY UNITS		Unit	Hot Oil	Equip.No.	H-801
		Type	Horizontal	No. Req.	1
		Owner	Matador	Job No.	387
Date:	########	Purchaser	EPC, Inc.	Model No.	4HE-14-4HE-4-6-E
Revision:	0	Vendor	Heat Recovery Corp.	Ref. No.	15405
Approved:	LJC	Date	12/17/2015	Page 3 of 5	

Mechanical Design Conditions (continued)

		Radiant	Shield	Conv.	
Description of Extended Surface:					
	28 Type	None	None	Serrated	
	29 Fin Material			C.S.	
	30 Fin Dimensions ..... ht/thck			1@ 1/2" + 2@ 1" x 0.05	
	31 Fin Spacing .....#/in			6/inch	
	32 Maximum Fin Temperature °F			745	
	33 Extension ratio				
Plug-Type Headers:					
	34 Manufacturer and Type	←	None	→	
*	35 Material (ASTM specification and grade)				
	36 Nominal Rating				
*	37 Location				
	38 Welded or Rolled				
Return Bends:					
	39 Manufacturer and Type	SR 180°	SR 180º	SR 180º	▶
*	40 Material (ASTM specification and grade)	←	A234-WPB	→	
	41 Nominal Rating or Schedule	←	Same as Tubes	→	
*	42 Location	←	Header Box	→	
Terminals: NOTE:					
	43 Manufacturer and Type	←	Flanged	→	
*	44 Material (ASTM specification and grade)	←	Same as Tubes	→	
	45 Nominal Rating	←	Same as Tubes	→	
*	46 Location	heater outlet		heater inlet	
*	47 Welded or Rolled	welded		welded	
	48 Flange: Size and Rating	4"-300# RFWN		4"-300# RFWN	
	Location	Radiant		Top Conv.	
Crossovers:					
*	49 Welded or Flanged	←	WELDED	→	
*	50 Pipe material (ASTM specification and grade)	←	SA-106-B	→	
	51 Pipe Size and Wall Thicknes	←	4" SCH 40	→	
*	52 Location	←	HEADER BOX	→	
	53 Flange Rating		--		
Tube Supports:					
	54 Ends, Top, Bottom:	←	Ends	→	
	Material		CS		
	Thickness		3/8 "		
	Type and Thickness of Insulation		4" Ceramic Fiber		
	Insulation Reinforcement		310 SS		
	55 Intermediate:				
	Material	←	None	→	
	Spacing				
	Type and Thickness of Coating				
	56 Guides: Location				
	Material				

Header Boxes

1 Location: Radaint & Convection Ends — Material: CS — Thickness: 3/16"

2 Insulation: Material: 6 # 1800 F Ceramic Fiber — Thickness: 2"

Anchoring Material: 304 SS

3 Are Header Box Doors Bolted or Hinged? Bolted

Burners

4 Manufacturer and Type: UNIVERSAL COMBUSTION TPS-4-4 — Number: 1

5 Location: Radiant Ends

6 Size and Type of Pilots: Electric ignition

7 Heat Release per Burner at Design Excess Air and Draft:

Normal 5.380 MM BTU per Hr; Maximum 6.2 MM Btu per Hr.

8 Minimum Distance Burner Centerline to Tube Centerline:

Horizontal 2.22' Vertical

FIRED HEATER DATA SHEET	Unit	Black River Plant 2	Plant Loc.	Eddy County, NM
CUSTOMARY UNITS	Service	Regeneration Gas Heater	Equip.No.	H-101
	Type	Horizontal	No. Req.	1
	Owner	Matador Resources	Job No.	J412
	Purchaser	Veritas Gas Processing	Model No.	6HE-10-4H-6-4HE-4-6-E
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	HRC 17417
Approved: LC	Date	9/26/2017	Page 1 of 5	

Process Design Conditions

*	1 Total duty per heater, MM Btu/Hr	6.544			
*	2 Heater section	Rad+Conv			
*	3 Service	Regen. Gas			
*	4 Heat Absorption, MM Btu/Hr	6.544			
*	5 Fluid name	Natural Gas			
*	6 Flow rate, lb/hr	23,279			
	7 Flow rate, bpd				
*	8 Pressure drop (allowable, clean), psi	10			
	9 Pressure drop (calculated, clean), psi ..with 1/8" coke	6			
*	10 Average flux density (allowable), Btu/hr-ft²				
	11 Average flux density (calculated), Btu/hr-ft²	12,000			
	12 Maximum flux density, Btu/hr-ft²	17,832			
	13 Velocity Limitations				
	14 Maximum allowable inside film temperature, °F				
	15 Fouling Factor	0.001			
	16 Corrosion or Erosion Characteristics				
	Inlet Conditions:				
*	17 Temperature, °F	120			
*	18 Pressure, psig	975			
*	19 Vapor flow, lb/hr	23,279			
*	20 Vapor, molecular weight	19.28			
*	21 Vapor Viscosity, Cp	0.0142			
*	22 Vapor, Specific Heat, Btu/lb-F	0.64			
*	23 Vapor Thermal Conductivity, Btu/hr-ft-F	0.024			
	Outlet Conditions:				
*	23 Temperature, °F	550			
*	24 Pressure, psig	969			
*	25 Vapor flow, lb/hr	23,279			
*	26 Vapor molecular weight	19.28			
*	27 Vapor Viscosity, Cp	0.0186			
*	28 Vapor, Specific Heat, Btu/hr-F	0.71			
*	29 Vapor Thermal Conductivity, Btu/hr-ft-F	0.042			
	Remarks and Special Requirements:				
*	30 Distillation Data or Composition Attached				

Combustion Design Conditions

*	1 Type of fuel	Natural Gas			
*	2 Excess air, percent	15%			
	3 Guaranteed Efficiency, Percent (LHV)	83.00			
	4 Calculated Efficiency, Percent (LHV)	84.00			
	5 Radiation loss, percent of heat release (LHV)	2.00			
	6 Flue gas temperature leaving radiant section, °F	1,683			
	7 Flue gas temperature leaving convection section, °F	620			
	8 Flue Gas Mass Velocity Thru Convection Section, lb/sq ft-s	0.30			
	9 Draft at Bridge Wall, In. H20	0.010			
	10 Draft at Burners, In. H20	0.060			
*	11 Ambient Air Temperature, °F comb/draft	60/95			
*	12 Altitude, Ft. Above Sea Level	3200			
	13 Calculated Heat Release, MM BTU per Hr (LHV)	7.79			
	14 Volumetric Heat Release, Btu/hr-ft³ (LHV)				

Note: A fuel savings of ________________ MM Btu/hr will offset a $1,000 increase in furnace cost (erected)

FIRED HEATER DATA SHEET	Service	Black River Plant 2	Plant Loc.	Eddy County, NM	
CUSTOMARY UNITS	Unit	Regeneration Gas Heater	Equip No.	H-101	
	Type	Horizontal	No. Req.	1	
	Owner	Matador Resources	Job No.	J412	
	Purchaser	Veritas Gas Processing	Model No.	6HE-10-4H-6-4HE-4-6-E	
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	HRC 17417	
Approved: LC	Date	9/26/2017			

Fuel Characteristics

			Composition	Volume %	
*	1 Type of fuel	Natural Gas			
*	2 Heating value (HHV)				
*	3 Heating value (LHV)	901 btu/scf			
*	4 Specific gravity				
*	5 H/C ratio (by weight)				
*	6 Temperature at Burner, °F				
*	7 Viscosity, @ °F,				
*	8 Viscosity, @ °F,				
*	9 Fuel Pressure Available @ burner, psig				
*	10 Atomizing Steam Pressure, psig				
*	11 Vanadium Content, ppm for Liquid Fuels				
*	12 Sodium Content, ppm for Liquid Fuels				
*	13 Sulfur Content, Percent by Weight				
*	14 Gases: Molecular weight				
*	Composition, Mole Percent				

Mechanical Design Conditions

General

*	1 Plot limitations		* Stack Limitations	
*	2 Tube limitations		Other Limitations	
*	3 Required Drawings			
*	4 Structural Design Data: Wind Load		Seismic Factor	
*	5 List of Applicable Standards or Specifications:	1	3	
		2	4	

Coil Design:

		Radiant	Shield	Conv.	
*	6 Heater Section	Radiant	Shield	Conv.	
*	7 Design Pressure, psig	1100	1100	1100	
*	8 Design Fluid Temperature, °F	600	600	600	
*	9 Corrosion Allowance: Tubes	0.063	0.063	0.063	
	Fittings	0.063	0.063	0.063	
	10 Hydrostatic Test Pressure, psig	2,200	2,200	2,200	
	11 Number of Passes	1	1	1	
	12 Overall Tube Length, Ft	14.230	14.230	14.230	
	13 Effective Tube length, ft	13.000	13.000	13.000	
	14 Bare Tubes, number	10 / 6	4		
	15 Bare tubes, total exposed surface, ft²	317	61		
	16 Extended surface tubes, number	- -	--	6	
	17 Extended surface tubes, total expsoed surface, ft²	--	--	735	
	18 Tube spacing, center-to-center (staggered), in	12	8	8	
	19 Tube Center to furnace wall In. Min.	9	4	4	
*	20 Stress Relieve	←	No	→	
*	21 Weld Inspection Requirements, X-Ray or Other	100% of buttwelds will be 10% X-rayed			

Tubes:

*	22 Vertical or Horizontal	Horizontal	Horizontal	Horizontal	
	23 Tube Material (ASTM Specifications & Grade)	←	SA 106 Gr B	→	
	24 Outside Diameter, in	6.625 / 4.5	4.5	4.5	
	25 Wall Thickness (minimum) (average), in	←	Sch 80	→	
	26 Maximum Tube Wall Temp., °F (Calculated)	745			
	27 Inside Film Coefficient (Calculated)	117			
	28 Maximum Tube Wall Temperature, °F (Design)	←	770	→	
	27 Design Basis for Tube Wall Thickness	←	ASME SECT VIII Div I	→	

FIRED HEATER DATA SHEET	Service	Black River Plant 2	Plant Loc.	Eddy County, NM	
CUSTOMARY UNITS	Unit	Regeneration Gas Heater	Equip.No.	H-101	
	Type	Horizontal	No. Req.	1	
	Owner	Matador Resources	Job No.	J412	
	Purchaser	Veritas Gas Processing	Model No.	6HE-10-4H-6-4HE-4-6-E	
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	HRC 17417	
Approved: LC	Date	9/26/2017		Page 3	of 5

Mechanical Design Conditions (continued)

	Radiant	Shield	Conv.	
Description of Extended Surface:				
28 Type	None	None	Serrated	
29 Fin Material			C.S.	
30 Fin Dimensions ht/thck			3/4" x 0.05	
31 Fin Spacing #/in			4	
32 Maximum Fin Temperature °F			766	
33 Extension ratio				
Plug-Type Headers:				
34 Manufacturer and Type	←	None	→	
* 35 Material (ASTM specification and grade)				
36 Nominal Rating				
* 37 Location				
38 Welded or Rolled				
Return Bends:				
39 Manufacturer and Type	SR / LR	SR 180° WPB	→	
* 40 Material (ASTM specification and grade)	←	WPB	→	
41 Nominal Rating or Schedule	←	Same as Tubes	→	
* 42 Location	←	Header Box	→	
Terminals: NOTE:				
43 Manufacturer and Type	←	Flanged	→	
* 44 Material (ASTM specification and grade)	←	Same as Tubes	→	
45 Nominal Rating	←	Same as Tubes	→	
* 46 Location	heater outlets		heater inlets	
* 47 Welded or Rolled	welded		welded	
48 Flange: Size and Rating	6"-600# RFWN		4"-600# RFWN	
Location	Radiant		Top Conv.	
Crossovers:				
* 49 Welded or Flanged	←	Welded	→	
* 50 Pipe material (ASTM specification and grade)	←	SA-106-B	→	
51 Pipe Size and Wall Thicknes	←	6" Sch 80	→	
* 52 Location	←	Header Box	→	
53 Flange Rating		--		
Tube Supports:				
54 Ends, Top, Bottom:	←	Ends	→	
Material		CS		
Thickness		3/8 "		
Type and Thickness of Insulation	2"- 8# 2300°F +	2" -6# 2300°F Ceramic Fiber Blanket		
Insulation Reinforcement	- -	310 SS Studs And Clips		
55 Intermediate:				
Material	←	None	→	
Spacing				
Type and Thickness of Coating				
56 Guides: Location				
Material				

Header Boxes

1 Location: Radiant and Convection Ends — Material: CS — Thickness: 3/16"

2 Insulation: Material: 6# 2300°F Ceramic Fiber Blanket — Thickness: 2"

Anchoring Material: 304 SS Studs and Clips

3 Are Header Box Doors Bolted or Hinged? Bolted

Burners

4 Manufacturer and Type: Universal Combustion LoNOx TPS 4-3 — Number: Two

5 Location: Each End

6 Size and Type of Pilots: Electric Ignition

7 Heat Release per Burner at Design Excess Air and Draft:

Normal 3.900 MM BTU per Hr; Maximum 4.8 MM Btu per Hr.

8 Minimum Distance Burner Centerline to Tube Centerline:

Horizontal 2.45' Vertical 5'

FIRED HEATER DATA SHEET
CUSTOMARY UNITS

Unit	Black River Plant- 3	Plant Loc.	Loving, NM
Service	Regeneration Gas Heater	Equip.No.	H-101
Type	Horizontal	No. Req.	1
Owner	Matador Resources	Job No.	J423
Purchaser	Veritas Gas Processing	Model No.	6HE-10-4H-6-4HE-4-6-E
Vendor	Heat Recovery Corporation	Ref. No.	19439
Date	9/27/2019		

Revision: 0
Approved: JB

Process Design Conditions

*	1	Total duty per heater, MM Btu/Hr	6.544			
*	2	Heater section	Rad+Conv			
*	3	Service	Regen. Gas			
*	4	Heat Absorption, MM Btu/Hr	6.544			
*	5	Fluid name	Natural Gas			
*	6	Flow rate, lb/hr	23,279			
	7	Flow rate, bpd				
*	8	Pressure drop (allowable, clean), psi	10			
	9	Pressure drop (calculated, clean), psi ..with 1/8" coke	6			
*	10	Average flux density (allowable), Btu/hr-ft²				
	11	Average flux density (calculated), Btu/hr-ft²	12,000			
	12	Maximum flux density, Btu/hr-ft²	17,832			
	13	Velocity Limitations				
	14	Maximum allowable inside film temperature, °F				
	15	Fouling Factor	0.001			
	16	Corrosion or Erosion Characteristics				
Inlet Conditions:						
*	17	Temperature, °F	120			
*	18	Pressure, psig	975			
*	19	Vapor flow, lb/hr	23,279			
*	20	Vapor, molecular weight	19.28			
*	21	Vapor Viscosity, Cp	0.0142			
*	22	Vapor, Specific Heat, Btu/lb-F	0.64			
*	23	Vapor Thermal Conductivity, Btu/hr-ft-F	0.024			
Outlet Conditions:						
*	23	Temperature, °F	550			
*	24	Pressure, psig	969			
*	25	Vapor flow, lb/hr	23,279			
*	26	Vapor molecular weight	19.28			
*	27	Vapor Viscosity, Cp	0.0186			
*	28	Vapor, Specific Heat, Btu/hr-F	0.71			
*	29	Vapor Thermal Conductivity, Btu/hr-ft-F	0.042			
Remarks and Special Requirements:						
*	30	Distillation Data or Composition Attached				

Combustion Design Conditions

*	1	Type of fuel	Natural Gas			
*	2	Excess air, percent	15%			
	3	Guaranteed Efficiency, Percent (LHV)	83.00			
	4	Calculated Efficiency, Percent (LHV)	84.00			
	5	Radiation loss, percent of heat release (LHV)	2.00			
	6	Flue gas temperature leaving radiant section, °F	1,683			
	7	Flue gas temperature leaving convection section, °F	620			
	8	Flue Gas Mass Velocity Thru Convection Section, lb/sq ft-s	0.30			
	9	Draft at Bridge Wall, In. H20	0.010			
	10	Draft at Burners, In. H20	0.060			
*	11	Ambient Air Temperature, °F ... comb/draft	60/95			
*	12	Altitude, Ft. Above Sea Level	3200			
	13	Calculated Heat Release, MM BTU per Hr (LHV)	7.79			
	14	Volumetric Heat Release, Btu/hr-ft³ (LHV)				

Note: A fuel savings of ________________ MM Btu/hr will offset a $1,000 increase in furnace cost (erected)

Note: At 3200 ASL & 620 degF Stack exit temperature, density is approxiatly 0.03123 PCF. ACFM ~4037

FIRED HEATER DATA SHEET
CUSTOMARY UNITS

Service	Black River Plant- 3	Plant Loc.	Loving, NM
Unit	Regeneration Gas Heater	Equip No.	H-101
Type	Horizontal	No. Req.	1
Owner	Matador Resources	Job No.	J423
Purchaser	Veritas Gas Processing	Model No.	6HE-10-4H-6-4HE-4-6-E
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No. 19439
Approved: JB	Date	9/27/2019	Page 2 of 5

Fuel Characteristics

				Composition	Volume %	
*	1	Type of fuel	Natural Gas			
*	2	Heating value (HHV)				
*	3	Heating value (LHV)	901 btu/scf			
*	4	Specific gravity				
*	5	H/C ratio (by weight)				
*	6	Temperature at Burner, °F				
*	7	Viscosity, @ °F,				
*	8	Viscosity, @ °F,				
*	9	Fuel Pressure Available @ burner, psig				
*	10	Atomizing Steam Pressure, psig				
*	11	Vanadium Content, ppm for Liquid Fuels				
*	12	Sodium Content, ppm for Liquid Fuels				
*	13	Sulfur Content, Percent by Weight				
*	14	Gases: Molecular weight				
*		Composition, Mole Percent				

Mechanical Design Conditions

General

*	1	Plot limitations	* Stack Limitations	
*	2	Tube limitations	Other Limitations	
*	3	Required Drawings		
*	4	Structural Design Data: Wind Load	Seismic Factor	
*	5	List of Applicable Standards or Specifications:	1	3
			2	4

Coil Design:

*	6	Heater Section	Radiant	Shield	Conv.	
*	7	Design Pressure, psig	1100	1100	1100	
*	8	Design Fluid Temperature, °F	600	600	600	
*	9	Corrosion Allowance: Tubes	0.063	0.063	0.063	
		Fittings	0.063	0.063	0.063	
	10	Hydrostatic Test Pressure, psig	2,200	2,200	2,200	
	11	Number of Passes	1	1	1	
	12	Overall Tube Length, Ft.	14.230	14.230	14.230	
	13	Effective Tube length, ft.	13.000	13.000	13.000	
	14	Bare Tubes, number	10 / 6	4		
	15	Bare tubes, total exposed surface, ft²	317	61		
	16	Extended surface tubes, number	- -	--	6	
	17	Extended surface tubes, total expsoed surface, ft²	--	--	735	
	18	Tube spacing, center-to-center (staggered), in	12	8	8	
	19	Tube Center to furnace wall In. Min.	9	4	4	
*	20	Stress Relieve	←	No	→	
*	21	Weld Inspection Requirements, X-Ray or Other	100% of buttwelds will be 10% X-rayed			

Tubes:

*	22	Vertical or Horizontal	Horizontal	Horizontal	Horizontal	
	23	Tube Material (ASTM Specifications & Grade)	←	SA 106 Gr B	→	
	24	Outside Diameter, in	6.625 / 4.5	4.5	4.5	
	25	Wall Thickness (minimum) (average), in	←	Sch 80	→	
	26	Maximum Tube Wall Temp., °F (Calculated)	745			
	27	Inside Film Coefficient (Calculated)	117			
	28	Maximum Tube Wall Temperature, °F (Design)	←	770	→	
	27	Design Basis for Tube Wall Thickness	←	ASME SECT VIII Div I	→	

FIRED HEATER DATA SHEET	Service	Black River Plant- 3	Plant Loc.	Loving, NM	
CUSTOMARY UNITS	Unit	Regeneration Gas Heater	Equip.No.	H-101	
	Type	Horizontal	No. Req.	1	
	Owner	Matador Resources	Job No.	J423	
	Purchaser	Veritas Gas Processing	Model No.	6HE-10-4H-6-4HE-4-6-E	
Revision: 0	Vendor	Heat Recovery Corporation	Ref. No.	19439	
Approved: JB	Date	9/27/2019		Page 3	of 5

Mechanical Design Conditions (continued)

Description of Extended Surface:		Radiant	Shield	Conv.	
	28 Type	None	None	Serrated	
	29 Fin Material			C.S.	
	30 Fin Dimensions ..... ht/thck			3/4" x 0.05	
	31 Fin Spacing .....#/in			4	
	32 Maximum Fin Temperature °F			766	
	33 Extension ratio				
Plug-Type Headers:					
	34 Manufacturer and Type	←	None	→	
*	35 Material (ASTM specification and grade)				
	36 Nominal Rating				
*	37 Location				
	38 Welded or Rolled				
Return Bends:					
	39 Manufacturer and Type	SR / LR	SR 180° WPB	→	
*	40 Material (ASTM specification and grade)	←	WPB	→	
	41 Nominal Rating or Schedule	←	Same as Tubes	→	
*	42 Location	←	Header Box	→	
Terminals: NOTE:					
	43 Manufacturer and Type	←	Flanged	→	
*	44 Material (ASTM specification and grade)	←	Same as Tubes	→	
	45 Nominal Rating	←	Same as Tubes	→	
*	46 Location	heater outlets		heater inlets	
*	47 Welded or Rolled	welded		welded	
	48 Flange: Size and Rating	6"-600# RFWN		4"-600# RFWN	
	Location	Radiant		Top Conv.	
Crossovers:					
*	49 Welded or Flanged	←	Welded	→	
*	50 Pipe material (ASTM specification and grade)	←	SA-106-B	→	
	51 Pipe Size and Wall Thicknes	←	6" Sch 80	→	
*	52 Location	←	Header Box	→	
	53 Flange Rating		--		
Tube Supports:					
	54 Ends, Top, Bottom:	←	Ends	→	
	Material		CS		
	Thickness		3/8 "		
	Type and Thickness of Insulation	2"- 8# 2300°F +	2" -6# 2300°F Ceramic Fiber Blanket		
	Insulation Reinforcement	- -	310 SS Studs And Clips		
	55 Intermediate:				
	Material	←	None	→	
	Spacing				
	Type and Thickness of Coating				
	56 Guides: Location				
	Material				

Header Boxes

1 Location: Radiant and Convection Ends — Material: CS — Thickness: 3/16"

2 Insulation: Material: 6# 2300°F Ceramic Fiber Blanket — Thickness: 2"

Anchoring Material: 304 SS Studs and Clips

3 Are Header Box Doors Bolted or Hinged? Bolted

Burners

4 Manufacturer and Type: Universal Combustion LoNOx TPS 4-3 — Number: Two

5 Location: Each End

6 Size and Type of Pilots: Electric Ignition

7 Heat Release per Burner at Design Excess Air and Draft:

Normal 3.900 MM BTU per Hr; Maximum 4.8 MM Btu per Hr.

8 Minimum Distance Burner Centerline to Tube Centerline:

Horizontal 2.45' Vertical 5'

Owner:	San Mateo Midstream	Owner Ref.:	H-801		Ftnt
Purchaser:	Veritas	Purchaser Ref.:	J-423		&
Manufacturer:	Tulsa Heaters Midstream, LLC	THM Ref.:	MJ19-409	/	Rev
Service:	Hot Oil Heater	Project:	290 GPM Amine Treating Unit		
Quantity:	1	Location:	Loving, Eddy County, NM		
SHO Duty:	18.61 MMBTU/ hr	SHO Model:	SHO1750		
CMS Release:	23.92 MMBTU/ hr	CMS Model:	CMS2500		

PROCESS DESIGN CONDITIONS

Heater Section	- - -	Radiant / Convection	Radiant / Convection	Radiant / Convection	Radiant / Convection
Operating Case	- - -	Design Case			
Service	- - -	Hot Oil Heater			
Heat Absorption (R/C)	MMBTU/ hr	12.36 / 6.25			
Process Fluid	- - -	Chemtherm 550			
Process Mass Flow Rate, Total	Lb/ hr	321,260			
Process Bulk Velocity (calc. R/C)	ft/ s	7 / 10			
Process Mass Velocity (calc. R/C)	Lb/ s ft2	321 / 505			
Coking Allowance (dP calcs)	in				
Pressure Drop, Clean (allow. / calc.)	psi	15 / 17			
Pressure Drop, Fouled (allow. / calc.)	psi				
Average Heat Flux (allowable)	BTU/ hr ft2	13,000			
Average Heat Flux (calculated)	BTU/ hr ft2	12,730			
Maximum Heat Flux (allowable)	BTU/ hr ft2				
Maximum Heat Flux (calc. R/C)	BTU/ hr ft2	22,600 / 28,620			
Fouling Factor, Internal	hr ft2 °F/ BTU	0.002			
Corrosion or Erosion Characteristics	- - -				
Max. Film Temperature (allow. / calc.)	°F	635 / 516			
Inlet Conditions:					
Temperature	°F	275			
Pressure	psig	55			
Mass Flow Rate, Liquid	Lb/ hr	321,260			
Mass Flow Rate, Vapor	Lb/ hr	0			
Weight Percent, Liquid / Vapor	wt%	100% / 0%			
Density, Liquid / Vapor	Lb/ ft3	51.46 / 0.00			
Molecular Weight, Liquid / Vapor	Lb/ Lbmole	- - - / 0.0			
Viscosity, Liquid / Vapor	cp	2.1651 / 0.000			
Specific Heat, Liquid / Vapor	BTU/ Lb °F	0.5556 / 0.000			
Thermal Conductivity, Liq./Vap.	BTU/hr ft °F	0.0675 / 0.000			
Outlet Conditions:					
Temperature	°F	375			
Pressure	psig	38			
Mass Flow Rate, Liquid	Lb/ hr	321,260			
Mass Flow Rate, Vapor	Lb/ hr	0			
Weight Percent, Liquid / Vapor	wt%	100% / 0%			
Density, Liquid / Vapor	Lb/ ft3	49.24 / 0.00			
Molecular Weight, Liquid / Vapor	Lb/ Lbmole	- - - / 0.0			
Viscosity, Liquid / Vapor	cp	0.977 / 0.000			
Specific Heat, Liquid / Vapor	BTU/ Lb °F	0.603 / 0.000			
Thermal Conductivity, Liq./Vap.	BTU/hr ft °F	0.066 / 0.000			

0	1-Aug-19	Flow and duty changed	JF		
A		Issued with Proposal			
revision	date	description	by	chk'd	appv'd

HRC - HEAT RECOVERY CORP.

FIRED HEATER DATA SHEET		Unit	Black River 3 Gas Plant	Plant Loc.	Loving, NM
CUSTOMARY UNITS		Service	Hot Oil Heater	Equip.No.	H-851
		Type	Horizontal	No. Req.	1
		Owner	Matador Resources	Job No.	19438 / J-423
Date:	10/27/2019	Purchaser	Veritas Gas Processing	Model No.	4HE-14-4HE-4-6-E
Revision:	0	Vendor	Heat Recovery Corp.	Proposal No.	HRC 19-03
Approved:	JB	Date	10/27/2019		Page 1 of 5

Process Design Conditions

*	1	Total duty per heater, MM Btu/Hr	4.600			
*	2	Heater section	Rad+Conv			
*	3	Service	Hot Oil Heater			
*	4	Heat Absorption, MM Btu/Hr	4.6			
*	5	Fluid name	Chemitherm 550			
*	6	Flow rate, lb/hr	74,938			
	7	Flow rate, bpd				
*	8	Pressure drop (allowable, clean), psi	10			
	9	Pressure drop (calculated, clean), psi ..with 1/8" coke	3			
*	10	Average flux density (allowable), Btu/hr-ft²				
	11	Average flux density (calculated), Btu/hr-ft²	11,366			
	12	Maximum flux density, Btu/hr-ft²	19,021			
	13	Velocity Limitations				
	14	Maximum allowable inside film temperature, °F	600 (564 Calc)			
	15	Fouling Factor	0.0015			
	16	Corrosion or Erosion Characteristics				
Inlet Conditions:						
*	17	Temperature, °F	350			
*	18	Pressure, psig	40			
*	19	Liquid flow, lb/hr	74,938			
*	20	Thermal Conductivity Btu / hr ft oF	0.069			
*	21	Specific Gravity	0.908			
*	22	Specific Heat Btu / lbm oF	0.59			
*	23	Liquid Viscosity, Cp	1.27			
Outlet Conditions:						
*	23	Temperature, °F	450			
*	24	Pressure, psig	37			
*	25	Liquid flow, lb/hr	74,938			
*	26	Thermal Conductivity Btu / hr ft oF	0.067			
*	27	Specific Gravity	0.908			
*	28	Specific Heat Btu / lbm oF	0.64			
*	29	Liquid Viscosity, Cp	0.727			
Remarks and Special Requirements:						
*	30	Distillation Data or Composition Attached				

Combustion Design Conditions

*	1	Type of fuel	Natural Gas			
*	2	Excess air, percent	15			
	3	Guaranteed Efficiency, Percent (LHV)	83.38			
	4	Calculated Efficiency, Percent (LHV)	84.38			
	5	Radiation loss, percent of heat release (LHV)	1.50			
	6	Flue gas temperature leaving radiant section, °F	1,790			
	7	Flue gas temperature leaving convection section, °F	606			
	8	Flue Gas Mass Velocity Thru Convection Section, lb/sq ft-s	0.23			
	9	Draft at Bridge Wall, In. H20	-0.010			
	10	Draft at Burners, In. H20	-0.050			
*	11	Ambient Air Temperature, °F........ comb/draft	60/95			
*	12	Altitude, Ft. Above Sea Level	3,000			
	13	Calculated Heat Release, MM BTU per Hr (LHV)	5.46			
	14	Volumetric Heat Release, Btu/hr-ft³ (LHV)				

Note: A fuel savings of ________________ MM Btu/hr will offset a $1,000 increase in furnace cost (erected)

Zeeco S.O. No. **35563**

Customer **Veritas Gas Processing, LP**

Customer PO No. **4122000238**

This manual covers the component description, installation, operation and maintenance of the below description.

- (1) 7' Dia. x 40' OAH Self-Supported Enclosed Flare Stack w/ Damper
- (1) Utility Flare Tip w/ flame tabs
- (2) EGF-Z-HEI Electric Ignition Pilot w/ Flame Scanner
- (1) Nema 4, Skid Mounted Pilot Ignition and Monitoring Panel
- (1) Shutdown Monitoring Logic and Controls
  a. Stack Mounted Thermocouple for Monitoring and High Temperature Shutdown
  b. Pilot Gas Solenoid
  c. 6" Butterfly Valve for Flare Shutdown

PLANT #1 TO FOR AMINE

Utility Requirements

Client:	Vertias Gas Pro	Zeeco Ref.:	35563	Date:	12-Jun-18
Location:	0.00	Client Ref.:	Flare	Rev.	AS SOLD

Pilot Gas

Pilots: 2

Total Fuel Gas: 130 Scfh @ 15 psig or 58 Scfh Propane @ 7 psig

Electricity

Control Panel: 120V / 60 Hz / 1 Phase

Recommended Flare Purge Rate

Flare Tip Size: 14

Seal Type: Velocity Seal

Purge Rate: 145 Scfh of a gas that will not go to dew point at operating temperatures

Assist Media

None Flow: TBD (Field adjusted based on smoke production)

Table 13.5-1 (English Units). THC, NOx AND SOOT EMISSIONS FACTORS FOR FLARE OPERATIONS FOR CERTAIN CHEMICAL MANUFACTURING PROCESSES[a]

Pollutant	SCC[e]	Emissions Factor Value	Emissions Factor Units	Grade or Representativeness
THC, elevated flares[c]	30190099; 30119701; 30119705; 30119709; 30119741	0.14[b,f]	$lb/10^6$ Btu	B
THC, enclosed ground flares[g,h] Low Percent Load[i]		8.37[j] or 3.88e-3[f]	$lb/10^6$ scf gas burned $lb/10^6$ Btu heat input	Moderately
THC, enclosed ground flares[g,h] Normal to High Percent Load[i]		2.56[j] or 1.20e-3[f]	$lb/10^6$ scf gas burned $lb/10^6$ Btu heat input	Moderately
Nitrogen oxides, elevated flares[d]		0.068[b,k]	$lb/10^6$ Btu	B
Soot, elevated flares[d]		0 – 274[b]	μg/L	B

[a] All of the emissions factors in this table represent the emissions exiting the flare. Since the flare is not the originating source of the THC emissions, but rather the device controlling these pollutants routed from a process at the facility, the emissions factors are representative of controlled emissions rates for THC. These values are not representative of the uncontrolled THC routed to the flare from the associated process, and as such, they may not be appropriate for estimating the uncontrolled THC emissions or potential to emit from the associated process.

[b] Reference 1. Based on tests using crude propylene containing 80% propylene and 20% propane.

[c] Measured as methane equivalent. The THC emissions factor may not be appropriate for reporting volatile organic compounds (VOC) emissions when a VOC emissions factor exists.

[d] Soot in concentration values: nonsmoking flares, 0 micrograms per liter (μg/L); lightly smoking flares, 40 μg/L; average smoking flares, 177 μg/L; and heavily smoking flares, 274 μg/L.

[e] See Table 13.5-4 for a description of these SCCs.

[f] Factor developed using the lower (net) heating value of the vent gas.

[g] THC measured as propane by US EPA Method 25A.

[h] These factors apply to well operated ground flares achieving at least 98% destruction efficiency and operating in compliance with the current General Provisions requirements of 40 CFR Part 60, i.e. >200 btu/scf net heating value in the vent gas and less than the specified maximum exit velocity. The emissions factor data set had an average destruction efficiency of 99.99%. Based on tests using pure propylene fuel. References 12 through 33 and 39 through 45.

[i] The dataset for these tests were broken into four different test conditions: ramping back and forth between 0 and 30% of load; ramping back and forth between 30% and 70% of load; ramping back and forth between 70% and 100% of load; and a fixed rate maximum load condition. Analyses determined that only the first condition was statistically different. Low percent load is represented by a unit operating at approximately less than 30% of maximum load.

[j] Heat input is an appropriate basis for combustion emissions factor. However, based on available data, heat input data is not always known, but gas flowrate is generally available. Therefore, the emissions factor is presented in two different forms.

[k] Factor developed using the higher (gross) heating value of the vent gas.

CLIENT:	Veritas Gas Processing	ZEECO DOC NO:	42050-7050
JOBSITE:	Loving, NM	CLIENT DOC NO:	
CLIENT PO:	4232000188	TOTAL PAGES:	2

UTILITY CONSUMPTION

REV	DATE	BY	APP	DESCRIPTION
0	15NOV19	CMM	GAC	ISSUED FOR APPROVAL

Predicted Utility Requirements (Process)

Client:	Veritas Gas Processing	Zeeco Ref.:	42050	Date:	7-Nov-19
Location:	Loving, NM	Client Ref.:	4232000188	Rev.	0
		Doc. No.	42050-7050		

Equipment	Normal Operations Utility Requirements
AFDS-14/42 **J-423, D-701**	**Pilot Gas Consumption (Fuel Gas):** 76 SCFH @ 15 PSIG per pilot (2.04 Nm^3/hr @ 1.05 kg/cm^2g) /B\\ ***(2 pilots total = 152 SCFH @ 15 PSIG / 4.07 Nm^3/hr @ 1.05 kg/cm^2g)*** ***Continuous Purge Gas Requirement:*** ***300*** SCFH (8.037 Nm^3/hr) Fuel Gas
GENERAL	**Power Consumption:** Control Rack Assembly: 425.2 Watts (Maximum & Continuous)

NOTES:

(1) Fuel gas requirements are based upon a fuel gas with a LHV of 913 BTU/SCF (8591.3 $kcal/Nm^3$) and a specific gravity of 0.57.
(2) Pressure requirement is defined at the inlet to Zeeco supplied piping.
(3) Control Rack Tag #: J-423

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6$ scf] = (3.67) (CON) (C)(D), where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2.
Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_X emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_X emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor (lb/10^6 scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from lb/10^6 scf to kg/10^6 m^3, multiply by 16. To convert from lb/10^6 scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. CO_2[lb/10^6 scf] = (3.67) (CON) (C)(D), where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ lb/10^6 scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2.
Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylchloranthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
207-08-9	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D
74-98-6	Propane	1.6E+00	E

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES[a]
(SCC 2-02-002-53)

Pollutant	Emission Factor (lb/MMBtu)[b] (fuel input)	Emission Factor Rating
Criteria Pollutants and Greenhouse Gases		
NO_x[c] 90 - 105% Load	2.21 E+00	A
NO_x[c] <90% Load	2.27 E+00	C
CO[c] 90 - 105% Load	3.72 E+00	A
CO[c] <90% Load	3.51 E+00	C
CO_2[d]	1.10 E+02	A
SO_2[e]	5.88 E-04	A
TOC[f]	3.58 E-01	C
Methane[g]	2.30 E-01	C
VOC[h]	2.96 E-02	C
PM10 (filterable)[i,j]	9.50 E-03	E
PM2.5 (filterable)[j]	9.50 E-03	E
PM Condensable[k]	9.91 E-03	E
Trace Organic Compounds		
1,1,2,2-Tetrachloroethane[l]	2.53 E-05	C
1,1,2-Trichloroethane[l]	<1.53 E-05	E
1,1-Dichloroethane	<1.13 E-05	E
1,2-Dichloroethane	<1.13 E-05	E
1,2-Dichloropropane	<1.30 E-05	E
1,3-Butadiene[l]	6.63 E-04	D
1,3-Dichloropropene[l]	<1.27 E-05	E
Acetaldehyde[l,m]	2.79 E-03	C
Acrolein[l,m]	2.63 E-03	C
Benzene[l]	1.58 E-03	B
Butyr/isobutyraldehyde	4.86 E-05	D
Carbon Tetrachloride[l]	<1.77 E-05	E

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES (Concluded)

Pollutant	Emission Factor (lb/MMBtu)[b] (fuel input)	Emission Factor Rating
Chlorobenzene[l]	<1.29 E-05	E
Chloroform[l]	<1.37 E-05	E
Ethane[n]	7.04 E-02	C
Ethylbenzene[l]	<2.48 E-05	E
Ethylene Dibromide[l]	<2.13 E-05	E
Formaldehyde[l,m]	2.05 E-02	A
Methanol[l]	3.06 E-03	D
Methylene Chloride[l]	4.12 E-05	C
Naphthalene[l]	<9.71 E-05	E
PAH[l]	1.41 E-04	D
Styrene[l]	<1.19 E-05	E
Toluene[l]	5.58 E-04	A
Vinyl Chloride[l]	<7.18 E-06	E
Xylene[l]	1.95 E-04	A

[a] Reference 7. Factors represent uncontrolled levels. For NO_x, CO, and PM-10, "uncontrolled" means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, "uncontrolled" means no oxidation control; the data set may include units with control techniques used for NOx control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM10 = Particulate Matter $\leq$ 10 microns (μm) aerodynamic diameter. A "<" sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

$$\text{lb/hp-hr} = (\text{lb/MMBtu})\,(\text{heat input, MMBtu/hr})\,(1/\text{operating HP, 1/hp})$$

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to CO_2. CO_2 [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO_2,

C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10^6 scf, and h = heating value of natural gas (assume 1020 Btu/scf at 60°F).

[e] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content in natural gas of 2,000 gr/10^6scf.

[f] Emission factor for TOC is based on measured emission levels from 6 source tests.

[g] Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor.

[h] VOC emission factor is based on the sum of the emission factors for all speciated organic compounds. Methane and ethane emissions were not measured for this engine category.

[i] No data were available for uncontrolled engines. PM10 emissions are for engines equipped with a PCC.

[j] Considered $\leq$ 1 μm in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).

[k] No data were available for condensable emissions. The presented emission factor reflects emissions from 4SLB engines.

[l] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

[m] For rich-burn engines, no interference is suspected in quantifying aldehyde emissions. The presented emission factors are based on FTIR and CARB 430 emissions data measurements.

[n] Ethane emission factor is determined by subtracting the VOC emission factor from the NMHC emission factor.

loading operation, resulting in high levels of vapor generation and loss. If the turbulence is great enough, liquid droplets will be entrained in the vented vapors.

A second method of loading is submerged loading. Two types are the submerged fill pipe method and the bottom loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. During most of submerged loading by both methods, the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly during submerged loading, resulting in much lower vapor generation than encountered during splash loading.

The recent loading history of a cargo carrier is just as important a factor in loading losses as the method of loading. If the carrier has carried a nonvolatile liquid such as fuel oil, or has just been cleaned, it will contain vapor-free air. If it has just carried gasoline and has not been vented, the air in the carrier tank will contain volatile organic vapors, which will be expelled during the loading operation along with newly generated vapors.

Cargo carriers are sometimes designated to transport only one product, and in such cases are practicing "dedicated service". Dedicated gasoline cargo tanks return to a loading terminal containing air fully or partially saturated with vapor from the previous load. Cargo tanks may also be "switch loaded" with various products, so that a nonvolatile product being loaded may expel the vapors remaining from a previous load of a volatile product such as gasoline. These circumstances vary with the type of cargo tank and with the ownership of the carrier, the petroleum liquids being transported, geographic location, and season of the year.

One control measure for vapors displaced during liquid loading is called "vapor balance service", in which the cargo tank retrieves the vapors displaced during product unloading at bulk plants or service stations and transports the vapors back to the loading terminal. Figure 5.2-5 shows a tank truck in vapor balance service filling a service station underground tank and taking on displaced gasoline vapors for return to the terminal. A cargo tank returning to a bulk terminal in vapor balance service normally is saturated with organic vapors, and the presence of these vapors at the start of submerged loading of the tanker truck results in greater loading losses than encountered during nonvapor balance, or "normal", service. Vapor balance service is usually not practiced with marine vessels, although some vessels practice emission control by means of vapor transfer within their own cargo tanks during ballasting operations, discussed below.

Emissions from loading petroleum liquid can be estimated (with a probable error of ±30 percent)[4] using the following expression:

$$L_L = 12.46 \frac{SPM}{T} \qquad (1)$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)
P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
T = temperature of bulk liquid loaded, °R (°F + 460)

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\,(s/12)^a (W/3)^b \qquad (1a)$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k\,(s/12)^a (S/30)^d}{(M/0.5)^c} - C \qquad (1b)$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions. The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows:

1 lb/VMT = 281.9 g/VKT

The constants for Equations 1a and 1b based on the stated aerodynamic particle sizes are shown in Tables 13.2.2-2 and 13.2.2-4. The PM-2.5 particle size multipliers (k-factors) are taken from Reference 27.

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

Constant	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
	PM-2.5	PM-10	PM-30*	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	-	-	-	0.5	0.5	0.3
Quality Rating	B	B	B	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-2 also contains the quality ratings for the various size-specific versions of Equation 1a and 1b. The equation retains the assigned quality rating, if applied within the ranges of source conditions, shown in Table 13.2.2-3, that were tested in developing the equation:

Table 13.2.2-3. RANGE OF SOURCE CONDITIONS USED IN DEVELOPING EQUATION 1a AND 1b

Emission Factor	Surface Silt Content, %	Mean Vehicle Weight		Mean Vehicle Speed		Mean No. of Wheels	Surface Moisture Content, %
		Mg	ton	km/hr	mph		
Industrial Roads (Equation 1a)	1.8-25.2	1.8-260	2-290	8-69	5-43	4-17[a]	0.03-13
Public Roads (Equation 1b)	1.8-35	1.4-2.7	1.5-3	16-88	10-55	4-4.8	0.03-13

[a] See discussion in text.

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces. Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall or watering, because of traffic-enhanced natural evaporation. (Factors influencing how fast a road dries are discussed in Section 13.2.2.3, below.) The quality ratings given above pertain to the mid-range of the measured source conditions for the equation. A higher mean vehicle weight and a higher than normal traffic rate may be justified when performing a worst-case analysis of emissions from unpaved roads.

The emission factors for the exhaust, brake wear and tire wear of a 1980's vehicle fleet (*C*) was obtained from EPA's MOBILE6.2 model [23]. The emission factor also varies with aerodynamic size range average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation:

$$E_{ext} = E\ [(365 - P)/365] \tag{2}$$

where:

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT

E = emission factor from Equation 1a or 1b

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation (see below)

Figure 13.2.2-1 gives the geographical distribution for the mean annual number of "wet" days for the United States.

Equation 2 provides an estimate that accounts for precipitation on an annual average basis for the purpose of inventorying emissions. It should be noted that Equation 2 does not account for differences in the temporal distributions of the rain events, the quantity of rain during any event, or the potential for the rain to evaporate from the road surface. In the event that a finer temporal and spatial resolution is desired for inventories of public unpaved roads, estimates can be based on a more complex set of assumptions. These assumptions include:

1. The moisture content of the road surface material is increased in proportion to the quantity of water added;
2. The moisture content of the road surface material is reduced in proportion to the Class A pan evaporation rate;
3. The moisture content of the road surface material is reduced in proportion to the traffic volume; and
4. The moisture content of the road surface material varies between the extremes observed in the area. The CHIEF Web site (http://www.epa.gov/ttn/chief/ap42/ch13/related/c13s02-2.html) has a file which contains a spreadsheet program for calculating emission factors which are temporally and spatially resolved. Information required for use of the spreadsheet program includes monthly Class A pan evaporation values, hourly meteorological data for precipitation, humidity and snow cover, vehicle traffic information, and road surface material information.

It is emphasized that <u>the simple assumption underlying Equation 2 and the more complex set of assumptions underlying the use of the procedure which produces a finer temporal and spatial resolution</u> have not been verified in any rigorous manner. For this reason, the quality ratings for either approach should be downgraded one letter from the rating that would be applied to Equation 1.

13.2.2.3 Controls[18-22]

A wide variety of options exist to control emissions from unpaved roads. Options fall into the following three groupings:

1. <u>Vehicle restrictions</u> that limit the speed, weight or number of vehicles on the road;

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Title 40 → Chapter I → Subchapter C → Part 98 → Subpart C → Appendix

Title 40: Protection of Environment
PART 98—MANDATORY GREENHOUSE GAS REPORTING
Subpart C—General Stationary Fuel Combustion Sources

TABLE C-1 TO SUBPART C OF PART 98—DEFAULT CO_2 EMISSION FACTORS AND HIGH HEAT VALUES FOR VARIOUS TYPES OF FUEL

Link to an amendment published at 81 FR 89252, Dec. 9, 2016.

DEFAULT CO_2 EMISSION FACTORS AND HIGH HEAT VALUES FOR VARIOUS TYPES OF FUEL

Fuel type	Default high heat value	Default CO_2 emission factor
Coal and coke	mmBtu/short ton	kg CO_2/mmBtu
Anthracite	25.09	103.69
Bituminous	24.93	93.28
Subbituminous	17.25	97.17
Lignite	14.21	97.72
Coal Coke	24.80	113.67
Mixed (Commercial sector)	21.39	94.27
Mixed (Industrial coking)	26.28	93.90
Mixed (Industrial sector)	22.35	94.67
Mixed (Electric Power sector)	19.73	95.52
Natural gas	mmBtu/scf	kg CO_2/mmBtu
(Weighted U.S. Average)	1.026×10^{-3}	53.06
Petroleum products	mmBtu/gallon	kg CO_2/mmBtu
Distillate Fuel Oil No. 1	0.139	73.25
Distillate Fuel Oil No. 2	0.138	73.96
Distillate Fuel Oil No. 4	0.146	75.04
Residual Fuel Oil No. 5	0.140	72.93
Residual Fuel Oil No. 6	0.150	75.10
Used Oil	0.138	74.00
Kerosene	0.135	75.20
Liquefied petroleum gases (LPG)[1]	0.092	61.71
Propane[1]	0.091	62.87
Propylene[2]	0.091	67.77
Ethane[1]	0.068	59.60
Ethanol	0.084	68.44
Ethylene[2]	0.058	65.96
Isobutane[1]	0.099	64.94
Isobutylene[1]	0.103	68.86
Butane[1]	0.103	64.77
Butylene[1]	0.105	68.72
Naphtha (<401 deg F)	0.125	68.02
Natural Gasoline	0.110	66.88
Other Oil (>401 deg F)	0.139	76.22
Pentanes Plus	0.110	70.02
Petrochemical Feedstocks	0.125	71.02
Petroleum Coke	0.143	102.41
Special Naphtha	0.125	72.34
Unfinished Oils	0.139	74.54
Heavy Gas Oils	0.148	74.92
Lubricants	0.144	74.27
Motor Gasoline	0.125	70.22
Aviation Gasoline	0.120	69.25
Kerosene-Type Jet Fuel	0.135	72.22
Asphalt and Road Oil	0.158	75.36
Crude Oil	0.138	74.54
Other fuels—solid	mmBtu/short ton	kg CO_2/mmBtu
Municipal Solid Waste	9.95[3]	90.7
Tires	28.00	85.97
Plastics	38.00	75.00

Petroleum Coke	30.00	102.41
Other fuels—gaseous	mmBtu/scf	kg CO_2/mmBtu
Blast Furnace Gas	0.092×10^{-3}	274.32
Coke Oven Gas	0.599×10^{-3}	46.85
Propane Gas	2.516×10^{-3}	61.46
Fuel Gas[4]	1.388×10^{-3}	59.00
Biomass fuels—solid	mmBtu/short ton	kg CO_2/mmBtu
Wood and Wood Residuals (dry basis)[5]	17.48	93.80
Agricultural Byproducts	8.25	118.17
Peat	8.00	111.84
Solid Byproducts	10.39	105.51
Biomass fuels—gaseous	mmBtu/scf	kg CO_2/mmBtu
Landfill Gas	0.485×10^{-3}	52.07
Other Biomass Gases	0.655×10^{-3}	52.07
Biomass Fuels—Liquid	mmBtu/gallon	kg CO_2/mmBtu
Ethanol	0.084	68.44
Biodiesel (100%)	0.128	73.84
Rendered Animal Fat	0.125	71.06
Vegetable Oil	0.120	81.55

[1]The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.

[2]Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.

[3]Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.

[4]Reporters subject to subpart X of this part that are complying with §98.243(d) or subpart Y of this part may only use the default HHV and the default CO_2 emission factor for fuel gas combustion under the conditions prescribed in §98.243(d)(2)(i) and (d)(2)(ii) and §98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.

[5]Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where HHV_w = wet basis HHV, M = moisture content (percent) and HHV_d = dry basis HHV from Table C-1.

[78 FR 71950, Nov. 29, 2013]

Need assistance?

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Title 40: Protection of Environment
PART 98—MANDATORY GREENHOUSE GAS REPORTING
Subpart C—General Stationary Fuel Combustion Sources

Table C-2 to Subpart C of Part 98—Default CH_4 and N_2O Emission Factors for Various Types of Fuel

Link to an amendment published at 81 FR 89252, Dec. 9, 2016.

Fuel type	Default CH_4 emission factor (kg CH_4/mmBtu)	Default N_2O emission factor (kg N_2O/mmBtu)
Coal and Coke (All fuel types in Table C-1)	1.1×10^{-02}	1.6×10^{-03}
Natural Gas	1.0×10^{-03}	1.0×10^{-04}
Petroleum (All fuel types in Table C-1)	3.0×10^{-03}	6.0×10^{-04}
Fuel Gas	3.0×10^{-03}	6.0×10^{-04}
Municipal Solid Waste	3.2×10^{-02}	4.2×10^{-03}
Tires	3.2×10^{-02}	4.2×10^{-03}
Blast Furnace Gas	2.2×10^{-05}	1.0×10^{-04}
Coke Oven Gas	4.8×10^{-04}	1.0×10^{-04}
Biomass Fuels—Solid (All fuel types in Table C-1, except wood and wood residuals)	3.2×10^{-02}	4.2×10^{-03}
Wood and wood residuals	7.2×10^{-03}	3.6×10^{-03}
Biomass Fuels—Gaseous (All fuel types in Table C-1)	3.2×10^{-03}	6.3×10^{-04}
Biomass Fuels—Liquid (All fuel types in Table C-1)	1.1×10^{-03}	1.1×10^{-04}

Note: Those employing this table are assumed to fall under the IPCC definitions of the “Energy Industry” or “Manufacturing Industries and Construction”. In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC “Energy Industry” category may employ a value of 1g of CH_4/mmBtu.

[78 FR 71952, Nov. 29, 2013]

Need assistance?

For flares subject to Chapter 115, Subchapter H, relating to highly reactive volatile organic compounds, valid flow rate and composition data required by 30 TAC 115.725–115.726 must be used to determine emissions for any portions of the current reporting year during which HRVOC monitors were installed and operational.

In the absence of monitoring data, selection of the most accurate method may sometimes require exercising scientific judgment. For example, when using the results of a one-time performance test, the test conditions must be compared to the flare's actual operating conditions during the inventory year to determine whether the test accurately represents the flare's performance. If test conditions do not accurately model flare operation, then engineering determinations based on detailed process evaluation may provide the best data.

NO_x and CO Emissions

To calculate NO_x and CO emissions, the net heating value of the flared gas must be known. Using the actual short-term flared gas composition and flow rate data for the inventory year, calculate the net heating value of the flared gas and the total heat release for each short time period. Use these total heat release data, in conjunction with the appropriate emission factors listed below, to determine NO_x and CO emissions for each time segment. Since the calculated net heating value of the gas and the assist gas type will determine the appropriate emission factors, carefully select the correct factors for each flare from Table A-7.

Calculate emissions using the most accurate data for the gas flow rate and composition available. (See "Flared Gas Flow Rate and Composition" earlier in this supplement for more information on preferred data.)

Regardless of the source of the data on gas flow and composition, the determination methodology for NO_x and CO emissions must be coded "A" for 'TCEQ-approved factor' when using the factors below.

Please note: at the time of publication, the EPA was proposing to update several of the emissions factors for flares in AP-42, Chapter 13.5. Once it has finalized the updates, the TCEQ will comment on the appropriateness of any revised factors for the EI. However, the current proposed EPA factors should not be used for determining flare emissions at this time and will not be accepted for the EI.

For flares subject to the HRVOC regulations in Chapter 115, Subchapter H, use the net heating value data required by 30 TAC 115.725 and 115.726 to determine NO_x and CO emissions for any portions of the current reporting year during which HRVOC monitors were installed and operational.

Table A-7. Flare Emission Factors

Contaminant	Assist Type	Waste Gas Stream Net Heating Value[a,b]	Emission Factor
NO_x	Steam	High Btu	0.0485 lb/MMBtu
		Low Btu	0.068 lb/MMBtu
	Air or Unassisted	High Btu	0.138 lb/MMBtu
		Low Btu	0.0641 lb/MMBtu
CO	Steam	High Btu	0.3503 lb/MMBtu
		Low Btu	0.3465 lb/MMBtu
	Air or Unassisted	High Btu	0.2755 lb/MMBtu
		Low Btu	0.5496 lb/MMBtu

[a] High Btu: > 1000 Btu/scf

[b] Low Btu: 192–1000 Btu/scf

Uncombusted Flared Gas Emissions

Uncombusted flared gas emissions usually include VOCs, H_2S, or both. Emissions calculations for these contaminants are based on the flared gas flow rate and composition, and the appropriate destruction efficiency, which depends upon the actual flare operation.

Destruction Efficiencies

Flare destruction efficiency varies with assist gas flow rate, flame stability, operating conditions, flare tip size and design, the specific compounds being combusted, and gas composition. HRVOC regulations in 30 TAC 115 address flare operational requirements. If flare operations are consistent with Chapter 115, the destruction efficiencies specified in 30 TAC 115.725 may be used to determine VOC emissions.

Otherwise, if the flare met all applicable regulations, the appropriate destruction efficiencies from either an applicable permit or the destruction efficiencies in Table A-8—the maximum destruction efficiencies for EI purposes—may be used to determine flare emissions. For assisted flares, there is the potential for over-assisting the waste gas stream, and the destruction efficiency may be lower than either the permitted efficiency or the appropriate efficiencies contained in the Chapter 115 HRVOC regulations or Table A-8. Emissions determinations must be adjusted accordingly.

Of course, if the flare flame (not the flare pilot) is ever extinguished, the destruction efficiency for the period when the flame was out will be zero. The pilot combustion zone is separate from the flame combustion zone. Therefore, the flare flame can be extinguished while the flare pilots are still lit.

Section 7

Map(s)

A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	A graphical scale

Please see attached map

GENERAL NOTES:

REV.	REVISION	DATE	DRAFT	CHECKED	APP'D.
A	ISSUED FOR APPROVAL	04/01/20	KES		

PELICAN
Energy Consultants, LLC

San Mateo
MIDSTREAM

TITLE
BRNGPP FACILITIES
EDDY COUNTY, NEW MEXICO
EMISSIONS LAYOUT
KEY PLAN

DRAWING APPROVAL

DRAWN BY:	KES	04/01/20	CHECKED BY:	DAH	04/01/20
DESIGN ENGINEER:	DAH	04/01/20	CLIENT APPROVAL:		
CLIENT	SAN MATEO MIDSTREAM		JOB NO. 190625		DWG. NO. 31500

PLOT TIME: April 1, 2020 4:49 PM BY: KATY SCHILD FILE PATH: R:\CLIENT_PROJECTS\MATADOR\RUSTLER_BREAKS_COMPRESSOR_STATION\170206\DRAWINGS\30000 MECHANICAL\31000\31500-190625.DWG

Section 8A

Applicable State & Federal Regulations

Provide a discussion demonstrating compliance with each applicable state & federal regulation. All input cells should be filled in, even if the response is 'No' or 'N/A'.

In the "Justification" column, identify the criteria that are critical to the applicability determination, numbering each. For each unit listed in the "Applies to Unit No(s)" column, after each listed unit, include the lowest level citation of the applicable regulation. For each unit, list the information necessary to verify the applicability of the regulation, including date of manufacture, date of construction, size (hp), and combustion type. Doing so will provide the applicability criteria for each unit.

Applicable STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Federally Enforceable	Overview of Regulation	Unit(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m^3, 3. VOL)
20.2.1 NMAC	General Provisions	Yes	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.	Facility	Yes	
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	Yes	20.2.3 NMAC is a State Implementation Plan (SIP) approved regulation that limits the maximum allowable concentration of Sulfur Compounds, Carbon Monoxide, and Nitrogen Dioxide.	Facility	Yes	**20.2.3 NMAC is a State Implementation Plan (SIP) approved regulation that limits the maximum allowable concentration of, Sulfur Compounds, Carbon Monoxide and Nitrogen Dioxide.** **The TSP NM ambient air quality standard was repealed by the EIB effective November 30, 2018.**
20.2.7 NMAC	Excess Emissions	Yes	If your entire facility or individual pieces of equipment are subject to emissions limits in a permit or numerical emissions standards in a federal or state regulation, this applies.	Facility	Yes	
20.2.38 NMAC	Hydrocarbon Storage Facility	No	Use the regulation link (left) then cut & paste applicable sections.	NA	No	
20.2.61.109 NMAC	Smoke & Visible Emissions	No	Engines and heaters are Stationary Combustion Equipment. Specify units subject to this regulation.	ENG-1, ENG-2, ENG-3, ENG-4, HT-101, HT-801, HT-102, AR-1, DR-1, AR-2, DR-2, HT-103, HT-802, TO-1,	Yes	This regulation that limits opacity to 20% applies to Stationary Combustion Equipment, such as engines, boilers, heaters, and flares unless your equipment is subject to another state regulation that limits particulate matter such as 20.2.19 NMAC (see 20.2.61.109 NMAC).

STATE REGU-LATIONS CITATION	**Title**	**Federally Enforceable**	**Overview of Regulation**	**Unit(s) or Facility**	**Applies? (Yes or No)**	**JUSTIFICATION:** Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m^3, 3. VOL)
				TO-2, VCU-1, FL-1, FL-2, FL-3		
20.2.73 NMAC	NOI & Emissions Inventory Requirements	Yes	NOI: 20.2.73.200 NMAC applies to all facilities emitting over 10 TPY of any regulated air contaminate. Thus, permitted facilities are also subject to this rule. This GCP-O&G registration also serves the purpose of meeting 20.2.73 the NMAC notification requirements.) Emissions Inventory: 20.2.73.300.A(1) NMAC applies to facilities registering under the GCP. Emission Inventory reporting is required upon request by the department per 20.2.73.300.B(4) NMAC.	Facility	Yes	Under 20.2.73.300.B(4) NMAC, the NMED is requesting emissions inventory reporting from minor sources for **calendar year 2020**.
20.2.77 NMAC	New Source Performance	Yes	This is a stationary source which is subject to the requirements of 40 CFR Part 60, as amended on the date of certification.	ENG-1, ENG-2, ENG-3, ENG-4, HT-101, HT-801, HT-102, AR-1, DR-1, AR-2, DR-2, HT-103, HT-802, TO-1, TO-2, VCU-1, FL-1, FL-2, FL-3	Yes	This is a stationary source which is subject to the requirements of 40 CFR Part 60.
20.2.78 NMAC	Emission Standards for HAPS	No	This facility emits hazardous air pollutants which are subject to the requirements of 40 CFR Part 61, as amended on the date of certification.	NA	No	
20.2.82 NMAC	MACT Standards for source categories of HAPS	Yes	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63, as amended on the date of certification.	DEHY-1, DEHY-2, AM-1, AM-2, ENG-1, ENG-2, ENG-3, ENG-4	Yes	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63.

Applicable FEDERAL REGULATIONS (This is not an exhaustive list; add applicable regulations such as NSPS GG and KKKK):

FEDERAL REGU-LATIONS CITATION	Title	Overview of Regulation	Units(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m3, 3. VOL)
40 CFR 50	NAAQS	Defined as applicable at 20.2.70.7.E.11, Any national ambient air quality standard	Facility	Yes	
40 CFR 60, Subpart A	General Provisions	Applies if any other NSPS subpart applies.	Units	Yes	Applies to Units subject to 40 CFR 60
40 CFR 60, Subpart OOOO	Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced After August 23, 2011, and on or before September 18, 2015	If there is a standard or other requirement, then the facility is an "affected facility." Currently there are standards for: gas wells (60.5375); centrifugal compressors (60.5380); reciprocating compressors (60.5385): controllers (60.5390); storage vessels (60.5395); equipment leaks (60.5400); sweetening units (60.5405). **If standards apply, list the unit number(s) and regulatory citation of the standard that applies to that unit (e.g. Centrifugal Compressors 1a-3a are subject to the standards at 60.5380(a)(1) and (2) since we use a control device to reduce emissions)**	NA	No	
40 CFR 60, Subpart OOOOa	Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015	If there is a standard or other requirement, then the facility is an "affected facility." Currently there are standards for: gas wells (60.5375a); centrifugal compressors (60.5380a); reciprocating compressors (60.5385a): controllers (60.5390a); storage vessels (60.5395a); fugitive emissions at well sites and compressor stations (60.5397a); equipment leaks at gas plants (60.5400a); sweetening units (60.5405a).	Facility	Yes	This regulation applies to amine units, reciprocating compressors, tanks and fugitive equipment leaks which commenced construction after September 18, 2015. Fugitives includes all components on equipment such as compressors and cryogenic units.
40 CFR 60, Subpart IIII	Standards of performance for Stationary Compression Ignition Internal Combustion Engines	See 40 CFR 60.4200(a) 1 through 4 to determine applicable category and state engine size, fuel type, and date of manufacture.	NA	No	
40 CFR 60, Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	See 40 CFR 60.4230(a), 1 through 5 to determine applicable category and state engine size, fuel type, and date of manufacture.	ENG-1, ENG-2. ENG-3, ENG-4	Yes	This regulation establishes standards of performance for stationary spark ignition internal combustion engines. The Waukesha engines at this facility is subject to

FEDERAL REGU-LATIONS CITATION	Title	Overview of Regulation	Units(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m3, 3. VOL)
					NSPS JJJJ as it commenced construction after June 12, 2006 and was manufactured on or after July 1, 2007 [§60.4230(a)(4)(i)].
40 CFR 63, Subpart A	General Provisions	Applies if any other subpart applies.	Units subjects to 40 CFR 63	Yes	
40 CFR 63, Subpart HH	NESHAP for Glycol Dehydrators	See 40 CFR 63, Subpart HH	DEHY-1 DEHY-2	Yes	This regulation establishes national emission standards for hazardous air pollutants from oil and natural gas production facilities. The facility is a major source of HAPs and meets the definition of a natural gas processing plant. The dehydrator will have a natural gas flow rate equal to or greater than 85 thousand standard cubic feet. The dehydrator vents less than 0.90 megagrams of benzene per year to the atmosphere and is therefore exempt from the emissions control requirements of MACT HH per 63.764(e)(1)(ii). Because the dehydrator complies with the 1 tpy control option under 63.765(b)(1)(ii) it is considered to be a large dehydrator under MACT HH.
40 CFR 63, Subpart ZZZZ	NESHAP for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)	Facilities are subject to this subpart if they own or operate a stationary RICE, except if the stationary RICE is being tested at a stationary RICE test cell/stand.	ENG-1, ENG-2, ENG-3, ENG-4	Yes	The engine(s) must meet the requirements of MACT ZZZZ by meeting the requirements of NSPS JJJJ. No other requirements under this part apply.

Section 8B
Compliance Test History

To evaluate the requirement for compliance tests, you must submit a compliance test history. The table below provides an example.

Compliance Test History Table

Unit No.	Test Description	Test Date
ENG-1, ENG-2, ENG-3, ENG-4	Tested in accordance with EPA test methods for NOx and CO as required by NSPS JJJJ.	3/19/2020