Denbury

May 21, 2021

State of Mississippi
Department of Environmental Quality
Office of Pollution Control
515 E. Amite Street
Jackson, MS 39201

RE: Notice of Intent for Coverage Under the Oil Production General Permit
Denbury Onshore, LLC
Tinsley Test Site #6
Yazoo County, Mississippi

In accordance with MAC Title 11, Part 2, submitted with this are two (2) bound sets of the referenced material. Request is hereby made for coverage under the Oil Production General Permit (OPGP). This facility is existing and was previously excluded from the requirement to obtain an air permit to construct and operate. Based on an increase in emissions associated with proposed increase in throughput, a permit will now be required.

The facility functions as an oil & gas production site and operates controls such that criteria pollutant emissions will not exceed emission rates restricted in the Oil Production General Permit, nor will hazardous air pollutant (HAP) emissions exceed any HAP emission rates restricted in the Oil Production General Permit. Details of the operations, emission estimates, and associated emission programs are included herein and verify that the facility should be classified as a synthetic minor source under the State and Federal air permitting programs. All measures should be taken in the review process to assure that the minor classification is federally recognized.

A copy of the public notice is enclosed and will be published in the Clarion Ledger. Additionally, a copy of the public notice and the complete OPGP NOI will be provided to the B. S. Ricks Memorial Library. The public notice, notarized proof of publication, and library proof of receipt will be submitted to MDEQ when available.

If any other information is required regarding these matters, please do not hesitate to contact HLP Engineering, Inc. at (337) 839-1075. All written correspondence should be directed to my attention at: **Denbury Onshore, LLC, 5851 Legacy Circle, Suite 1200, Plano, TX 75024.** Thank you in advance for your assistance with this matter.

Sincerely,
DENBURY ONSHORE, LLC

Kevin Hendricks

Enclosures

Oil Production General Permit Public Notice
Mississippi Environmental Quality Permit Board
P. O. Box 2261
Jackson, Mississippi 39225
Telephone No. (601) 961-5171

Public Notice Start Date: TBD

Denbury Onshore, LLC Tinsley Test Site #6 located *at 32 44 19.61, -90 27 55.07* in *Tinsley, Yazoo County,* Mississippi, *972-673-2529,* has applied to the Mississippi Department of Environmental Quality (MDEQ) for coverage and/or modification under MDEQ's Oil Production General Permit to construct and operate an oil production facility.

The Oil Production General Permit has been developed to ensure compliance with all State and Federal regulations. Facilities granted coverage under this permit and adhering to the conditions contained therein should operate within State and Federal environmental laws and standards concerning the operation of air emissions equipment.

The proposed project consists of construction and/or operation of *an oil and gas test site including headers, various process vessels, and 1 control flare.* The facility will operate control(s) such that criteria pollutant emissions will not exceed emission rates restricted in the Oil Production General Permit, nor will hazardous air pollutant (HAP) emissions exceed any HAP emission rates restricted in the Oil Production General Permit. This project will result in new sources of potential emissions of regulated air pollutants. However, emissions will be below the Prevention of Significant Deterioration significance levels as specified in the Mississippi Regulations for the Prevention of Significant Deterioration of Air Quality, 11 Miss. Admin. Code Pt. 2, Ch. 5., and in 40 CFR Part 52.21. Potential emissions will also be below the Air Title V Major Source thresholds as specified in 11 Miss. Admin. Code Pt. 2, Ch. 6. and in 40 CFR Part 70.

Persons wishing to comment upon or object to the proposed request are invited to submit comments in writing to the **Air 1 Branch Chief, Environmental Permits Division** at the Permit Board's address shown above no later than 30-days from the date of publication of this notice. All comments received or postmarked by this date will be considered in the determination regarding the coverage approval. After receipt of public comments and thorough consideration of all comments, MDEQ will formulate its recommendations regarding coverage approval.

Additional details about the proposed project are available by writing or calling the **Air 1 Branch Chief, Environmental Permits Division** at the above Permit Board address and telephone number and on the MDEQ's website at: https://www.mdeq.ms.gov/ensearch/recently-received-general-permit-noi/. This information is also available for review at the following location during normal business hours:

Mississippi Department of Environmental Quality
Office of Pollution Control
515 East Amite Street,
Jackson, MS 39201
(601) 961-5171

Please bring the foregoing to the attention of persons whom you know will be interested.

Notice of Intent for Oil Production General Permit

Denbury Onshore, LLC

ORIGINAL

Tinsley Test Site #6
Yazoo County, MS

May 2021

RECEIVED
MAY 24 2021
MDEQ

HLP engineering, inc.
A Professional Environmental Firm

Table of Contents

ORIGINAL

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Facility (Agency Interest) Information | **Section OPGP - A**

1. Name, Address, and Location of Facility

A. Owner/Company Name: Denbury Onshore, LLC

B. Facility Name (*if different than A. above*) : Tinsley Test Site #6

C. Facility Air Permit/Coverage No. (*if known*) :

D. Agency Interest No. (*if known*) :

RECEIVED
MAY 24 2021
MDEQ

E. Physical Address

1. Street Address: This facility is located approximately 0.5 mile northwesterly of Tinsley, MS.
2. City: Tinsley
3. State: MS
4. County: Yazoo
5. Zip Code: 39173
6. Telephone No.: 972-673-2529
7. Fax No.:
8. Are facility records kept at this location? ☐ Yes ☑ No. Please complete Item 10.

F. Mailing Address

1. Street Address or P.O. Box: 5851 Legacy Circle, Suite 1200
2. City: Plano
3. State: TX
4. Zip Code: 75024

G. Latitude/Longitude Data

1. Collection Point (*check one*):
   ☐ Site Entrance ☑ Other: Center surface location
2. Method of Collection (*check one*):
   ☐ GPS Specify coordinate system (NAD 83, etc.)
   ☑ Map Interpolation (Google Earth, etc.) ☐ Other:
3. Latitude (*degrees/minutes/seconds*) : 32 44 19.61
4. Longitude (*degrees/minutes/seconds*): 90 27 55.07
5. Elevation (*feet*): 180±

H. SIC Code: 1311

2. Name and Address of Facility Contact

A. Name: Kevin Hendricks Title: Env. Compliance Coordinator

B. Mailing Address

1. Street Address or P.O. Box: 5851 Legacy Circle, Suite 1200
2. City: Plano
3. State: TX
4. Zip Code: 75024
5. Fax No.:
6. Telephone No.: 972-673-2529
7. Email: kevin.hendricks@denbury.com

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Facility (Agency Interest) Information | **Section OPGP - A**

3. Name and Address of Air Contact (*if different from Facility Contact*)

A. Name: _____ Title: _____

B. Mailing Address

1. Street Address or P.O. Box: _____
2. City: _____ 3. State: _____
4. Zip Code: _____ 5. Fax No.: _____
6. Telephone No.: _____
7. Email: _____

4. Name and Address of Responsible Official for the Facility

The Form must be signed by a Responsible Official as defined in 11 Miss. Admin. Code Pt.2, R. 2.1.C(24).

A. Name: Randy Robichaux Title: VP - Env., Health, & Safety

B. Mailing Address

1. Street Address or P.O. Box: 5851 Legacy Circle, Suite 1200
2. City: Plano 3. State: TX
4. Zip Code: 75024 5. Fax No.:
6. Telephone No.: 972-673-2073
7. Email: randy.robichaux@denbury.com

C. Is the person above a duly authorized representative and not a corporate officer?

☐ Yes ☑ No

If yes, has written notification of such authorization been submitted to MDEQ?

☐ Yes ☐ No ☐ Request for authorization is attached

5. Type of Oil Production Notice of Intent (*Check all that apply*)

☑ Initial Coverage ☐ Re-Coverage for existing Coverage

☐ Modification with Public Notice ☐ Modification without Public Notice

☐ Update Compliance Plan

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Facility (Agency Interest) Information | **Section OPGP - A**

6. Equipment List (*Check all that apply*)

Complete supporting emission calculations must be included for each potential emission unit selected below.

- ☐ Heater Treater. Include a completed Section OPGP-C Form for each unit.
- ☐ Condensation Storage Vessel. Include a completed Section OPGP-E Form for each unit.
- ☐ Water Storage Vessel. Include a completed Section OPGP-E Form for each unit.
- ☐ Internal Combustion Engine. Include a completed Section OPGP-D Form for each unit.
- ☑ Flare. Include a completed Section OPGP-F Form for each unit.
- ☐ Oil Truck Loading (Section OPGP-B Form)
- ☑ Component Fugitive Emissions (Section OPGP-B Form)
- ☑ Other: 1 Line Heater-Burner Stack, Flare Gas, 1 Chemical Storage Tank, & 1 Sump Tank

7. Process/Product Details

Maximum Anticipated Well(s) Production for Facilty:

Produced Material	Throughput	Units
Gas		MMCF/day
Oil		barrels/day
Water		barrels/day
Other (Specify)		

*Due to the nature of this facility, throughput volumes will vary; however, emissions are not dependent on these volumes and should not be used to evaluate compliance.

Maximum Anticipated Throughput for Principal Product(s) (*as applicable*):

Produced Material	Throughput	Units
Flared Gas	1.65	MMCF/day
Oil		barrels/day
Water		barrels/day
Other (Specify)		

8. Zoning

A. Is the facility (either existing or proposed) located in accordance with any applicable city and/or county zoning ordinances? If no, please explain
Yes

B. Is the facility (either existing or proposed) required to obtain any zoning variance to locate/expand the facility at this site? If yes, please explain.
No

C. Is the required USGS quadrangle map or equivalent attached? ☑ Yes ☐ No

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Facility (Agency Interest) Information | **Section OPGP - A**

9. MS Secretary of State Registration / Certificate of Good Standing

No permit will be issued to a company that is not authorized to conduct business in Mississippi. If the company applying for the permit is a corporation, limited liability company, a partnership or a business trust, the application package should include proof of registration with the Mississippi Secretary of State and/or a copy of the company's Certificate of Good Standing. The name listed on the permit will include the company name as it is registered with the Mississippi Secretary of State.

It should be noted that for an application submitted in accordance with 11 Miss. Admin. Code Pt. 2, R. 2.8.B. to renew a State Permit to Operate or in accordance with 11 Miss. Admin. Code Pt. 2, R. 6.2.A(1)(c). to renew a Title V Permit to be considered timely and complete, the applicant shall be registered and in good standing with the Mississippi Secretary of State to conduct business in Mississippi.

10. Address and Location of Facility Records

Physical Address

1. Street Address: 5851 Legacy Circle, Suite 1200
2. City: Plano
3. State: TX
4. County: Collin
5. Zip Code: 75024
6. Telephone No.: 972-673-2529
7. Fax No.:

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Facility (Agency Interest) Information	Section OPGP - A

11. Certification

The Form must be signed by a Responsible Official as defined in 11 Miss. Admin. Code Pt. 2, R. 2.1.C.(24).

I certify that to the best of my knowledge and belief formed after reasonable inquiry, the statements and information in this application are true, complete, and accurate, and that as a responsible official, my signature shall constitute an agreement that the applicant assumes the responsibility for any alteration, additions, or changes in operation that may be necessary to achieve and maintain compliance with all applicable Rules and Regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Randy Robichaux — 05/15/21

Signature of Responsible Official/DAR — **Date**

Randy Robichaux — 05/15/21

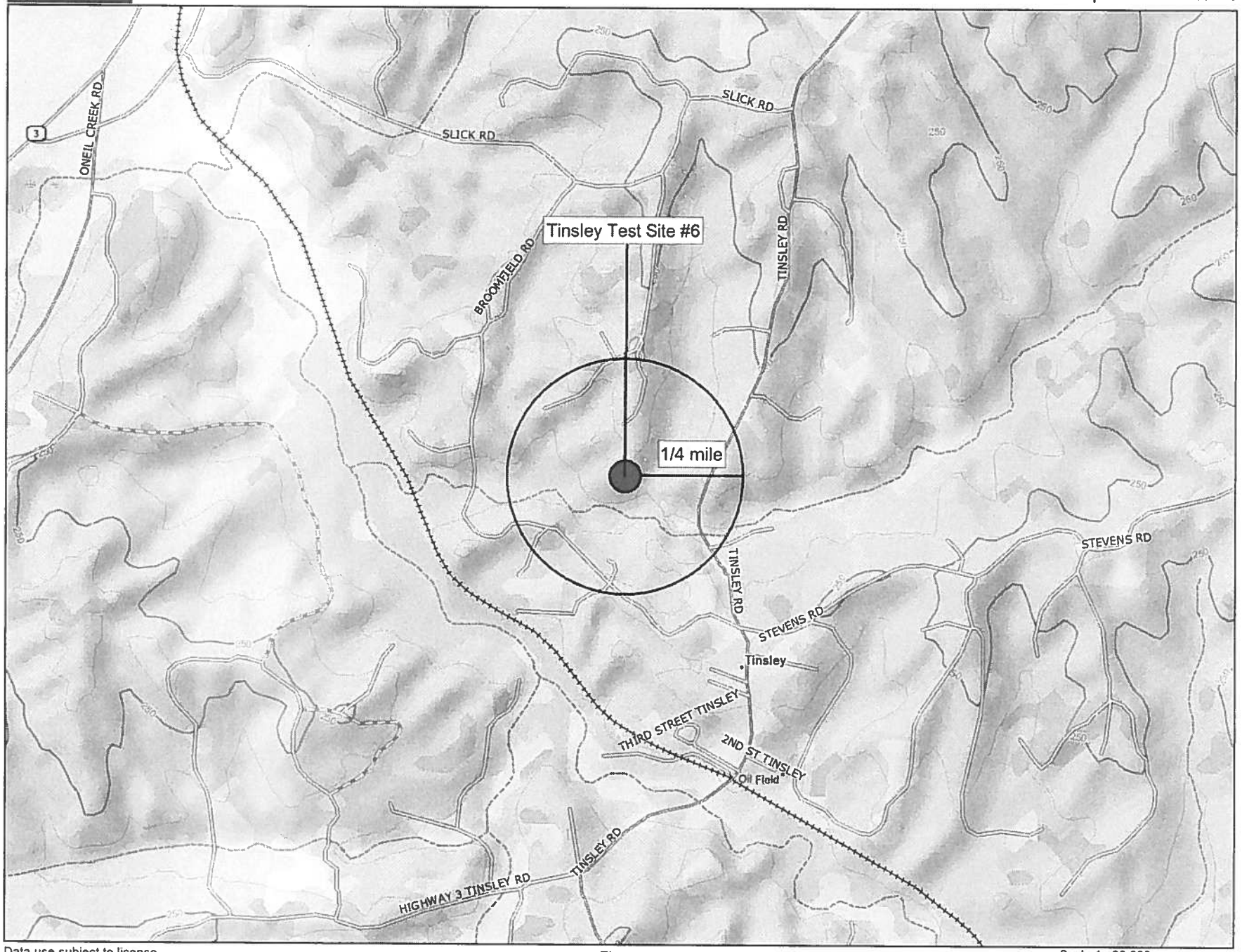
Printed Name — **Date**


Tinsley Test Site #6
Legend
1/4 mile
DNR-Tinsley Test Site #6
DNR-Tinsley Test Site #6
Tinsley Rd
Google Earth
© 2021 Google
N
1000 ft


Tinsley Test Site #6
Legend
DNR-Tinsley Test Site #6
DNR-Tinsley Test Site #6
Google Earth
© 2021 Google
N
100 ft

DeLORME

Topo North America™ 9



TN

MN (1.3°W)

Scale 1 : 20,000

0 600 1200 1800 2400 3000 ft

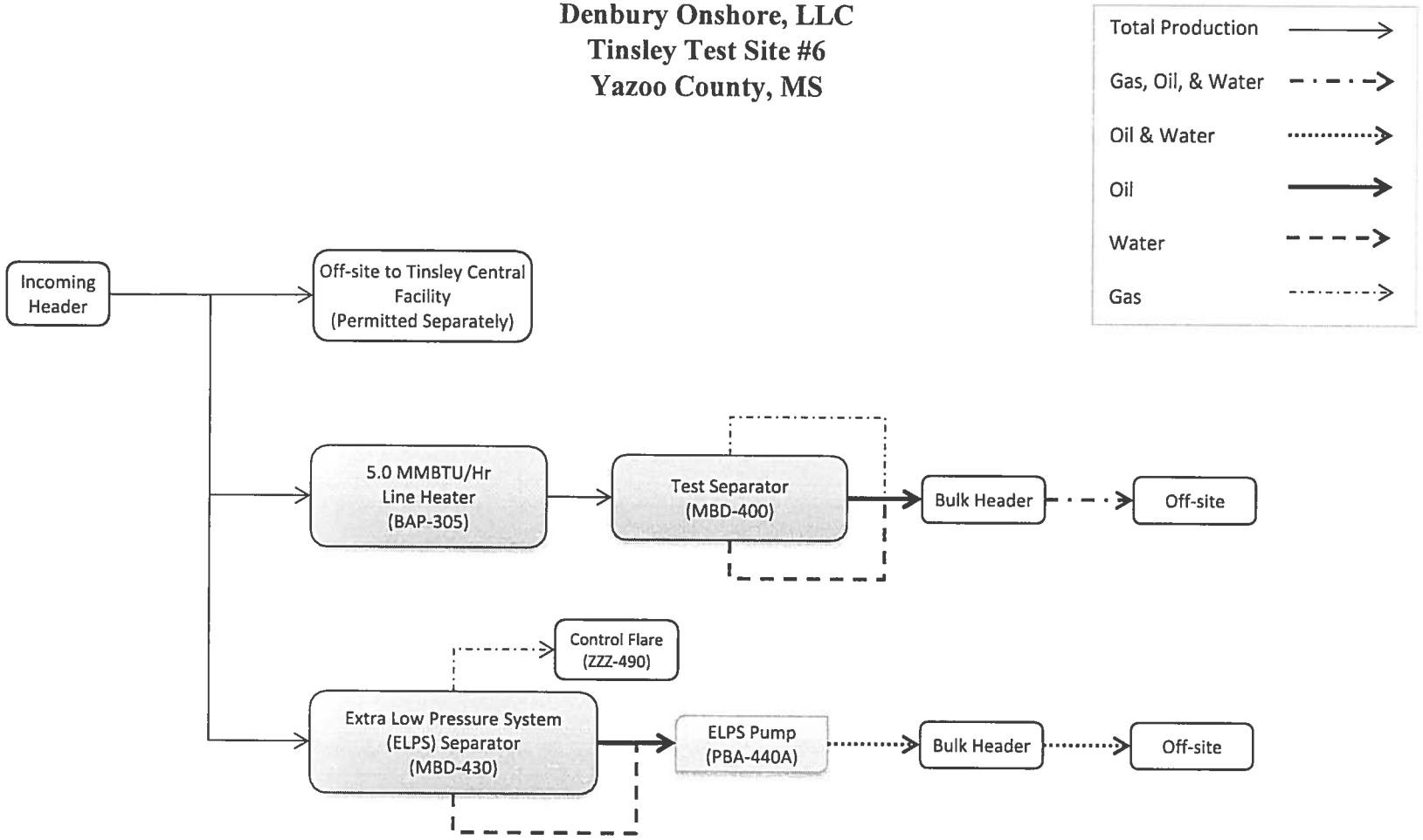
0 180 360 540 720 900 m

1" = 1,666.7 ft

Data Zoom 13-3

Simplified Process Flow Diagram & Process Description

Denbury Onshore, LLC
Tinsley Test Site #6
Yazoo County, MS



At this facility, product is tested before it is piped to the Tinsley EOR Facility. Associated with the test site is an ELPS (Extra Low Pressure System), which handles the wells that have pressures of 50 PSI or lower and are beginning to respond to CO_2 injection. As the wells are tested, product flows to the test sites before being pipelined to the Tinsley EOR Facility. When oil pressure in the ELPS tank reaches a predetermined level, the ELPS pump activates to reduce oil pressure. Inhibitor pumps add inhibitor to the product when needed. Incoming wells flowing into the facility with a pressure of 50 PSI or higher are directly manifolded to the Tinsley EOR Facility.

Section OPGP-B.1: Maximum Uncontrolled Emissions (under normal operating conditions)

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Maximum Uncontrolled Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. 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 plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) in Section OGP-B.3 and GHGs in Section OGP-B.4. Emission Point 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. Emissions > 0.01 TPY must be included. Please do not change the column widths on this table.

Emission Point ID	TSP[1] (PM)		PM-10[1]		PM-2.5[1]		SO_2		NOx		CO		VOC		TRS[2]		Lead		Total HAPs	
	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
1-21-LH-BS	0.05	0.20	0.05	0.20	0.05	0.20	0.01	0.03	0.60	2.63	0.50	2.21	0.03	0.14	-	-	-	-	0.01	0.05
2-21-FG	-	-	-	-	-	-	-	-	-	-	-	-	568.71	2490.96	-	-	-	-	44.46	194.74
3-21-F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-21-FE	-	-	-	-	-	-	-	-	-	-	-	-	0.21	0.93	-	-	-	-	0.01	0.07
5-21-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	-	-	-	-	0.00	0.00
6-21-ST	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.09	-	-	-	-	0.00	0.00
Totals	**0.05**	**0.20**	**0.05**	**0.20**	**0.05**	**0.20**	**0.01**	**0.03**	**0.60**	**2.63**	**0.50**	**2.21**	**568.97**	**2492.12**	**0.00**	**0.00**	**0.00**	**0.00**	**44.48**	**194.86**

[1] **Condensables:** Include condensable particulate matter emissions in particulate matter calculations for PM-10 and PM-2.5, but not for TSP (PM).

[2] **TRS:** Total reduced sulfur (TRS) is the sum of the sulfur compounds hydrogen sulfide (H_2S), methyl mercaptan (CH_4S), dimethyl sulfide (C_2H_6S), and dimethyl disulfide ($C_2H_6S_2$).

Section OPGP-B.2: Proposed Allowable Emissions

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Proposed Allowable Emissions (Potential to Emit) are those emissions the facility is currently permitted to emit as limited by a specific permit requirement or federal/state standard (e.g., a MACT standard); or the emission rate at which the facility proposes to emit considering emissions control devices, restrictions to operating rates/hours, or other requested permit limits that reduce the maximum emission rates. Emission Point 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. Additional columns may be added if there are regulated pollutants (other than HAPs and GHGs) emitted at the facility.

Emission Point ID	TSP[1]		PM10[1]		PM2.5[1]		SO_2		NOx		CO		VOC		TRS		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	lb/hr	ton/yr
1-21-LH-BS	0.05	0.20	0.05	0.20	0.05	0.20	0.01	0.03	0.60	2.63	0.50	2.21	0.03	0.14	-	-	-	-
3-21-F	0.76	3.32	0.76	3.32	0.76	3.32	0.00	0.00	10.28	45.02	20.52	89.87	11.38	49.87	-	-	-	-
4-21-FE	-	-	-	-	-	-	-	-	-	-	-	-	0.21	0.93	-	-	-	-
5-21-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	-	-	-	-
6-21-ST	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.09	-	-	-	-
Totals	**0.81**	**3.52**	**0.81**	**3.52**	**0.81**	**3.52**	**0.01**	**0.03**	**10.88**	**47.65**	**21.02**	**92.08**	**11.64**	**51.03**	**0.00**	**0.00**	**0.00**	**0.00**

[1] **Condensables:** Include condensable particulate matter emissions in particulate matter calculations for PM-10 and PM-2.5, but not for TSP (PM).

[2] **TRS:** Total reduced sulfur (TRS) is the sum of the sulfur compounds hydrogen sulfide (H_2S), methyl mercaptan (CH_4S), dimethyl sulfide (C_2H_6S), and dimethyl disulfide ($C_2H_6S_2$).

Section OPGP-B.3: Proposed Allowable Hazardous Air Pollutants (HAPs)

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

In the table below, report the Proposed Allowable Emissions (Potential to Emit) for each HAP from each regulated emission unit if the HAP > 0.01 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources. Use the HAP nomenclature as it appears in the Instructions. Emission Point numbering must be consistent throughout the application package. 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. Additional columns may be added as necessary to address each HAP.

Emission Point ID	Total HAPs		1,3-Butadiene		2,2,4-Trimethyl-pentane		Acetaldehyde		Acrolein		Benzene		Ethylbenzene		Formaldehyde		n-Hexane		Methanol		Toluene		Xylenes	
	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
1-21-LH-BS	0.01	0.05	-	-	-	-	-	-	-	-	0.00	0.00	-	-	0.00	0.00	0.01	0.05	-	-	-	-	-	-
3-21-F	0.89	3.90	-	-	0.12	0.54	-	-	-	-	0.10	0.46	0.01	0.03	-	-	0.52	2.26	-	-	0.11	0.47	0.03	0.14
4-21-FE	0.01	0.07	-	-	0.00	0.01	-	-	-	-	0.00	0.01	0.00	0.00	-	-	0.01	0.04	-	-	0.00	0.01	0.00	0.00
5-21-CST	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-21-ST	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals:	**0.91**	**4.02**	**0.00**	**0.00**	**0.12**	**0.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.47**	**0.01**	**0.03**	**0.00**	**0.00**	**0.54**	**2.35**	**0.00**	**0.00**	**0.11**	**0.48**	**0.03**	**0.14**

Section OPGP-B.4: Greenhouse Gas Emissions

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Applicants must report potential emission rates in SHORT TONS per year, as opposed to metric tons required by Part 98. Emission Point numbering must be consistent throughout the application package and, for existing emission points, should match any MDEQ ID's in the current permit.

		CO_2 (non-biogenic) ton/yr	CO_2 (biogenic)[2] ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC[3] ton/yr					Total GHG Mass Basis ton/yr[5]	Total CO_2e ton/yr[6]
Emission Point ID	**GWPs [1]**	**1**	**1**	**298**	**25**	**22,800**	**footnote 4**						
1-21-LH-BS	**mass GHG**	3199.83	0.00	0.00	0.06	0.00	0.00					3199.89	
	CO_2e	3199.83	0.00	0.00	1.50	0.00	0.00						3201.33
3-21-F	**mass GHG**	39372.66	0.00	0.08	220.98	0.00	0.00					39593.72	
	CO_2e	39372.66	0.00	23.84	5524.50	0.00	0.00						44921.00
4-21-FE	**mass GHG**	0.40	0.00	0.00	3.49	0.00	0.00					3.89	
	CO_2e	0.40	0.00	0.00	87.25	0.00	0.00						87.65
FACILITY TOTAL	**mass GHG**	**42572.89**	**0.00**	**0.08**	**224.53**	**0.00**	**0.00**					**42797.50**	
	CO_2e	**42572.89**	**0.00**	**23.84**	**5613.25**	**0.00**	**0.00**						**48209.98**

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] Biogenic CO2 is defined as carbon dioxide emissions resulting from the combustion or decomposition of non-fossilized and biodegradable organic material originating from plants, animals, or micro-organisms.

[3] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[4] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[5] Greenhouse gas emissions on a **mass basis** is the ton per year greenhouse gas emission before adjustment with its GWP. Do not include biogenic CO_2 in this total.

[6] **CO_2e** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the greenhouse gas by its GWP. Do not include biogenic CO_2e in this total.

Section OPGP-B.5: Stack Parameters and Exit Conditions

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Emission Point numbering must be consistent throughout the application package.

Emission Point ID	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Base Elevation (ft)	Exit Temp. (°F)	Inside Diameter or Dimensions (ft)	Velocity (ft/sec)	Moisture by Volume (%)	Geographic Position (degrees/minutes/seconds)	
									Latitude	Longitude
1-21-LH-BS	V	No	15±	180±	300	0.5	187	0	32 44 19.61	90 27 55.07
3-21-F	V	No	25	180±	1500	1.2	895	0	32 44 19.61	90 27 55.07

[1] A WAAS-capable GPS receiver should be used and in the WGS84 or NAD83 coordinate system.

Denbury Onshore, LLC
Tinsley Test Site #6
Yazoo County, MS

Section B.6: EMISSION POINT SOURCE LIST

Facility Ref. No.:	MDEQ EPN:	Footnote:	Emission Point Description:	Routes To:	Operating Rate/Capacity	Operating Schedule:		
						Hrs/Day or (Hrs/Yr)	Days/Wk	Wks/Yr
1-21-LH-BS			5.0 MMBTU/Hr Line Heater-Burner Stack (BAP-305)		5.0 MMBTU/Hr	24	7	52.143
2-21-FG		a	Flare Gas	3-21-F	602 MMSCF/Yr	24	7	52.143
3-21-F		b	Control Flare (ZZZ-490)		603 MMSCF/Yr	24	7	52.143
4-21-FE			Fugitive Emissions		N/A	24	7	52.143
5-21-CST			350 Gallon Chemical Storage Tank		3,500 Gallons/Yr	24	7	52.143
6-21-ST			6912 Gallon Sump Tank (ZZZ-460)		69,120 Gallons/Yr	24	7	52.143

Footnotes:

a *Gas from the extra low pressure system (ELPS) separator is routed to the control flare (EPN: 3-21-F) for combustion.*

b *Routine emission limits for this source account for flare gas and the assist gas & pilot gas stream.*

ORIGINAL

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Fuel Burning Equipment – External Combustion Sources

Section OPGP-C

1. Emission Point Description

A. Emission Point Designation (Ref. No.): 1-21-LH-BS

B. Equipment Description: 5.0 MMBTU/Hr Line Heater-Burner Stack (BAP-305)

C. Manufacturer: Unknown D. Date of Manufacture and No.: Unknown

E. Maximum Heat Input (higher heating value): 5.0 MMBtu/hr

F. Nominal Heat Input Capacity: 5.0 MMBtu/hr

G. Use: ☒ Line Heater ☐ Heater Treater ☐ TEG Burner

☐ Space Heat ☐ Process Heat ☐ Other (describe): _____

H. Heat Mechanism: ☐ Direct ☒ Indirect

I. Burner Type (e.g., forced draft, natural draft, etc.): _____

J. Additional Design Controls (e.g., FGR, etc.): N/A

K. Status: ☒ Operating ☐ Proposed ☐ Under Construction

2014

2. Fuel Type

Complete the following table, identifying each type of fuel and the amount used. Specify the units for heat content, hourly usage, and yearly usage.

FUEL TYPE	HEAT CONTENT	% SULFUR	% ASH	MAXIMUM HOURLY USAGE	MAXIMUM YEARLY USAGE
Natural Gas	1042 BTU/scf	<0.0007	N/A	4798 scf	42.0 MMscf

Please list any fuel components that are hazardous air pollutants and the percentage in the fuel:
See gas analysis in supporting documents

RECEIVED
MAY 24 2021
MDEQ

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary — Section OPGP-E

1. Emission Point Description

A. Emission Point Designation (Ref. No.): 5-21-CST

B. Product(s) Stored: Organic Chemical Blend (assumes 100% Toluene as worst case)

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2014

2. Tank Data

A. Tank Specifications:

1.	Design capacity	350	gallons		
2.	True vapor pressure at storage temperature:	0.5	psia @	72	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.6	psia @	82	°F
4.	Reid vapor pressure at storage temperature:	0.5	psia @	72	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	92	lb/lbmol		

B. Tank Orientation: ☐ Vertical ☒ Horizontal

C. Type of Tank:

☒ Fixed Roof ☐ External Floating Roof ☐ Internal Floating Roof

☐ Pressure ☐ Variable Vapor Space ☐ Other: _____

D. Is the tank equipped with a Vapor Recovery System and/or flare? ☐ Yes ☒ No

If yes, describe below and include the efficiency of each.

E. Closest City:

☒ Jackson, MS ☐ Meridian, MS ☐ Tupelo, MS ☐ Mobile, AL

☐ New Orleans, LA ☐ Memphis, TN ☐ Baton Rouge, LA

F. Is an E&P or similar report described in Condition 5.4(5) of the General Permit included for this tank in the Notice of Intent? ☒ Yes ☐ No

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary — Section OPGP-E

3. Horizontal Fixed Roof Tank

A. Shell Length: 5.5 feet
B. Shell Diameter: 3.3 feet
C. Working Volume: 350 gal
D. Maximum Throughput: 3,500 gal/yr
E. Is the tank heated? ☐ Yes ☒ No
F. Is the tank underground? ☐ Yes ☒ No
G. Shell Color/Shade:
☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
☐ Gray/Light ☐ Gray/Medium ☒ Red/Primer
H. Shell Condition: ☒ Good ☐ Poor

4. Vertical Fixed Roof Tank

A. Dimensions:
1. Shell Height: _____ feet
2. Shell Diameter: _____ feet
3. Maximum Liquid Height: _____ feet
4. Average Liquid Height: _____ feet
5. Working Volume: _____ gal
6. Turnovers per year: _____
7. Maximum throughput: _____
8. Is the tank heated? ☐ Yes ☐ No

B. Shell Characteristics:
1. Shell Color/Shade:
☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
2. Shell Condition: ☐ Good ☐ Poor

C. Roof Characteristics:
1. Roof Color/Shade:
☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
2. Roof Condition: ☐ Good ☐ Poor
3. Type: ☐ Cone ☐ Dome
4. Height: _____ feet

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary — Section OPGP-E

5. Internal Floating Roof Tank

A. Tank Characteristics:

1. Diameter: _____ feet
2. Tank Volume: _____ gal
3. Turnovers per year: _____
4. Maximum Throughput: _____ gal/yr
5. Number of Columns: _____
6. Self-Supporting Roof? ☐ Yes ☐ No
7. Effective Column Diameter:
   ☐ 9"x7" Built-up Column ☐ 8" Diameter Pipe ☐ Unknown
8. Internal Shell Condition:
   ☐ Light Rust ☐ Dense Rust ☐ Gunite Lining
9. External Shell Color/Shade:
   ☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
   ☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
10. External Shell Condition: ☐ Good ☐ Poor
11. Roof Color/Shade:
    ☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
    ☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
12. Roof Condition: ☐ Good ☐ Poor

B. Rim Seal System:

1. Primary Seal: ☐ Mechanical Shoe ☐ Liquid-mounted ☐ Vapor-mounted
2. Secondary Seal: ☐ Shoe-mounted ☐ Rim-mounted ☐ None

C. Deck Characteristics:

1. Deck Type: ☐ Bolted ☐ Welded
2. Deck Fitting Category: ☐ Typical ☐ Detail

6. External Floating Roof Tank

A. Tank Characteristics

1. Diameter: _____ feet
2. Tank Volume: _____ gal
3. Turnovers per year: _____
4. Maximum Throughput: _____ gal/yr
5. Internal Shell Condition:
   ☐ Light Rust ☐ Dense Rust ☐ Gunite Lining

6. External Floating Roof Tank (continued)

A. Tank Characteristics (continued):

6. Paint Color/Shade:

☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse

☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer

7. Paint Condition: ☐ Good ☐ Poor

B. Roof Characteristics

1. Roof Type: ☐ Pontoon ☐ Double Deck

2. Roof Fitting Category: ☐ Typical ☐ Detail

C. Tank Construction and Rim-Seal System:

1. Tank Construction: ☐ Welded ☐ Riveted

2. Primary Seal:

☐ Mechanical Shoe ☐ Liquid-mounted ☐ Vapor-mounted

3. Secondary Seal

☐ None ☐ Shoe-mounted ☐ Rim-mounted ☐ Weather shield

7. Pollutant Emissions

A. Fixed Roof Emissions:

Pollutant[1]	Working Loss (tons/yr)	Breathing Loss (tons/yr)	Total Emissions (tons/yr)
VOC	0.002	0.003	0.00

B. Floating Roof Emissions:

Pollutant[1]	Rim Seal Loss (tons/yr)	Withdrawal Loss (tons/yr)	Deck Fitting Loss (tons/yr)	Deck Seam Loss (tons/yr)	Landing Loss[2] (tons/yr)	Total Emissions (tons/yr)

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with the OGP Application Instructions. A list of regulated air pollutants and a link to EPA's list of hazardous air pollutants is provided in the OGP Application Instructions.
2. Landing losses should be determined according to the procedures in *Organic Liquid Storage Tanks* chapter of EPA's AP-42 emission factors. If the roof is not landed at least once/yr, enter "NA".

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary — Section OPGP-E

1. Emission Point Description

A. Emission Point Designation (Ref. No.): 6-21-ST (ZZZ-460)

B. Product(s) Stored: Various Hydrocarbons (assumes 100% Toluene as worst case)

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2014

2. Tank Data

A. Tank Specifications:

1.	Design capacity	6,912	gallons		
2.	True vapor pressure at storage temperature:	0.5	psia @	72	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.6	psia @	82	°F
4.	Reid vapor pressure at storage temperature:	0.5	psia @	72	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	92	lb/lbmol		

B. Tank Orientation: ☐ Vertical ☒ Horizontal

C. Type of Tank:

☒ Fixed Roof ☐ External Floating Roof ☐ Internal Floating Roof

☐ Pressure ☐ Variable Vapor Space ☐ Other: _____

D. Is the tank equipped with a Vapor Recovery System and/or flare? ☐ Yes ☒ No

If yes, describe below and include the efficiency of each.

E. Closest City:

☒ Jackson, MS ☐ Meridian, MS ☐ Tupelo, MS ☐ Mobile, AL

☐ New Orleans, LA ☐ Memphis, TN ☐ Baton Rouge, LA

F. Is an E&P or similar report described in Condition 5.4(5) of the General Permit included for this tank in the Notice of Intent? ☒ Yes ☐ No

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary | Section OPGP-E

3. Horizontal Fixed Roof Tank

A. Shell Length: 14.0 feet
B. Shell Diameter: 9.2 feet
C. Working Volume: 6,912 gal
D. Maximum Throughput: 69,120 gal/yr
E. Is the tank heated? ☐ Yes ☒ No
F. Is the tank underground? ☐ Yes ☒ No
G. Shell Color/Shade:
☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
☐ Gray/Light ☐ Gray/Medium ☒ Red/Primer
H. Shell Condition: ☒ Good ☐ Poor

4. Vertical Fixed Roof Tank

A. Dimensions:
1. Shell Height: _____ feet
2. Shell Diameter: _____ feet
3. Maximum Liquid Height: _____ feet
4. Average Liquid Height: _____ feet
5. Working Volume: _____ gal
6. Turnovers per year: _____
7. Maximum throughput: _____
8. Is the tank heated? ☐ Yes ☐ No

B. Shell Characteristics:
1. Shell Color/Shade:
☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
2. Shell Condition: ☐ Good ☐ Poor

C. Roof Characteristics:
1. Roof Color/Shade:
☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
2. Roof Condition: ☐ Good ☐ Poor
3. Type: ☐ Cone ☐ Dome
4. Height: _____ feet

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary | Section OPGP-E

5. Internal Floating Roof Tank

A. Tank Characteristics:

1. Diameter: _____ feet
2. Tank Volume: _____ gal
3. Turnovers per year: _____
4. Maximum Throughput: _____ gal/yr
5. Number of Columns: _____
6. Self-Supporting Roof? ☐ Yes ☐ No
7. Effective Column Diameter:
   ☐ 9"x7" Built-up Column ☐ 8" Diameter Pipe ☐ Unknown
8. Internal Shell Condition:
   ☐ Light Rust ☐ Dense Rust ☐ Gunite Lining
9. External Shell Color/Shade:
   ☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
   ☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
10. External Shell Condition: ☐ Good ☐ Poor
11. Roof Color/Shade:
    ☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
    ☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer
12. Roof Condition: ☐ Good ☐ Poor

B. Rim Seal System:

1. Primary Seal: ☐ Mechanical Shoe ☐ Liquid-mounted ☐ Vapor-mounted
2. Secondary Seal: ☐ Shoe-mounted ☐ Rim-mounted ☐ None

C. Deck Characteristics:

1. Deck Type: ☐ Bolted ☐ Welded
2. Deck Fitting Category: ☐ Typical ☐ Detail

6. External Floating Roof Tank

A. Tank Characteristics

1. Diameter: _____ feet
2. Tank Volume: _____ gal
3. Turnovers per year: _____
4. Maximum Throughput: _____ gal/yr
5. Internal Shell Condition:
   ☐ Light Rust ☐ Dense Rust ☐ Gunite Lining

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Tank Summary | Section OPGP-E

6. External Floating Roof Tank (continued)

A. Tank Characteristics (continued):

6. Paint Color/Shade:
   - ☐ White/White ☐ Aluminum/Specular ☐ Aluminum/Diffuse
   - ☐ Gray/Light ☐ Gray/Medium ☐ Red/Primer

7. Paint Condition: ☐ Good ☐ Poor

B. Roof Characteristics

1. Roof Type: ☐ Pontoon ☐ Double Deck

2. Roof Fitting Category: ☐ Typical ☐ Detail

C. Tank Construction and Rim-Seal System:

1. Tank Construction: ☐ Welded ☐ Riveted

2. Primary Seal:
   ☐ Mechanical Shoe ☐ Liquid-mounted ☐ Vapor-mounted

3. Secondary Seal
   ☐ None ☐ Shoe-mounted ☐ Rim-mounted ☐ Weather shield

7. Pollutant Emissions

A. Fixed Roof Emissions:

Pollutant[1]	Working Loss (tons/yr)	Breathing Loss (tons/yr)	Total Emissions (tons/yr)
VOC	0.035	0.057	0.09

B. Floating Roof Emissions:

Pollutant[1]	Rim Seal Loss (tons/yr)	Withdrawal Loss (tons/yr)	Deck Fitting Loss (tons/yr)	Deck Seam Loss (tons/yr)	Landing Loss[2] (tons/yr)	Total Emissions (tons/yr)

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with the OGP Application Instructions. A list of regulated air pollutants and a link to EPA's list of hazardous air pollutants is provided in the OGP Application Instructions.
2. Landing losses should be determined according to the procedures in *Organic Liquid Storage Tanks* chapter of EPA's AP-42 emission factors. If the roof is not landed at least once/yr, enter "NA".

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Flare | Section OPGP-F

1. Equipment Description

A. Emission Point Designation (Ref. No.): 3-21-F (ZZZ-490)

B. Equipment Description (include the process(es) that the flare controls emissions from): Control flare to combust emissions from flare gas (EPN: 2-21-FG).

C. Manufacturer: Flare Industries D. Model: DU-16 X 25 ft.

E. Status: ☒ Operating ☐ Proposed ☐ Under Construction

F. ☐ Requesting a federally enforceable condition to route tank emissions to the flare.

2. System Data

A. Efficiency: 98 % Controlling the following pollutant(s): VOC, HAPs
Efficiency: _____ % Controlling the following pollutant(s): _____
Reason for different efficiency: _____

B. Flare Data (if applicable):

1. Flare type: ☒ Non-assisted ☐ Steam-assisted ☐ Air-assisted ☐ Other: _____

2. Net heating value of combusted gas: 1104 Btu/scf

3. Design exit velocity: N/A ft/sec

4. System: ☒ Auto-ignitor ☐ Continuous Flame

5. Is the presence of a flare pilot flame monitored? ☒ Yes ☐ No

If yes, please describe the monitoring: The presence of a pilot flame is visually observed daily and is recorded by Denbury.

6. Is the auto-ignitor system monitored? ☒ Yes ☐ No

If yes, please describe the monitoring: The flare is equipped with an auto-ignitor alarm system with electronic data logging.

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE

Compliance Plan — Section OPGP-G

Part 1. Equipment List

List all equipment and the corresponding federal and/or state regulation that is applicable. Clearly identify federal regulations from state requirements. Provide the expected or actual construction date, startup date and removal date if the equipment is no longer on site.

EMISSION UNIT (Ref No.)	FEDERAL or STATE REGULATION Ex. 40 CFR Part _____, Subpart _____ Ex. 11 Miss. Admin. Code Pt. 2, R. 1.4.B(2).	CONSTRUCTION DATE	STARTUP DATE	REMOVAL DATE
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.A.	2014	2014	N/A
1-21-LH-BS *Line Heater*	11 Miss Admin Code Pt. 2, R. 1.3 B.	2014	2014	N/A
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3. D(1)(b).	2014	2014	N/A
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3. D(1)(a).	2014	2014	N/A
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R.1.4.A(1)	2014	2014	N/A
3-21-F *Flare*	11 Miss. Admin. Code Pt. 2, R.1.4.B(2).	2014	2014	N/A

MDEQ NOTICE OF INTENT FOR COVERAGE UNDER THE OIL PRODUCTION GENERAL PERMIT TO CONSTRUCT/OPERATE AIR EMISSIONS EQUIPMENT AT A SYNTHETIC MINOR SOURCE	
Compliance Plan	**Section OPGP-G**

Part 2. Applicable Requirements

List all applicable state and federal requirements, including emission limits, operating restrictions, etc., and the applicable test methods or monitoring used to demonstrate compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.A.	Opacity	40%	N/A
1-21-LH-BS *Line Heater*	11 Miss Admin Code Pt. 2, R. 1.3 B.	Opacity	Equivalent Opacity	N/A
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3. D(1)(b).	PM	$E = 0.8808*I^{-0.1667}$	N/A
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3. D(1)(a).	PM	0.6 lb/MMBTU	N/A
1-21-LH-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R.1.4.A(1)	SO_2	4.8 lbs/MMBTU	N/A
3-21-F *Flare*	11 Miss. Admin. Code Pt. 2, R.1.4.B(2).	H_2S	1 grain H_2S per 100 standard cubic feet (1 gr/100 scf)	Recordkeeping of H_2S composition of gas by gas analysis; Maintenance of continuous flame for gas combustion.

Emission Calculations

POINT SOURCE I.D. NUMBER: *1-21-LH-BS*

EMISSION SOURCE DESCRIPTION: *5.0 MMBTU/Hr Line Heater-Burner Stack (BAP-305)*

DATA:

Emission Source:	*External Combustion Burner*
Annual Hours of Operation:	*8760*
Maximum Burner Rating (MMBTU/Hr):	*5.0*
Fuel Gas Heat of Combustion (BTU/scf): *(based on a representative fuel gas analysis)*	*1042*
Sulfur Concentration of Fuel Gas (ppmv): *(conservative estimate)*	*7*
Fuel Source:	*Field Gas*

Max. Hourly Fuel Consumption (SCFH): = burner rating/fuel gas heat of combustion/80% efficiency = ***5,998.08***

Max. Annual Fuel Consumption (MSCF/Yr): = hourly fuel consumption x annual hours = ***52,543.18***

EMISSION FACTORS:
Unless otherwise noted, emission factors taken from EPA Publication AP-42, "Compilation of Air Pollution Emission Factors" - Natural Gas Combustion (Small Boilers). SO_2 emission factor based on 100% conversion of sulfur compounds in fuel gas, using H_2S fuel composition noted above.

EMISSION CALCULATIONS:

POLLUTANT:	EMISSION FACTOR ($LBS/10^6$ SCF)	CALCULATED EMISSION RATES:	
		Hourly (lb/hr)	Annual (TPY)
Particulate Matter (filterable + condensable)	7.6	0.0456	0.1997
Sulfur Dioxide	1.182	0.0071	0.0310
Nitrogen Oxides	100	0.5998	2.6272
Carbon Monoxide	84	0.5038	2.2068
Methane (excluded from VOC total)	2.3	0.0138	0.0604
VOC	5.5	0.0330	0.1445
TOC	11	0.0660	0.2890
2-Methylnaphthalene (TAP)	0.0000240	0.0000	0.0000
3-Methylchloranthrene (TAP)	0.0000018	0.0000	0.0000
7,12-Dimethylbenz(a)anthrancene (TAP)	0.0000160	0.0000	0.0000
Acenaphthene (TAP)	0.0000018	0.0000	0.0000
Acenaphthylene (TAP)	0.0000018	0.0000	0.0000
Anthracene (TAP)	0.0000024	0.0000	0.0000
Benz(a)anthracene (TAP)	0.0000018	0.0000	0.0000
Benzene (TAP)	0.0021000	0.0000	0.0001
Benzo(a)pyrene (TAP)	0.0000012	0.0000	0.0000

POLLUTANT:	EMISSION FACTOR ($LBS/10^6$ SCF)	CALCULATED EMISSION RATES:	
		Hourly (lb/hr)	Annual (TPY)
Benzo(b)fluoranthene (TAP)	0.0000018	0.0000	0.0000
Benzo(g,h,I)perylene (TAP)	0.0000012	0.0000	0.0000
Benzo(k)fluoranthene (TAP)	0.0000018	0.0000	0.0000
Chrysene (TAP)	0.0000018	0.0000	0.0000
Dibenzo(a,h)anthrancene (TAP)	0.0000012	0.0000	0.0000
Dichlorobenzene (TAP)	0.0012000	0.0000	0.0000
Fluorathene (TAP)	0.0000030	0.0000	0.0000
Fluorene (TAP)	0.0000028	0.0000	0.0000
Formaldehyde (TAP)	0.0750000	0.0004	0.0020
Hexane (TAP)	1.8000000	0.0108	0.0473
Indeno(1,2,3-cd)pyrene (TAP)	0.0000018	0.0000	0.0000
Naphthalene (TAP)	0.0006100	0.0000	0.0000
Phenanathrene (TAP)	0.0000170	0.0000	0.0000
Pyrene (TAP)	0.0000050	0.0000	0.0000
Toluene (TAP)	0.0034000	0.0000	0.0001
Arsenic (TAP)	0.0002000	0.0000	0.0000
Beryllium (TAP)	0.0000120	0.0000	0.0000
Cadmium (TAP)	0.0011000	0.0000	0.0000
Chromium (TAP)	0.0014000	0.0000	0.0000
Cobalt (TAP)	0.0000840	0.0000	0.0000
Manganese (TAP)	0.0003800	0.0000	0.0000
Mercury (TAP)	0.0002600	0.0000	0.0000
Nickel (TAP)	0.0021000	0.0000	0.0001
Selenium (TAP)	0.0000240	0.0000	0.0000
Total TAPs		0.01	0.05
Total VOC-TAPs		0.01	0.05
Total Non VOC & Non TAP-HC		0.01	0.06
Total VOC		**0.03**	**0.14**

Emission Calculations

Emission calculations shown below are presented for informational purposes only as gas from the extra low pressure system (ELPS) separator is routed to the control flare (EPN: 3-21-F) for combustion.

POINT SOURCE I.D. NUMBER: *2-21-FG*

EMISSION SOURCE DESCRIPTION: *Flare Gas*

DATA:

Emission Source:	*Flare Gas*
Gas Specific Gravity:	*0.6975*
Maximum Gas Rate (MSCFD): *(conservative estimate provided by operator)*	*1650*
Basis of Emission Estimates:	*Conservative Estimate Provided By Operator & Representative Gas Analysis*

Avg. Hourly Uncontrolled Gas Rate (SCF/Hr)	=	Max. Gas Rate * 1000/24	=	**68750.00**
Avg. Hourly Uncontrolled Total Emissions (lb/hr)	=	Gas Gravity * Density of Air * Hourly Gas Rate	=	**3663.62**
Max. Hourly Uncontrolled Total Emissions (lb/hr)	=	Gas Gravity * Density of Air * Hourly Gas Rate	=	**3663.62**
Annual Potential Uncontrolled Total Emissions (TPY)	=	Hourly * 8760/2000	=	**16046.66**

SPECIATION FACTORS:

Speciation of the flare gas is based on a representative gas analysis; refer to Zedi Report No.: 1054-19051005-01 in Section 4.0.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	1.6896	61.9016	61.9016	271.1292
Carbon Dioxide (excluded from VOC total)	7.7195	282.8131	282.8131	1238.7216
Methane (excluded from VOC total)	68.5541	2511.5602	2511.5602	11000.6376
Ethane (excluded from VOC total)	6.5135	238.6311	238.6311	1045.2046
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	3.4452	126.2206	126.2206	552.8466
Iso-Butane	1.7163	62.8788	62.8788	275.4091
N-Butane	2.3519	86.1633	86.1633	377.3953
Iso-Pentane	1.6152	59.1740	59.1740	259.1823
N-Pentane	1.3702	50.2007	50.2007	219.8792
Iso-Hexane	3.0464	111.6079	111.6079	488.8427
N-Hexane (TAP)	0.7057	25.8525	25.8525	113.2339
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1431	5.2444	5.2444	22.9707
Cyclohexane	0.0000	0.0000	0.0000	0.0000

Heptanes	0.3811	13.9632	13.9632	61.1588
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000
Toluene (TAP)	0.1454	5.3265	5.3265	23.3300
2,2,4-Trimethylpentane (TAP)	0.1689	6.1864	6.1864	27.0964
Octanes Plus	0.3833	14.0424	14.0424	61.5059
Ethylbenzene (TAP)	0.0082	0.3015	0.3015	1.3205
Xylenes (TAP)	0.0423	1.5505	1.5505	6.7911
Total Weight Percent:	100.0000			
Total TAP Emissions		44.46	44.46	194.74
Total VOC Emissions		**568.71**	**568.71**	**2490.96**
Total Non VOC & Non TAP-HC		2750.19	2750.19	12045.84
Total Emissions		3663.62	3663.62	16046.66

Uncontrolled VOC Emission Total (TPY)	Flare Gas	=	**2490.96**

Emission Calculations

POINT SOURCE I.D. NUMBER: *3-21-F*

EMISSION SOURCE DESCRIPTION: *Control Flare (ZZZ-490)*

DATA:

Emission Source:	***Unburned Hydrocarbons and Products of Combustion***
Low Pressure Gas Streams:	
Gas Stream #1:	***Flare Gas***
Gas Heat of Combustion (BTU/Ft^3-representative gas analysis):	***1104***
Assist Gas & Pilot Gas Feed:	***Yes***
Gas Heat of Combustion (BTU/Ft^3-representative fuel gas analysis):	***1042***
Combustion Efficiency:	***98% for all HC***

Gas Stream #1 - Flare Gas

DATA:

Emission Source:	***Flare Gas***
Gas Specific Gravity:	***0.6975***
Maximum Gas Rate (MSCFD): *(conservative estimate provided by operator)*	***1650***
Basis of Emission Estimates:	***Conservative Estimate Provided By Operator & Representative Gas Analysis***

Gas volume estimates are supported by the calculations provided above and associated with EPN: 2-21-FG:

INPUT					
Maximum Gas Flowrate (scf/hr)	*Operating Time (hrs/year)*	*Burn Efficiency (%)*	*Gas Heat of Combustion (BTU/FT^3)*	*Specific Gravity of Gas*	
68,750	*8760*	*98*	*1104*	*0.6975*	

CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*68,750.00*	*x*	*0.98*	*x*	*8,760*
	=	***590,205,000 scf/yr***		=	***67,375.00 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*590,205,000*	*x*	*1104*		
	=	***74.3820 MMBTU/Hr***				
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*0.6975*	*x*	*0.0764*	*x*	*68,750.00*
	=	***3,663.62 lbs/hr***				
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*0.6975*	*x*	*0.0000382*	*x*	*602,250,000*
	=	***16,046.65 TPY***				

SPECIATION FACTORS:

Speciation of the flare gas is based on a representative gas analysis; refer to Zedi Report No.: 1054-19051005-01 in Section 4.0.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	1.6896	61.9016	61.9016	271.1291
Carbon Dioxide (excluded from VOC total)	7.7195	282.8131	282.8131	1238.7212
Methane (excluded from VOC total)	68.5541	50.2312	50.2312	220.0127
Ethane (excluded from VOC total)	6.5135	4.7726	4.7726	20.9041
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	3.4452	2.5244	2.5244	11.0569
Iso-Butane	1.7163	1.2576	1.2576	5.5082
N-Butane	2.3519	1.7233	1.7233	7.5479
Iso-Pentane	1.6152	1.1835	1.1835	5.1836
N-Pentane	1.3702	1.0040	1.0040	4.3976
Iso-Hexanes	3.0464	2.2322	2.2322	9.7769
N-Hexane (TAP)	0.7057	0.5170	0.5170	2.2647
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1431	0.1049	0.1049	0.4594
Cyclohexane	0.0000	0.0000	0.0000	0.0000
Heptanes	0.3811	0.2793	0.2793	1.2232
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000
Toluene (TAP)	0.1454	0.1065	0.1065	0.4666
2,2,4-Trimethylpentane (TAP)	0.1689	0.1237	0.1237	0.5419
Octanes Plus	0.3833	0.2808	0.2808	1.2301
Ethylbenzene (TAP)	0.0082	0.0060	0.0060	0.0264
Xylenes (TAP)	0.0423	0.0310	0.0310	0.1358
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.89	0.89	3.90
TOTAL VOC EMISSIONS:		**11.37**	**11.37**	**49.82**
TOTAL Non-VOC & Non-TAP HC:		55.00	55.00	240.92
TOTAL EMISSIONS:		411.09	411.09	1800.59

Assist Gas & Pilot Gas Feed (maximum gas flowrate based on conservative estimate):

INPUT				
Maximum Gas Flowrate (scf/hr)	*Operating Time (hrs/year)*	*Burn Efficiency (%)*	*Gas Heat of Combustion (BTU/FT^3)*	*Specific Gravity of Gas*
100.00	*8760*	*98*	*1042*	*0.6687*

CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*100.00*	*x*	*0.98*	*x*	*8,760*
	=	***858,480 scf/yr***		=	***98.00 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*858,480*	*x*	*1042*		
	=			***0.1021 MMBTU/Hr***		
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*0.6687*	*x*	*0.0764*	*x*	*100.00*
	=	***5.11 lbs/hr***				
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*0.6687*	*x*	*0.0000382*	*x*	*876,000*
	=	***22.38 TPY***				

SPECIATION FACTORS:

Speciation of the assist gas & pilot gas is based on a representative fuel gas analysis; refer to Mech. 9-7 #2 Gas Analysis in Section 4.0.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	2.35851	0.1205	0.1205	0.5278
Carbon Dioxide (excluded from VOC total)	9.43280	0.4819	0.4819	2.1108
Methane (excluded from VOC total)	72.43241	0.0740	0.0740	0.3242
Ethane (excluded from VOC total)	5.65598	0.0058	0.0058	0.0253
Hydrogen Sulfide (TAP; excluded from VOC total)	0.00000	0.0000	0.0000	0.0000
Propane	2.98655	0.0031	0.0031	0.0134
Iso-Butane	1.29957	0.0013	0.0013	0.0058
N-Butane	1.51774	0.0016	0.0016	0.0068
Iso-Pentane	0.98379	0.0010	0.0010	0.0044
N-Pentane	0.71976	0.0007	0.0007	0.0032
Iso-Hexanes	1.58423	0.0016	0.0016	0.0071
N-Hexane (TAP)	0.36697	0.0004	0.0004	0.0016
Methylcyclopentane	0.00000	0.0000	0.0000	0.0000
Benzene (TAP)	0.07444	0.0001	0.0001	0.0003
Cyclohexane	0.00000	0.0000	0.0000	0.0000

Heptanes	0.19820	0.0002	0.0002	0.0009
Methylcyclohexane	0.00000	0.0000	0.0000	0.0000
Toluene (TAP)	0.07561	0.0001	0.0001	0.0003
2,2,4-Trimethylpentane (TAP)	0.08781	0.0001	0.0001	0.0004
Octanes Plus	0.19933	0.0002	0.0002	0.0009
Ethylbenzene (TAP)	0.00428	0.0000	0.0000	0.0000
Xylenes (TAP)	0.02201	0.0000	0.0000	0.0001
Other Nm/NE HC	0.00000	0.0000	0.0000	0.0000
TOTAL WEIGHT PERCENT:	100.00000			
TOTAL TAP EMISSIONS:		0.00	0.00	0.00
TOTAL VOC EMISSIONS:		**0.01**	**0.01**	**0.05**
TOTAL Non-VOC & Non-TAP HC:		0.08	0.08	0.35
TOTAL EMISSIONS:		0.69	0.69	3.03

Total of Average Hourly VOC emissions estimated for this source:	**11.38 Lbs/Hr**
Total of Maximum Hourly VOC emissions estimated for this source:	**11.38 Lbs/Hr**
Total of Maximum Annual VOC emissions estimated for this source:	**49.87 TPY**

CALCULATIONS - Selected Combustion Products

Summary of all routine streams combusted by this flare:

Gas Stream	*Annual Operating Hours*	*Average Flowrate (SCF/Hr)*	*Maximum Flowrate (SCF/Hr)*	*Average Heat Rate (MMBTU/Hr)*	*Maximum Heat Rate (MMBTU/Hr)*
1. Flare Gas	8760	68750.00	68750.00	74.3820	74.3820
Assist Gas & Pilot Gas Feed	8760	100.00	100.00	0.1021	0.1021
Totals:		*68,850.00*	*68,850.00*	*74.48*	*74.48*

Emission factor for soot is from AP-42 "Compilation of Air Pollution Emission Factors" for an industrial burn flare stack (refer to Section 4.0 for copies of supporting documentation).
SO_2 emissions based on the composite H_2S composition of the flare gas streams assuming stoichiometric combustion.

POLLUTANT:	Emission Factor (lb/SCF)	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Soot (expressed as PM_{10})	0.000011	0.76	0.76	3.32
Soot (expressed as $PM_{2.5}$)	0.000011	0.76	0.76	3.32
SO_2	N/A	0.00	0.00	0.00

Emission factors for nitrogen oxide and carbon monoxide are from a 1983 CMA document entitled "A Report on a Flare Efficiency Study", for a non-assisted industrial burn flares. (refer to Section 4.0 for copies of supporting documentation).

POLLUTANT:	Emission Factor ($lb/10^6$ BTU)	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen Oxides	0.1380	10.28	10.28	45.02
CO	0.2755	20.52	20.52	89.87

Emission Calculations

POINT SOURCE I.D. NUMBERS: *4-21-FE*

EMISSION SOURCE DESCRIPTION: *Fugitive Emissions*

DATA:

Emission Source:	*Fugitive from Light Liquid & Gas-Service Components*
Basis of Emission Estimates:	*U.S. EPA*

EMISSION CALCULATIONS:

	Count - by Service			THC Emission Factors [c] (kg/hr/source)		Calculated THC Emissions			
						Hourly Emissions (lb/hr)		Annual Emissions (TPY)	
	Lt. Liquid	Gas	Total	Lt. Liquid Service	Gas Service	LL	Gas	LL	Gas
Connectors	24	328	352	2.1E-04	2.0E-04	0.011	0.145	0.05	0.63
Flanges	34	0	34	1.1E-04	3.9E-04	0.008	0.000	0.04	0.00
Open Ends	0	15	15	1.4E-03	2.0E-03	0.000	0.066	0.00	0.29
Pumps[a]	0		0	1.3E-02	2.4E-03	0.000	N/A	0.00	N/A
Valves	17	96	113	2.5E-03	4.5E-03	0.094	0.952	0.41	4.17
"Others"[b]	0	0	0	7.5E-03	8.8E-03	0.000	0.000	0.00	0.00
TOTALS:	**75**	**439**	**514**			**0.11**	**1.16**	**0.50**	**5.09**

[a] Process Pumps Only

[b] "Others" equipment derived from compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents

[c] Refer to EPA Publication No. 453/R-95-017, "Protocol for Equipment Leak Emission Estimates", copy included in Section 4.0

LIGHT LIQUID-SERVICE SPECIATION FACTORS:

Speciation of the emission stream from components in light liquid service was taken from EPA Publication No.: 453/R-95-017; "Protocol for Equipment Leak Emission Estimates".

EMISSIONS SUMMARY:

Component	Weight Percent	Calculated Emission Rate	
		Avg. Hourly (lb/hr)	Avg. Annual (TPY)
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0	0.0000	0.0000
NMEHC (expressed as VOC)	29.2	0.0330	0.1446
Benzene (TAP)	0.027	0.0000	0.0001
Ethylbenzene (TAP)	0.0170	0.0000	0.0001

Toluene (TAP)	0.075	0.0001	0.0004
Xylenes (m,p,o) (TAP)	0.036	0.0000	0.0002
	TOTAL TAP EMISSIONS:	0.00	0.00
	TOTAL VOC EMISSIONS:	**0.03**	**0.14**

GAS SERVICE SPECIATION FACTORS:

Speciation of the emission stream from components in gas service is based on a representative gas analysis; refer to Zedi Report No.: 1054-19051005-01 in Section 4.0.

EMISSIONS SUMMARY:

Component	Weight Percent	Calculated Emission Rate	
		Avg. Hourly (lb/hr)	Avg. Annual (TPY)
Nitrogen (excluded from VOC total)	1.6896	0.0197	0.0861
Carbon Dioxide (excluded from VOC total)	7.7195	0.0898	0.3933
Methane (excluded from VOC total)	68.5541	0.7974	3.4926
Ethane (excluded from VOC total)	6.5135	0.0758	0.3318
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000
Propane	3.4452	0.0401	0.1755
Iso-Butane	1.7163	0.0200	0.0874
N-Butane	2.3519	0.0274	0.1198
Iso-Pentane	1.6152	0.0188	0.0823
N-Pentane	1.3702	0.0159	0.0698
Iso-Hexanes	3.0464	0.0354	0.1552
N-Hexane (TAP)	0.7057	0.0082	0.0360
Methylcyclopentane	0.0000	0.0000	0.0000
Benzene (TAP)	0.1431	0.0017	0.0073
Cyclohexane	0.0000	0.0000	0.0000
Heptanes	0.3811	0.0044	0.0194
Methylcyclohexane	0.0000	0.0000	0.0000
Toluene (TAP)	0.1454	0.0017	0.0074
2,2,4-Trimethylpentane (TAP)	0.1689	0.0020	0.0086
Octanes Plus	0.3833	0.0045	0.0195
Ethylbenzene (TAP)	0.0082	0.0001	0.0004
Xylenes (TAP)	0.0423	0.0005	0.0022
TOTAL WEIGHT PERCENT:	100.0000		
	TOTAL TAP EMISSIONS:	0.01	0.07
	TOTAL VOC EMISSIONS:	**0.18**	**0.79**
	TOTAL Non-VOC & Non-TAP HC:	0.87	3.82
	TOTAL Emissions:	1.16	5.09

Facility-Wide VOC Fugitive Totals	=	**0.21 lb/hr**	**0.93 TPY**

Emission Calculations

POINT SOURCE I.D. NUMBER: *5-21-CST*

EMISSION SOURCE DESCRIPTION: *350 Gallon Chemical Storage Tank*

DATA:

Emission Source:	***"Working" & "Standing" Losses***
Maximum Annual Throughput: (Gallons/Yr)	***3,500***
Average VOC Working Losses - L_W (lb/yr):	***3.567***
Average VOC Standing Losses - L_S (lb/yr):	***6.116***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to Section 4.0 for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) / 8760	=	**0.00**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.00**

Emission Calculations

POINT SOURCE I.D. NUMBER: *6-21-ST*

EMISSION SOURCE DESCRIPTION: *6912 Gallon Sump Tank (ZZZ-460)*

DATA:

Emission Source:	*"Working" & "Standing" Losses*
Maximum Annual Throughput: (Gallons/Yr)	*69,120*
Average VOC Working Losses - L_W (lb/yr):	*70.601*
Average VOC Standing Losses - L_S (lb/yr):	*114.805*
Basis of Estimates:	*AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to Section 4.0 for summary*

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) / 8760	=	**0.02**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.09**

Michael Watson
SECRETARY OF STATE

This is not an official certificate of good standing.

ORIGINAL

Name History

Name	Name Type
DENBURY ONSHORE, LLC	Legal

Business Information

Business Type:	Limited Liability Company
Business ID:	743899
Status:	Good Standing
Effective Date:	12/31/2003
State of Incorporation:	DE
Principal Office Address:	

Registered Agent

Name

C T CORPORATION SYSTEM
645 LAKELAND EAST DR STE 101
FLOWOOD, MS 39232

Officers & Directors

Name	Title
Alan Rhoades 5320 LEGACY DRIVE PLANO, TX 75024	Organizer
Mark C. Allen 5851 Legacy Circle, Suite 1200 PLANO, TX 75024	Manager, Treasurer, Vice President
James S. Matthews 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Manager, Secretary, Vice President
Christian S. Kendall 5851 Legacy Circle, Suite 1200 PLANO, TX 75024	Manager, President
Richard H. Williams 5851 Legacy Circle, Suite 1200 PLANO, TX 75024	Vice President

RECEIVED
MAY 24 2021
MDEQ

Nikulas J. Wood 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Randy J. Robichaux 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Steve A. McLaurin 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Nicole H. Jennings 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Christopher S. Hibbetts 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Dan E. Cole 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Jenny Cochran 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
David E. Sheppard 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President
Matthew Dahan 5851 Legacy Circle, Suite 1200 Plano, TX 75024	Vice President

Mech. 9-7 #2 Gas analysis Jan 10.18

Gulf Pine Energy
8970 HWY 13
New Hebron, MS
Print Date Time: 01/10/2018 15:39

Lab Name: Gulf Pine
Analyzed By: Owen Lott
Meter ID: Mech. 9-7 #2
Analysis Time: 01/10/2018 15:24 Sample Type: Spot
Flowing Temp.: 111 Deg. F Flowing Pressure: 81 psig

Comp	UnNorm %	Normal %	Liquids (USgal/MCF)	Ideal (Btu/SCF)	Rel. Density
Propane	1.27260	1.30970	0.36163	32.95339	0.01994
IsoButane	0.42013	0.43238	0.14181	14.06042	0.00868
Butane	0.49066	0.50496	0.15955	16.47347	0.01013
IsoPentane	0.25621	0.26368	0.09665	10.54963	0.00657
Pentane	0.18745	0.19292	0.07009	7.73355	0.00481
Hexane+	0.54100	0.00000	0.00000	0.00000	0.00000
Nitrogen	1.58199	1.62822	0.17953	0.00000	0.01575
Methane	84.83566	87.30943	14.83468	881.82520	0.48361
Carbon Dioxide	4.02736	4.14478	0.70893	0.00000	0.06298
Ethylene	0.00000	0.00000	0.00000	0.00000	0.00000
Ethane	3.53432	3.63737	0.97494	64.37051	0.03776
Hydrogen Sulfide	0.00000	0.00000	0.00000	0.00000	0.00000
Total	97.16660	100.00000	17.76454	1055.23767	0.66871

Inferior Wobbe 1274.8464 (Btu/SCF) Superior Wobbe 1296.6327 (Btu/SCF)
Compressibility 0.9975 Density 0.0512 (lbm/ft3)
Real Rel. Density 0.6687 Ideal CV 1055.2377 (Btu/SCF)
Wet CV 1041.9072 (Btu/SCF) Dry CV 1060.3130 (Btu/SCF)
Contract Temp. 60.0000 (deg F) Contract Press. 14.7300 (psia)

Number of Cycles 3 Connected Stream 1
Atmospheric Pressure 14.73

Mech. 9-7 #2 Gas Analysis

COMPONENT	mole %	MOLE FRACTION	MW	fuel weight	WT frac	Wt %	dh*	Heat Value (BTU/SCF)	Carbon Weight %	C-H ratio	
Nitrogen	1.58199	0.016	28.0134	0.44	0.0236	2.35851	0	0.00	0.0000	0	0
Carbon Dioxide	4.02736	0.040	44.01	1.77	0.0943	9.43280	0	0.00	0.4839	0	0
Methane	84.83566	0.848	16.043	13.61	0.7243	72.43241	1010	856.84	10.1804	0.25	0.21208915
Ethane	3.53432	0.035	30.07	1.06	0.0566	5.65598	1770	62.54	0.8481	0.33333	0.011780949
Hydrogen Sulfide	0.00000	0.000	34.08	0.00	0.0000	0.00000	637.1	0.00	0.0000	0	0
Propane	1.27260	0.013	44.097	0.56	0.0299	2.98655	2516	32.02	0.4582	0.375	0.00477225
I-Butane	0.42013	0.004	58.123	0.24	0.0130	1.29957	3252	13.66	0.2017	0.4	0.00168052
N-Butane	0.49066	0.005	58.123	0.29	0.0152	1.51774	3262	16.01	0.2355	0.4	0.00196264
I-Pentane	0.25621	0.003	72.15	0.18	0.0098	0.98379	4001	10.25	0.1537	0.41667	0.00106755
N-Pentane	0.18745	0.002	72.15	0.14	0.0072	0.71976	4009	7.51	0.1125	0.41667	0.000781048
Other hexanes	0.34543	0.003	86.177	0.30	0.0158	1.58423	4750	16.41	0.2487	0.42857	0.001480403
N-hexane	0.08001	0.001	86.177	0.07	0.0037	0.36697	4756	3.81	0.0576	0.42857	0.000342916
benzene	0.01791	0.000	78.114	0.01	0.0007	0.07444	3742	0.67	0.0129	1	0.000179071
heptane	0.03717	0.000	100.204	0.04	0.0020	0.19820	5503	2.05	0.0312	0.4375	0.000162604
toluene	0.01542	0.000	92.141	0.01	0.0008	0.07561	4475	0.69	0.0130	0.875	0.000134912
iso-octane	0.01444	0.000	114.231	0.02	0.0009	0.08781	6232	0.90	0.0139	0.4444	6.41922E-05
octanes+	0.02597	0.000	144.231	0.04	0.0020	0.19933	6500	1.69	0.0311	0.4444	0.000115402
ethylbenzene	0.00076	0.000	106.167	0.00	0.0000	0.00428	5222	0.04	0.0007	0.8	6.0592E-06
xylene	0.00390	0.000	106.167	0.00	0.0002	0.02201	5209	0.20	0.0037	0.8	3.11616E-05
TOTALS	**97.14738**	**0.971**		**18.79**	**1.0000**	**100.00000**		***1025***	***13.0868***		0.236650827

		sg	**0.6479**		
hexanes+	0.54100	**VOC wt%**	**10.1203**	Carbon wt%	69.64708
		Toxic wt%	**0.6311**		

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 $lb/10^6$ 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 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. 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 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
7440-38-2	Arsenic[b]	2.0E-04	E
7440-39-3	Barium	4.4E-03	D
7440-41-7	Beryllium[b]	<1.2E-05	E
7440-43-9	Cadmium[b]	1.1E-03	D
7440-47-3	Chromium[b]	1.4E-03	D
7440-48-4	Cobalt[b]	8.4E-05	D
7440-50-8	Copper	8.5E-04	C
7439-96-5	Manganese[b]	3.8E-04	D
7439-97-6	Mercury[b]	2.6E-04	D
7439-98-7	Molybdenum	1.1E-03	D
7440-02-0	Nickel[b]	2.1E-03	C
7782-49-2	Selenium[b]	<2.4E-05	E
7440-62-2	Vanadium	2.3E-03	D
7440-66-6	Zinc	2.9E-02	E

[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. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020.

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

References For Section 1.4

1. *Exhaust Gases From Combustion And Industrial Processes*, EPA Contract No. EHSD 71-36, Engineering Science, Inc., Washington, DC, October 1971.

2. *Chemical Engineers' Handbook, Fourth Edition*, J. H. Perry, Editor, McGraw-Hill Book Company, New York, NY, 1963.

3. *Background Information Document For Industrial Boilers*, EPA-450/3-82-006a, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1982.

4. *Background Information Document For Small Steam Generating Units*, EPA-450/3-87-000, U. S . Environmental Protection Agency, Research Triangle Park, NC, 1987.

5. J. L. Muhlbaier, "Particulate and Gaseous Emissions From Natural Gas Furnaces and Water Heaters", *Journal Of The Air Pollution Control Association*, December 1981.

6. L. P. Nelson, *et al.*, *Global Combustion Sources Of Nitrous Oxide Emissions*, Research Project 2333-4 Interim Report, Sacramento: Radian Corporation, 1991.

7. R. L. Peer, *et al.*, *Characterization Of Nitrous Oxide Emission Sources*, Prepared for the U. S. EPA Contract 68-D1-0031, Research Triangle Park, NC: Radian Corporation, 1995.

8. S. D. Piccot, *et al.*, *Emissions and Cost Estimates For Globally Significant Anthropogenic Combustion Sources Of NO_x, N_2O, CH_4, CO, and CO_2,* EPA Contract No. 68-02-4288, Research Triangle Park, NC: Radian Corporation, 1990.

9. *Sector-Specific Issues and Reporting Methodologies Supporting the General Guidelines for the Voluntary Reporting of Greenhouse Gases under Section 1605(b) of the Energy Policy Act of 1992* (1994) DOE/PO-0028, Volume 2 of 3, U.S. Department of Energy.

10. J. P. Kesselring and W. V. Krill, "A Low-NO_x Burner For Gas-Fired Firetube Boilers", *Proceedings: 1985 Symposium On Stationary Combustion NO_x Control, Volume 2*, EPRI CS-4360, Electric Power Research Institute, Palo Alto, CA, January 1986.

11. *Emission Factor Documentation for AP-42 Section 1.4—Natural Gas Combustion*, Technical Support Division, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1997.

12. *Alternate Control Techniques Document - NO_x Emissions from Utility Boilers*, EPA-453/R-94-023, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

337.233.2066:zedisolutions.com
Zedi US Inc, 101 Ibex Lane, Broussard, LA, 70518

Hydrocarbon Gas Report

Customer: DENBURY ONSHORE LLC
Customer Sample ID: TINSLEY , MS - TFU 36-6 #3
Report Date: 5/10/2019
Laboratory Order ID: 1054-19051005
Analysis Number: 1054-19051005-01

Unique Number:
Equipment:
Sample Temperature: na(F)
Sample Pressure: 550(PSIG)
Cylinder Number:
State: MS
Notes:

Collection Date: 5/8/2019 12:50:01 PM
Sample Type:
Sample Matrix: Gas
Sampling Method: Fill and Empty
Sampled By: Denbury
County:

Analysis: C6+
Analysis Date: 5/10/2019
Test Method: GPA 2261
Analyst: tjh

Components	Mole%	BTU	GPM at 15.025
Nitrogen	1.2135	0.0000	0.0000
Carbon Dioxide	3.5290	0.0000	0.0000
Methane	85.9729	868.3264	0.0000
Ethane	4.3581	77.1255	1.1923
Propane	1.5719	39.5507	0.4430
Isobutane	0.5941	19.3208	0.1989
n-Butane	0.8141	26.5587	0.2625
Isopentane	0.4504	18.0204	0.1685
n-Pentane	0.3821	15.3172	0.1417
Hexanes+	1.1139	57.1330	0.4972
Total	100.0000	1121.3527	2.9041

Notation: All Calculations Performed Using Physical Constants From GPA 2145-16, The Tables Of Physical Constants For Hydrocarbons And Other Compounds Of Interest to The Natural Gas Industry. BTU units are in BTU per cubic foot.

337.233.2066:zedisolutions.com
Zedi US Inc, 101 Ibex Lane, Broussard, LA, 70518

Hydrocarbon Gas Report

Customer:	DENBURY ONSHORE LLC	**Report Date:**	5/10/2019
Customer Sample ID:	TINSLEY , MS - TFU 36-6 #3	**Laboratory Order ID:**	1054-19051005
		Analysis Number:	1054-19051005-01

Calculated Sample Characteristics	
Compressibility Factor	0.9969
Relative Density (60 °F/60 °F)	0.6975
Average Molecular Weight	20.1460
Gasoline GPM	0.8074

BTU Values at 15.025			
Ideal/Dry	1146.46	**Real/Dry**	1150.04
Ideal/Saturated	1126.90	**Real/Saturated**	1130.41

BTU Values at 14.73			
Ideal/Dry	1123.95	**Real/Dry**	1127.39
Ideal/Saturated	1104.39	**Real/Saturated**	1107.77

Notation: All Calculations Performed Using Physical Constants From GPA 2145-16, The Tables Of Physical Constants For Hydrocarbons And Other Compounds Of Interest to The Natural Gas Industry. BTU units are in BTU per cubic foot.

Zedi Report No.: 1054-19051005-01

COMPONENT	mole %	MOLE FRACTION	MW	fuel weight	WT frac	Wt %	dh*	Heat Value (BTU/SCF)	Carbon Weight %	C-H ratio	
Nitrogen	1.2135	0.012	28.0134	0.34	0.0169	1.6896	0	0.00	0.0000	0	0
Carbon Dioxide	3.5290	0.035	44.01	1.55	0.0772	7.7195	0	0.00	0.4240	0	0
Methane	85.9729	0.860	16.043	13.79	0.6855	68.5541	1010	868.33	10.3169	0.25	0.21493225
Ethane	4.3581	0.044	30.07	1.31	0.0651	6.5135	1770	77.12	1.0458	0.33333	0.014526855
Hydrogen Sulfide	0.0000	0.000	34.08	0.00	0.0000	0.0000	637.1	0.00	0.0000	0	0
Propane	1.5719	0.016	44.097	0.69	0.0345	3.4452	2516	39.55	0.5660	0.375	0.005894625
I-Butane	0.5941	0.006	58.123	0.35	0.0172	1.7163	3252	19.32	0.2852	0.4	0.0023764
N-Butane	0.8141	0.008	58.123	0.47	0.0235	2.3519	3262	26.56	0.3908	0.4	0.0032564
I-Pentane	0.4504	0.005	72.15	0.32	0.0162	1.6152	4001	18.02	0.2702	0.41667	0.001876682
N-Pentane	0.3821	0.004	72.15	0.28	0.0137	1.3702	4009	15.32	0.2293	0.41667	0.001592096
Other hexanes	0.7112	0.007	86.177	0.61	0.0305	3.0464	4750	33.79	0.5121	0.42857	0.003048098
N-hexane	0.1647	0.002	86.177	0.14	0.0071	0.7057	4756	7.84	0.1186	0.42857	0.000706051
benzene	0.0369	0.000	78.114	0.03	0.0014	0.1431	3742	1.38	0.0265	1	0.000368701
heptane	0.0765	0.001	100.204	0.08	0.0038	0.3811	5503	4.21	0.0643	0.4375	0.000334797
toluene	0.0317	0.000	92.141	0.03	0.0015	0.1454	4475	1.42	0.0267	0.875	0.000277779
iso-octane	0.0297	0.000	114.231	0.03	0.0017	0.1689	6232	1.85	0.0286	0.4444	0.00013217
octanes+	0.0535	0.001	144.231	0.08	0.0038	0.3833	6500	3.48	0.0640	0.4444	0.000237608
ethylbenzene	0.0016	0.000	106.167	0.00	0.0001	0.0082	5222	0.08	0.0015	0.8	1.24757E-05
xylene	0.0080	0.000	106.167	0.01	0.0004	0.0423	5209	0.42	0.0077	0.8	6.41606E-05
TOTALS	**100.0000**	**1.000**		**20.12**	**1.0000**	**100.0000**		***1119***	***14.3781***		0.249637147

		sg	**0.6938**		
hexanes+	1.1139	**VOC wt%**	**15.5233**	Carbon wt%	71.464
		Toxic wt%	**1.2136**		

June 1998
RG-109

Air Permit Technical Guidance for Chemical Sources:

Flares and Vapor Oxidizers

printed on recycled paper

New Source Review Permits Division

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Flare Emission Factors

The usual flare destruction efficiencies and emission factors are provided in Table 4. The high-Btu waste streams referred to in the table have a heating value greater than 1,000 Btu/scf.

Flare Destruction Efficiencies

Claims for destruction efficiencies greater than those listed in Table 4 will be considered on a case-by-case basis. The applicant may make one of the three following demonstrations to justify the higher destruction efficiency: (1) general method, (2) 99.5 percent justification, or (3) flare stack sampling.

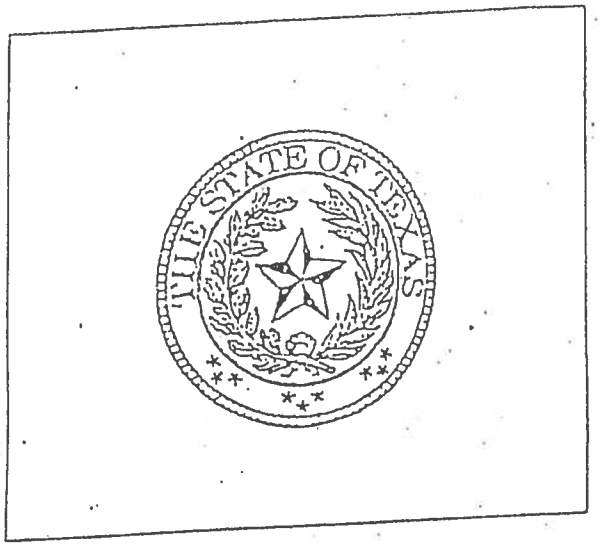
Table 4. Flare Factors

Waste Stream	Destruction/Removal Efficiency (DRE)		
VOC	98 percent (generic)		
	99 percent for compounds containing no more than 3 carbons that contain no elements other than carbon and hydrogen in addition to the following compounds: methanol, ethanol, propanol, ethylene oxide and propylene oxide		
H_2S	98 percent		
NH_3	case by case		
CO	case by case		
Air Contaminants	**Emission Factors**		
thermal NO_x	steam-assist:	high Btu	0.0485 lb/MMBtu
		low Btu	0.068 lb/MMBtu
	other:	high Btu	0.138 lb/MMBtu
		low Btu	0.0641 lb/MMBtu
fuel NO_x	NO_x is 0.5 wt percent of inlet NH_3, other fuels case by case		
CO	steam-assist:	high Btu	0.3503 lb/MMBtu
		low Btu	0.3465 lb/MMBtu
	other:	high Btu	0.2755 lb/MMBtu
		low Btu	0.5496 lb/MMBtu
PM	none, required to be smokeless		
SO_2	100 percent S in fuel to SO_2		

Technical Guidance Package for
Chemical Sources

Flare Sources

Texas
Natural
Resource
Conservati
on
Commissio
n



John Hall, Chairman
Pam Reed, Commissioner
Peggy Garner, Commissioner
Dan Pearson, Executive Director

Compiled by TNRCC Chemical Section Engineers
November 1994

Published and distributed by the
Texas Natural Resource Conservation Commission
Post Office Box 13087
Austin, Texas 78711-3087
(512) 239-1250

greater than standard destruction efficiencies (>SDE) are claimed. The determinations shall indicate the maximum or minimum values required for flare performance at the claimed efficiency. The determinations shall be made during the testing protocols used to demonstrate >SDE.

A. Tip Velocities and Flow rates (maximum)

B. Heating Values (minimum).

4. The applicant shall install, calibrate, operate and maintain a flow meter to monitor actual stream flow rates to, and calculate tip velocities of, flares for which >SDE are claimed.

5. Records shall be maintained which indicate on a continuous basis the flow rates and heating values of the streams directed to the flares for which >SDE are claimed.

6. Flow rates of streams to flares for which >SDE are claimed shall not exceed the lesser of the indicated maxima; (1) flow rates which produce the tip velocities specified in 40 CFR 60.18, or (2) flow rates demonstrated during testing to correspond to the demonstrated flare efficiency.

7. Tip velocities of flares for which >SDE are claimed shall not exceed the lesser of the indicated maxima; (1) tip velocities specified in 40 CFR 60.18, or (2) tip velocities demonstrated during testing to correspond to the demonstrated flare efficiency.

8. Heating values of streams directed to flares for which >SDE are claimed shall be no less than the greater of the indicated minima; (1) 300 BTU/scf for streams directed to non-assisted flares and 400 BTU/scf for streams directed to assisted flares, or (2) heating values demonstrated during testing to correspond to the demonstrated flare efficiency.

9. The applicant shall provide vendor data supportive of the claimed flare efficiency.

<u>NO_x and CO Emissions</u>

The following NO_x and CO factors were derived by the Chemical Section of the New Source Review Division based on data published in the 1983 CMA document entitled, *A Report on A Flare Efficiency Study*. These factors should be used in estimating NO_x and CO emissions rather than the emission factors found in Section 11.5 of AP-42.

Table 3: Flare Factors.

Type	Waste Gas	NO_x lb/MM Btu	CO lb/MM Btu
Steam Assisted	High Btu (>1000/scf)	0.0485	0.3503
Steam Assisted	Low Btu (192-1000/scf)	0.0680	0.3465
Air & Nonassisted	High Btu (>1000/scf)	0.1380	0.2755
Air & Nonassisted	Low Btu (184-1000/scf)	0.0641	0.5496

Example 2:

For the sample case, calculate the mole percent of each constituent in the waste stream for both the average and maximum scenarios by dividing the individual flow rates by the total flow rates and multiplying by 100 percent.

Table 4: Calculation of constituents in mole percent.

	Average Case		Maximum Case	
	scfm	mole %	scfm	mole %
Butane+	10.16	5.08	12.70	5.08
Propylene	5.94	2.97	7.43	2.97
Propane	5.08	2.54	6.35	2.54
Ethylene	84.74	42.37	105.93	42.37
Ethane	37.28	18.64	46.60	18.64
Hydrogen	22.04	11.02	27.55	11.02
Ammonia	4.24	2.12	5.30	2.12
Inerts	30.50	15.26	38.13	15.26
Totals	200.00	100.00	250.00	100.00

In this case, our calculations are simplified since the average and maximum case waste streams have the same compositions. If they were of different composition, the following heating value calculations would be required for both cases. Note that the maximum case shows the maximum vent stream to the flare under normal operating conditions for the purpose of calculating emissions from the flare (upset and maintenance conditions are not considered).

Next, estimate the net, or lower, heating value of the waste stream

Since flares do not lend themselves to conventional emission testing techniques, only a few attempts have been made to characterize flare emissions. Recent EPA tests using propylene as flare gas indicated that efficiencies of 98 percent can be achieved when burning an offgas with at least 11,200 kJ/m^3 (300 Btu/ft^3). The tests conducted on steam-assisted flares at velocities as low as 39.6 meters per minute (m/min) (130 ft/min) to 1140 m/min (3750 ft/min), and on air-assisted flares at velocities of 180 m/min (617 ft/min) to 3960 m/min (13,087 ft/min) indicated that variations in incoming gas flow rates have no effect on the combustion efficiency. Flare gases with less than 16,770 kJ/m^3 (450 Btu/ft^3) do not smoke.

Table 13.5-1 presents flare emission factors, and Table 13.5-2 presents emission composition data obtained from the EPA tests.[1] Crude propylene was used as flare gas during the tests. Methane was a major fraction of hydrocarbons in the flare emissions, and acetylene was the dominant intermediate hydrocarbon species. Many other reports on flares indicate that acetylene is always formed as a stable intermediate product. The acetylene formed in the combustion reactions may react further with hydrocarbon radicals to form polyacetylenes followed by polycyclic hydrocarbons.[2]

In flaring waste gases containing no nitrogen compounds, NO is formed either by the fixation of atmospheric nitrogen (N) with oxygen (O) or by the reaction between the hydrocarbon radicals present in the combustion products and atmospheric nitrogen, by way of the intermediate stages, HCN, CN, and OCN.[2] Sulfur compounds contained in a flare gas stream are converted to SO_2 when burned. The amount of SO_2 emitted depends directly on the quantity of sulfur in the flared gases.

Table 13.5-1 (English Units). EMISSION FACTORS FOR FLARE OPERATIONS[a]

EMISSION FACTOR RATING: B

Component	Emission Factor ($lb/10^6$ Btu)
Total hydrocarbons[b]	0.14
Carbon monoxide	0.37
Nitrogen oxides	0.068
Soot[c]	0 - 274

[a] Reference 1. Based on tests using crude propylene containing 80% propylene and 20% propane.
[b] Measured as methane equivalent.
[c] 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.

Table 13.5-2. HYDROCARBON COMPOSITION OF FLARE EMISSION[a]

Composition	Volume %	
	Average	Range
Methane	55	14 - 83
Ethane/Ethylene	8	1 - 14
Acetylene	5	0.3 - 23
Propane	7	0 - 16
Propylene	25	1 - 65

[a] Reference 1. The composition presented is an average of a number of test results obtained under the following sets of test conditions: steam-assisted flare using high-Btu-content feed; steam-assisted using low-Btu-content feed; air-assisted flare using high-Btu-content feed; and air-assisted flare using low-Btu-content feed. In all tests, "waste" gas was a synthetic gas consisting of a mixture of propylene and propane.

References For Section 13.5

1. *Flare Efficiency Study*, EPA-600/2-83-052, U. S. Environmental Protection Agency, Cincinnati, OH, July 1983.

2. K. D. Siegel, *Degree Of Conversion Of Flare Gas In Refinery High Flares*, Dissertation, University of Karlsruhe, Karlsruhe, Germany, February 1980.

3. *Manual On Disposal Of Refinery Wastes, Volume On Atmospheric Emissions*, API Publication 931, American Petroleum Institute, Washington, DC, June 1977.

United States
Environmental Protection
Agency

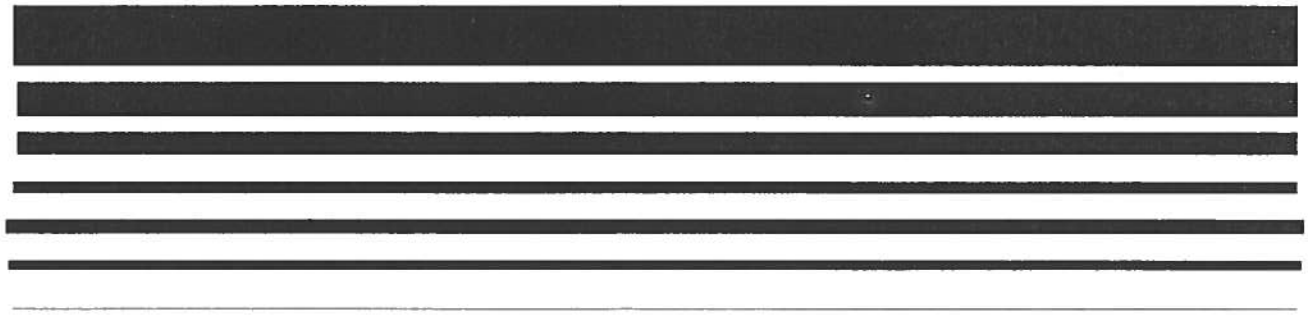
Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-453/R-95-017
November 1995

Air

EPA

Protocol for Equipment Leak Emission Estimates



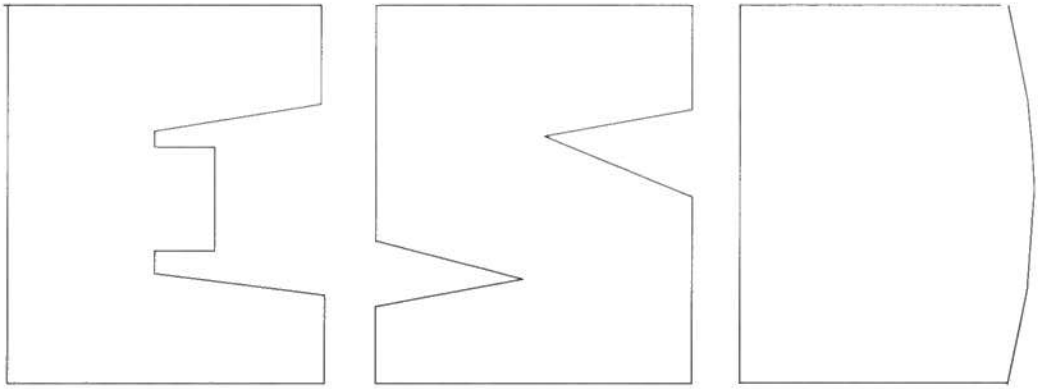


TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

Equipment Type	Service[a]	Emission Factor (kg/hr/source)[b]
Valves	Gas	4.5E-03
	Heavy Oil	8.4E-06
	Light Oil	2.5E-03
	Water/Oil	9.8E-05
Pump seals	Gas	2.4E-03
	Heavy Oil	NA
	Light Oil	1.3E-02
	Water/Oil	2.4E-05
Others[c]	Gas	8.8E-03
	Heavy Oil	3.2E-05
	Light Oil	7.5E-03
	Water/Oil	1.4E-02
Connectors	Gas	2.0E-04
	Heavy Oil	7.5E-06
	Light Oil	2.1E-04
	Water/Oil	1.1E-04
Flanges	Gas	3.9E-04
	Heavy Oil	3.9E-07
	Light Oil	1.1E-04
	Water/Oil	2.9E-06
Open-ended lines	Gas	2.0E-03
	Heavy Oil	1.4E-04
	Light Oil	1.4E-03
	Water/Oil	2.5E-04

[a]Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

[b]These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

[c]The "other" equipment type was derived from compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

EPA Average Emission Factors

The EPA emission factors used by GRI-HAPCalc 3.01 to estimate fugitive emissions were developed from data obtained during a joint American Petroleum Institute (API)/GRI fugitive testing program at natural gas production and processing sites [U.S. Environmental Protection Agency, 1995; American Petroleum Institute, 1995]. Over 184,000 components at 20 sites were screened for total hydrocarbon (THC) emissions, and the results were averaged for each component type to develop THC emission factors. Furthermore, a statistical analysis conducted by the EPA found no difference in THC fugitive emissions by industry segment for oil and gas production operation. The average THC emission factors for equipment in gas and light liquid service are shown in Table 20.

Table 20. EPA Average Emission Factors for THC

	Emission Factor, lb THC/yr		
Component	Gas Service	Light Liquids Service	Heavy Liquids Service
Connections	3.9	4.1	0.1
Flanges	7.5	2.1	0.0075
Open-Ended Line	39	27	2.7
Pump Seals	46	250	NA
Valves	87	48	0.16
Other*	170	140	0.62

** The "Other" category includes compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents.*

To calculate speciated fugitive emissions for BTEX, methane, NMHC, and NMEHC, composition data obtained during a joint American Petroleum Institute (API)/GRI fugitive testing program are used with the THC emission factors above. The average compositions of fugitive leaks from production facilities and natural gas plants are shown in Table 21.

Table 21. Fractional Composition of Fugitive Emissions

	Fractional Composition, lb/lb THC			
Compound	Gas Production/ Compressor Station	Gas Plant	Light Liquid Service	Heavy Liquid Service
Benzene	0.00023	0.00123	0.00027	0.00935
Toluene	0.00039	0.00032	0.00075	0.00344
Ethylbenzene	0.000020	0.000010	0.000170	0.00051
Xylenes (m,p,o)	0.00010	0.000040	0.000360	0.00372
Methane	0.920	0.564	0.613	0.942
NMHC	0.080	0.436	0.387	0.058
NMEHC	0.0350	0.253	0.292	0.030

The following equation shows how annual emission rates are calculated from the above emission factors. The user-entered component count of each type of fugitive emission source is multiplied by the emission factor (lb THC/component/year) and the fractional composition (lb compound *i* / lb THC). This is then converted to an annual emission rate. Note that all calculations in GRI-HAPCalc 3.01 are done in U.S. Standard units and converted to metric units when necessary.

Tank Emission Calculations Based on AP 42 Chapter 7 (June 2020, Section 7.1.3.1), Fixed Roof

Tank ID	5-21-CST
Tank Description	350 Gallon Chemical Storage Tank
Company Name	Denbury Onshore, LLC

Tank Orientation	Horizontal
Tank Diameter (D ft)	3.30
Vertical Height/Horizontal Length (H_S ft)	5.50
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	3.30
Avg Liquid Height (H_L ft)	1.65
Breather Vent Pressure Setting (P_{BP} psig)	
Breather Vent Vacuum Setting (P_{BV} psig)	
actual tank pressure (P_I psig)	0.0
Shell Paint Solar Absorptance (S_A)	0.90
Roof Paint Solar Absorptance (R_A)	0.9
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	

Tank Shell Color/Shade	Red - Primer
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Red - Primer
Tank Roof Paint Condition	average
Roof Type	horizontal tank
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	83.33
Annual Turnovers, N	9.95
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	47.04
vapor space outage (H_{VO} ft)	1.296
vapor space volume (V_V ft^3)	23.52

Major City for Meterological Data	Jackson, MS
Site Elevation (ft)	300
Atmospheric Pressure (P_A psia)	14.537
Table 7.1-2 Liquid	
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	

Working Loss Product Factor (K_P)	1
working loss turnover factor K_N	1.000

*sales oil data determines RVP per API pub 4683

Tank contents (if not selected from Table 7.1-2):

					Antoine constants (log_{10}, mmHg, °C)		
component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Toluene	100.000	92.141	92.14100	100.00000	7.017	1377.600	222.640
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
	100.000		92.141	100.000			

HLP engineering, inc.
A Professional Environmental Firm

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
hourly average maximum ambient temperature (T_{AX} °F)	56.50	60.80	68.10	75.70	83.00	89.00	91.10	91.20	86.50	77.10	66.30	58.10	75.30
hourly average minimum ambient temperature (T_{AN} °F)	37.00	39.30	45.90	53.30	62.50	69.20	72.10	71.40	65.50	53.90	43.90	37.90	54.30
daily total solar insolation factor (I btu/ft^2 day)	783	1039	1369	1762	1929	2025	1969	1849	1576	1262	922	726	1434
daily average ambient temperature (T_{AA} °F)	46.75	50.05	57.00	64.50	72.75	79.10	81.60	81.30	76.00	65.50	55.10	48.00	64.80
liquid bulk temperature (T_B °F)	48.86	52.86	60.70	69.26	77.96	84.57	86.92	86.29	80.26	68.91	57.59	49.96	68.67
average vapor temperature (T_V °F)	52.46	57.62	66.97	77.34	86.81	93.85	95.95	94.77	87.48	74.70	61.82	53.29	75.25
daily ambient temperature range (ΔT_A °R)	19.50	21.50	22.20	22.40	20.50	19.80	19.00	19.80	21.00	23.20	22.40	20.20	21.00
daily vapor temperature range (ΔT_V °R)	27.74	33.75	40.18	47.40	49.07	50.31	48.74	47.14	43.07	38.96	32.28	27.31	40.51
daily average liquid surface temperature (T_{LA} °F)	50.66	55.24	63.84	73.30	82.38	89.21	91.43	90.53	83.87	71.80	59.70	51.63	71.96
daily maximum liquid surface temperature (T_{LX} °F)	57.60	63.68	73.88	85.15	94.65	101.79	103.62	102.32	94.64	81.54	67.77	58.45	82.09
daily minimum liquid surface temperature (T_{LN} °F)	43.72	46.80	53.79	61.45	70.11	76.63	79.25	78.75	73.10	62.06	51.63	44.80	61.83
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.246	0.285	0.372	0.494	0.641	0.774	0.822	0.802	0.668	0.473	0.328	0.254	0.475
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.307	0.371	0.502	0.692	0.896	1.080	1.132	1.095	0.895	0.626	0.419	0.315	0.635
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.196	0.217	0.272	0.346	0.450	0.544	0.586	0.578	0.491	0.353	0.254	0.203	0.350
daily vapor pressure range (ΔP_V)	0.1113	0.1538	0.2304	0.3460	0.4460	0.5357	0.5454	0.5166	0.4043	0.2730	0.1656	0.1125	0.2852
vapor space expansion factor (K_E)	0.0622	0.0763	0.0930	0.1136	0.1226	0.1306	0.1282	0.1233	0.1084	0.0927	0.0738	0.0613	0.0965
vapor molecular weight (M_V lb/lbmole)	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft^3/month) and avg = total annual	40	36	40	38	40	38	40	40	38	40	38	40	468
monthly turnovers (N/month) with avg = total annual	0.84	0.76	0.84	0.82	0.84	0.82	0.84	0.84	0.82	0.84	0.82	0.84	9.95
vented vapor saturation factor (K_S)	0.9834	0.9808	0.9751	0.9672	0.9578	0.9495	0.9466	0.9478	0.9561	0.9685	0.9780	0.9829	0.9684
vent setting correction factor (K_B)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
vapor density (W_V lb/ft^3)	0.0041	0.0047	0.0061	0.0079	0.0101	0.0120	0.0127	0.0124	0.0105	0.0076	0.0054	0.0042	0.0076
standing storage losses (L_S lb/month & avg is lb/yr)	0.28	0.29	0.41	0.52	0.69	0.79	0.87	0.85	0.69	0.52	0.36	0.29	6.55
working losses (L_W lb/month & avg is lb/yr)	0.16	0.17	0.24	0.30	0.40	0.46	0.50	0.49	0.40	0.30	0.21	0.17	3.82
total losses (L_T lb/month & avg is lb/yr)	0.44	0.46	0.65	0.82	1.09	1.25	1.37	1.34	1.09	0.82	0.56	0.46	10.37
max hourly Q in bbl/hour	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.000	0.000	
max hourly total loss (L_T lb/hr)	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	

L_S sum months	L_W sum months	L_T sum months
6.55	3.82	10.37

The monthly sums will be greater than the annual average since the monthly variables yield higher emissions

Emissions Summary:

	avg lbs/hr	max lbs/hr	lbs/yr
Standing/Breathing Loss L_S	**0.001**	**0.002**	**6.116**
Working Loss L_W	**0.000**	**0.001**	**3.567**
Total Loss L_T	**0.001**	**0.002**	**9.684**

max hourly total loss may not add up to L_S + L_W as their max values may be in different months

HLP engineering inc.
A Professional Environmental Firm

Tank Emission Calculations Based on AP 42 Chapter 7 (June 2020, Section 7.1.3.1), Fixed Roof

Tank ID	**6-21-ST**
Tank Description	**6912 Gallon Sump Tank**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Horizontal**
Tank Diameter (D ft)	**9.20**
Vertical Height/Horizontal Length (H_S ft)	**14.00**
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	**9.20**
Avg Liquid Height (H_L ft)	**4.60**
Breather Vent Pressure Setting (P_{BP} psig)	
Breather Vent Vacuum Setting (P_{BV} psig)	
actual tank pressure (P_I psig)	**0.0**
Shell Paint Solar Absorptance (S_A)	**0.90**
Roof Paint Solar Absorptance (R_A)	**0.9**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	

Tank Shell Color/Shade	**Red - Primer**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Red - Primer**
Tank Roof Paint Condition	**average**
Roof Type	**horizontal tank**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**1,645.71**
Annual Turnovers, N	**9.93**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**930.67**
vapor space outage (H_{VO} ft)	**3.613**
vapor space volume (V_V ft^3)	**465.33**

Major City for Meterological Data	**Jackson, MS**
Site Elevation (ft)	**300**
Atmospheric Pressure (P_A psia)	**14.537**
Table 7.1-2 Liquid	
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	

Working Loss Product Factor (K_P)	**1**
working loss turnover factor K_N	**1.000**

*sales oil data determines RVP per API pub 4683

Tank contents (if not selected from Table 7.1-2):

					Antoine constants (log_{10}, mmHg, °C)		
component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Toluene	100.000	92.141	92.14100	100.00000	7.017	1377.600	222.640
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
	100.000		92.141	100.000			

HLP engineering inc.
A Professional Environmental Firm

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
hourly average maximum ambient temperature (T_{AX} °F)	56.50	60.80	68.10	75.70	83.00	89.00	91.10	91.20	86.50	77.10	66.30	58.10	75.30
hourly average minimum ambient temperature (T_{AN} °F)	37.00	39.30	45.90	53.30	62.50	69.20	72.10	71.40	65.50	53.90	43.90	37.90	54.30
daily total solar insolation factor (I btu/ft^2 day)	783	1039	1369	1762	1929	2025	1969	1849	1576	1262	922	726	1434
daily average ambient temperature (T_{AA} °F)	46.75	50.05	57.00	64.50	72.75	79.10	81.60	81.30	76.00	65.50	55.10	48.00	64.80
liquid bulk temperature (T_B °F)	48.86	52.86	60.70	69.26	77.96	84.57	86.92	86.29	80.26	68.91	57.59	49.96	68.67
average vapor temperature (T_V °F)	52.55	57.74	67.14	77.55	87.04	94.10	96.18	94.99	87.67	74.85	61.93	53.38	75.42
daily ambient temperature range (ΔT_A °R)	19.50	21.50	22.20	22.40	20.50	19.80	19.00	19.80	21.00	23.20	22.40	20.20	21.00
daily vapor temperature range (ΔT_V °R)	27.74	33.75	40.18	47.40	49.07	50.31	48.74	47.14	43.07	38.96	32.28	27.28	40.51
daily average liquid surface temperature (T_{LA} °F)	50.71	55.30	63.92	73.40	82.50	89.33	91.55	90.64	83.96	71.88	59.76	51.67	72.05
daily maximum liquid surface temperature (T_{LX} °F)	57.64	63.74	73.96	85.25	94.77	101.91	103.73	102.43	94.73	81.62	67.83	58.49	82.17
daily minimum liquid surface temperature (T_{LN} °F)	43.77	46.86	53.87	61.55	70.23	76.75	79.36	78.86	73.20	62.14	51.69	44.85	61.92
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.246	0.286	0.373	0.496	0.643	0.776	0.824	0.804	0.670	0.474	0.328	0.254	0.476
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.307	0.371	0.504	0.694	0.899	1.083	1.135	1.098	0.898	0.627	0.420	0.316	0.637
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.196	0.217	0.273	0.347	0.451	0.546	0.588	0.580	0.493	0.354	0.254	0.203	0.351
daily vapor pressure range (ΔP_V)	0.1115	0.1541	0.2309	0.3469	0.4472	0.5372	0.5468	0.5179	0.4051	0.2735	0.1658	0.1125	0.2859
vapor space expansion factor (K_E)	0.0622	0.0764	0.0930	0.1136	0.1227	0.1307	0.1283	0.1234	0.1084	0.0927	0.0738	0.0612	0.0965
vapor molecular weight (M_V lb/lbmole)	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft^3/month) and avg = total annual	785	709	785	759	785	759	785	785	759	785	759	785	9,239
monthly turnovers (N/month) with avg = total annual	0.84	0.76	0.84	0.82	0.84	0.82	0.84	0.84	0.82	0.84	0.82	0.84	9.93
vented vapor saturation factor (K_S)	0.9549	0.9482	0.9333	0.9133	0.8904	0.8706	0.8637	0.8665	0.8863	0.9168	0.9408	0.9536	0.9164
vent setting correction factor (K_B)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
vapor density (W_V lb/ft^3)	0.0041	0.0047	0.0061	0.0079	0.0101	0.0120	0.0127	0.0125	0.0105	0.0076	0.0054	0.0043	0.0076
standing storage losses (L_S lb/month & avg is lb/yr)	5.27	5.46	7.76	9.78	12.88	14.87	16.25	15.89	12.97	9.71	6.68	5.43	122.95
working losses (L_W lb/month & avg is lb/yr)	3.24	3.36	4.77	6.01	7.92	9.14	9.99	9.77	7.98	5.97	4.11	3.34	75.61
total losses (L_T lb/month & avg is lb/yr)	8.51	8.82	12.54	15.79	20.80	24.01	26.24	25.66	20.95	15.69	10.78	8.77	198.57
max hourly Q in bbl/hour	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.004	0.005	0.006	0.008	0.011	0.013	0.013	0.013	0.011	0.008	0.006	0.004	
breathing/standing loss (L_S lb/hr)	0.007	0.008	0.010	0.016	0.021	0.027	0.027	0.026	0.020	0.013	0.009	0.007	
max hourly total loss (L_T lb/hr)	0.011	0.013	0.017	0.024	0.032	0.039	0.041	0.039	0.031	0.021	0.015	0.012	

L_S sum months	L_W sum months	L_T sum months
122.95	75.61	198.57

The monthly sums will be greater than the annual average since the monthly variables yield higher emissions

Emissions Summary:

	avg lbs/hr	max lbs/hr	lbs/yr
Standing/Breathing Loss L_S	**0.013**	**0.027**	**114.805**
Working Loss L_W	**0.008**	**0.013**	**70.601**
Total Loss L_T	**0.021**	**0.041**	**185.406**

max hourly total loss may not add up to L_S + L_W as their max values may be in different months

HLP engineering inc.
A Professional Environmental Firm

HLP *Engineering, Inc.*

Environmental Engineers & Consultants

Post Office Box 52805
Lafayette, Louisiana 70505-2805

PH: (337) 839-1075
FAX: (337) 839-1072

www.hlpengineering.com