Denbury

June 26, 2025

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

RE: Notice of Intent for Coverage Under the Oil Production General Permit
Denbury Onshore, LLC
Tinsley Central Facility
AI No.: 35323; Permit No.: 3020-00057
Yazoo County, MS

In accordance with MAC Title 11, Part 2, submitted with this are two (2) bound sets of the referenced material. An electronic copy has also been submitted through the EPD Electronic Application Submittal webpage. Request is hereby made for coverage under the Oil Production General Permit (OPGP).

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 Yazoo Herald. 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

Notice of Intent for Oil Production General Permit

Denbury Onshore, LLC

Tinsley Central Facility
Yazoo County, MS

June 2025

Denbury

Table of Contents

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 Central Facility

C. Facility Air Permit/Coverage No. *(if known)* : 3020-00057

D. Agency Interest No. *(if known)* : 35323

E. Physical Address

1. Street Address: See driving directions below

This facility is located approximately 3.0 miles south of Tinsley, MS. From the interstion of Highway 49 and Anding Oil City Road, travel west on Anding Oil City Road approximately 4.5 miles to Tinsley Road. Travel northwest on Tinsley Road approximately 0.4 mile to the facility.

2. City: Tinsley
3. State: MS
4. County: Yazoo
5. Zip Code: 39194
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:
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 41 38.80
4. Longitude (*degrees/minutes/seconds*): 90 26 30.36
5. Elevation (*feet*): 300±

H. SIC Code: 1311

2. Name and Address of Facility Contact

A. Name: Kevin Hendricks Title: Environmental 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@exxonmobil.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: Rusty Shaw Title: Director of Regulatory Affairs

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.: 972-673-2777
7. Email: rusty.shaw@exxonmobil.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: Compressor Blowdowns

7. Process/Product Details

Maximum Anticipated Well(s) Production for Faciltiy:

Produced Material	Throughput	Units
Gas		MMCF/day
Oil	15,000	barrels/day
Water	50,000	barrels/day
Other (Specify)		

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

Produced Material	Throughput	Units
Flared Gas	0.43	MMCF/day
Oil	15,000	barrels/day
Water	50,000	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.

Rusty Shaw
Signature of Responsible Official/DAR

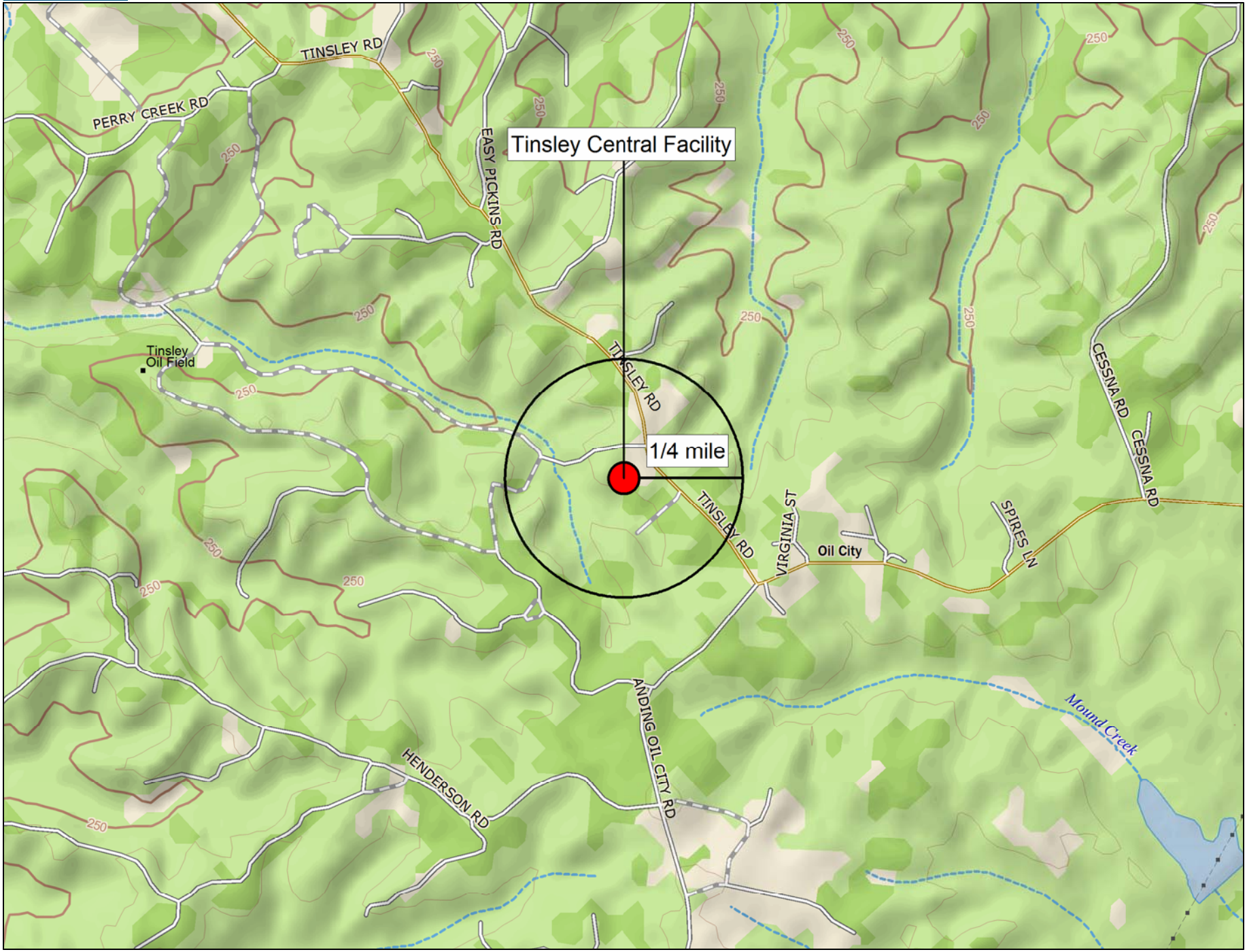
5/29/25
Date

Rusty Shaw
Printed Name

Director of Regulatory Affairs
Title


Tinsley Central Facility
Legend
1/4 mile
DNR-Tinsley Central Facility
DNR-Tinsley Central Facility
Tinsley Rd


DNR-Tinsley Central Facility
Tinsley Rd



TN

MN (0.9°W)

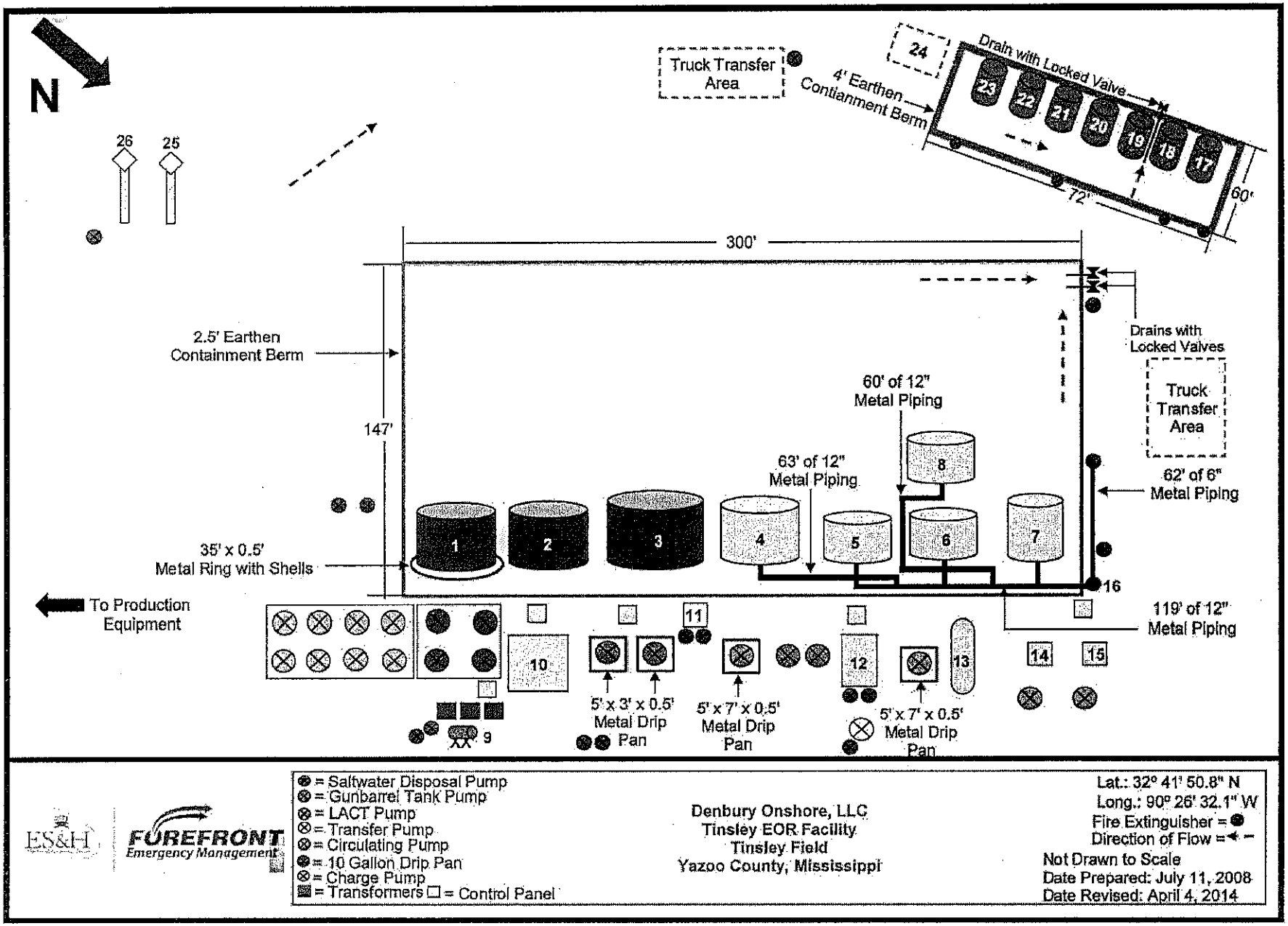
Scale 1 : 20,000

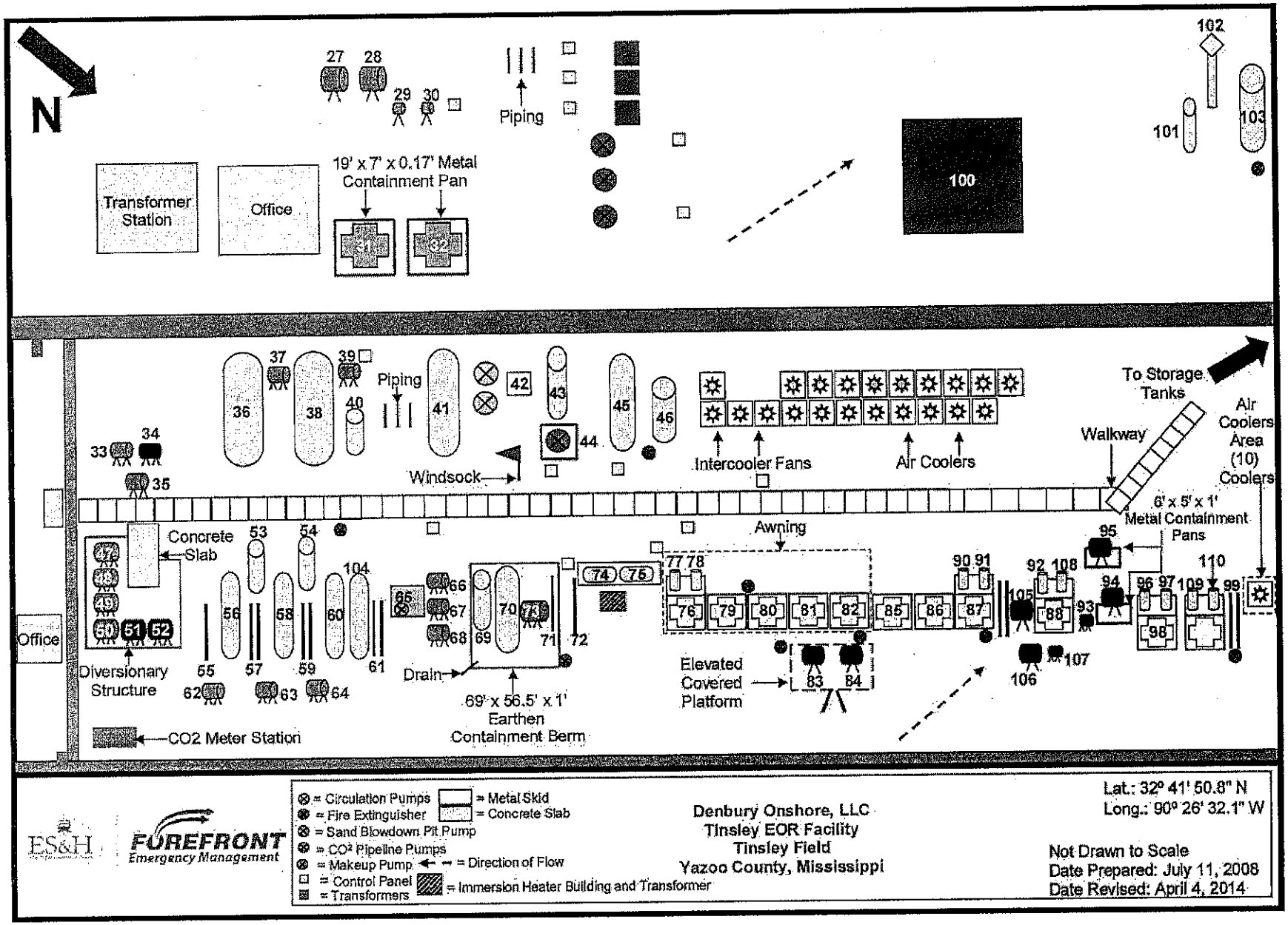
0 600 1200 1800 2400 3000 ft

0 180 360 540 720 900 m

1" = 1,666.7 ft

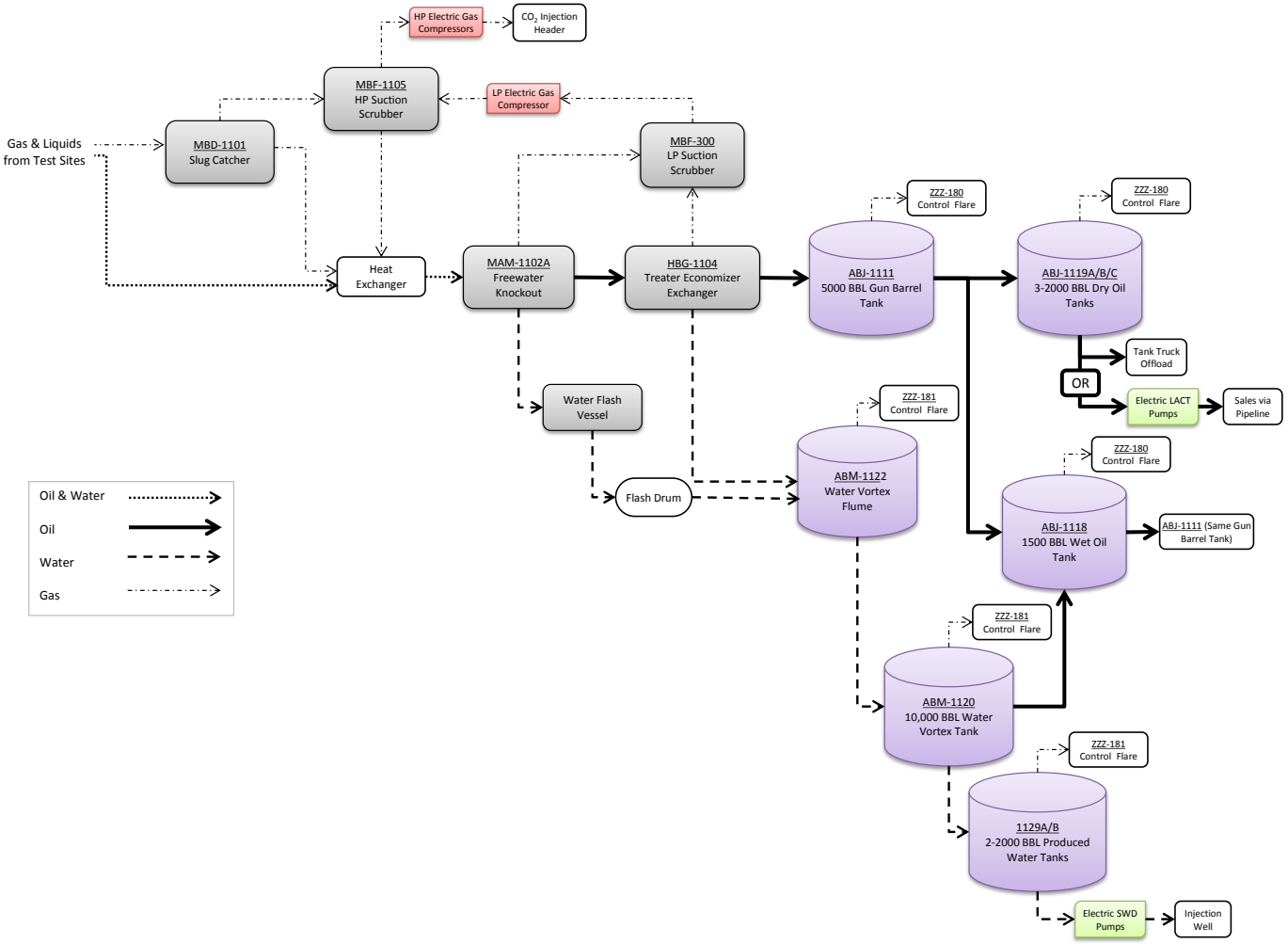
Data Zoom 13-0


N
Truck Transfer Area
4' Earthen Containment Berm
24
Drain with Locked Valve
23
22
21
20
19
18
17
72'
60'
26
25
300'
2.5' Earthen Containment Berm
147'
Drains with Locked Valves
Truck Transfer Area
60' of 12" Metal Piping
63' of 12" Metal Piping
62' of 6" Metal Piping
35' x 0.5' Metal Ring with Shells
To Production Equipment
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
119' of 12" Metal Piping
5' x 3' x 0.5' Metal Drip Pan
5' x 7' x 0.5' Metal Drip Pan
5' x 7' x 0.5' Metal Drip Pan
= Saltwater Disposal Pump
= Gunbarrel Tank Pump
= LACT Pump
= Transfer Pump
= Circulating Pump
= 10 Gallon Drip Pan
= Charge Pump
= Transformers
= Control Panel
Denbury Onshore, LLC
Tinsley EOR Facility
Tinsley Field
Yazoo County, Mississippi
Lat.: 32° 41' 50.8" N
Long.: 90° 26' 32.1" W
Fire Extinguisher =
Direction of Flow =
Not Drawn to Scale
Date Prepared: July 11, 2008
Date Revised: April 4, 2014
ES&H
FOREFRONT
Emergency Management


N
Transformer Station
Office
19' x 7' x 0.17' Metal Containment Pan
Piping
100
101
102
103
Windsock
Intercooler Fans
Air Coolers
To Storage Tanks
Walkway
Air Coolers Area (10) Coolers
Awning
6' x 5' x 1' Metal Containment Pans
Concrete Slab
Office
Diversionary Structure
Drain
69' x 56.5' x 1' Earthen Containment Berm
Elevated Covered Platform
CO2 Meter Station
Circulation Pumps
Fire Extinguisher
Sand Blowdown Pit Pump
CO2 Pipeline Pumps
Makeup Pump
Control Panel
Transformers
Metal Skid
Concrete Slab
Direction of Flow
Immersion Heater Building and Transformer
ES&H
FOREFRONT
Emergency Management
Denbury Onshore, LLC
Tinsley EOR Facility
Tinsley Field
Yazoo County, Mississippi
Lat.: 32° 41' 50.8" N
Long.: 90° 26' 32.1" W
Not Drawn to Scale
Date Prepared: July 11, 2008
Date Revised: April 4, 2014

Simplified Process Flow Diagram

Denbury Onshore, LLC
Tinsley Central Facility
Yazoo County, MS



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
1a-07-GBT-CV	-	-	-	-	-	-	-	-	-	-	-	-	847.82	3713.47	0.07	0.32	-	-	27.94	122.36
1b-07-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.71	3.10	0.00	0.00	-	-	0.02	0.10
1c-07-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	7.43	32.56	0.00	0.00	-	-	0.25	1.08
1d-07-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	7.43	32.56	0.00	0.00	-	-	0.25	1.08
1e-12-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	7.43	32.56	0.00	0.00	-	-	0.25	1.08
2a-07-WVF-CV	-	-	-	-	-	-	-	-	-	-	-	-	12.51	54.79	0.05	0.20	-	-	2.10	9.24
2b-07-WVT-CV	-	-	-	-	-	-	-	-	-	-	-	-	1.94	8.51	0.01	0.03	-	-	0.32	1.44
2d-07-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.98	4.29	0.00	0.02	-	-	0.17	0.72
2e-07-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.98	4.29	0.00	0.02	-	-	0.17	0.72
3-07-F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-07-F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-07-SBP	-	-	-	-	-	-	-	-	-	-	-	-	0.46	0.17	0.00	0.00	-	-	0.03	0.01
16-07-FE	-	-	-	-	-	-	-	-	-	-	-	-	0.52	2.26	0.00	0.01	-	-	0.02	0.08
17-07-CB	-	-	-	-	-	-	-	-	-	-	-	-	105.43	3.16	0.37	0.01	-	-	5.72	0.17
19-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	1.69	7.39	0.00	0.00	-	-	1.69	7.39
20-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.84	3.69	0.00	0.00	-	-	0.84	3.69
26-12-LL	-	-	-	-	-	-	-	-	-	-	-	-	76.78	333.63	0.01	0.03	-	-	2.53	10.99
Totals	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1072.95**	**4236.43**	**0.51**	**0.64**	**0.00**	**0.00**	**42.30**	**160.15**

[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
1a-07-GBT-CV	-	-	-	-	-	-	-	-	-	-	-	-	2.90	12.72	0.00	0.00	-	-
1b-07-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.00	0.00	-	-
1c-07-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.32	0.00	0.00	-	-
1d-07-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.32	0.00	0.00	-	-
1e-12-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.32	0.00	0.00	-	-
2a-07-WVF-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.13	0.58	0.00	0.00	-	-
2b-07-WVT-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.00	0.00	-	-
2d-07-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.00	0.00	-	-
2e-07-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.00	0.00	-	-
3-07-F	0.11	0.49	0.11	0.49	0.11	0.49	0.01	0.09	3.42	15.00	6.84	29.94	2.64	11.60	0.00	0.00	-	-
4-07-F	0.09	0.38	0.09	0.38	0.09	0.38	0.11	0.49	0.10	0.44	0.85	3.73	1.47	6.42	0.00	0.01	-	-
5-07-SBP	-	-	-	-	-	-	-	-	-	-	-	-	0.46	0.17	0.00	0.00	-	-
16-07-FE	-	-	-	-	-	-	-	-	-	-	-	-	0.52	2.26	0.00	0.01	-	-
17-07-CB	-	-	-	-	-	-	-	-	-	-	-	-	105.43	3.16	0.37	0.01	-	-
19-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	1.69	7.39	0.00	0.00	-	-
20-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.84	3.69	0.00	0.00	-	-
26-12-LL	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-
Totals	**0.20**	**0.87**	**0.20**	**0.87**	**0.20**	**0.87**	**0.12**	**0.58**	**3.52**	**15.44**	**7.69**	**33.67**	**116.33**	**49.07**	**0.37**	**0.03**	**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		2,2,4-Trimethylpentane		Benzene		Ethylbenzene		Formaldehyde		N-Hexane		Toluene		Xylene	
	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
1a-07-GBT-CV	0.10	0.41	0.00	0.00	0.01	0.02	0.00	0.00	-	-	0.08	0.36	0.01	0.03	0.00	0.00
1b-07-OST-CV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00
1c-07-OST-CV	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.01	0.00	0.00	0.00	0.00
1d-07-OST-CV	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.01	0.00	0.00	0.00	0.00
1e-12-OST-CV	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.01	0.00	0.00	0.00	0.00
2a-07-WVF-CV	0.02	0.09	0.00	0.00	0.01	0.02	0.00	0.00	-	-	0.01	0.06	0.00	0.01	0.00	0.00
2b-07-WVT-CV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00
2d-07-WST-CV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00
2e-07-WST-CV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00
3-07-F	0.04	0.18	0.00	0.00	0.00	0.01	0.00	0.00	-	-	0.04	0.16	0.00	0.01	0.00	0.00
4-07-F	0.06	0.25	0.00	0.00	0.01	0.06	0.00	0.00	-	-	0.04	0.16	0.01	0.02	0.00	0.01
5-07-SBP	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.02	0.01	0.00	0.00	0.00	0.00
16-07-FE	0.01	0.09	0.00	0.00	0.00	0.01	0.00	0.00	-	-	0.01	0.06	0.00	0.01	0.00	0.01
17-07-CB	5.72	0.17	0.00	0.00	0.84	0.03	0.05	0.00	-	-	4.04	0.12	0.39	0.01	0.40	0.01
19-13-CST	1.69	7.39	-	-	-	-	-	-	-	-	1.69	7.39	-	-	-	-
20-13-CST	0.84	3.69	-	-	-	-	-	-	-	-	0.84	3.69	-	-	-	-
26-12-LL	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals:	8.50	12.31	0.00	0.00	0.87	0.15	0.05	0.00	0.00	0.00	6.77	12.04	0.41	0.09	0.40	0.03

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**	**265**	**28**	**22,800**	**footnote 4**						
1a-07-GBT-CV	**mass GHG**	0.17	0.00	0.00	1.15	0.00	0.00					1.31	
	CO_2e	0.17	0.00	0.00	32.10	0.00	0.00						32.26
1b-07-OST-CV	**mass GHG**	0.00	0.00	0.00	0.00	0.00	0.00					0.00	
	CO_2e	0.00	0.00	0.00	0.00	0.00	0.00						0.00
1c-07-OST-CV	**mass GHG**	0.00	0.00	0.00	0.03	0.00	0.00					0.03	
	CO_2e	0.00	0.00	0.00	0.93	0.00	0.00						0.93
1d-07-OST-CV	**mass GHG**	0.00	0.00	0.00	0.03	0.00	0.00					0.03	
	CO_2e	0.00	0.00	0.00	0.93	0.00	0.00						0.93
1e-12-OST-CV	**mass GHG**	0.00	0.00	0.00	0.03	0.00	0.00					0.03	
	CO_2e	0.00	0.00	0.00	0.93	0.00	0.00						0.93
2a-07-WVF-CV	**mass GHG**	29.82	0.00	0.00	0.01	0.00	0.00					29.83	
	CO_2e	29.82	0.00	0.00	0.31	0.00	0.00						30.13
2b-07-WVT-CV	**mass GHG**	1.49	0.00	0.00	0.00	0.00	0.00					1.49	
	CO_2e	1.49	0.00	0.00	0.00	0.00	0.00						1.49
2d-07-WST-CV	**mass GHG**	1.47	0.00	0.00	0.00	0.00	0.00					1.47	
	CO_2e	1.47	0.00	0.00	0.00	0.00	0.00						1.47
2e-07-WST-CV	**mass GHG**	1.47	0.00	0.00	0.00	0.00	0.00					1.47	
	CO_2e	1.47	0.00	0.00	0.00	0.00	0.00						1.47
3-07-F	**mass GHG**	12705.90	0.00	0.02	0.74	0.00	0.00					12706.66	
	CO_2e	12705.90	0.00	5.84	20.68	0.00	0.00						12732.42
4-07-F	**mass GHG**	4476.54	0.00	0.00	0.03	0.00	0.00					4476.57	
	CO_2e	4476.54	0.00	0.00	0.93	0.00	0.00						4477.47
5-07-SBP	**mass GHG**	0.29	0.00	0.00	2.91	0.00	0.00					3.20	
	CO_2e	0.29	0.00	0.00	81.48	0.00	0.00						81.77
16-07-FE	**mass GHG**	2.61	0.00	0.00	26.39	0.00	0.00					29.00	
	CO_2e	2.61	0.00	0.00	738.90	0.00	0.00						741.51
17-07-CB	**mass GHG**	5.42	0.00	0.00	54.77	0.00	0.00					60.20	
	CO_2e	5.42	0.00	0.00	1533.67	0.00	0.00						1539.09
19-13-CST	**mass GHG**	0.00	0.00	0.00	0.00	0.00	0.00					0.00	
	CO_2e	0.00	0.00	0.00	0.00	0.00	0.00						0.00
20-13-CST	**mass GHG**	0.00	0.00	0.00	0.00	0.00	0.00					0.00	
	CO_2e	0.00	0.00	0.00	0.00	0.00	0.00						0.00
26-12-LL	**mass GHG**	0.00	0.00	0.00	0.00	0.00	0.00					0.00	
	CO_2e	0.00	0.00	0.00	0.00	0.00	0.00						0.00
FACILITY TOTAL	**mass GHG**	**17225.16**	**0.00**	**0.02**	**86.10**	**0.00**	**0.00**					**17311.29**	**0.00**
	CO_2e	**17225.16**	**0.00**	**5.84**	**2410.84**	**0.00**	**0.00**					**0.00**	**19641.85**

[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. (^{o}F)	Inside Diameter or Dimensions (ft)	Velocity (ft/sec)	Moisture by Volume (%)	Geographic Position (degrees/minutes/seconds)	
									Latitude	Longitude
1a-07-GBT-CV	V	No	24	300±	80	0.5	0.04	0	32 41 38.80	90 26 30.36
1b-07-OST-CV	V	No	24	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
1c-07-OST-CV	V	No	16	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
1d-07-OST-CV	V	No	16	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
1e-12-OST-CV	V	No	16	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
2a-07-WVF-CV	V	No	42.5	300±	80	0.5	0.1	0	32 41 38.80	90 26 30.36
2b-07-WVT-CV	V	No	32	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
2d-07-WST-CV	V	No	24	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
2e-07-WST-CV	V	No	24	300±	80	0.5	<0.01	0	32 41 38.80	90 26 30.36
3-07-F	V	No	30	300±	1500	0.6	783	0	32 41 38.80	90 26 30.36
4-07-F	V	No	30	300±	1500	0.5	876	0	32 41 38.80	90 26 30.36
19-13-CST	V	No	16	300±	80	0.1	0.3	0	32 41 38.80	90 26 30.36
20-13-CST	V	No	7	300±	80	0.1	0.13	0	32 41 38.80	90 26 30.36

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

Denbury Onshore, LLC
Tinsley Central Facility
Yazoo County, MS

Section B.6: EMISSION POINT SOURCE LIST

Emission Point ID:	MDEQ EPN:	Footnote:	Emission Point Description:	Routes To:	Operating Rate/Capacity	Operating Schedule:		
						Hrs/Day or (Hrs/Yr)	Days/Wk	Wks/Yr
1a-07-GBT-CV	AA-001	a	5000 BBL Gun Barrel Tank-Common Vent (ABJ-1111)	3-07-F	5,475,000 BOPY	24	7	52.143
1b-07-OST-CV	AA-002	a	1500 BBL Wet Oil Tank-Common Vent (ABJ-1118)	3-07-F	18,250 BOPY	24	7	52.143
1c-07-OST-CV	AA-003	a	5000 BBL Dry Oil Tank-Common Vent (ABJ-1119A)	3-07-F	1,825,000 BOPY	24	7	52.143
1d-07-OST-CV	AA-004	a	5000 BBL Dry Oil Tank-Common Vent (ABJ-1119B)	3-07-F	1,825,000 BOPY	24	7	52.143
1e-12-OST-CV	AA-005	a	5000 BBL Dry Oil Tank-Common Vent (ABJ-1119C)	3-07-F	1,825,000 BOPY	24	7	52.143
2a-07-WVF-CV	AA-006	b	Water Vortex Flume-Common Vent (ABM-1122)	4-07-F	18,250,000 BWPY & 18,250 BOPY	24	7	52.143
2b-07-WVT-CV	AA-007	b	9700 BBL Water Vortex Tank-Common Vent (ABM-1120)	4-07-F	18,250,000 BWPY	24	7	52.143
2d-07-WST-CV	AA-008	b	5000 BBL Produced Water Tank-Common Vent (1129A)	4-07-F	9,125,000 BWPY	24	7	52.143
2e-07-WST-CV	AA-009	b	5000 BBL Produced Water Tank-Common Vent (1129B)	4-07-F	9,125,000 BWPY	24	7	52.143
3-07-F	AA-010	c	Control Flare (ZZZ-180)		88.3 MMSCF/Yr	24	7	52.143
4-07-F	AA-011	d	Atmospheric Control Flare (ZZZ-181)		68.5 MMSCF/Yr	24	7	52.143
5-07-SBP	AA-012		Sand Blowdown Pit (ZZZ-130)		50 BBLs/Hr Brine	(730)	-	-
16-07-FE	AA-015		Fugitive Emissions		N/A	24	7	52.143
17-07-CB	AA-016		Compressor Blowdowns		2.75 MMSCF/Yr	(60)	-	-
19-13-CST	AA-018		10-Chemical Storage Tanks (≤13,000 Gallons)		13,000 Gallons/Yr Each	24	7	52.143
20-13-CST	AA-019		50-Chemical Storage Tanks (≤1,000 Gallons)		2,000 Gallons/Yr Each	24	7	52.143
26-12-LL	AA-025	e	Loading Losses-Oil Transfer to Tank Truck	3-07-F	5,475,000 BOPY	(8690)	-	-

Footnotes:

a *Vapors from this source are routed to the control flare (EPN: 3-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.*

b *Vapors from this source are routed to the control flare (EPN: 4-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.*

c *Routine emission limits for this source account for vapors from the oil storage tanks (EPNs: 1a-07-GBT-CV through 1e-12-OST-CV) and oil tank truck loading. This source may also combust gas from the facility's pressure release system on an emergency and non-routine basis.*

d *Routine emission limits for this source account for vapors from the water storage tanks (EPNs: 2a-07-WVF-CV through 2e-07-WST-CV) and assist gas. This source may also combust gas from the facility's pressure release system on an emergency and non-routine basis.*

e *Vapors associated with the oil tank truck loading process are routed to the control flare (EPN: 3-07-F) for combustion.*

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.): AA-001 [1a-07-GBT-CV (ABJ-1111)]

B. Product(s) Stored: Produced Oil

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2007

2. Tank Data

A. Tank Specifications:

1.	Design capacity	210,000	gallons		
2.	True vapor pressure at storage temperature:	4.492	psia @	70.60	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	5.204	psia @	78.86	ºF
4.	Reid vapor pressure at storage temperature:	6.00	psia @	70.60	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	50	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.

Vapors from these sources are routed to the control flare (EPN: 3-07-F) for combustion with a combustion efficiency of 98%.

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: _____ feet
B. Shell Diameter: _____ feet
C. Working Volume: _____ gal
D. Maximum Throughput: _____ gal/yr
E. Is the tank heated? ☐ Yes ☐ No
F. Is the tank underground? ☐ Yes ☐ No
G. Shell Color/Shade:
☐ ☐ 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: 24.00 feet
2. Shell Diameter: 38.70 feet
3. Maximum Liquid Height: 23.00 feet
4. Average Liquid Height: 11.50 feet
5. Working Volume: 210,000 gal
6. Turnovers per year: 1136.10
7. Maximum throughput: 5,475,000 BBLs/yr
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: 1.21 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	452.40*	5.24*	457.64*

**It should be noted that the emissions listed above represent the fixed roof emissions prior to emissions being routed to the control flare for combustion.*

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.): AA-002 [1b-07-OST-CV (ABJ-1118)]

B. Product(s) Stored: Produced Oil

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2007

2. Tank Data

A. Tank Specifications:

1.	Design capacity	63,000	gallons		
2.	True vapor pressure at storage temperature:	4.458	psia @	70.17	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	5.165	psia @	78.43	ºF
4.	Reid vapor pressure at storage temperature:	6.00	psia @	70.17	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	50	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.

Vapors from these sources are routed to the control flare (EPN: 3-07-F) for combustion with a combustion efficiency of 98%.

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: _____ feet
B. Shell Diameter: _____ feet
C. Working Volume: _____ gal
D. Maximum Throughput: _____ gal/yr
E. Is the tank heated? ☐ Yes ☐ No
F. Is the tank underground? ☐ Yes ☐ No
G. Shell Color/Shade:
☐ ☐ 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: 24.00 feet
2. Shell Diameter: 21.50 feet
3. Maximum Liquid Height: 23.00 feet
4. Average Liquid Height: 11.50 feet
5. Working Volume: 63,000 gal
6. Turnovers per year: 12.27
7. Maximum throughput: 18,250 BBLs/yr
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: 0.67 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	1.50*	1.60*	3.10*

**It should be noted that the emissions listed above represent the fixed roof emissions prior to emissions being routed to the control flare for combustion.*

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.): AA-003, AA-004, & AA-005 [1c-07-OST-CV, 1d-07-OST-CV, & 1e-12-OST-CV (ABJ-1119A, ABJ-1119B, & ABJ-1119C)]

B. Product(s) Stored: Produced Oil

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2007

2. Tank Data

A. Tank Specifications:

1.	Design capacity	84,000	gallons		
2.	True vapor pressure at storage temperature:	4.501	psia @	70.70	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	5.213	psia @	78.96	ºF
4.	Reid vapor pressure at storage temperature:	6.00	psia @	70.70	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	50	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.

Vapors from these sources are routed to the control flare (EPN: 3-07-F) for combustion with a combustion efficiency of 98%.

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: _____ feet
B. Shell Diameter: _____ feet
C. Working Volume: _____ gal
D. Maximum Throughput: _____ gal/yr
E. Is the tank heated? ☐ Yes ☐ No
F. Is the tank underground? ☐ Yes ☐ No
G. Shell Color/Shade:
☐ ☐ 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: 16.00 feet
2. Shell Diameter: 29.75 feet
3. Maximum Liquid Height: 15.00 feet
4. Average Liquid Height: 7.50 feet
5. Working Volume: 84,000 gal
6. Turnovers per year: 982.61
7. Maximum throughput: 1,825,000 BBLs/yr
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: 0.93 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	29.78*	2.78*	32.56*

**It should be noted that the emissions listed above represent the fixed roof emissions prior to emissions being routed to the control flare for combustion.*

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.): AA-006 [2a-07-WVF-CV (ABM-1122)]

B. Product(s) Stored: Produced Water & Condensate

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2007

2. Tank Data

A. Tank Specifications:

1.	Design capacity	1,000	gallons		
2.	True vapor pressure at storage temperature:	0.356	psia @	69.11	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	0.470	psia @	77.37	ºF
4.	Reid vapor pressure at storage temperature:	6.00	psia @	69.11	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	18.41	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.

Vapors from these sources are routed to the control flare (EPN: 4-07-F) for combustion with a combustion efficiency of 98%.

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: _____ feet
B. Shell Diameter: _____ feet
C. Working Volume: _____ gal
D. Maximum Throughput: _____ gal/yr
E. Is the tank heated? ☐ Yes ☐ No
F. Is the tank underground? ☐ Yes ☐ No
G. Shell Color/Shade:
☐ ☐ 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: 42.5 feet
2. Shell Diameter: 4.0 feet
3. Maximum Liquid Height: 41.5 feet
4. Average Liquid Height: 20.75 feet
5. Working Volume: 1,000 gal
6. Turnovers per year: 196,657.90
7. Maximum throughput: 18,268,250 BBLs/yr
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: 0.13 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	44.32*	0.00*	44.32*

**It should be noted that the emissions listed above represent the fixed roof emissions prior to emissions being routed to the control flare for combustion.*

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.): AA-007 [2b-07-WVT-CV (ABM-1120)]

B. Product(s) Stored: Produced Water

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2007

2. Tank Data

A. Tank Specifications:

1.	Design capacity	407,400	gallons		
2.	True vapor pressure at storage temperature:	0.370	psia @	70.53	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	0.488	psia @	78.79	ºF
4.	Reid vapor pressure at storage temperature:	0.370	psia @	70.53	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	18.02	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.

Vapors from these sources are routed to the control flare (EPN: 4-07-F) for combustion with a combustion efficiency of 98%.

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: _____ feet
B. Shell Diameter: _____ feet
C. Working Volume: _____ gal
D. Maximum Throughput: _____ gal/yr
E. Is the tank heated? ☐ Yes ☐ No
F. Is the tank underground? ☐ Yes ☐ No
G. Shell Color/Shade:
☐ ☐ 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: 32.00 feet
2. Shell Diameter: 46.75 feet
3. Maximum Liquid Height: 31.00 feet
4. Average Liquid Height: 15.50 feet
5. Working Volume: 407,400 gal
6. Turnovers per year: 1,925.40
7. Maximum throughput: 18,250,000 BBLs/yr
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: 1.46 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	8.15*	0.36*	8.51*

**It should be noted that the emissions listed above represent the fixed roof emissions prior to emissions being routed to the control flare for combustion.*

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.): AA-008 & AA-009 [2d-07-WST-CV & 2e-07-WST-CV (ABJ-1129A & ABJ-1129B)]

B. Product(s) Stored: Produced Water

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2007

2. Tank Data

A. Tank Specifications:

1.	Design capacity	210,000	gallons		
2.	True vapor pressure at storage temperature:	0.371	psia @	70.60	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	0.489	psia @	78.86	ºF
4.	Reid vapor pressure at storage temperature:	0.371	psia @	70.60	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	18.02	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.

Vapors from these sources are routed to the control flare (EPN: 4-07-F) for combustion with a combustion efficiency of 98%.

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: _____ feet
B. Shell Diameter: _____ feet
C. Working Volume: _____ gal
D. Maximum Throughput: _____ gal/yr
E. Is the tank heated? ☐ Yes ☐ No
F. Is the tank underground? ☐ Yes ☐ No
G. Shell Color/Shade:
☐ ☐ 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: 24.00 feet
2. Shell Diameter: 38.70 feet
3. Maximum Liquid Height: 23.00 feet
4. Average Liquid Height: 11.50 feet
5. Working Volume: 210,000 gal
6. Turnovers per year: 1,893.50
7. Maximum throughput: 9,125,000 BBLs/yr
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: 1.21 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	4.09*	0.20*	4.29*

**It should be noted that the emissions listed above represent the fixed roof emissions prior to emissions being routed to the control flare for combustion.*

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.): AA-018 [19-13-CST]*

**It should be noted that this emission point source accounts for approximately 10 organic chemical blend storage tanks for ease of permitting. In addition, the emissions associated with these sources were aggregated and assumes a maximum capacity for conservative purposes.*

B. Product(s) Stored: Organic Chemical Blend (assumes 100% N-Hexane 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: 2013

2. Tank Data

A. Tank Specifications:

1.	Design capacity	13,000	gallons		
2.	True vapor pressure at storage temperature:	2.601	psia @	72.16	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	3.319	psia @	82.29	ºF
4.	Reid vapor pressure at storage temperature:	2.601	psia @	72.16	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	86.18	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: 16.00 feet
B. Shell Diameter: 11.80 feet
C. Working Volume: 13,000 gal
D. Maximum Throughput: 130,000 gal/yr
E. Is the tank heated? ☐ Yes ☒ No
F. Is the tank underground? ☐ Yes ☒ No
G. Shell Color/Shade:

☐ ☐ 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: _____ BBLs/yr
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	0.34	7.05	7.39

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.): AA-019 [20-13-CST]*

**It should be noted that this emission point source accounts for approximately 50 organic chemical blend storage tanks for ease of permitting. In addition, the emissions associated with these sources were aggregated and assumes a maximum capacity for conservative purposes.*

B. Product(s) Stored: Organic Chemical Blend (assumes 100% N-Hexane 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: 2013

2. Tank Data

A. Tank Specifications:

1.	Design capacity	1,000	gallons		
2.	True vapor pressure at storage temperature:	2.599	psia @	72.13	ºF
3.	Maximum true vapor pressure (as defined in §60.111b)	3.317	psia @	82.25	ºF
4.	Reid vapor pressure at storage temperature:	2.599	psia @	72.13	ºF
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	86.18	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: 7.00 feet
B. Shell Diameter: 5.00 feet
C. Working Volume: 1,000 gal
D. Maximum Throughput: 100,000 gal/yr
E. Is the tank heated? ☐ Yes ☒ No
F. Is the tank underground? ☐ Yes ☒ No
G. Shell Color/Shade:

☐ ☐ 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: _____ BBLs/yr
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

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	0.12	3.57	3.69

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.): AA-010 [3-07-F (ZZZ-180)]

B. Equipment Description (include the process(es) that the flare controls emissions from): Control flare to combust emissions from oil storage tanks (EPNs: 1a-07-GBT-CV through 1e-12-OST-CV) and loading losses (EPN: 26-12-LL).

C. Manufacturer: Unknown D. Model: Unknown

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: 2510 Btu/scf

3. Design exit velocity: 784 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 the flare pilot flame is continuously monitored by use of a thermocouple.*

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

If yes, please describe the monitoring: The flare is equipped with an auto-ignitor.*

*Denbury will maintain a flare pilot flame or auto-igniter system at all times when emissions may be vented to the flare. Denbury will either continuously monitor & record the presence of the flare pilot flame by use of a thermocouple OR maintain & operate an auto-igniter system on the flare to ensure a flame is immediately restored when emissions are being sent to the flare.

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.): AA-011 [4-07-F (ZZZ-181)]

B. Equipment Description (include the process(es) that the flare controls emissions from): Control flare to combust emissions from water storage tanks (EPNs: 2a-07-WFV-CV through 2e-07-WST-CV).

C. Manufacturer: Unknown D. Model: Unknown

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: 202 Btu/scf

3. Design exit velocity: 876 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 the flare pilot flame is continuously monitored by use of a thermocouple.*

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

If yes, please describe the monitoring: The flare is equipped with an auto-ignitor.*

*Denbury will maintain a flare pilot flame or auto-igniter system at all times when emissions may be vented to the flare. Denbury will either continuously monitor & record the presence of the flare pilot flame by use of a thermocouple OR maintain & operate an auto-igniter system on the flare to ensure a flame is immediately restored when emissions are being sent to the flare.

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
3-07-F *Control Flare* 4-07-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.1.4.B(2)	2007	2007	N/A
3-07-F *Control Flare* 4-07-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.2.2.B(10).	2007	2007	N/A
3-07-F *Control Flare* 4-07-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.2.2.B(11).	2007	2007	N/A
5-07-SBP *Sand Blowdown Pit*	11 Miss. Admin. Code Pt. 2, R.2.2.B(10).	2007	2007	N/A
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa)	Modified After 9/18/2015	Modified After 9/18/2015	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
3-07-F *Control Flare* 4-07-F *Control 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.
3-07-F *Control Flare* 4-07-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.2.2.B(10).	VOC, HAPs	Flare Operating Requirements	The flare shall be operated at all times when emissions may be vented to it. The flare is anticipated to provide a significant reduction in hydrocarbon emissions. Based on manufacturer's data, a minimum of 98% reduction can be expected. It should also be noted that the facility will operate the flare 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.

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
3-07-F *Control Flare* 4-07-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.2.2.B(11).	VOC, HAPs	Monitoring and recordkeeping	Denbury shall maintain a flare pilot flame or auto-igniter system at all times when emissions may be vented to the flare. Denbury will either continuously monitor & record the presence of the flare pilot flame by use of a thermocouple OR maintain & operate an auto-igniter system on the flare to ensure a flame is immediately restored when emissions are being sent to the flare. The flare shall be operated with no visible emissions as determined by EPA Method 22, except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours. Records of all visual observations/tests and corrective action shall be maintained.
5-07-SBP *Sand Blowdown Pit*	11 Miss. Admin. Code Pt. 2, R.2.2.B(10).	VOC	Sand Blowdown Operating Limits	The sand blowdown pit will operate no more than 730 hours during a 12-month period.

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5365a(i) 40 CFR 60.5397a 40 CFR 60.5397a(a)	VOC	Owners and operators of an affected facility, which is the collection of fugitive emission components at a well site that commenced construction or modification after 9/18/2015 and on or before 12/6/2022, must reduce GHG & VOC emissions by complying with paragraphs (a) through (j) of this section. Owners and operators must: 1) Monitor all fugitive emission components, as defined in §60.5430a, in accordance with §60.5397a(b)-(g); 2) Repair all sources of fugitive emissions (defined as any visible emission from a fugitive emissions component observed using optical gas imaging or an instrument reading of 500 parts per million (ppm) or greater using Method 21 of appendix A-7 to this part) in accordance with §60.5397a(h); and 3) Keep records in accordance with §60.5397a(i) and report in accordance with §60.5397a(j).	N/A

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5397a(b) 40 CFR 60.5397a(c) 40 CFR 60.5397a(d) 40 CFR 60.5397a(e) 40 CFR 60.5397a(f)(1) 40 CFR 60.5397a(g)(1)	VOC	**Requirements that specify monitoring:** Develop an emissions monitoring plan that covers the collection of fugitive emissions components at the affected well site(s) and compressor station(s) within each company-defined area in accordance with paragraphs (c) & (d). Fugitive emissions monitoring plans must include the elements specified in paragraphs (c)(1) through (8), at a minimum. Each fugitive emissions monitoring plan must include the elements specified in paragraphs (d)(1) through (3), at a minimum, as applicable. Each monitoring survey shall observe each fugitive emissions component, as defined in §60.5430a, for fugitive emissions. Conduct an initial monitoring survey within 90 days of the startup of production, as defined in §60.5430a, for each collection of fugitive emissions components at a new well site or by June 3, 2017, whichever is later. For a modified well site, conduct an initial monitoring survey within 90 days of the first day of production after the modification, or by June 3, 2017, whichever is later. Subsequent monitoring surveys must be conducted at least semiannually after the initial survey. Consecutive semiannual monitoring surveys must be conducted at least 4 months apart and no more than 7 months apart.	N/A

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5397a(g)(3) 40 CFR 60.5397a(g)(4) 40 CFR 60.5397a(g)(5) 40 CFR 60.5397a(h)	VOC	Fugitive emissions components that cannot be monitored without elevating the monitoring personnel more than 2 meters above the surface may be designated as difficult-to-monitor and must meet the specifications of §60.5397a(g)(3)(i) through (iv). Fugitive emissions components that cannot be monitored because monitoring personnel would be exposed to immediate danger while conducted a monitoring survey may be designated as unsafe-to-monitor and must meet the specifications of §60.5397a(g)(4)(i) through (iv). An affected facility is no longer required to comply with the requirements of paragraph (g)(1) of this section when the owner or operator removes all major production and processing equipment, as defined in §60.5430a, such that the well site becomes a wellhead only well site. If any major production and processing equipment is subsequently added to the well site, then the owner or operator must comply with the requirements in paragraphs (f)(1) and (g)(1) of this section. Each identified source of fugitive emissions shall be repaired, as defined in §60.5430a, in accordance with paragraphs (h)(1) & (2) of this section.	N/A

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5397a(h)(3) 40 CFR 60.5397a(h)(3)(i) 40 CFR 60.5397a(h)(3)(ii)	VOC	Delay of repair will be allowed if the conditions in paragraphs (h)(3)(i) or (ii) of this section are met. If the repair is technically infeasible, would require a vent blowdown, a compressor station shutdown, a well shutdown or well shut-in, or would be unsafe to repair during operation of the unit, the repair must be completed during the next scheduled compressor station shutdown for maintenance, scheduled well shutdown, scheduled well shut-in, after a scheduled vent blowdown, or within 2 years of detecting the fugitive emissions, whichever is earliest. For purposes of this paragraph (h)(3), a vent blowdown is the opening of one or more blowdown valves to depressurize major production and processing equipment, other than a storage vessel. If the repair requires replacement of a fugitive emissions component or a part thereof, but the replacement cannot be acquired and installed within the repair timelines specified in paragraphs (h)(1) and (2) of this section due to either of the conditions specified in paragraphs (h)(3)(ii)(A) or (B) of this section, the repair must be completed in accordance with paragraph (h)(3)(ii)(C) of this section and documented in accordance with § 60.5420a(c)(15)(vii)(I). (A) Valve assembly supplies had been sufficiently stocked but are depleted at the time of the required repair; (B) A replacement fugitive emissions component or a part thereof requires custom fabrication. (C) The required replacement must be ordered no later than 10 calendar days after the first attempt at repair. The repair must be completed as soon as practicable, but no later than 30 calendar days after receipt of the replacement component, unless the repair requires a compressor station or well shutdown. If the repair requires a compressor station or well shutdown, the repair must be completed in accordance with the timeframe specified in paragraph (h)(3)(i) of this section.	N/A

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5397a(h)(4) 40 CFR 60.5397a(i) 40 CFR 60.5420a(c)(15) 40 CFR 60.5420a(c)	VOC	Each identified source of fugitive emissions must be resurveyed to complete repair according to the requirements in paragraphs (h)(4)(i) through (iv) of this section, to ensure that there are no fugitive emissions. **Requirements that specify records to be kept and record retention time:** Records for each monitoring survey shall be maintained as specified §60.5420a(c)(15). For each collection of fugitive emissions components at a well site and each collection of fugitive emissions components at a compressor station, maintain the records identified in paragraphs (c)(15)(i) through (ix) of this section, as applicable. Records must be maintained either onsite or at the nearest local field office for at least 5 years.	N/A

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5397a(j) 40 CFR 60.5420a(b) 40 CFR 60.5420a(b)(11) 40 CFR 60.5410a	VOC	**Requirements that specify reports to be submitted:** Annual reports shall be submitted for each collection of fugitive emissions components at a well site and each collection of fugitive emissions components at a compressor station that include the information specified in §60.5420a(b)(7). Multiple collection of fugitive emissions components at a well site or at a compressor station may be included in a single annual report. Submit an annual report containing the information specified in §60.5420a(b)(1)(i)-(iv)&(b)(7)(i)-(iv), as applicable. The initial annual report is due no later than 90 days after the end of the initial compliance period as determined according to §60.5410a. Subsequent annual reports are due no later than the same date each year as the initial annual report. Submit reports to the EPA via CEDRI, except as outlined in this paragraph (b)(11). (CEDRI can be accessed through the EPA's CDX (https://cdx.epa.gov/).) The initial compliance period begins on August 2, 2016, or upon initial startup, whichever is later, and ends no later than 1 year after the initial startup date for the affected facility or no later than 1 year after August 2, 2016. The initial compliance period may be less than one full year.	N/A

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EMISSION UNIT (Ref No.)	APPLICABLE REQUIREMENT (Specific Regulatory citation)	POLLUTANT	LIMITS/ REQUIREMENTS	TEST METHOD/ COMPLIANCE MONITORING
16-07-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa) 40 CFR 60.5410a(j) 40 CFR 60.5415a(h)	VOC	To achieve initial compliance with the fugitive emission standards for each collection of fugitive emissions components at a well site and each collection of fugitive emissions components at a compressor station, comply with paragraphs (j)(1) through (5) of this section. Demonstrate continuous compliance with the fugitive emission standards specified in §60.5397a(a)(1) according to paragraphs (h)(1) through (4) of this section.	N/A

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the gun barrel tank are routed to the control flare (EPN: 3-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***1a-07-GBT-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Gun Barrel Tank-Common Vent (ABJ-1111)***

DATA:

Emission Source:	***Crude Oil Storage Vapors ('Working' & 'Standing')***
Average Daily Oil Throughput: **(Annual Average; BBLD - Q_{avg})**	***15000***
Maximum Daily Oil Throughput: **(BBLD - Q_{max})**	***15000***
Average VOC Working Losses - L_W (lb/yr):	***904,796.691***
Average VOC Standing Losses - L_S (lb/yr):	***10,474.464***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 1.2643/8760	=	**132.10**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 1.2643/8760	=	**132.10**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**578.61**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	1.3763	1.3763	6.0282
Methane (excluded from VOC total)	7.1440	9.4374	9.4374	41.3357
Ethane (excluded from VOC total)	12.7151	16.7970	16.7970	73.5711
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0091	0.0091	0.0398
Propane	20.1603	26.6324	26.6324	116.6498
Iso-Butane	6.7943	8.9755	8.9755	39.3126
N-Butane	24.7308	32.6701	32.6701	143.0949
Iso-Pentane	7.1127	9.3961	9.3961	41.1550
N-Pentane	10.4422	13.7945	13.7945	60.4199
Iso-Hexane	3.2510	4.2947	4.2947	18.8108
N-Hexane (TAP)	2.2186	2.9308	2.9308	12.8368
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.1961	0.1961	0.8590
Cyclohexane	0.3771	0.4982	0.4982	2.1822

Heptanes	2.5825	3.4115	3.4115	14.9425
Methylcyclohexane	0.2942	0.3887	0.3887	1.7025
Toluene (TAP)	0.2037	0.2691	0.2691	1.1788
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.8913	0.8913	3.9040
Ethylbenzene (TAP)	0.0122	0.0161	0.0161	0.0706
Xylenes (TAP)	0.0231	0.0305	0.0305	0.1335
Nonanes	0.0661	0.0873	0.0873	0.3826
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent:	100.0000			
Total TAP Emissions		3.45	3.45	15.12
Total VOC Emissions		**104.48**	**104.48**	**457.64**
Total Non VOC & Non TAP-HC		26.23	26.23	114.91
Total Hydrocarbon Emissions		132.10	132.10	578.61

DATA:

Emission Source:	***Flash Gas from Oil***
Flash Gas Specific Gravity:	***1.5377***
Average Oil Throughput: **(BBLD)**	***15000***
Maximum Oil Throughput: **(BBLD)**	***15000***
Basis of Emission Estimates:	***Actual GOR & Actual Flare Gas Analysis***
Flash Gas Analysis Report Number:	***Southern Petroleum Laboratories Report No.: 172-24090228-001A***

Estimates for gas volumes and composition associated with this stage of the process were derived from a laboratory test of an oil sample collected at this facility, refer to Southern Petroleum Laboratories Report No.: 23080183-007A in supporting documentation. The following table shows the actual field and laboratory conditions.

API Oil Gravity @ 60°F	**Process Conditions**		**Gas/Oil Ratio**
	Pressure (PSIG)	**Temperature (°F)**	**(SCF/BBL)**
Actual Facility & Laboratory Conditions:			
39.73	38	86	
	0	60	12.80
		GOR Estimate:	**12.80**

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Oil Rate * GOR	=	**8000.00**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**939.84**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Oil Rate to Avg. Oil Rate	=	**939.84**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * 8760/2000	=	**4116.50**

SPECIATION FACTORS:

Speciation of the flash gas mixture taken from the referenced laboratory results and normalized to account for the removal of Nitrogen and the presence of H2S; refer to supporting documentation

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	9.7917	9.7917	42.8875
Methane (excluded from VOC total)	7.1440	67.1419	67.1419	294.0808
Ethane (excluded from VOC total)	12.7151	119.5022	119.5022	523.4183
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0646	0.0646	0.2831
Propane	20.1603	189.4755	189.4755	829.9006
Iso-Butane	6.7943	63.8559	63.8559	279.6880
N-Butane	24.7308	232.4305	232.4305	1018.0430
Iso-Pentane	7.1127	66.8485	66.8485	292.7958
N-Pentane	10.4422	98.1406	98.1406	429.8550
Iso-Hexane	3.2510	30.5546	30.5546	133.8287
N-Hexane (TAP)	2.2186	20.8510	20.8510	91.3270
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	1.3953	1.3953	6.1113
Cyclohexane	0.3771	3.5445	3.5445	15.5249
Heptanes	2.5825	24.2712	24.2712	106.3075
Methylcyclohexane	0.2942	2.7654	2.7654	12.1126
Toluene (TAP)	0.2037	1.9148	1.9148	8.3866
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	6.3412	6.3412	27.7746
Ethylbenzene (TAP)	0.0122	0.1146	0.1146	0.5022
Xylenes (TAP)	0.0231	0.2169	0.2169	0.9500
Nonanes	0.0661	0.6214	0.6214	2.7217
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent:	100.0000			
Total TAP Emissions		24.56	24.56	107.56
Total VOC Emissions		**743.34**	**743.34**	**3255.83**
Total Non VOC & Non TAP-HC		186.64	186.64	817.50
Total Emissions		939.84	939.84	4116.50

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***5,475,000***
Gross Blanket Gas Required (MSCF/Yr):	***30,742***
Gas from Process to Tank(s) (MSCF/Yr):	***70,080***
Calculated Volume Requirement (MSCF/Yr):	***-39,338***

**There are no emissions associated with supplied blanket gas as flash generated from this tank should be sufficient to maintain the gas blanket as demonstrated herein.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Oil Flash + Blanket Gas	=	**3713.47**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5377***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***89.33***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**3.67**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**89.33**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**16.08**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	1.0418	0.038	0.931	0.168
Methane (excluded from VOC total)	7.1440	0.262	6.382	1.149
Ethane (excluded from VOC total)	12.7151	0.467	11.358	2.044
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.006	0.001
Propane	20.1603	0.740	18.009	3.242
Iso-Butane	6.7943	0.249	6.069	1.092
N-Butane	24.7308	0.908	22.092	3.976
Iso-Pentane	7.1127	0.261	6.354	1.144
N-Pentane	10.4422	0.383	9.328	1.679
Iso-Hexane	3.2510	0.119	2.904	0.523
N-Hexane (TAP)	2.2186	0.081	1.982	0.357
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1485	0.005	0.133	0.024
Cyclohexane	0.3771	0.014	0.337	0.061
Heptanes	2.5825	0.095	2.307	0.415
Methylcyclohexane	0.2942	0.011	0.263	0.047

Toluene (TAP)	0.2037	0.007	0.182	0.033
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.6747	0.025	0.603	0.108
Ethylbenzene (TAP)	0.0122	0.000	0.011	0.002
Xylenes (TAP)	0.0231	0.001	0.021	0.004
Nonanes	0.0661	0.002	0.059	0.011
Decanes Plus	0.0000	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.10	2.33	0.42
Total VOC Emissions		**2.90**	**70.65**	**12.72**
Total Non VOC & Non TAP-HC		0.73	17.74	3.19
Total Emissions		3.67	89.33	16.08

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the wet oil tank are routed to the control flare (EPN: 3-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***1b-07-OST-CV***

EMISSION SOURCE DESCRIPTION: ***1500 BBL Wet Oil Tank-Common Vent (ABJ-1118)***

DATA:

Emission Source:	***Crude Oil Storage Vapors ('Working' & 'Standing')***
Average Daily Oil Throughput: **(Annual Average; BBLD - Q_{avg})**	***50***
Maximum Daily Oil Throughput: **(BBLD - Q_{max})**	***50***
Average VOC Working Losses - L_W (lb/yr):	***2,997.505***
Average VOC Standing Losses - L_S (lb/yr):	***3,200.559***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 1.2643/8760	=	**0.89**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 1.2643/8760	=	**0.89**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**3.92**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	0.0093	0.0093	0.0408
Methane (excluded from VOC total)	7.1440	0.0639	0.0639	0.2799
Ethane (excluded from VOC total)	12.7151	0.1137	0.1137	0.4982
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0001	0.0001	0.0003
Propane	20.1603	0.1804	0.1804	0.7899
Iso-Butane	6.7943	0.0608	0.0608	0.2662
N-Butane	24.7308	0.2212	0.2212	0.9690
Iso-Pentane	7.1127	0.0636	0.0636	0.2787
N-Pentane	10.4422	0.0934	0.0934	0.4092
Iso-Hexane	3.2510	0.0291	0.0291	0.1274
N-Hexane (TAP)	2.2186	0.0198	0.0198	0.0869
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.0013	0.0013	0.0058
Cyclohexane	0.3771	0.0034	0.0034	0.0148

Heptanes	2.5825	0.0231	0.0231	0.1012
Methylcyclohexane	0.2942	0.0026	0.0026	0.0115
Toluene (TAP)	0.2037	0.0018	0.0018	0.0080
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.0060	0.0060	0.0264
Ethylbenzene (TAP)	0.0122	0.0001	0.0001	0.0005
Xylenes (TAP)	0.0231	0.0002	0.0002	0.0009
Nonanes	0.0661	0.0006	0.0006	0.0026
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.02	0.02	0.10
Total VOC Emissions		**0.71**	**0.71**	**3.10**
Total Non VOC & Non TAP-HC		0.18	0.18	0.78
Total Hydrocarbon Emissions		0.89	0.89	3.92

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***18,250***
Gross Blanket Gas Required (MSCF/Yr):	***102***
Gas from Process to Tank(s) (MSCF/Yr):	***8,595***
Calculated Volume Requirement (MSCF/Yr):	***-8,493***

**There are no emissions associated with supplied blanket gas as flash generated from the gun barrel tank should be sufficient to maintain the gas blanket as demonstrated herein.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**3.10**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5377***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***0.18***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.01**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**0.18**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.03**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	1.0418	0.000	0.002	0.000
Methane (excluded from VOC total)	7.1440	0.000	0.013	0.002
Ethane (excluded from VOC total)	12.7151	0.001	0.023	0.004

Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.000	0.000
Propane	20.1603	0.001	0.036	0.007
Iso-Butane	6.7943	0.000	0.012	0.002
N-Butane	24.7308	0.002	0.045	0.008
Iso-Pentane	7.1127	0.000	0.013	0.002
N-Pentane	10.4422	0.001	0.019	0.003
Iso-Hexane	3.2510	0.000	0.006	0.001
N-Hexane (TAP)	2.2186	0.000	0.004	0.001
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1485	0.000	0.000	0.000
Cyclohexane	0.3771	0.000	0.001	0.000
Heptanes	2.5825	0.000	0.005	0.001
Methylcyclohexane	0.2942	0.000	0.001	0.000
Toluene (TAP)	0.2037	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.6747	0.000	0.001	0.000
Ethylbenzene (TAP)	0.0122	0.000	0.000	0.000
Xylenes (TAP)	0.0231	0.000	0.000	0.000
Nonanes	0.0661	0.000	0.000	0.000
Decanes Plus	0.0000	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.00	0.00
Total VOC Emissions		**0.01**	**0.14**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.04	0.01
Total Emissions		0.01	0.18	0.03

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the dry oil tank are routed to the control flare (EPN: 3-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***1c-07-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Dry Oil Tank-Common Vent (ABJ-1119A)***

DATA:

Emission Source:	***Crude Oil Storage Vapors ('Working' & 'Standing')***
Average Daily Oil Throughput: **(Annual Average; BBLD - Q_{avg})**	***5000***
Maximum Daily Oil Throughput: **(BBLD - Q_{max})**	***15000***
Average VOC Working Losses - L_W (lb/yr):	***59,560.301***
Average VOC Standing Losses - L_S (lb/yr):	***5,565.369***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 1.2643/8760	=	**9.40**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 1.2643/8760	=	**26.59**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**41.17**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	0.0979	0.2771	0.4289
Methane (excluded from VOC total)	7.1440	0.6715	1.8998	2.9412
Ethane (excluded from VOC total)	12.7151	1.1952	3.3813	5.2349
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0006	0.0018	0.0028
Propane	20.1603	1.8950	5.3612	8.3002
Iso-Butane	6.7943	0.6386	1.8068	2.7973
N-Butane	24.7308	2.3246	6.5766	10.1818
Iso-Pentane	7.1127	0.6686	1.8915	2.9284
N-Pentane	10.4422	0.9815	2.7769	4.2991
Iso-Hexane	3.2510	0.3056	0.8645	1.3385
N-Hexane (TAP)	2.2186	0.2085	0.5900	0.9134
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.0140	0.0395	0.0611
Cyclohexane	0.3771	0.0354	0.1003	0.1553

Heptanes	2.5825	0.2427	0.6867	1.0632
Methylcyclohexane	0.2942	0.0277	0.0782	0.1211
Toluene (TAP)	0.2037	0.0192	0.0542	0.0839
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.0634	0.1794	0.2778
Ethylbenzene (TAP)	0.0122	0.0011	0.0032	0.0050
Xylenes (TAP)	0.0231	0.0022	0.0061	0.0095
Nonanes	0.0661	0.0062	0.0176	0.0272
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.25	0.69	1.08
Total VOC Emissions		**7.43**	**21.03**	**32.56**
Total Non VOC & Non TAP-HC		1.87	5.28	8.18
Total Hydrocarbon Emissions		9.40	26.59	41.17

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***1,825,000***
Gross Blanket Gas Required (MSCF/Yr):	***10,247***
Gas from Process to Tank(s) (MSCF/Yr):	***13,113***
Calculated Volume Requirement (MSCF/Yr):	***-2,865***

**There are no emissions associated with supplied blanket gas as flash generated from the gun barrel tank should be sufficient to maintain the gas blanket as demonstrated herein.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**32.56**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5377***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***2.22***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.09**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**2.22**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.40**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	1.0418	0.001	0.023	0.004
Methane (excluded from VOC total)	7.1440	0.007	0.159	0.028
Ethane (excluded from VOC total)	12.7151	0.012	0.282	0.051

Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.000	0.000
Propane	20.1603	0.018	0.448	0.080
Iso-Butane	6.7943	0.006	0.151	0.027
N-Butane	24.7308	0.023	0.549	0.099
Iso-Pentane	7.1127	0.006	0.158	0.028
N-Pentane	10.4422	0.010	0.232	0.042
Iso-Hexane	3.2510	0.003	0.072	0.013
N-Hexane (TAP)	2.2186	0.002	0.049	0.009
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1485	0.000	0.003	0.001
Cyclohexane	0.3771	0.000	0.008	0.002
Heptanes	2.5825	0.002	0.057	0.010
Methylcyclohexane	0.2942	0.000	0.007	0.001
Toluene (TAP)	0.2037	0.000	0.005	0.001
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.6747	0.001	0.015	0.003
Ethylbenzene (TAP)	0.0122	0.000	0.000	0.000
Xylenes (TAP)	0.0231	0.000	0.001	0.000
Nonanes	0.0661	0.000	0.001	0.000
Decanes Plus	0.0000	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.06	0.01
Total VOC Emissions		**0.07**	**1.76**	**0.32**
Total Non VOC & Non TAP-HC		0.02	0.44	0.08
Total Emissions		0.09	2.22	0.40

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the dry oil tank are routed to the control flare (EPN: 3-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***1d-07-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Dry Oil Tank-Common Vent (ABJ-1119B)***

DATA:

Emission Source:	***Crude Oil Storage Vapors ('Working' & 'Standing')***
Average Daily Oil Throughput: **(Annual Average; BBLD - Q_{avg})**	***5000***
Maximum Daily Oil Throughput: **(BBLD - Q_{max})**	***15000***
Average VOC Working Losses - L_W (lb/yr):	***59,560.301***
Average VOC Standing Losses - L_S (lb/yr):	***5,565.369***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 1.2643/8760	=	**9.40**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 1.2643/8760	=	**26.59**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**41.17**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	0.0979	0.2771	0.4289
Methane (excluded from VOC total)	7.1440	0.6715	1.8998	2.9412
Ethane (excluded from VOC total)	12.7151	1.1952	3.3813	5.2349
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0006	0.0018	0.0028
Propane	20.1603	1.8950	5.3612	8.3002
Iso-Butane	6.7943	0.6386	1.8068	2.7973
N-Butane	24.7308	2.3246	6.5766	10.1818
Iso-Pentane	7.1127	0.6686	1.8915	2.9284
N-Pentane	10.4422	0.9815	2.7769	4.2991
Iso-Hexane	3.2510	0.3056	0.8645	1.3385
N-Hexane (TAP)	2.2186	0.2085	0.5900	0.9134
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.0140	0.0395	0.0611
Cyclohexane	0.3771	0.0354	0.1003	0.1553

Heptanes	2.5825	0.2427	0.6867	1.0632
Methylcyclohexane	0.2942	0.0277	0.0782	0.1211
Toluene (TAP)	0.2037	0.0192	0.0542	0.0839
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.0634	0.1794	0.2778
Ethylbenzene (TAP)	0.0122	0.0011	0.0032	0.0050
Xylenes (TAP)	0.0231	0.0022	0.0061	0.0095
Nonanes	0.0661	0.0062	0.0176	0.0272
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.25	0.69	1.08
Total VOC Emissions		**7.43**	**21.03**	**32.56**
Total Non VOC & Non TAP-HC		1.87	5.28	8.18
Total Hydrocarbon Emissions		9.40	26.59	41.17

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***1,825,000***
Gross Blanket Gas Required (MSCF/Yr):	***10,247***
Gas from Process to Tank(s) (MSCF/Yr):	***13,113***
Calculated Volume Requirement (MSCF/Yr):	***-2,865***

**There are no emissions associated with supplied blanket gas as flash generated from the gun barrel tank should be sufficient to maintain the gas blanket as demonstrated herein.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**32.56**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5377***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***2.22***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.09**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**2.22**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.40**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	1.0418	0.001	0.023	0.004
Methane (excluded from VOC total)	7.1440	0.007	0.159	0.028
Ethane (excluded from VOC total)	12.7151	0.012	0.282	0.051

Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.000	0.000
Propane	20.1603	0.018	0.448	0.080
Iso-Butane	6.7943	0.006	0.151	0.027
N-Butane	24.7308	0.023	0.549	0.099
Iso-Pentane	7.1127	0.006	0.158	0.028
N-Pentane	10.4422	0.010	0.232	0.042
Iso-Hexane	3.2510	0.003	0.072	0.013
N-Hexane (TAP)	2.2186	0.002	0.049	0.009
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1485	0.000	0.003	0.001
Cyclohexane	0.3771	0.000	0.008	0.002
Heptanes	2.5825	0.002	0.057	0.010
Methylcyclohexane	0.2942	0.000	0.007	0.001
Toluene (TAP)	0.2037	0.000	0.005	0.001
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.6747	0.001	0.015	0.003
Ethylbenzene (TAP)	0.0122	0.000	0.000	0.000
Xylenes (TAP)	0.0231	0.000	0.001	0.000
Nonanes	0.0661	0.000	0.001	0.000
Decanes Plus	0.0000	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.06	0.01
Total VOC Emissions		**0.07**	**1.76**	**0.32**
Total Non VOC & Non TAP-HC		0.02	0.44	0.08
Total Emissions		0.09	2.22	0.40

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the dry oil tank are routed to the control flare (EPN: 3-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***1e-12-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Dry Oil Tank-Common Vent (ABJ-1119C)***

DATA:

Emission Source:	***Crude Oil Storage Vapors ('Working' & 'Standing')***
Average Daily Oil Throughput: **(Annual Average; BBLD - Q_{avg})**	***5000***
Maximum Daily Oil Throughput: **(BBLD - Q_{max})**	***15000***
Average VOC Working Losses - L_W (lb/yr):	***59,560.301***
Average VOC Standing Losses - L_S (lb/yr):	***5,565.369***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 1.2643/8760	=	**9.40**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 1.2643/8760	=	**26.59**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**41.17**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	0.0979	0.2771	0.4289
Methane (excluded from VOC total)	7.1440	0.6715	1.8998	2.9412
Ethane (excluded from VOC total)	12.7151	1.1952	3.3813	5.2349
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0006	0.0018	0.0028
Propane	20.1603	1.8950	5.3612	8.3002
Iso-Butane	6.7943	0.6386	1.8068	2.7973
N-Butane	24.7308	2.3246	6.5766	10.1818
Iso-Pentane	7.1127	0.6686	1.8915	2.9284
N-Pentane	10.4422	0.9815	2.7769	4.2991
Iso-Hexane	3.2510	0.3056	0.8645	1.3385
N-Hexane (TAP)	2.2186	0.2085	0.5900	0.9134
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.0140	0.0395	0.0611
Cyclohexane	0.3771	0.0354	0.1003	0.1553

Heptanes	2.5825	0.2427	0.6867	1.0632
Methylcyclohexane	0.2942	0.0277	0.0782	0.1211
Toluene (TAP)	0.2037	0.0192	0.0542	0.0839
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.0634	0.1794	0.2778
Ethylbenzene (TAP)	0.0122	0.0011	0.0032	0.0050
Xylenes (TAP)	0.0231	0.0022	0.0061	0.0095
Nonanes	0.0661	0.0062	0.0176	0.0272
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.25	0.69	1.08
Total VOC Emissions		**7.43**	**21.03**	**32.56**
Total Non VOC & Non TAP-HC		1.87	5.28	8.18
Total Hydrocarbon Emissions		9.40	26.59	41.17

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***1,825,000***
Gross Blanket Gas Required (MSCF/Yr):	***10,247***
Gas from Process to Tank(s) (MSCF/Yr):	***13,113***
Calculated Volume Requirement (MSCF/Yr):	***-2,865***

**There are no emissions associated with supplied blanket gas as flash generated from the gun barrel tank should be sufficient to maintain the gas blanket as demonstrated herein.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**32.56**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5377***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***2.22***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.09**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**2.22**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.40**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	1.0418	0.001	0.023	0.004
Methane (excluded from VOC total)	7.1440	0.007	0.159	0.028
Ethane (excluded from VOC total)	12.7151	0.012	0.282	0.051

Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.000	0.000
Propane	20.1603	0.018	0.448	0.080
Iso-Butane	6.7943	0.006	0.151	0.027
N-Butane	24.7308	0.023	0.549	0.099
Iso-Pentane	7.1127	0.006	0.158	0.028
N-Pentane	10.4422	0.010	0.232	0.042
Iso-Hexane	3.2510	0.003	0.072	0.013
N-Hexane (TAP)	2.2186	0.002	0.049	0.009
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1485	0.000	0.003	0.001
Cyclohexane	0.3771	0.000	0.008	0.002
Heptanes	2.5825	0.002	0.057	0.010
Methylcyclohexane	0.2942	0.000	0.007	0.001
Toluene (TAP)	0.2037	0.000	0.005	0.001
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.6747	0.001	0.015	0.003
Ethylbenzene (TAP)	0.0122	0.000	0.000	0.000
Xylenes (TAP)	0.0231	0.000	0.001	0.000
Nonanes	0.0661	0.000	0.001	0.000
Decanes Plus	0.0000	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.06	0.01
Total VOC Emissions		**0.07**	**1.76**	**0.32**
Total Non VOC & Non TAP-HC		0.02	0.44	0.08
Total Emissions		0.09	2.22	0.40

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the water vortex flume are routed to the control flare (EPN: 4-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***2a-07-WVF-CV***

EMISSION SOURCE DESCRIPTION: ***Water Vortex Flume-Common Vent (ABM-1122)***

DATA:

Emission Source:	***Crude Oil/Water Storage Vapors ('Working' & 'Standing')***
Average Daily Oil Throughput: **(Annual Average; BBLD - Q_{avg})**	***50***
Maximum Daily Oil Throughput: **(BBLD - Q_{max})**	***50***
Average Daily Water Throughput: **(Annual Average; BBLD - Q_{avg})**	***50000***
Maximum Daily Water Throughput: **(BBLD - Q_{max})**	***50000***
Average VOC Working Losses - L_W (lb/yr):	***88,635.699***
Average VOC Standing Losses - L_S (lb/yr):	***6.265***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 52.2569/8760	=	**528.79**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 52.2569/8760	=	**528.79**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**2316.08**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24050260-002A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	518.4637	518.4637	2270.8711
Methane (excluded from VOC total)	0.0270	0.1427	0.1427	0.6249
Ethane (excluded from VOC total)	0.0044	0.0233	0.0233	0.1020
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0365	0.0365	0.1601
Propane	0.0191	0.1008	0.1008	0.4414
Iso-Butane	0.1468	0.7760	0.7760	3.3989
N-Butane	0.1106	0.5851	0.5851	2.5627
Iso-Pentane	0.1414	0.7479	0.7479	3.2759
N-Pentane	0.1881	0.9948	0.9948	4.3573
Iso-Hexane	0.2512	1.3281	1.3281	5.8173
N-Hexane (TAP)	0.2070	1.0946	1.0946	4.7943

Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.3951	0.3951	1.7306
Cyclohexane	0.1077	0.5697	0.5697	2.4953
Heptanes	0.3226	1.7058	1.7058	7.4713
Methylcyclohexane	0.0990	0.5236	0.5236	2.2935
Toluene (TAP)	0.0324	0.1715	0.1715	0.7510
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1327	0.7019	0.7019	3.0744
Ethylbenzene (TAP)	0.0010	0.0053	0.0053	0.0232
Xylenes (TAP)	0.0075	0.0398	0.0398	0.1742
Nonanes	0.0700	0.3700	0.3700	1.6207
Decanes Plus	0.0017	0.0089	0.0089	0.0389
Total Weight Percent:	100.0000			
Total TAP Emissions		1.74	1.74	7.63
Total VOC Emissions		**10.12**	**10.12**	**44.32**
Total Non VOC & Non TAP-HC		0.17	0.17	0.73
Total Hydrocarbon Emissions		528.79	528.79	2316.08

DATA:

Emission Source:	***Flash Gas from Oil***
Flash Gas Specific Gravity:	***1.5304***
Average Oil Throughput: **(BBLD)**	***50***
Maximum Oil Throughput: **(BBLD)**	***50***
Basis of Emission Estimates:	***Actual GOR & Actual Flare Gas Analysis***
Flash Gas Analysis Report Number:	***Southern Petroleum Laboratories Report No.: 172-24050260-002A***

Estimates for gas volumes and composition associated with this stage of the process were derived from a laboratory test of an oil sample collected at this facility, refer to Southern Petroleum Laboratories Report No.: 23080183-007A in supporting documentation. The following table shows the actual field and laboratory conditions.

API Oil Gravity @ 60°F	**Process Conditions**		**Gas/Oil Ratio**
	Pressure (PSIG)	**Temperature (°F)**	**(SCF/BBL)**
Actual Facility & Laboratory Conditions:			
39.73	50	86	
	0	60	12.80
		GOR Estmiate:	**12.80**

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Oil Rate * GOR	=	**26.67**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**3.12**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Oil Rate to Avg. Oil Rate	=	**3.12**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * 8760/2000	=	**13.67**

SPECIATION FACTORS:

Speciation of the flash gas mixture taken from the referenced laboratory results and normalized to account for the removal of Nitrogen and the presence of H2S; refer to supporting documentation

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	3.0575	3.0575	13.3989
Methane (excluded from VOC total)	0.0270	0.0008	0.0008	0.0037
Ethane (excluded from VOC total)	0.0044	0.0001	0.0001	0.0006
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0002	0.0002	0.0009
Propane	0.0191	0.0006	0.0006	0.0026
Iso-Butane	0.1468	0.0046	0.0046	0.0201
N-Butane	0.1106	0.0035	0.0035	0.0151
Iso-Pentane	0.1414	0.0044	0.0044	0.0193
N-Pentane	0.1881	0.0059	0.0059	0.0257
Iso-Hexane	0.2512	0.0078	0.0078	0.0343
N-Hexane (TAP)	0.2070	0.0065	0.0065	0.0283
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.0023	0.0023	0.0102
Cyclohexane	0.1077	0.0034	0.0034	0.0147
Heptanes	0.3226	0.0101	0.0101	0.0441
Methylcyclohexane	0.0990	0.0031	0.0031	0.0135
Toluene (TAP)	0.0324	0.0010	0.0010	0.0044
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1327	0.0041	0.0041	0.0181
Ethylbenzene (TAP)	0.0010	0.0000	0.0000	0.0001
Xylenes (TAP)	0.0075	0.0002	0.0002	0.0010
Nonanes	0.0700	0.0022	0.0022	0.0096
Decanes Plus	0.0017	0.0001	0.0001	0.0002
Total Weight Percent:	100.0000			
Total TAP Emissions		0.01	0.01	0.05
Total VOC Emissions		**0.06**	**0.06**	**0.26**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		3.12	3.12	13.67

DATA:

Emission Source:	***Flash Gas from Brine Solution***
Approx. Pressure Drop of Brine Solution: (psig)	***50***
Approx. Temperature of Brine Solution: (ºF)	***86***
Flash Gas Specific Gravity:	***1.5304***
Avg. Water Throughput: (BBLD)	***50000***
Max. Water Throughput: (BBLD)	***50000***
Gas to Water Ratio: (SCF/BBL of Brine; GWR)	***0.5***
Basis of Emission Estimates:	***API Documentation & Actual Flare Gas Analysis (Refer to supporting documentation)***
Flash Gas Analysis Report Number:	***Southern Petroleum Laboratories Report No.: 172-24050260-002A***

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Brine Rate * GWR	=	**1041.67**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**121.79**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Water Rate to Avg. Water Rate	=	**121.79**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * 8760/2000	=	**533.44**

EMISSION ESTIMATES:

The magnitude of the solubility of natural gas in the interstitial water present in oil sands was studied by The American Petroleum Institute (API) and presented in a 1944 document entitled, "P-V-T and Solubility Relations". Results of these studies have been projected to provide estimates of gas volumes present in the brine solution handled at this site within the specific pressure and temperature ranges expected. The composition of this gas is based on the referenced analysis and normalized to account for the removal of Nitrogen and the presence of H2S.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	119.4174	119.4174	523.0279
Methane (excluded from VOC total)	0.0270	0.0329	0.0329	0.1439
Ethane (excluded from VOC total)	0.0044	0.0054	0.0054	0.0235
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0084	0.0084	0.0369
Propane	0.0191	0.0232	0.0232	0.1017
Iso-Butane	0.1468	0.1787	0.1787	0.7828
N-Butane	0.1106	0.1348	0.1348	0.5902
Iso-Pentane	0.1414	0.1723	0.1723	0.7545
N-Pentane	0.1881	0.2291	0.2291	1.0036
Iso-Hexane	0.2512	0.3059	0.3059	1.3398
N-Hexane (TAP)	0.2070	0.2521	0.2521	1.1042
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.0910	0.0910	0.3986
Cyclohexane	0.1077	0.1312	0.1312	0.5747
Heptanes	0.3226	0.3929	0.3929	1.7208
Methylcyclohexane	0.0990	0.1206	0.1206	0.5282
Toluene (TAP)	0.0324	0.0395	0.0395	0.1730
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000

Octanes	0.1327	0.1617	0.1617	0.7081
Ethylbenzene (TAP)	0.0010	0.0012	0.0012	0.0054
Xylenes (TAP)	0.0075	0.0092	0.0092	0.0401
Nonanes	0.0700	0.0852	0.0852	0.3733
Decanes Plus	0.0017	0.0020	0.0020	0.0090
Total Weight Percent:	100.0000			
Total TAP Emissions		0.40	0.40	1.76
Total VOC Emissions		**2.33**	**2.33**	**10.21**
Total Non VOC & Non TAP-HC		0.04	0.04	0.17
Total Emissions		121.79	121.79	533.44

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***18,268,250***
Gross Blanket Gas Required (MSCF/Yr):	***N/A****

**There are no emissions associated with supplied blanket gas as the water vortex flume maintains a constant level.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Oil Flash Gas + Brine Flash Gas + Blanket Gas	=	**54.79**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5304***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***168.98***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**6.95**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**168.98**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**30.42**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	98.0481	6.810	165.682	29.823
Methane (excluded from VOC total)	0.0270	0.002	0.046	0.008
Ethane (excluded from VOC total)	0.0044	0.000	0.007	0.001
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.012	0.002
Propane	0.0191	0.001	0.032	0.006
Iso-Butane	0.1468	0.010	0.248	0.045
N-Butane	0.1106	0.008	0.187	0.034
Iso-Pentane	0.1414	0.010	0.239	0.043
N-Pentane	0.1881	0.013	0.318	0.057
Iso-Hexane	0.2512	0.017	0.424	0.076

N-Hexane (TAP)	0.2070	0.014	0.350	0.063
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0747	0.005	0.126	0.023
Cyclohexane	0.1077	0.007	0.182	0.033
Heptanes	0.3226	0.022	0.545	0.098
Methylcyclohexane	0.0990	0.007	0.167	0.030
Toluene (TAP)	0.0324	0.002	0.055	0.010
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1327	0.009	0.224	0.040
Ethylbenzene (TAP)	0.0010	0.000	0.002	0.000
Xylenes (TAP)	0.0075	0.001	0.013	0.002
Nonanes	0.0700	0.005	0.118	0.021
Decanes Plus	0.0017	0.000	0.003	0.001
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.02	0.56	0.10
Total VOC Emissions		**0.13**	**3.23**	**0.58**
Total Non VOC & Non TAP-HC		0.00	0.05	0.01
Total Emissions		6.95	168.98	30.42

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the water vortex tank are routed to the control flare (EPN: 4-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***2b-07-WVT-CV***

EMISSION SOURCE DESCRIPTION: ***9700 BBL Water Vortex Tank-Common Vent (ABM-1120)***

DATA:

Emission Source:	***Water Storage Vapors ('Working' & 'Standing')***
Average Daily Water Throughput: **(Annual Average; BBLD - Q_{avg})**	***50000***
Maximum Daily Water Throughput: **(BBLD - Q_{max})**	***50000***
Average VOC Working Losses - L_W (lb/yr):	***16,304.054***
Average VOC Standing Losses - L_S (lb/yr):	***717.295***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 52.2569/8760	=	**101.54**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 52.2569/8760	=	**101.54**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**444.74**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24050260-002A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	99.5573	99.5573	436.0608
Methane (excluded from VOC total)	0.0270	0.0274	0.0274	0.1200
Ethane (excluded from VOC total)	0.0044	0.0045	0.0045	0.0196
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0070	0.0070	0.0307
Propane	0.0191	0.0194	0.0194	0.0848
Iso-Butane	0.1468	0.1490	0.1490	0.6527
N-Butane	0.1106	0.1124	0.1124	0.4921
Iso-Pentane	0.1414	0.1436	0.1436	0.6290
N-Pentane	0.1881	0.1910	0.1910	0.8367
Iso-Hexane	0.2512	0.2550	0.2550	1.1171
N-Hexane (TAP)	0.2070	0.2102	0.2102	0.9206
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.0759	0.0759	0.3323
Cyclohexane	0.1077	0.1094	0.1094	0.4792

Heptanes	0.3226	0.3275	0.3275	1.4347
Methylcyclohexane	0.0990	0.1005	0.1005	0.4404
Toluene (TAP)	0.0324	0.0329	0.0329	0.1442
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1327	0.1348	0.1348	0.5904
Ethylbenzene (TAP)	0.0010	0.0010	0.0010	0.0045
Xylenes (TAP)	0.0075	0.0076	0.0076	0.0335
Nonanes	0.0700	0.0711	0.0711	0.3112
Decanes Plus	0.0017	0.0017	0.0017	0.0075
Total Weight Percent:	100.0000			
Total TAP Emissions		0.33	0.33	1.47
Total VOC Emissions		**1.94**	**1.94**	**8.51**
Total Non VOC & Non TAP-HC		0.03	0.03	0.14
Total Hydrocarbon Emissions		101.54	101.54	444.74

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***18,250,000***
Gross Blanket Gas Required (MSCF/Yr):	***N/A****

**There are no emissions associated with supplied blanket gas as the water vortex tank maintains a constant level.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**8.51**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5304***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***8.46***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.35**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**8.46**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**1.52**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	98.0481	0.340	8.295	1.493
Methane (excluded from VOC total)	0.0270	0.000	0.002	0.000
Ethane (excluded from VOC total)	0.0044	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.001	0.000
Propane	0.0191	0.000	0.002	0.000

Iso-Butane	0.1468	0.001	0.012	0.002
N-Butane	0.1106	0.000	0.009	0.002
Iso-Pentane	0.1414	0.000	0.012	0.002
N-Pentane	0.1881	0.001	0.016	0.003
Iso-Hexane	0.2512	0.001	0.021	0.004
N-Hexane (TAP)	0.2070	0.001	0.018	0.003
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0747	0.000	0.006	0.001
Cyclohexane	0.1077	0.000	0.009	0.002
Heptanes	0.3226	0.001	0.027	0.005
Methylcyclohexane	0.0990	0.000	0.008	0.002
Toluene (TAP)	0.0324	0.000	0.003	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1327	0.000	0.011	0.002
Ethylbenzene (TAP)	0.0010	0.000	0.000	0.000
Xylenes (TAP)	0.0075	0.000	0.001	0.000
Nonanes	0.0700	0.000	0.006	0.001
Decanes Plus	0.0017	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.03	0.01
Total VOC Emissions		**0.01**	**0.16**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.35	8.46	1.52

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the produced water tank are routed to the control flare (EPN: 4-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***2d-07-WST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Produced Water Tank-Common Vent (1129A)***

DATA:

Emission Source:	***Water Storage Vapors ('Working' & 'Standing')***
Average Daily Water Throughput: **(Annual Average; BBLD - Q_{avg})**	***25000***
Maximum Daily Water Throughput: **(BBLD - Q_{max})**	***50000***
Average VOC Working Losses - L_W (lb/yr):	***8,181.377***
Average VOC Standing Losses - L_S (lb/yr):	***398.002***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 52.2569/8760	=	**51.18**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 52.2569/8760	=	**99.98**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**224.17**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24050260-002A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	50.1805	98.0331	219.7905
Methane (excluded from VOC total)	0.0270	0.0138	0.0270	0.0605
Ethane (excluded from VOC total)	0.0044	0.0023	0.0044	0.0099
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0035	0.0069	0.0155
Propane	0.0191	0.0098	0.0191	0.0427
Iso-Butane	0.1468	0.0751	0.1467	0.3290
N-Butane	0.1106	0.0566	0.1106	0.2480
Iso-Pentane	0.1414	0.0724	0.1414	0.3171
N-Pentane	0.1881	0.0963	0.1881	0.4217
Iso-Hexane	0.2512	0.1285	0.2511	0.5630
N-Hexane (TAP)	0.2070	0.1059	0.2070	0.4640
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.0382	0.0747	0.1675
Cyclohexane	0.1077	0.0551	0.1077	0.2415

Heptanes	0.3226	0.1651	0.3225	0.7231
Methylcyclohexane	0.0990	0.0507	0.0990	0.2220
Toluene (TAP)	0.0324	0.0166	0.0324	0.0727
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1327	0.0679	0.1327	0.2976
Ethylbenzene (TAP)	0.0010	0.0005	0.0010	0.0022
Xylenes (TAP)	0.0075	0.0039	0.0075	0.0169
Nonanes	0.0700	0.0358	0.0700	0.1569
Decanes Plus	0.0017	0.0009	0.0017	0.0038
Total Weight Percent:	100.0000			
Total TAP Emissions		0.17	0.33	0.74
Total VOC Emissions		**0.98**	**1.91**	**4.29**
Total Non VOC & Non TAP-HC		0.02	0.03	0.07
Total Hydrocarbon Emissions		51.18	99.98	224.17

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***9,125,000***
Gross Blanket Gas Required (MSCF/Yr):	***N/A****

**There are no emissions associated with supplied blanket gas as the produced water tank maintains a constant level.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**4.29**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5304***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***8.33***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.34**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**8.33**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**1.50**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	98.0481	0.336	8.167	1.470
Methane (excluded from VOC total)	0.0270	0.000	0.002	0.000
Ethane (excluded from VOC total)	0.0044	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.001	0.000
Propane	0.0191	0.000	0.002	0.000

Iso-Butane	0.1468	0.001	0.012	0.002
N-Butane	0.1106	0.000	0.009	0.002
Iso-Pentane	0.1414	0.000	0.012	0.002
N-Pentane	0.1881	0.001	0.016	0.003
Iso-Hexane	0.2512	0.001	0.021	0.004
N-Hexane (TAP)	0.2070	0.001	0.017	0.003
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0747	0.000	0.006	0.001
Cyclohexane	0.1077	0.000	0.009	0.002
Heptanes	0.3226	0.001	0.027	0.005
Methylcyclohexane	0.0990	0.000	0.008	0.001
Toluene (TAP)	0.0324	0.000	0.003	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1327	0.000	0.011	0.002
Ethylbenzene (TAP)	0.0010	0.000	0.000	0.000
Xylenes (TAP)	0.0075	0.000	0.001	0.000
Nonanes	0.0700	0.000	0.006	0.001
Decanes Plus	0.0017	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.03	0.00
Total VOC Emissions		**0.01**	**0.16**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.34	8.33	1.50

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the produced water tank are routed to the control flare (EPN: 4-07-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***2e-07-WST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Produced Water Tank-Common Vent (1129B)***

DATA:

Emission Source:	***Water Storage Vapors ('Working' & 'Standing')***
Average Daily Water Throughput: **(Annual Average; BBLD - Q_{avg})**	***25000***
Maximum Daily Water Throughput: **(BBLD - Q_{max})**	***50000***
Average VOC Working Losses - L_W (lb/yr):	***8,181.377***
Average VOC Standing Losses - L_S (lb/yr):	***398.002***
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***

Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) * 52.2569/8760	=	**51.18**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 52.2569/8760	=	**99.98**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**224.17**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24050260-002A in supporting documentation.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	50.1805	98.0331	219.7905
Methane (excluded from VOC total)	0.0270	0.0138	0.0270	0.0605
Ethane (excluded from VOC total)	0.0044	0.0023	0.0044	0.0099
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0035	0.0069	0.0155
Propane	0.0191	0.0098	0.0191	0.0427
Iso-Butane	0.1468	0.0751	0.1467	0.3290
N-Butane	0.1106	0.0566	0.1106	0.2480
Iso-Pentane	0.1414	0.0724	0.1414	0.3171
N-Pentane	0.1881	0.0963	0.1881	0.4217
Iso-Hexane	0.2512	0.1285	0.2511	0.5630
N-Hexane (TAP)	0.2070	0.1059	0.2070	0.4640
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.0382	0.0747	0.1675
Cyclohexane	0.1077	0.0551	0.1077	0.2415

Heptanes	0.3226	0.1651	0.3225	0.7231
Methylcyclohexane	0.0990	0.0507	0.0990	0.2220
Toluene (TAP)	0.0324	0.0166	0.0324	0.0727
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1327	0.0679	0.1327	0.2976
Ethylbenzene (TAP)	0.0010	0.0005	0.0010	0.0022
Xylenes (TAP)	0.0075	0.0039	0.0075	0.0169
Nonanes	0.0700	0.0358	0.0700	0.1569
Decanes Plus	0.0017	0.0009	0.0017	0.0038
Total Weight Percent:	100.0000			
Total TAP Emissions		0.17	0.33	0.74
Total VOC Emissions		**0.98**	**1.91**	**4.29**
Total Non VOC & Non TAP-HC		0.02	0.03	0.07
Total Hydrocarbon Emissions		51.18	99.98	224.17

DATA:

Emission Source:	***Blanket Gas***
Average Annual Tank Throughput (BBLs/Yr):	***9,125,000***
Gross Blanket Gas Required (MSCF/Yr):	***N/A****

**There are no emissions associated with supplied blanket gas as the produced water tank maintains a constant level.*

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	**4.29**

DATA:

Emission Source:	***Losses When Opening Thief Hatches***
Specific Gravity of Gas:	***1.5304***
Maximum Thief Hatch Venting (Hrs/Yr) **(Under Normal/Routine Operating Conditions)**	***30***
Max. Minutes a Hatch is Opened in a Single Hour:	***5***
Maximum Hourly Emission Rate (lb/hr): **(from preceding tank emission estimates)**	***8.33***

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.34**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**8.33**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**1.50**

EMISSION SUMMARY (based on the above referenced flare gas analysis):

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Water Vapor (excluded from VOC total)	0.0000	0.000	0.000	0.000
Nitrogen (excluded from VOC total)	0.0000	0.000	0.000	0.000
Carbon Dioxide (excluded from VOC total)	98.0481	0.336	8.167	1.470
Methane (excluded from VOC total)	0.0270	0.000	0.002	0.000
Ethane (excluded from VOC total)	0.0044	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.000	0.001	0.000
Propane	0.0191	0.000	0.002	0.000

Iso-Butane	0.1468	0.001	0.012	0.002
N-Butane	0.1106	0.000	0.009	0.002
Iso-Pentane	0.1414	0.000	0.012	0.002
N-Pentane	0.1881	0.001	0.016	0.003
Iso-Hexane	0.2512	0.001	0.021	0.004
N-Hexane (TAP)	0.2070	0.001	0.017	0.003
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0747	0.000	0.006	0.001
Cyclohexane	0.1077	0.000	0.009	0.002
Heptanes	0.3226	0.001	0.027	0.005
Methylcyclohexane	0.0990	0.000	0.008	0.001
Toluene (TAP)	0.0324	0.000	0.003	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1327	0.000	0.011	0.002
Ethylbenzene (TAP)	0.0010	0.000	0.000	0.000
Xylenes (TAP)	0.0075	0.000	0.001	0.000
Nonanes	0.0700	0.000	0.006	0.001
Decanes Plus	0.0017	0.000	0.000	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.03	0.00
Total VOC Emissions		**0.01**	**0.16**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.34	8.33	1.50

Emission Calculations

POINT SOURCE I.D. NUMBER: ***3-07-F***

EMISSION SOURCE DESCRIPTION: ***Control Flare (ZZZ-180)***

DATA:

Emission Source:	***Unburned Hydrocarbons and Products of Combustion***
Atmospheric Gas Streams:	
Gas Stream #1a:	***Oil Tank Truck Loading Vapors***
Gas Heat of Combustion (BTU/Ft^3-actual flare gas analysis):	***2510***
Gas Stream #1b:	***Oil Storage Tank Vapors***
Gas Heat of Combustion (BTU/Ft^3-actual flare gas analysis):	***2510***
Combustion Efficiency:	***98% for all other HC***

Gas Stream #1a - Oil Tank Truck Loading Vapors

Gas volume estimates are supported by the calculations associated with EPN: 26-12-LL and are outlined below:

INPUT

Maximum Gas Flowrate (scf/hr)	*Operating Time (hrs/year)*	*Burn Efficiency (%)*	*Gas Heat of Combustion (BTU/FT^3)*	*Specific Gravity of Gas*
718.51	*8690.00*	*98*	*2510*	*1.5377*

CALCULATIONS

Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*718.51*	*x*	*0.98*	*x*	*8,690*
	=	***6,118,975 scf/yr***		=	***704.14 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*6,118,975*	*x*	*2510*		
	=			***1.7533 MMBTU/Hr***		
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*1.5377*	*x*	*0.0764*	*x*	*718.51*
	=	***84.41 lbs/hr***				
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*1.5377*	*x*	*0.0000382*	*x*	*6,243,852*
	=	***366.76 TPY***				

SPECIATION FACTORS:

Speciation of the flash gas mixture is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	0.8724	0.8794	3.8211
Methane (excluded from VOC total)	7.1440	0.1196	0.1206	0.5240
Ethane (excluded from VOC total)	12.7151	0.2129	0.2147	0.9327
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0069	0.0001	0.0001	0.0005
Propane	20.1603	0.3376	0.3404	1.4788
Iso-Butane	6.7943	0.1138	0.1147	0.4984
N-Butane	24.7308	0.4142	0.4175	1.8141
Iso-Pentane	7.1127	0.1191	0.1201	0.5217
N-Pentane	10.4422	0.1749	0.1763	0.7660
Iso-Hexanes	3.2510	0.0544	0.0549	0.2385
N-Hexane (TAP)	2.2186	0.0372	0.0375	0.1627
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.0025	0.0025	0.0109
Cyclohexane	0.3771	0.0063	0.0064	0.0277
Heptanes	2.5825	0.0432	0.0436	0.1894
Methylcyclohexane	0.2942	0.0049	0.0050	0.0216
Toluene (TAP)	0.2037	0.0034	0.0034	0.0149
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.0113	0.0114	0.0495
Ethylbenzene (TAP)	0.0122	0.0002	0.0002	0.0009
Xylenes (TAP)	0.0231	0.0004	0.0004	0.0017
Nonanes	0.0661	0.0011	0.0011	0.0048
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Other NM/NE HC	0.0000	0.0000	0.0000	0.0000
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.04	0.04	0.19
TOTAL VOC EMISSIONS:		**1.32**	**1.34**	**5.80**
TOTAL Non-VOC & Non-TAP HC:		0.33	0.34	1.46
TOTAL EMISSIONS:		2.53	2.55	11.08

Gas Stream #1b - Oil Storage Tank Vapors

Gas volume estimates are supported by the calculations associated with EPNs: 1a-07-GBT-CV through 1e-12-OST-CV and are outlined below:

INPUT				
Maximum Gas Flowrate (scf/hr)	*Operating Time (hrs/year)*	*Burn Efficiency (%)*	*Gas Heat of Combustion (BTU/FT^3)*	*Specific Gravity of Gas*
9,372.06	*8760*	*98*	*2510*	*1.5377*

CALCULATIONS							
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*	
	=	*9,372.06*	*x*	*0.98*	*x*	*8,760*	
	=	***80,457,261***	***scf/yr***	=	***9,184.62***	***SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*			
	=	*80,457,261*	*x*	*2510*			
	=			***23.0534***	***MMBTU/Hr***		
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*	
	=	*1.5377*	*x*	*0.0764*	*x*	*9,372.06*	
	=	***1,101.03***	***lbs/hr***				
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*	
	=	*1.5377*	*x*	*0.0000382*	*x*	*82,099,246*	
	=	***4,822.52***	***TPY***				

SPECIATION FACTORS:

Speciation of the flash gas mixture is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to in supporting documentation.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	0.8724	0.8794	3.8211
Methane (excluded from VOC total)	7.1440	0.1196	0.1206	0.5240
Ethane (excluded from VOC total)	12.7151	0.2129	0.2147	0.9327
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0069	0.0001	0.0001	0.0005
Propane	20.1603	0.3376	0.3404	1.4788
Iso-Butane	6.7943	0.1138	0.1147	0.4984
N-Butane	24.7308	0.4142	0.4175	1.8141
Iso-Pentane	7.1127	0.1191	0.1201	0.5217
N-Pentane	10.4422	0.1749	0.1763	0.7660
Iso-Hexanes	3.2510	0.0544	0.0549	0.2385
N-Hexane (TAP)	2.2186	0.0372	0.0375	0.1627
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.0025	0.0025	0.0109
Cyclohexane	0.3771	0.0063	0.0064	0.0277

Heptanes	2.5825	0.0432	0.0436	0.1894
Methylcyclohexane	0.2942	0.0049	0.0050	0.0216
Toluene (TAP)	0.2037	0.0034	0.0034	0.0149
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.0113	0.0114	0.0495
Ethylbenzene (TAP)	0.0122	0.0002	0.0002	0.0009
Xylenes (TAP)	0.0231	0.0004	0.0004	0.0017
Nonanes	0.0661	0.0011	0.0011	0.0048
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Other NM/NE HC	0.0000	0.0000	0.0000	0.0000
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.04	0.04	0.19
TOTAL VOC EMISSIONS:		**1.32**	**1.34**	**5.80**
TOTAL Non-VOC & Non-TAP HC:		0.33	0.34	1.46
TOTAL EMISSIONS:		2.53	2.55	11.08

Total of Average Hourly VOC emissions estimated for this source:	**2.64 Lbs/Hr**
Total of Maximum Hourly VOC emissions estimated for this source:	**2.68 Lbs/Hr**
Total of Maximum Annual VOC emissions estimated for this source:	**11.60 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)*
1a. Oil Tank Truck Loading Vapors	8690	712.77	718.51	1.7533	1.7674
1b. Oil Storage Tank Vapors	8760	9372.06	9372.06	23.0534	23.0534
Totals:		***10,084.83***	***10,090.57***	***24.81***	***24.82***

Emission factor for soot is from AP-42 "Compilation of Air Pollution Emission Factors" for an industrial burn flare stack (refer to supporting documentation for copies).
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	0.11	0.11	0.49
Soot (expressed as $PM_{2.5}$)	0.000011	0.11	0.11	0.49
SO_2	N/A	0.01	0.01	0.09

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 supporting documentation for copies).

POLLUTANT:	Emission Factor ($lb/10^6$ BTU)	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen Oxides	0.1380	3.42	3.43	15.00
CO	0.2755	6.84	6.84	29.94

Emission Calculations

POINT SOURCE I.D. NUMBER: ***4-07-F***

EMISSION SOURCE DESCRIPTION: ***Atmospheric Control Flare (ZZZ-181)***

DATA:

Emission Source:	***Unburned Hydrocarbons and Products of Combustion***
Atmospheric Gas Streams:	
Gas Stream #1:	***Water Storage Tank Vapors***
Gas Heat of Combustion (BTU/Ft^3-actual flare gas analysis):	***47***
Assist Gas Feed:	***Yes***
Gas Heat of Combustion (BTU/Ft^3-propane):	***2516***
Combustion Efficiency:	***98% for all other HC***

Gas Stream #1 - Water Storage Tank Vapors

Gas volume estimates are supported by the calculations associated with EPNs: 2a-07-WFV-CV through 2e-07-WST-CV and are outlined below:

INPUT

Maximum Gas Flowrate (scf/hr)	*Operating Time (hrs/year)*	*Burn Efficiency (%)*	*Gas Heat of Combustion (BTU/FT^3)*	*Specific Gravity of Gas*
7,334.80	*8760*	*98*	*47*	*1.5304*

CALCULATIONS

Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*7,334.80*	*x*	*0.98*	*x*	*8,760*
	=	***62,967,791***	***scf/yr***	=	***7,188.10***	***SCF/hr***
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*62,967,791*	*x*	*47*		
	=			***0.3378***	***MMBTU/Hr***	
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*1.5304*	*x*	*0.0764*	*x*	*7,334.80*
	=	***857.60***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*1.5304*	*x*	*0.0000382*	*x*	*64,252,848*
	=	***3,756.30***	***TPY***			

SPECIATION FACTORS:

Speciation of the flash gas mixture is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24050260-002A in supporting documentation.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	98.0481	840.8639	840.8639	3682.9839
Methane (excluded from VOC total)	0.0270	0.0046	0.0046	0.0203
Ethane (excluded from VOC total)	0.0044	0.0008	0.0008	0.0033
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0069	0.0012	0.0012	0.0052
Propane	0.0191	0.0033	0.0033	0.0143
Iso-Butane	0.1468	0.0252	0.0252	0.1102
N-Butane	0.1106	0.0190	0.0190	0.0831
Iso-Pentane	0.1414	0.0243	0.0243	0.1063
N-Pentane	0.1881	0.0323	0.0323	0.1413
Iso-Hexanes	0.2512	0.0431	0.0431	0.1887
N-Hexane (TAP)	0.2070	0.0355	0.0355	0.1555
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0747	0.0128	0.0128	0.0561
Cyclohexane	0.1077	0.0185	0.0185	0.0809
Heptanes	0.3226	0.0553	0.0553	0.2423
Methylcyclohexane	0.0990	0.0170	0.0170	0.0744
Toluene (TAP)	0.0324	0.0056	0.0056	0.0244
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1327	0.0228	0.0228	0.0997
Ethylbenzene (TAP)	0.0010	0.0002	0.0002	0.0008
Xylenes (TAP)	0.0075	0.0013	0.0013	0.0057
Nonanes	0.0700	0.0120	0.0120	0.0526
Decanes Plus	0.0017	0.0003	0.0003	0.0013
Other NM/NE HC	0.0000	0.0000	0.0000	0.0000
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.06	0.06	0.25
TOTAL VOC EMISSIONS:		**0.33**	**0.33**	**1.44**
TOTAL Non-VOC & Non-TAP HC:		0.01	0.01	0.02
TOTAL EMISSIONS:		841.20	841.20	3684.45

Assist Gas (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*	
490.00	*8760*	*98*	*2516*		*1.52*	
CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*490.00*	*x*	*0.98*	*x*	*8,760*
	=	***4,206,552***	***scf/yr***	=	***480.20***	***SCF/hr***
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*4,206,552*	*x*	*2516*		
	=				***1.2082***	***MMBTU/Hr***
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*1.5200*	*x*	*0.0764*	*x*	*490.00*
	=	***56.90***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*1.5200*	*x*	*0.0000382*	*x*	*4,292,400*
	=	***249.23***	***TPY***			

SPECIATION FACTORS:

Speciation of the assist gas is based on propane.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Propane	100.000	1.1381	1.1381	4.9847
TOTAL WEIGHT PERCENT:	100.000			
TOTAL TAP EMISSIONS:		0.00	0.00	0.00
TOTAL VOC EMISSIONS:		**1.14**	**1.14**	**4.98**
TOTAL Non-VOC & Non-TAP HC:		0.00	0.00	0.00
TOTAL EMISSIONS:		1.14	1.14	4.98

Total of Average Hourly VOC emissions estimated for this source:	**1.47 Lbs/Hr**
Total of Maximum Hourly VOC emissions estimated for this source:	**1.47 Lbs/Hr**
Total of Maximum Annual VOC emissions estimated for this source:	**6.42 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. Water Storage Tank Vapors	8760	7334.80	7334.80	0.3378	0.3378
Assist Gas Feed	8760	490.00	490.00	1.2082	1.2082
	Totals:	***7,824.80***	***7,824.80***	***1.55***	***1.55***

Emission factor for soot is from AP-42 "Compilation of Air Pollution Emission Factors" for an industrial burn flare stack (refer to supporting documentation for copies).
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	0.09	0.09	0.38
Soot (expressed as $PM_{2.5}$)	0.000011	0.09	0.09	0.38
SO_2	N/A	0.11	0.11	0.49

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 supporting documentation for copies).

POLLUTANT:	**Emission Factor ($lb/10^6$ BTU)**	**CALCULATED EMISSION RATES**		
		Average Hourly (lb/hr)	**Maximum Hourly (lb/hr)**	**Annual (TPY)**
Nitrogen Oxides	0.0641	0.10	0.10	0.44
CO	0.5496	0.85	0.85	3.73

Emission Calculations

POINT SOURCE I.D. NUMBER: *5-07-SBP*

EMISSION SOURCE DESCRIPTION: *Sand Blowdown Pit (ZZZ-130)*

DATA:

Emission Source:	***Flash Gas from Brine Solution****
Approx. Pressure Drop of Brine Solution: (psig)	***400***
Approx. Temperature of Brine Solution: (ºF)	***72***
Flash Gas Specific Gravity:	***0.6131***
Avg. Water Throughput: (BBL/Hr)	***50***
Max. Water Throughput: (BBL/Hr)	***50***
Blowdown Hours per Year:	***730***
Gas to Water Ratio: (SCF/BBL of Brine; GWR)	***4.0***
Basis of Emission Estimates:	***API Documentation & Actual Inlet Gas Analysis (Refer to supporting documentation)***
Flash Gas Analysis Report Number:	***Southern Petroleum Laboratories Report No.: 172-23080183-004A***

**Associated with vessel blowdowns.*

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Brine Rate * GWR	=	**200.00**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**9.37**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Water Rate to Avg. Water Rate	=	**9.37**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * Blowdown Hours/2000	=	**3.42**

EMISSION ESTIMATES:

The magnitude of the solubility of natural gas in the interstitial water present in oil sands was studied by The American Petroleum Institute (API) and presented in a 1944 document entitled, "P-V-T and Solubility Relations". Results of these studies have been projected to provide estimates of gas volumes present in the brine solution handled at this site within the specific pressure and temperature ranges expected. The composition of this gas is based on the referenced analysis and normalized to account for the presence of H_2S.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.7206	0.0675	0.0675	0.0246
Carbon Dioxide (excluded from VOC total)	8.4215	0.7889	0.7889	0.2880
Methane (excluded from VOC total)	85.0332	7.9661	7.9661	2.9082
Ethane (excluded from VOC total)	0.8973	0.0841	0.0841	0.0307
Hydrogen Sulfide (excluded from VOC total)	0.0173	0.0016	0.0016	0.0006
Propane	1.1157	0.1045	0.1045	0.0382
Iso-Butane	0.3664	0.0343	0.0343	0.0125
N-Butane	0.9225	0.0864	0.0864	0.0315
Iso-Pentane	0.5157	0.0483	0.0483	0.0176
N-Pentane	0.4382	0.0411	0.0411	0.0150
Iso-Hexane	0.3373	0.0316	0.0316	0.0115
N-Hexane (TAP)	0.1880	0.0176	0.0176	0.0064

Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0391	0.0037	0.0037	0.0013
Cyclohexane	0.1051	0.0098	0.0098	0.0036
Heptanes	0.3426	0.0321	0.0321	0.0117
Methylcyclohexane	0.1336	0.0125	0.0125	0.0046
Toluene (TAP)	0.0181	0.0017	0.0017	0.0006
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1696	0.0159	0.0159	0.0058
Ethylbenzene (TAP)	0.0024	0.0002	0.0002	0.0001
Xylenes (TAP)	0.0185	0.0017	0.0017	0.0006
Nonanes	0.1219	0.0114	0.0114	0.0042
Decanes Plus	0.0752	0.0070	0.0070	0.0026
Total Weight Percent:	100.0000			
Total TAP Emissions		0.03	0.03	0.01
Total VOC Emissions		**0.46**	**0.46**	**0.17**
Total Non VOC & Non TAP-HC		8.05	8.05	2.94
Total Emissions		9.37	9.37	3.42

Uncontrolled VOC Emission Total (TPY)	Brine Flash Gas	=	**0.17**

Emission Calculations

POINT SOURCE I.D. NUMBERS: *16-07-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	78	1,527	1605	2.1E-04	2.0E-04	0.036	0.673	0.16	2.95
Flanges	92	0	92	1.1E-04	3.9E-04	0.022	0.000	0.10	0.00
Open Ends	0	47	47	1.4E-03	2.0E-03	0.000	0.207	0.00	0.91
Pumps[(a)]	9		9	1.3E-02	2.4E-03	0.258	N/A	1.13	N/A
Valves	48	563	611	2.5E-03	4.5E-03	0.265	5.585	1.16	24.46
"Others"[(b)]	0	32	32	7.5E-03	8.8E-03	0.000	0.621	0.00	2.72
TOTALS:	**227**	**2,169**	**2,396**			**0.58**	**7.09**	**2.54**	**31.04**

[(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 supporting documentation

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" and normalized to account for the presence of H_2S.

EMISSIONS SUMMARY:

Component	Weight Percent	Calculated Emission Rate	
		Avg. Hourly (lb/hr)	Avg. Annual (TPY)
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0136	0.0001	0.0003
NMEHC (expressed as VOC)	29.1960	0.1696	0.7429
Benzene (TAP)	0.0270	0.0002	0.0007
Ethylbenzene (TAP)	0.0170	0.0001	0.0004

Toluene (TAP)	0.0750	0.0004	0.0019
Xylenes (m,p,o) (TAP)	0.0360	0.0002	0.0009
	TOTAL TAP EMISSIONS:	0.00	0.00
	TOTAL VOC EMISSIONS:	**0.17**	**0.74**

GAS SERVICE SPECIATION FACTORS:

Speciation of the emission stream from components in gas service is based on an actual inlet gas analysis and normalized to account for the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-23080183-004A in supporting documentation.

EMISSIONS SUMMARY:

Component	Weight Percent	Calculated Emission Rate	
		Avg. Hourly (lb/hr)	Avg. Annual (TPY)
Nitrogen (excluded from VOC total)	0.7206	0.0511	0.2237
Carbon Dioxide (excluded from VOC total)	8.4215	0.5968	2.6140
Methane (excluded from VOC total)	85.0332	6.0261	26.3944
Ethane (excluded from VOC total)	0.8973	0.0636	0.2785
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0173	0.0012	0.0054
Propane	1.1157	0.0791	0.3463
Iso-Butane	0.3664	0.0260	0.1137
N-Butane	0.9225	0.0654	0.2863
Iso-Pentane	0.5157	0.0365	0.1601
N-Pentane	0.4382	0.0311	0.1360
Iso-Hexanes	0.3373	0.0239	0.1047
N-Hexane (TAP)	0.1880	0.0133	0.0584
Methylcyclopentane	0.0000	0.0000	0.0000
Benzene (TAP)	0.0391	0.0028	0.0121
Cyclohexane	0.1051	0.0074	0.0326
Heptanes	0.3426	0.0243	0.1064
Methylcyclohexane	0.1336	0.0095	0.0415
Toluene (TAP)	0.0181	0.0013	0.0056
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000
Octanes	0.1696	0.0120	0.0526
Ethylbenzene (TAP)	0.0024	0.0002	0.0007
Xylenes (TAP)	0.0185	0.0013	0.0057
Nonanes	0.1219	0.0086	0.0378
Decanes Plus	0.0752	0.0053	0.0233
TOTAL WEIGHT PERCENT:	100.0000		
	TOTAL TAP EMISSIONS:	0.02	0.09
	TOTAL VOC EMISSIONS:	**0.35**	**1.52**
	TOTAL Non-VOC & Non-TAP HC:	6.09	26.67
	TOTAL Emissions:	7.09	31.04

Facility-Wide VOC Fugitive Totals	=	**0.52 lb/hr**	**2.26 TPY**

Emission Calculations

POINT SOURCE I.D. NUMBER: ***17-07-CB***

EMISSION SOURCE DESCRIPTION: ***Compressor Blowdowns***

DATA:

Emission Source:	***Compressor Blowdowns***
Gas Specific Gravity:	***0.6131***
Maximum Volume per Blowdown Rate (SCF): *(conservative estimate provided by operator)*	***45841***
Maximum Number of Blowdowns per Year:	***60***
Basis of Emission Estimates:	***Conservative Estimate Provided By Operator & Actual Inlet Gas Analysis (Refer to supporting documentation)***
Well Gas Analysis Report Number:	***Southern Petroleum Laboratories Report No.: 172-23080183-004A***

Total Blowdown Gas Volume (SCF/Yr)	=	Volume per Event * Number of Events	=	**2750460.00**
Avg. Hourly Uncontrolled Total Emissions (lb/hr)	=	Gas Gravity * Density of Air * Volume per Blowdown	=	**2147.23**
Max. Hourly Uncontrolled Total Emissions (lb/hr)	=	Gas Gravity * Density of Air * Volume per Blowdown	=	**2147.23**
Annual Potential Uncontrolled Total Emissions (TPY)	=	Hourly * Number of Events per Year/2000	=	**64.42**

SPECIATION FACTORS:

Speciation of the compressor blowdowns is based on the referenced analysis and normalized to account for the presence of H2S.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.7206	15.4732	15.4732	0.4642
Carbon Dioxide (excluded from VOC total)	8.4215	180.8290	180.8290	5.4249
Methane (excluded from VOC total)	85.0332	1825.8588	1825.8588	54.7757
Ethane (excluded from VOC total)	0.8973	19.2672	19.2672	0.5780
Hydrogen Sulfide (excluded from VOC total)	0.0173	0.3704	0.3704	0.0111
Propane	1.1157	23.9576	23.9576	0.7187
Iso-Butane	0.3664	7.8681	7.8681	0.2360
N-Butane	0.9225	19.8072	19.8072	0.5942
Iso-Pentane	0.5157	11.0739	11.0739	0.3322
N-Pentane	0.4382	9.4098	9.4098	0.2823
Iso-Hexane	0.3373	7.2430	7.2430	0.2173
N-Hexane (TAP)	0.1880	4.0378	4.0378	0.1211
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0391	0.8395	0.8395	0.0252
Cyclohexane	0.1051	2.2562	2.2562	0.0677
Heptanes	0.3426	7.3571	7.3571	0.2207
Methylcyclohexane	0.1336	2.8694	2.8694	0.0861
Toluene (TAP)	0.0181	0.3894	0.3894	0.0117

2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1696	3.6417	3.6417	0.1093
Ethylbenzene (TAP)	0.0024	0.0513	0.0513	0.0015
Xylenes (TAP)	0.0185	0.3974	0.3974	0.0119
Nonanes	0.1219	2.6175	2.6175	0.0785
Decanes Plus	0.0752	1.6151	1.6151	0.0485
Total Weight Percent:	100.0000			
Total TAP Emissions		6.09	6.09	0.18
Total VOC Emissions		**105.43**	**105.43**	**3.16**
Total Non VOC & Non TAP-HC		1845.13	1845.13	55.35
Total Emissions		2147.23	2147.23	64.42

Uncontrolled VOC Emission Total (TPY)	Compressor Blowdowns	=	**3.16**

Emission Calculations

POINT SOURCE I.D. NUMBER: ***19-13-CST***

EMISSION SOURCE DESCRIPTION: ***10-Chemical Storage Tanks (≤13,000 Gallons)***

DATA:

Emission Source:	***"Working" & "Standing" Losses***		
Maximum Annual Throughput: **(Gallons/Yr/Tank)**	***13,000***		
Average VOC Working Losses - L_W (lb/yr):	***678.087***		
Average VOC Standing Losses - L_S (lb/yr):	***14,101.230***		
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***		
Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) / 8760	=	**1.69**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**7.39**

For purposes of permitting and/or providing conservative emission estimates, emissions were calculated using N-Hexane as the stored material for this tank. A throughput of approximately 130,000 gallons/yr was used in the emissions model in an effort to demonstrate a conservative potential emissions estimate.

Emission Calculations

POINT SOURCE I.D. NUMBER: ***20-13-CST***

EMISSION SOURCE DESCRIPTION: ***50-Chemical Storage Tanks (≤1,000 Gallons)***

DATA:

Emission Source:	***"Working" & "Standing" Losses***		
Maximum Annual Throughput: **(Gallons/Yr/Tank)**	***2,000***		
Average VOC Working Losses - L_W (lb/yr):	***247.677***		
Average VOC Standing Losses - L_S (lb/yr):	***7,136.200***		
Basis of Estimates:	***AP-42, Chapter 7 (June 2020, Section 7.1.3.1); Refer to supporting documentation for summary***		
Avg. Hourly Uncontrolled THC Losses (lb/hr)	= (Lw + Ls) / 8760	=	**0.84**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**3.69**

For purposes of permitting and/or providing conservative emission estimates, emissions were calculated using N-Hexane as the stored material for this tank. A throughput of approximately 100,000 gallons/yr was used in the emissions model in an effort to demonstrate a conservative potential emissions estimate.

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors associated with oil tank truck loading are routed to the control flare (EPN: 3-07-F) for combustion.

POINT SOURCE I.D. NUMBER: ***26-12-LL***

EMISSION SOURCE DESCRIPTION: ***Loading Losses-Oil Transfer to Tank Truck***

DATA:

Emission Source:	***Vapors from Oil Truck Loading***
Maximum Annual Loading Volume-Barrels (Q):	***5,475,000***
Average Oil Temperature - °F:	***80***
Average Oil Temperature - °R (T):	***540***
API Oil Gravity@ 100 °F (APIG):	***43.0***
Vapor Molecular Weight - lb/lb/mole (M):	***50***
Saturation Factor (S):	***0.6***
Reid Vapor Pressure = -1.699 + (0.179 x APIG): **(from Eq. 3-5 of API Pub. No.: 4683)**	***6.00***
True Vapor Pressure (P): **(from Fig. 7.1-13b of AP-42)**	***5.33***
Loading Rate-Barrels/Hr (R): **(conservative estimate)**	***630***
Basis of Loading Loss Estimates:	***AP-42; June 2008 edition; refer to supporting documentation***

Annual Uncontrolled Total Emissions (TPY)	= 12.46 * S * P * M/T*Q*42/2000/1000 gallons loaded	=	**421.82**
Hourly Uncontrolled Total Emissions (lb/hr)	= 12.46 * S * P * M/T*R*42/1000 gallons loaded	=	**97.08**
Max. Hourly Uncontrolled Total Emissions (lb/hr)	= 12.46 * S * P * M/T*R*42/1000 gallons loaded	=	**97.08**

SPECIATION FACTORS:

The composition of this gas is based on an actual analysis of the vapors routed to the control flare and normalized to account for the removal of Nitrogen and the presence of H2S; refer to Southern Petroleum Laboratories Report No.: 172-24090228-001A in supporting documentation.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (excluded from VOC total)	1.0418	1.0114	1.0114	4.3947
Methane (excluded from VOC total)	7.1440	6.9354	6.9354	30.1346
Ethane (excluded from VOC total)	12.7151	12.3438	12.3438	53.6350
Hydrogen Sulfide (excluded from VOC total)	0.0069	0.0067	0.0067	0.0290
Propane	20.1603	19.5717	19.5717	85.0404
Iso-Butane	6.7943	6.5959	6.5959	28.6598
N-Butane	24.7308	24.0087	24.0087	104.3194

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Iso-Pentane	7.1127	6.9050	6.9050	30.0029
N-Pentane	10.4422	10.1373	10.1373	44.0475
Iso-Hexane	3.2510	3.1561	3.1561	13.7135
N-Hexane (TAP)	2.2186	2.1538	2.1538	9.3583
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1485	0.1441	0.1441	0.6262
Cyclohexane	0.3771	0.3661	0.3661	1.5908
Heptanes	2.5825	2.5071	2.5071	10.8934
Methylcyclohexane	0.2942	0.2857	0.2857	1.2412
Toluene (TAP)	0.2037	0.1978	0.1978	0.8594
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.6747	0.6550	0.6550	2.8461
Ethylbenzene (TAP)	0.0122	0.0118	0.0118	0.0515
Xylenes (TAP)	0.0231	0.0224	0.0224	0.0974
Nonanes	0.0661	0.0642	0.0642	0.2789
Decanes Plus	0.0000	0.0000	0.0000	0.0000
Total Weight Percent	100.0000			
Total TAP Emissions		2.54	2.54	11.02
Total VOC Emissions		**76.78**	**76.78**	**333.63**
Total Non VOC & Non TAP-HC		19.28	19.28	83.77
Total Emissions		97.08	97.08	421.82

Calculated Max. Gas Flowrate (SCFH) = **718.51**

Michael Watson
SECRETARY OF STATE

This is not an official certificate of good standing.

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:	5851 Legacy Circle, Suite 1200 Plano, TX 75024

Registered Agent

Name

CORPORATION SERVICE COMPANY
109 Executive Drive, Suite 3
Madison, MS 39110

Officers & Directors

Name	Title
Alan Rhoades 5320 LEGACY DRIVE PLANO, TX 75024	Organizer
KATHLEEN D ASH 5851 LEGACY CIRCLE, SUITE 1200 PLANO, TX 75024	Manager
KATHLEEN A BRACCI 5851 LEGACY CIRCLE, SUITE 1200 PLANO, TX 75024	Manager
ROBERT D TRACY 5851 LEGACY CIRCLE, SUITE 1200 PLANO, TX 75024	Manager

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

Tank ID	**1a-07-GBT-CV**
Tank Description	**5000 BBL Gun Barrel Tank (ABJ-1111)**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Vertical**
Tank Diameter (D ft)	**38.70**
Vertical Height/Horizontal Length (H_S ft)	**24.00**
Roof Height (H_R ft)	**1.21**
Max Liquid Height (H_{LX} ft)	**23.00**
Avg Liquid Height (H_L ft)	**11.50**
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)	**0.64**
Roof Paint Solar Absorptance (R_A)	**0.64**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	**0.4031**

Tank Shell Color/Shade	**Aluminum - Diffuse**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Aluminum - Diffuse**
Tank Roof Paint Condition	**average**
Roof Type	**vertical tank with cone roof**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**5,475,000.00**
Annual Turnovers, N	**1136.10**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**27,054.51**
vapor space outage (H_{VO} ft)	**12.903**
vapor space volume (V_V ft^3)	**15,177.73**

Major City for Meterological Data	**Jackson, MS**
Site Elevation (ft)	**300**
Atmospheric Pressure (P_A psia)	**14.537**
Table 7.1-2 Liquid	**crude oil**
*RVP**	**6.00**
*API gravity**	**39.7**
*°F basis for gv**	**60.0**
bubble point psia	
API gravity at 60F	**39.7**
API gravity at 100F	**43.0**
Working Loss Product Factor (K_P)	**0.75**
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):

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
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						
0	0.000						
	0.000		0.000	0.000			

	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)	48.25	52.04	59.63	67.88	76.45	82.99	85.38	84.85	79.03	67.92	56.87	49.39	67.55
average vapor temperature (T_V °F)	51.58	56.46	65.44	75.37	84.65	91.59	93.75	92.71	85.72	73.28	60.79	52.48	73.65
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)	23.67	28.35	33.06	38.23	39.04	39.78	38.50	37.53	34.87	32.39	27.48	23.52	33.06
daily average liquid surface temperature (T_{LA} °F)	49.92	54.25	62.54	71.63	80.55	87.29	89.56	88.78	82.37	70.60	58.83	50.94	70.60
daily maximum liquid surface temperature (T_{LX} °F)	55.83	61.34	70.80	81.18	90.31	97.23	99.19	98.16	91.09	78.70	65.70	56.82	78.86
daily minimum liquid surface temperature (T_{LN} °F)	44.00	47.16	54.27	62.07	70.79	77.34	79.94	79.40	73.66	62.51	51.96	45.06	62.34
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	3.045	3.312	3.875	4.576	5.360	6.019	6.255	6.172	5.532	4.493	3.614	3.106	4.492
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	3.414	3.789	4.509	5.419	6.334	7.105	7.336	7.214	6.418	5.190	4.108	3.479	5.204
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	2.708	2.884	3.313	3.841	4.508	5.067	5.303	5.253	4.746	3.872	3.168	2.766	3.860
daily vapor pressure range (ΔP_V)	0.7061	0.9047	1.1959	1.5787	1.8260	2.0379	2.0326	1.9604	1.6714	1.3174	0.9400	0.7128	1.3443
vapor space expansion factor (K_E)	0.1079	0.1358	0.1755	0.2305	0.2712	0.3120	0.3155	0.3028	0.2500	0.1922	0.1391	0.1084	0.1962
vapor molecular weight (M_V lb/lbmole)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
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	2,610,510	2,357,880	2,610,510	2,526,300	2,610,510	2,526,300	2,610,510	2,610,510	2,526,300	2,610,510	2,526,300	2,610,510	30,736,650
monthly turnovers (N/month) with avg = total annual	96.49	87.15	96.49	93.38	96.49	93.38	96.49	96.49	93.38	96.49	93.38	96.49	1,136.10
vented vapor saturation factor (K_S)	0.3245	0.3063	0.2740	0.2421	0.2143	0.1955	0.1895	0.1915	0.2091	0.2455	0.2881	0.3201	0.2456
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)	0.0277	0.0299	0.0344	0.0399	0.0459	0.0509	0.0527	0.0521	0.0473	0.0393	0.0324	0.0283	0.0392
standing storage losses (L_S lb/month & avg is lb/yr)	628.93	612.09	779.22	874.18	1039.96	1115.86	1193.60	1180.11	1036.71	890.29	709.68	640.45	10701.06
working losses (L_W lb/month & avg is lb/yr)	54327.47	52872.66	67309.83	75512.85	89832.72	96388.94	103104.80	101939.24	89552.27	76903.91	61302.82	55322.98	924370.49
total losses (L_T lb/month & avg is lb/yr)	54956.40	53484.75	68089.05	76387.03	90872.68	97504.79	104298.40	103119.35	90588.98	77794.19	62012.50	55963.43	935071.55
max hourly Q in bbl/hour	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	3508.75	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	73.021	78.680	90.470	104.879	120.743	133.874	138.582	137.015	124.378	103.365	85.143	74.359	
breathing/standing loss (L_S lb/hr)	0.845	0.911	1.047	1.407	1.687	1.962	1.991	1.910	1.562	1.197	0.986	0.861	
max hourly total loss (L_T lb/hr)	73.866	79.590	91.518	106.285	122.430	135.835	140.573	138.925	125.940	104.562	86.128	75.220	

L_S sum months	L_W sum months	L_T sum months
10701.06	924370.49	935071.55

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	**1.196**	**1.991**	**10,474.464**
Working Loss L_W	**103.287**	**138.582**	**904,796.691**
Total Loss L_T	**104.483**	**140.573**	**915,271.155**

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

Certificate of Analysis

Number: 172-24090228-001A

Williston Laboratory
3111 1st Ave W
Williston, ND 58801

Kevin Hendricks
Denbury
202 S 4th Street West
Baker, MT 59313

Sample ID:	WO# 211778968	Report Date:	09/30/2024
Station Name:	MS Tinsley EOR Facility	Sampled By:	Tim Keene
Sample Point:	Flare Inlet Gas - ZZZ - 108	Sample Of:	Gas Spot
PO/Ref. No:	4300204782	Sample Date:	09/14/2024 08:00
Method:	GPA 2286	Sample Conditions:	71 °F
Instrument:	172_GC Micro A,	Received Date:	09/24/2024
Analyzed:	09/27/2024 09:46:15	Login Date:	09/24/2024

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia		
Nitrogen	27.7951	19.4733		GPM TOTAL C2+	17.706
Methane	14.3393	5.7531			
Carbon Dioxide	0.7623	0.8390			
Ethane	13.6164	10.2397	3.6716		
Propane	14.7219	16.2354	4.0894		
Iso-Butane	3.7642	5.4717	1.2420		
n-Butane	13.7014	19.9164	4.3552		
Iso-Pentane	3.1745	5.7281	1.1705		
n-Pentane	4.6605	8.4094	1.7033		
Hexanes	1.2148	2.6181	0.5028		
n-Hexane	0.8290	1.7867	0.3437		
Benzene	0.0612	0.1196	0.0173		
Cyclohexane	0.1443	0.3037	0.0495		
Heptanes	0.8299	2.0797	0.3861		
Methylcyclohexane	0.0965	0.2370	0.0391		
Toluene	0.0712	0.1641	0.0240		
Octanes	0.1902	0.5434	0.0982		
Ethylbenzene	0.0037	0.0098	0.0014		
Xylenes	0.0070	0.0186	0.0027		
Nonanes	0.0166	0.0532	0.0094		
	100.0000	100.0000	17.7062		

Calculated Physical Properties	**Total**
Calculated Molecular Weight	39.98
GPA 2172 Calculation:	
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F	
Higher Heating Value, Real Gas Dry BTU	1832.5
Water Sat. Gas Base BTU	1801.5
Relative Density Real Gas	1.3950
Compressibility Factor	0.9893

L Showalter

Data reviewed by: Lalena Showalter, Laboratory Technician

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated. The test results apply to the sample as received.

Normalized Component Calculation

Flare Gas Analysis (EPN: 3-07-F); Southern Petroleum Laboratories Report No.: 172-24090228-001A

COMPONENT	mole %	Normalized mole %	COMPONENT MW	Fuel Weight	Normalized WT %	Component BTU/scf	Partial Heating Values
Water	0.0000	0.0000	18	0.00	0.0000	0	0
Nitrogen	27.7951	0.0000	28.0134	0.00	0.0000	0	0
Carbon Dioxide	0.7623	1.0557	44.01	0.46	1.0418	0	0
Methane	14.3393	19.8574	16.043	3.19	7.1440	1010	201
Ethane	13.6164	18.8563	30.07	5.67	12.7151	1770	334
Hydrogen Sulfide	0.0000	0.0090	34.08	0.00	0.0069	637	0
Propane	14.7219	20.3872	44.097	8.99	20.1603	2516	513
I-Butane	3.7642	5.2128	58.123	3.03	6.7943	3252	170
N-Butane	13.7014	18.9740	58.123	11.03	24.7308	3262	619
I-Pentane	3.1745	4.3961	72.15	3.17	7.1127	4001	176
N-Pentane	4.6605	6.4540	72.15	4.66	10.4422	4009	259
Other/Iso Hexanes	1.2148	1.6823	86.177	1.45	3.2510	4750	80
N-Hexane	0.8290	1.1480	86.177	0.99	2.2186	4756	55
Methylcyclopentane	0.0000	0.0000	84.1608	0.00	0.0000	4501	0
Benzene	0.0612	0.0848	78.114	0.07	0.1485	3742	3
Cyclohexane	0.1443	0.1998	84.1608	0.17	0.3771	4482	9
Heptane	0.8299	1.1493	100.204	1.15	2.5825	5503	63
Methylcyclohexane	0.0965	0.1336	98.188	0.13	0.2942	5216	7
Toluene	0.0712	0.0986	92.141	0.09	0.2037	4475	4
Iso-Octane/224-Trimethylpentane	0.0000	0.0000	114.231	0.00	0.0000	6232	0
Octanes	0.1902	0.2634	114.231	0.30	0.6747	6249	16
Ethylbenzene	0.0037	0.0051	106.167	0.01	0.0122	5222	0
Xylenes	0.0070	0.0097	106.167	0.01	0.0231	5209	1
Nonanes	0.0166	0.0230	128.258	0.03	0.0661	6997	2
Decanes Plus	0.0000	0.0000	142.285	0.00	0.0000	7743	0
TOTALS	**100.0000**	**100.0000**	**MW=**	**44.59**	**100.0000**	**btu/scf =**	**2510.49852**
				sg	**1.5377**		
				VOC wt%	**79.0922**		
				Toxic wt%	**2.6060**		

SPL, Inc.
3111 1st Ave W
Williston, ND 58801
701-368-7183

Flash Liberation of Hydrocarbon Liquid Study

Client:	Denbury	Sample Lab ID:	23080183-007A
Facility:	MS Tinsley EOR Facility	Facility Well:	Not Indicated
Equipment:	Not Indicated	Sample Source:	eater Dump LP Separator 2104
Unique Number:	Not Indicated	Analyst:	JMC
Date Sampled:	08/08/23	Date Analyzed:	08/18/23
State:	MS	Site Notes:	
County:	Not Indicated		

Flash Liberation of Hydrocarbon Liquid Conditions

	Pressure (psig)	Temperature (°F)
Separator Hydrocarbon Liquid	38.0	86.0
Stock Tank	0.0	60.0

Base Conditions

	Condition	Units/Description
Base Conditions, Pressure	15.025	psi

Flash Liberation of Hydrocarbon Liquid Results

	Result	Units/Description
Gas Oil Ratio	12.80	SCF flashed vapor/bbl stock tank oil
Gas Oil Ratio	1.536	lb flashed vapor/bbl stock tank oil
Gas Specific Gravity	1.568	Air = 1.000
Separator Volume Factor	1.016	Separator Volume/Stock tank Volume

Stock Tank Fluid Properties

	Result	Units/Description
Shrinkage Recovery Factor	0.9839	Fraction of first stage separator liquid
Oil API Gravity at 60 °F	39.73	
Oil API Gravity, observed	39.73	at 59.97°F
Specific Gravity at 60 °F	0.8264	ASTM D7777, Measured
Reid Vapor Pressure, psi	2.74	Absolute Pressure at 100°F by D5191

Cylinder Pressure Check

	Pressure (psi)	Temperature (°F)
Sample Conditions	38.0	86.0
Test Sample	29.0	73.9

Quality Control Summary

Duplicate Results		Acceptable Range
Gas Oil Ratio (% difference)	0.7	<5%
Separator Volume Factor (% difference)	0.1	<5%
Shrinkage Recovery Factor (% difference)	0.1	<5%
Cylinder Type	Piston	
Cylinder Size (cc)	500	
Cylinder Number	1992	
Sample Collection Rate (mL/min)	42	<50 mL/min

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

Tank ID	**1b-07-OST-CV**
Tank Description	**1500 BBL Wet Oil Tank (ABJ-1118)**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Vertical**
Tank Diameter (D ft)	**21.50**
Vertical Height/Horizontal Length (H_S ft)	**24.00**
Roof Height (H_R ft)	**0.67**
Max Liquid Height (H_{LX} ft)	**23.00**
Avg Liquid Height (H_L ft)	**11.50**
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)	**0.64**
Roof Paint Solar Absorptance (R_A)	**0.64**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	**0.2240**

Tank Shell Color/Shade	**Aluminum - Diffuse**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Aluminum - Diffuse**
Tank Roof Paint Condition	**average**
Roof Type	**vertical tank with cone roof**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**18,250.00**
Annual Turnovers, N	**12.27**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**8,350.16**
vapor space outage (H_{VO} ft)	**12.724**
vapor space volume (V_V ft^3)	**4,619.44**

Major City for Meterological Data	**Jackson, MS**
Site Elevation (ft)	**300**
Atmospheric Pressure (P_A psia)	**14.537**
Table 7.1-2 Liquid	**crude oil**
*RVP**	**6.00**
*API gravity**	**39.7**
*°F basis for gv**	**60.0**
bubble point psia	
API gravity at 60F	**39.7**
API gravity at 100F	**43.0**
Working Loss Product Factor (K_P)	**0.75**
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):

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
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						
0	0.000						
	0.000		0.000	0.000			

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	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)	48.25	52.04	59.63	67.88	76.45	82.99	85.38	84.85	79.03	67.92	56.87	49.39	67.55
average vapor temperature (T_V °F)	51.11	55.84	64.63	74.31	83.50	90.38	92.57	91.60	84.78	72.53	60.24	52.04	72.79
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)	24.09	28.39	33.06	38.23	39.04	39.78	38.50	37.53	34.87	32.39	27.91	24.07	33.06
daily average liquid surface temperature (T_{LA} °F)	49.68	53.94	62.13	71.10	79.97	86.68	88.97	88.22	81.90	70.23	58.55	50.72	70.17
daily maximum liquid surface temperature (T_{LX} °F)	55.70	61.04	70.39	80.66	89.73	96.63	98.60	97.61	90.62	78.32	65.53	56.74	78.43
daily minimum liquid surface temperature (T_{LN} °F)	43.66	46.84	53.86	61.54	70.21	76.74	79.35	78.84	73.18	62.13	51.58	44.70	61.91
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	3.031	3.292	3.845	4.533	5.306	5.957	6.193	6.115	5.487	4.462	3.595	3.093	4.458
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	3.406	3.768	4.476	5.370	6.273	7.035	7.266	7.149	6.367	5.155	4.096	3.473	5.165
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	2.690	2.866	3.287	3.803	4.461	5.013	5.249	5.202	4.706	3.845	3.145	2.746	3.829
daily vapor pressure range (ΔP_V)	0.7159	0.9018	1.1887	1.5669	1.8116	2.0216	2.0169	1.9461	1.6607	1.3103	0.9507	0.7269	1.3361
vapor space expansion factor (K_E)	0.1095	0.1355	0.1745	0.2287	0.2686	0.3084	0.3119	0.2996	0.2479	0.1912	0.1407	0.1107	0.1949
vapor molecular weight (M_V lb/lbmole)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
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	8,702	7,860	8,702	8,421	8,702	8,421	8,702	8,702	8,421	8,702	8,421	8,702	102,456
monthly turnovers (N/month) with avg = total annual	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04	12.27
vented vapor saturation factor (K_S)	0.3285	0.3105	0.2783	0.2465	0.2184	0.1993	0.1932	0.1952	0.2127	0.2494	0.2920	0.3241	0.2496
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)	0.0276	0.0298	0.0342	0.0396	0.0455	0.0505	0.0523	0.0517	0.0470	0.0391	0.0322	0.0282	0.0390
standing storage losses (L_S lb/month & avg is lb/yr)	192.65	187.28	238.11	266.75	317.20	340.29	364.11	360.16	316.69	272.24	217.28	196.24	3269.00
working losses (L_W lb/month & avg is lb/yr)	180.43	175.40	223.01	249.82	297.08	318.70	341.01	337.31	296.59	254.96	203.50	183.79	3061.60
total losses (L_T lb/month & avg is lb/yr)	373.08	362.69	461.12	516.57	614.28	659.00	705.12	697.47	613.28	527.20	420.78	380.02	6330.60
max hourly Q in bbl/hour	11.70	11.70	11.70	11.70	11.70	11.70	11.70	11.70	11.70	11.70	11.70	11.70	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.243	0.261	0.300	0.347	0.399	0.443	0.458	0.453	0.412	0.343	0.283	0.247	
breathing/standing loss (L_S lb/hr)	0.259	0.279	0.320	0.429	0.514	0.597	0.606	0.582	0.477	0.366	0.302	0.264	
max hourly total loss (L_T lb/hr)	0.501	0.540	0.620	0.776	0.913	1.040	1.064	1.035	0.889	0.709	0.584	0.511	

L_S sum months	L_W sum months	L_T sum months
3269.00	3061.60	6330.60

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	**0.365**	**0.606**	**3,200.559**
Working Loss L_W	**0.342**	**0.458**	**2,997.505**
Total Loss L_T	**0.708**	**1.064**	**6,198.065**

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

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

Tank ID	**1c-07-OST-CV through 1e-12-OST-CV**
Tank Description	**2000 BBL Dry Oil Tank (ABJ-1119A/B/C)**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Vertical**
Tank Diameter (D ft)	**29.75**
Vertical Height/Horizontal Length (H_S ft)	**16.00**
Roof Height (H_R ft)	**0.93**
Max Liquid Height (H_{LX} ft)	**15.00**
Avg Liquid Height (H_L ft)	**7.50**
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)	**0.64**
Roof Paint Solar Absorptance (R_A)	**0.64**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	**0.3099**

Tank Shell Color/Shade	**Aluminum - Diffuse**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Aluminum - Diffuse**
Tank Roof Paint Condition	**average**
Roof Type	**vertical tank with cone roof**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**1,825,000.00**
Annual Turnovers, N	**982.61**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**10,426.90**
vapor space outage (H_{VO} ft)	**8.810**
vapor space volume (V_V ft^3)	**6,123.99**

Major City for Meterological Data	**Jackson, MS**
Site Elevation (ft)	**300**
Atmospheric Pressure (P_A psia)	**14.537**
Table 7.1-2 Liquid	**crude oil**
*RVP**	**6.00**
*API gravity**	**39.7**
*°F basis for gv**	**60.0**
bubble point psia	
API gravity at 60F	**39.7**
API gravity at 100F	**43.0**
Working Loss Product Factor (K_P)	**0.75**
working loss turnover factor K_N	**0.197**

*sales oil data determines RVP per API pub 4683

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

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
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						
0	0.000						
	0.000		0.000	0.000			

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	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)	48.25	52.04	59.63	67.88	76.45	82.99	85.38	84.85	79.03	67.92	56.87	49.39	67.55
average vapor temperature (T_V °F)	51.69	56.60	65.64	75.62	84.92	91.87	94.02	92.96	85.94	73.46	60.92	52.58	73.85
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)	23.67	28.35	33.06	38.23	39.04	39.78	38.50	37.53	34.87	32.39	27.48	23.43	33.06
daily average liquid surface temperature (T_{LA} °F)	49.97	54.32	62.63	71.75	80.69	87.43	89.70	88.91	82.48	70.69	58.89	50.99	70.70
daily maximum liquid surface temperature (T_{LX} °F)	55.89	61.41	70.90	81.31	90.45	97.38	99.33	98.29	91.20	78.79	65.76	56.85	78.96
daily minimum liquid surface temperature (T_{LN} °F)	44.05	47.24	54.37	62.19	70.93	77.49	80.08	79.53	73.77	62.59	52.02	45.13	62.44
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	3.048	3.317	3.881	4.587	5.373	6.033	6.269	6.186	5.543	4.500	3.618	3.109	4.501
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	3.418	3.794	4.517	5.431	6.348	7.122	7.352	7.229	6.429	5.198	4.113	3.480	5.213
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	2.711	2.888	3.319	3.850	4.519	5.080	5.316	5.265	4.756	3.879	3.172	2.770	3.867
daily vapor pressure range (ΔP_V)	0.7067	0.9057	1.1976	1.5815	1.8294	2.0418	2.0363	1.9638	1.6739	1.3191	0.9409	0.7107	1.3462
vapor space expansion factor (K_E)	0.1080	0.1359	0.1757	0.2309	0.2719	0.3128	0.3164	0.3036	0.2504	0.1925	0.1392	0.1081	0.1965
vapor molecular weight (M_V lb/lbmole)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
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	870,170	785,960	870,170	842,100	870,170	842,100	870,170	870,170	842,100	870,170	842,100	870,170	10,245,550
monthly turnovers (N/month) with avg = total annual	83.45	75.38	83.45	80.76	83.45	80.76	83.45	83.45	80.76	83.45	80.76	83.45	982.61
vented vapor saturation factor (K_S)	0.4127	0.3924	0.3556	0.3183	0.2850	0.2620	0.2546	0.2572	0.2787	0.3225	0.3718	0.4079	0.3224
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)	0.0278	0.0299	0.0344	0.0399	0.0460	0.0510	0.0528	0.0522	0.0473	0.0393	0.0324	0.0283	0.0393
standing storage losses (L_S lb/month & avg is lb/yr)	333.97	325.11	414.01	464.63	552.79	593.16	634.44	627.20	550.87	472.95	376.90	340.07	5686.09
working losses (L_W lb/month & avg is lb/yr)	3574.15	3479.35	4430.75	4972.41	5915.92	6347.92	6789.73	6712.27	5895.37	5061.50	4033.52	3639.41	60852.28
total losses (L_T lb/month & avg is lb/yr)	3908.13	3804.46	4844.76	5437.03	6468.70	6941.07	7424.17	7339.47	6446.24	5534.45	4410.41	3979.48	66538.38
max hourly Q in bbl/hour	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	1169.58	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	24.361	26.256	30.200	35.021	40.322	44.709	46.278	45.750	41.522	34.499	28.409	24.806	
breathing/standing loss (L_S lb/hr)	0.449	0.484	0.556	0.749	0.909	1.066	1.084	1.039	0.843	0.636	0.523	0.457	
max hourly total loss (L_T lb/hr)	24.810	26.740	30.756	35.770	41.231	45.775	47.363	46.789	42.365	35.135	28.932	25.263	

L_S sum months	L_W sum months	L_T sum months
5686.09	60852.28	66538.38

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	**0.635**	**1.084**	**5,565.369**
Working Loss L_W	**6.799**	**46.278**	**59,560.301**
Total Loss L_T	**7.434**	**47.363**	**65,125.670**

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

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

Tank ID	**2a-07-WVF-CV**
Tank Description	**Water Vortex Flume (ABM-1122)**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Vertical**
Tank Diameter (D ft)	**4.00**
Vertical Height/Horizontal Length (H_S ft)	**42.50**
Roof Height (H_R ft)	**0.13**
Max Liquid Height (H_{LX} ft)	**41.50**
Avg Liquid Height (H_L ft)	**20.75**
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)	**0.64**
Roof Paint Solar Absorptance (R_A)	**0.64**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	**0.0417**

Tank Shell Color/Shade	**Aluminum - Diffuse**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Aluminum - Diffuse**
Tank Roof Paint Condition	**average**
Roof Type	**vertical tank with cone roof**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**18,268,250.00**
Annual Turnovers, N	**196657.90**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**521.50**
vapor space outage (H_{VO} ft)	**21.792**
vapor space volume (V_V ft^3)	**273.84**

Major City for Meterological Data	**Jackson, MS**
Site Elevation (ft)	**300**
Atmospheric Pressure (P_A psia)	**14.537**
Table 7.1-2 Liquid	
*RVP**	**6.00**
*API gravity**	**39.7**
*°F basis for gv**	**60.0**
bubble point psia	
API gravity at 60F	**39.7**
API gravity at 100F	**43.0**
Working Loss Product Factor (K_P)	**0.75**
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):

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
Crude Oil	0.100	50.000	0.04995	0.27678	11.087	5082.567	0.000
Water	99.900	18.015	17.99700	99.72322	8.108	1750.300	235.000
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		18.047	100.000			

	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)	48.25	52.04	59.63	67.88	76.45	82.99	85.38	84.85	79.03	67.92	56.87	49.39	67.55
average vapor temperature (T_V °F)	49.95	54.30	62.60	71.71	80.64	87.38	89.65	88.86	82.45	70.66	58.87	50.97	70.67
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)	25.19	29.19	33.06	38.23	39.04	39.78	38.50	37.53	34.87	32.64	29.12	25.41	33.06
daily average liquid surface temperature (T_{LA} °F)	49.10	53.17	61.11	69.79	78.55	85.19	87.52	86.86	80.74	69.29	57.87	50.18	69.11
daily maximum liquid surface temperature (T_{LX} °F)	55.40	60.47	69.38	79.35	88.31	95.13	97.14	96.24	89.45	77.45	65.15	56.53	77.37
daily minimum liquid surface temperature (T_{LN} °F)	42.80	45.87	52.85	60.24	68.79	75.24	77.89	77.47	72.02	61.13	50.59	43.83	60.85
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.175	0.203	0.270	0.365	0.488	0.605	0.651	0.638	0.524	0.359	0.241	0.182	0.356
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.220	0.264	0.360	0.501	0.668	0.825	0.877	0.854	0.692	0.471	0.311	0.229	0.470
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.138	0.155	0.201	0.262	0.352	0.438	0.478	0.471	0.393	0.270	0.185	0.143	0.267
daily vapor pressure range (ΔP_V)	0.0823	0.1090	0.1589	0.2395	0.3155	0.3874	0.3995	0.3822	0.2992	0.2008	0.1262	0.0860	0.2023
vapor space expansion factor (K_E)	0.0552	0.0645	0.0746	0.0891	0.0950	0.1008	0.0991	0.0962	0.0859	0.0759	0.0651	0.0558	0.0768
vapor molecular weight (M_V lb/lbmole)	18.56	18.53	18.46	18.40	18.35	18.32	18.31	18.31	18.34	18.41	18.49	18.55	18.41
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	8,710,402	7,867,460	8,710,402	8,429,421	8,710,402	8,429,421	8,710,402	8,710,402	8,429,421	8,710,402	8,429,421	8,710,402	##########
monthly turnovers (N/month) with avg = total annual	16,702.45	15,086.09	16,702.45	16,163.66	16,702.45	16,163.66	16,702.45	16,702.45	16,163.66	16,702.45	16,163.66	16,702.45	196,657.90
vented vapor saturation factor (K_S)	0.8320	0.8100	0.7623	0.7036	0.6394	0.5887	0.5707	0.5758	0.6228	0.7072	0.7825	0.8263	0.7085
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)	0.0006	0.0007	0.0009	0.0012	0.0015	0.0019	0.0020	0.0020	0.0017	0.0012	0.0008	0.0006	0.0012
standing storage losses (L_S lb/month & avg is lb/yr)	0.27	0.28	0.41	0.53	0.71	0.84	0.93	0.92	0.74	0.54	0.36	0.28	6.82
working losses (L_W lb/month & avg is lb/yr)	3877.07	4025.37	5811.21	7440.72	10097.47	11937.93	13219.78	12967.48	10453.19	7574.64	5054.88	4024.95	96484.71
total losses (L_T lb/month & avg is lb/yr)	3877.34	4025.66	5811.62	7441.25	10098.18	11938.77	13220.72	12968.40	10453.93	7575.18	5055.24	4025.24	96491.53
max hourly Q in bbl/hour	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	11707.53	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	5.211	5.990	7.811	10.334	13.572	16.580	17.769	17.429	14.518	10.181	7.021	5.410	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	
max hourly total loss (L_T lb/hr)	5.211	5.991	7.811	10.335	13.573	16.582	17.770	17.431	14.519	10.182	7.021	5.410	

L_S sum months	L_W sum months	L_T sum months
6.82	96484.71	96491.53

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**	**0.001**	**6.265**
Working Loss L_W	**10.118**	**17.769**	**88,635.699**
Total Loss L_T	**10.119**	**17.770**	**88,641.964**

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

Certificate of Analysis

Number: 172-24050260-002A

Williston Laboratory
3111 1st Ave W
Williston, ND 58801

May 28, 2024

Kevin Hendricks
Denbury
202 S 4th Street West
Baker, MT 59313

Station Name: MS Tinsley EOR Facility
Sample Point: FLARE INLET GAS ZZZ-181
Method: GPA 2286
Analyzed: 05/23/2024 13:50:49

Sampled By: John Fielder
Sample Of: Gas Spot
Sample Date: 05/07/2024 10:45
Sample Conditions: 71 °F
PO/Ref. No: 4300204782

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia		
Nitrogen	4.6082	2.9590		GPM TOTAL C2+	0.383
Methane	0.0712	0.0262			
Carbon Dioxide	94.3253	95.1533			
Ethane	0.0062	0.0043	0.0017		
Propane	0.0183	0.0185	0.0051		
Iso-Butane	0.1069	0.1424	0.0351		
n-Butane	0.0806	0.1074	0.0255		
Iso-Pentane	0.0830	0.1373	0.0304		
n-Pentane	0.1104	0.1826	0.0401		
Hexanes	0.1234	0.2437	0.0508		
n-Hexane	0.1017	0.2009	0.0419		
Benzene	0.0405	0.0725	0.0114		
Cyclohexane	0.0542	0.1046	0.0185		
Heptanes	0.1363	0.3131	0.0631		
Methylcyclohexane	0.0427	0.0961	0.0172		
Toluene	0.0149	0.0315	0.0050		
Octanes	0.0492	0.1288	0.0253		
Ethylbenzene	0.0004	0.0010	0.0002		
Xylenes	0.0030	0.0073	0.0012		
Nonanes	0.0231	0.0679	0.0130		
Decanes Plus	0.0005	0.0016	0.0003		
	100.0000	100.0000	0.3858		

Calculated Physical Properties	**Total**	**C10+**
Calculated Molecular Weight	43.63	142.28
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Higher Heating Value, Real Gas Dry BTU	45.34	7742.9
Water Sat. Gas Base BTU	44.57	7607.8
Relative Density Real Gas	1.5140	4.9126
Compressibility Factor	0.9945	

Data reviewed by: Mo Milton, Laboratory Technician

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

Normalized Component Calculation

Flare Gas Analysis (EPN: 4-07-F); Southern Petroleum Laboratories Report No.: 172-24050260-002A

COMPONENT	mole %	Normalized mole %	COMPONENT MW	Fuel Weight	Normalized WT %	Component BTU/scf	Partial Heating Values
Water	0.0000	0.0000	18	0.00	0.0000	0	0
Nitrogen	4.6082	0.0000	28.0134	0.00	0.0000	0	0
Carbon Dioxide	94.3253	98.8731	44.01	43.51	98.0481	0	0
Methane	0.0712	0.0746	16.043	0.01	0.0270	1010	1
Ethane	0.0062	0.0065	30.07	0.00	0.0044	1770	0
Hydrogen Sulfide	0.0000	0.0090	34.08	0.00	0.0069	637	0
Propane	0.0183	0.0192	44.097	0.01	0.0191	2516	0
I-Butane	0.1069	0.1121	58.123	0.07	0.1468	3252	4
N-Butane	0.0806	0.0845	58.123	0.05	0.1106	3262	3
I-Pentane	0.0830	0.0870	72.15	0.06	0.1414	4001	3
N-Pentane	0.1104	0.1157	72.15	0.08	0.1881	4009	5
Other/Iso Hexanes	0.1234	0.1293	86.177	0.11	0.2512	4750	6
N-Hexane	0.1017	0.1066	86.177	0.09	0.2070	4756	5
Methylcyclopentane	0.0000	0.0000	84.1608	0.00	0.0000	4501	0
Benzene	0.0405	0.0425	78.114	0.03	0.0747	3742	2
Cyclohexane	0.0542	0.0568	84.1608	0.05	0.1077	4482	3
Heptane	0.1363	0.1429	100.204	0.14	0.3226	5503	8
Methylcyclohexane	0.0427	0.0448	98.188	0.04	0.0990	5216	2
Toluene	0.0149	0.0156	92.141	0.01	0.0324	4475	1
Iso-Octane/224-Trimethylpentane	0.0000	0.0000	114.231	0.00	0.0000	6232	0
Octanes	0.0492	0.0516	114.231	0.06	0.1327	6249	3
Ethylbenzene	0.0004	0.0004	106.167	0.00	0.0010	5222	0
Xylenes	0.0030	0.0031	106.167	0.00	0.0075	5209	0
Nonanes	0.0231	0.0242	128.258	0.03	0.0700	6997	2
Decanes Plus	0.0005	0.0005	142.285	0.00	0.0017	7743	0
TOTALS	**100.0000**	**100.0000**	**MW=**	**44.38**	**100.0000**	**btu/scf =**	**47.317101**
				sg	**1.5304**		
				VOC wt%	**1.9136**		
				Toxic wt%	**0.3227**		

DRILLING AND PRODUCTION PRACTICE

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New York 20, N. Y.

1945

To calculate the properties of the interstitial water in the reservoir, it is observed from Table 4 that the change in formation volume of pure water at 3,000 psi, absolute, and 200 deg F (due to the solution of 15.4 cu ft per bbl of gas) is 1.0380 minus 1.0271, or 0.0059 bbl per bbl. As the solubility in the interstitial water is only 13.6 cu ft per bbl, the change in formation volume would be expected to be $\frac{13.6}{15.4}$ (0.0059), or 0.0052. Hence, the formation volume of the interstitial water is calculated to be 1.0271 plus 0.0052, or 1.0323 bbl per bbl. A similar calculation at a reservoir pressure of 2,000 psi, absolute, yields a formation volume of 1.0340 bbl per bbl—which indicates that, even though the interstitial water contains less dissolved gas at 2,000 psi, absolute, than it did at 3,000 psi, absolute, its volume is greater at the lower pressure. This result is interesting, because it is opposite to the behavior of natural-gas–crude-oil mixtures.

The compressibility of the saturated interstitial water is found from Fig. 2 by multiplying the correction factor for the gas solubility, 1.12 for a 13.6-cu-ft-per-bbl mixture, times the compressibility, 3.12 times 10^{-6}, of pure water, which gives 3.50 times 10^{-6} bbl per bbl per lb per sq in.

The use of data on the formation volumes of the saturated interstitial water, together with the data on the compressibilities, permits accurate accounting of the interstitial-water behavior for material-balance calculations when the accuracy of the other data justifies the additional refinement.

TABLE 4

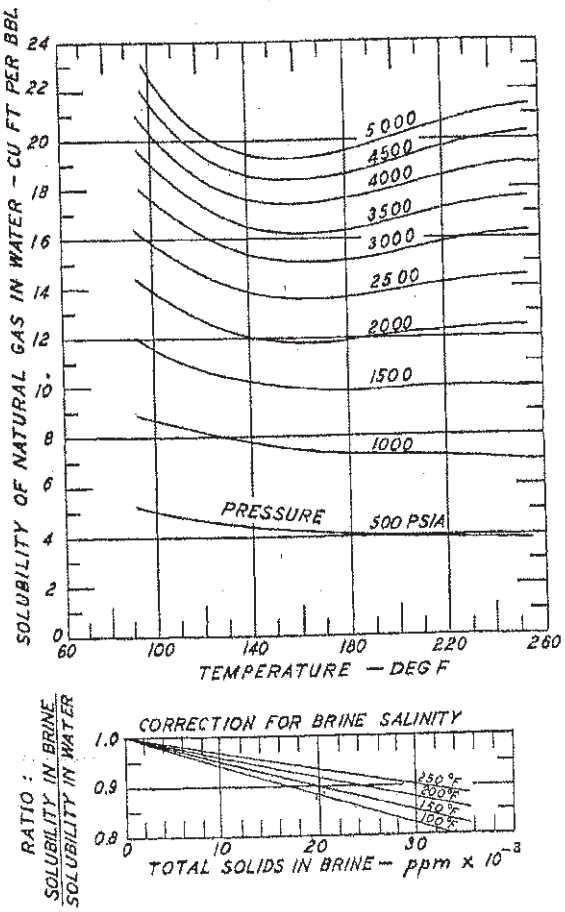
Formation Volumes of Pure Water and Mixtures of Natural Gas and Water

Saturation Pressure (PSI, Absolute)	Formation Volumes—Barrel Per Barrel			
	100 Deg F	150 Deg F	200 Deg F	250 Deg F
	Natural Gas and Water			
5,000	0.9989	1.0126	1.0301	1.0522
4,000	1.0003	1.0140	1.0316	1.0537
3,000	1.0017	1.0154	1.0330	1.0552
2,000	1.0031	1.0168	1.0345	1.0568
1,000	1.0045	1.0183	1.0361	1.0584
Pressure (PSI, Absolute)	Pure Water *			
5,000	0.9910	1.0039	1.0210	1.0418
4,000	0.9938	1.0067	1.0240	1.0452
3,000	0.9966	1.0095	1.0271	1.0487
2,000	0.9995	1.0125	1.0304	1.0523
1,000	1.0025	1.0153	1.0335	1.0560
Vapor pressure of water	1.0056	1.0187	1.0370	1.0598

* See reference No. 3.

Water production from so-called "clean" gas wells or high gas-oil-ratio (distillate) wells may be a combination of the water that exists as vapor in the reservoir gas and liquid water that is brought to the surface by mechanical entrainment in the gas. The water produced by condensation is free of salts, whereas the entrained water may contain a considerable amount of dissolved salts.

The amount of water that will be produced from a well as vapor can be determined from Table 5 and Fig. 3. For example, consider the case of a gas reservoir at 3,000 psi, absolute, and 200 deg F, in which the interstitial water has a salinity of 30,000 ppm. From Table 5 and Fig. 3, the amount of water vapor in the formation gas is shown to be 0.82 bbl per 1,000 MCF of dry gas when vaporized from pure water, or 0.82 times 0.93, which equals 0.76 bbl per 1,000 MCF for the gas in equilibrium with the saline interstitial water. If the foregoing reservoir gas is put through a trap operating at 500 psi, absolute, and 100 deg F, the amount of water which can remain as vapor in the gas at these conditions is shown in Table 5 to be 0.31 bbl per 1,000



Solubility of Natural Gas in Water.

FIG. 1

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

Tank ID	**2b-07-WVT-CV**
Tank Description	**9,700 BBL Water Vortex Tank (ABM-1120)**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Vertical**
Tank Diameter (D ft)	**46.75**
Vertical Height/Horizontal Length (H_S ft)	**32.00**
Roof Height (H_R ft)	**1.46**
Max Liquid Height (H_{LX} ft)	**31.00**
Avg Liquid Height (H_L ft)	**15.50**
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)	**0.64**
Roof Paint Solar Absorptance (R_A)	**0.64**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	**0.4870**

Tank Shell Color/Shade	**Aluminum - Diffuse**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Aluminum - Diffuse**
Tank Roof Paint Condition	**average**
Roof Type	**vertical tank with cone roof**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**18,250,000.00**
Annual Turnovers, N	**1925.40**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**53,212.64**
vapor space outage (H_{VO} ft)	**16.987**
vapor space volume (V_V ft^3)	**29,158.77**

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)	**0.75**
working loss turnover factor K_N	**0.182**

*sales oil data determines RVP per API pub 4683

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

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
Water	100.000	18.015	18.01500	100.00000	8.108	1750.300	235.000
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
	100.000		18.015	100.000			

	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)	48.25	52.04	59.63	67.88	76.45	82.99	85.38	84.85	79.03	67.92	56.87	49.39	67.55
average vapor temperature (T_V °F)	51.50	56.36	65.31	75.19	84.46	91.39	93.55	92.52	85.57	73.16	60.70	52.41	73.50
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)	23.72	28.35	33.06	38.23	39.04	39.78	38.50	37.53	34.87	32.39	27.50	23.61	33.06
daily average liquid surface temperature (T_{LA} °F)	49.88	54.20	62.47	71.54	80.46	87.19	89.47	88.69	82.30	70.54	58.78	50.90	70.53
daily maximum liquid surface temperature (T_{LX} °F)	55.81	61.29	70.73	81.10	90.22	97.13	99.09	98.07	91.01	78.64	65.66	56.80	78.79
daily minimum liquid surface temperature (T_{LN} °F)	43.95	47.11	54.20	61.98	70.70	77.24	79.84	79.30	73.58	62.44	51.91	45.00	62.26
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.177	0.208	0.280	0.383	0.515	0.639	0.687	0.670	0.547	0.370	0.245	0.184	0.370
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.220	0.268	0.372	0.526	0.703	0.871	0.924	0.896	0.721	0.485	0.313	0.228	0.488
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.141	0.160	0.208	0.275	0.372	0.463	0.505	0.496	0.410	0.279	0.191	0.147	0.278
daily vapor pressure range (ΔP_V)	0.0788	0.1086	0.1646	0.2508	0.3315	0.4077	0.4196	0.4002	0.3112	0.2057	0.1217	0.0811	0.2099
vapor space expansion factor (K_E)	0.0520	0.0627	0.0749	0.0897	0.0959	0.1021	0.1004	0.0973	0.0866	0.0756	0.0616	0.0519	0.0772
vapor molecular weight (M_V lb/lbmole)	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02
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	8,701,700	7,859,600	8,701,700	8,421,000	8,701,700	8,421,000	8,701,700	8,701,700	8,421,000	8,701,700	8,421,000	8,701,700	##########
monthly turnovers (N/month) with avg = total annual	163.53	147.70	163.53	158.25	163.53	158.25	163.53	163.53	158.25	163.53	158.25	163.53	1,925.40
vented vapor saturation factor (K_S)	0.8625	0.8424	0.7989	0.7438	0.6833	0.6347	0.6178	0.6236	0.6702	0.7502	0.8191	0.8579	0.7502
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)	0.0006	0.0007	0.0009	0.0012	0.0016	0.0019	0.0021	0.0020	0.0017	0.0012	0.0008	0.0006	0.0012
standing storage losses (L_S lb/month & avg is lb/yr)	30.43	31.94	46.79	60.82	83.11	98.64	109.09	106.65	85.22	60.99	40.07	31.56	785.31
working losses (L_W lb/month & avg is lb/yr)	691.71	726.11	1063.57	1382.48	1889.18	2241.98	2479.64	2424.05	1936.99	1386.23	910.81	717.28	17850.02
total losses (L_T lb/month & avg is lb/yr)	722.14	758.05	1110.36	1443.30	1972.29	2340.62	2588.73	2530.70	2022.21	1447.22	950.88	748.84	18635.33
max hourly Q in bbl/hour	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	11695.83	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	5.101	5.929	7.844	10.536	13.933	17.086	18.287	17.878	14.762	10.224	6.941	5.290	
breathing/standing loss (L_S lb/hr)	0.041	0.048	0.065	0.097	0.126	0.153	0.157	0.150	0.119	0.082	0.056	0.042	
max hourly total loss (L_T lb/hr)	5.142	5.976	7.909	10.633	14.059	17.239	18.445	18.028	14.880	10.305	6.997	5.332	

L_S sum months	L_W sum months	L_T sum months
785.31	17850.02	18635.33

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	**0.082**	**0.157**	**717.295**
Working Loss L_W	**1.861**	**18.287**	**16,304.054**
Total Loss L_T	**1.943**	**18.445**	**17,021.349**

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	**2d-07-WST-CV & 2e-07-WST-CV**
Tank Description	**5000 BBL Produced Water Tank (1129A/B)**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Vertical**
Tank Diameter (D ft)	**38.70**
Vertical Height/Horizontal Length (H_S ft)	**24.00**
Roof Height (H_R ft)	**1.21**
Max Liquid Height (H_{LX} ft)	**23.00**
Avg Liquid Height (H_L ft)	**11.50**
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)	**0.64**
Roof Paint Solar Absorptance (R_A)	**0.64**
breather vent pressure range (ΔP_B psi)	**0.00**
roof outage (H_{RO} ft)	**0.4031**

Tank Shell Color/Shade	**Aluminum - Diffuse**
Tank Shell Paint Condition	**average**
Tank Roof Color/Shade	**Aluminum - Diffuse**
Tank Roof Paint Condition	**average**
Roof Type	**vertical tank with cone roof**
Tank Insulation	**no insulation**
Tank Underground?	**no**
Annual Throughput (Q bbl/year)	**9,125,000.00**
Annual Turnovers, N	**1893.50**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**27,054.51**
vapor space outage (H_{VO} ft)	**12.903**
vapor space volume (V_V ft^3)	**15,177.73**

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)	**0.75**
working loss turnover factor K_N	**0.183**

*sales oil data determines RVP per API pub 4683

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

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
Water	100.000	18.015	18.01500	100.00000	8.108	1750.300	235.000
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
	100.000		18.015	100.000			

	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)	48.25	52.04	59.63	67.88	76.45	82.99	85.38	84.85	79.03	67.92	56.87	49.39	67.55
average vapor temperature (T_V °F)	51.58	56.46	65.44	75.37	84.65	91.59	93.75	92.71	85.72	73.28	60.79	52.48	73.65
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)	23.67	28.35	33.06	38.23	39.04	39.78	38.50	37.53	34.87	32.39	27.48	23.52	33.06
daily average liquid surface temperature (T_{LA} °F)	49.92	54.25	62.54	71.63	80.55	87.29	89.56	88.78	82.37	70.60	58.83	50.94	70.60
daily maximum liquid surface temperature (T_{LX} °F)	55.83	61.34	70.80	81.18	90.31	97.23	99.19	98.16	91.09	78.70	65.70	56.82	78.86
daily minimum liquid surface temperature (T_{LN} °F)	44.00	47.16	54.27	62.07	70.79	77.34	79.94	79.40	73.66	62.51	51.96	45.06	62.34
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.177	0.208	0.280	0.384	0.516	0.641	0.689	0.672	0.548	0.371	0.246	0.184	0.371
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.221	0.269	0.373	0.527	0.705	0.874	0.927	0.898	0.723	0.486	0.313	0.229	0.489
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.142	0.160	0.208	0.276	0.373	0.465	0.506	0.497	0.411	0.280	0.191	0.148	0.278
daily vapor pressure range (ΔP_V)	0.0787	0.1088	0.1649	0.2515	0.3324	0.4088	0.4207	0.4012	0.3119	0.2061	0.1218	0.0809	0.2103
vapor space expansion factor (K_E)	0.0519	0.0628	0.0749	0.0897	0.0960	0.1021	0.1005	0.0974	0.0866	0.0756	0.0615	0.0517	0.0772
vapor molecular weight (M_V lb/lbmole)	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02	18.02
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	4,350,850	3,929,800	4,350,850	4,210,500	4,350,850	4,210,500	4,350,850	4,350,850	4,210,500	4,350,850	4,210,500	4,350,850	51,227,750
monthly turnovers (N/month) with avg = total annual	160.82	145.25	160.82	155.63	160.82	155.63	160.82	160.82	155.63	160.82	155.63	160.82	1,893.50
vented vapor saturation factor (K_S)	0.8918	0.8754	0.8391	0.7921	0.7390	0.6951	0.6797	0.6850	0.7274	0.7978	0.8562	0.8881	0.7978
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)	0.0006	0.0007	0.0009	0.0012	0.0016	0.0020	0.0021	0.0020	0.0017	0.0012	0.0008	0.0006	0.0012
standing storage losses (L_S lb/month & avg is lb/yr)	16.87	17.72	25.96	33.76	46.15	54.77	60.56	59.20	47.29	33.83	22.22	17.49	435.82
working losses (L_W lb/month & avg is lb/yr)	346.80	364.19	533.69	694.06	948.57	1125.78	1244.98	1216.88	972.07	695.43	456.73	359.59	8958.77
total losses (L_T lb/month & avg is lb/yr)	363.67	381.91	559.65	727.83	994.72	1180.54	1305.54	1276.08	1019.36	729.26	478.95	377.08	9394.58
max hourly Q in bbl/hour	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	5847.92	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	2.554	2.969	3.930	5.282	6.986	8.567	9.169	8.962	7.397	5.121	3.476	2.648	
breathing/standing loss (L_S lb/hr)	0.023	0.026	0.036	0.054	0.071	0.088	0.090	0.086	0.067	0.045	0.031	0.024	
max hourly total loss (L_T lb/hr)	2.577	2.996	3.966	5.336	7.057	8.655	9.259	9.048	7.465	5.167	3.507	2.672	

L_S sum months	L_W sum months	L_T sum months
435.82	8958.77	9394.58

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	**0.045**	**0.090**	**398.002**
Working Loss L_W	**0.934**	**9.169**	**8,181.377**
Total Loss L_T	**0.979**	**9.259**	**8,579.379**

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

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Weighted Average for Oil Storage Tank Vapors to Control Flare (EPN: 3-07-F)

Total Working & Standing Losses:	**161.19**	**lb/hr**
Total Oil Flash Vapors:	**8000.00**	**SCFH**
Total Stream Flowrate:	**9372.06**	**SCFH**

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.

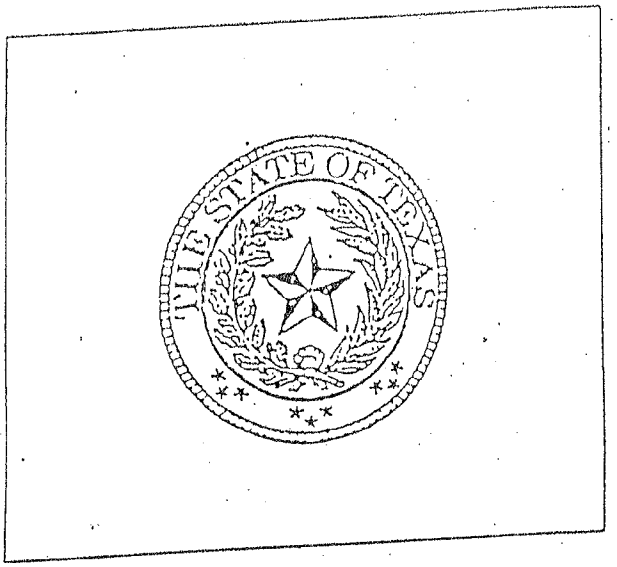
Table 4. Flare Factors

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 Conservation Commission



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

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November 1994

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(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, 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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 13.5-2 (English Units). VOC and CO EMISSIONS FACTORS FOR ELEVATED FLARE OPERATIONS FOR CERTAIN REFINERY AND CHEMICAL MANUFACTURING PROCESSES[a,b]

Pollutant	SCC[e]	Emissions Factor ($lb/10^6$ Btu)[f]	Representativeness
Volatile organic compounds[c]	30190099; 30600904; 30119701; 30119705; 30119709; 30119741; 30119799; 30130115; 30600201; 30600401; 30600508; 30600903; 30600999; 30601701; 30601801; 30688801; 40600240	0.66	Poorly
Carbon monoxide[d]		0.31	Poorly

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

[b] These factors apply to well operated flares achieving at least 98% destruction efficiency and operating in compliance with the current General Provisions requirements of 40 CFR Part 60, i.e. >300 btu/scf net heating value in the vent gas and less than the specified maximum flare tip velocity. The VOC emissions factor data set had an average destruction efficiency of 98.9%, and the CO emissions factor data set had an average destruction efficiency of 99.1% (based on test reports where destruction efficiency was provided). These factors are based on steam-assisted and air-assisted flares burning a variety of vent gases.

[c] References 4 through 9 and 11.

[d] References 1, 4 through 8, and 11.

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

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

Weighted Average for Water Storage Tank Vapors Control Flare (EPN: 4-07-F)

Total Working & Standing Losses:	**732.69**	**lb/hr**
Total Brine Flash Vapors:	**1041.67**	**SCFH**
Total Oil Flash Vapors:	**26.67**	**SCFH**
Total Stream Flowrate:	**7334.80**	**SCFH**

Certificate of Analysis

Number: 172-23080183-004A

Williston Laboratory
3111 1st Ave W
Williston, ND 58801

Aug. 22, 2023

Kevin Hendricks
Denbury
202 S 4th Street West
Baker, MT 59313

Station Name: MS Tinsley EOR Facility
Sample Point: HP Separator
Method: GPA 2286
Cylinder No: 01492
Analyzed: 08/18/2023 13:04:04

Sampled By: John Fielder
Sample Of: Gas Spot
Sample Date: 08/08/2023 07:00
Sample Conditions: 730 psig, @ 84 °F
PO/Ref. No: 4300204782

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia
Nitrogen	0.4574	0.2967	
Methane	3.4025	1.2640	
Carbon Dioxide	94.2460	96.0480	
Ethane	0.5306	0.3695	0.1423
Propane	0.4499	0.4594	0.1243
Iso-Butane	0.1121	0.1509	0.0368
n-Butane	0.2822	0.3798	0.0892
Iso-Pentane	0.1271	0.2124	0.0466
n-Pentane	0.1080	0.1804	0.0393
Hexanes	0.0696	0.1389	0.0287
n-Hexane	0.0388	0.0774	0.0160
Benzene	0.0089	0.0161	0.0025
Cyclohexane	0.0222	0.0433	0.0076
Heptanes	0.0608	0.1411	0.0281
Methylcyclohexane	0.0242	0.0550	0.0098
Toluene	0.0035	0.0075	0.0012
Octanes	0.0264	0.0698	0.0136
Ethylbenzene	0.0004	0.0010	0.0002
Xylenes	0.0031	0.0076	0.0012
Nonanes	0.0169	0.0502	0.0095
Decanes Plus	0.0094	0.0310	0.0058
	100.0000	100.0000	0.6027

GPM TOTAL C2+ 0.603

Calculated Physical Properties	Total	C10+
Calculated Molecular Weight	43.18	142.28
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Higher Heating Value, Real Gas Dry BTU	92.86	7742.9
Water Sat. Gas Base BTU	91.27	7607.8
Relative Density Real Gas	1.4989	4.9126
Compressibility Factor	0.9943	

Data reviewed by: Ahsenur Kara, Lab Technician 1

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

Normalized Component Calculation (Hydrogen Sulfide)

Inlet Gas Analysis; Southern Petroleum Laboratories Report No.: 172-23080183-004A

COMPONENT	mole %	Normalized mole %	COMPONENT MW	Fuel Weight	Normalized WT %	Component BTU/scf	Partial Heating Values
Water	0.0000	0.0000	18	0.00	0.0000	0	0
Nitrogen	0.4574	0.4574	28.0134	0.13	0.7206	0	0
Carbon Dioxide	3.4025	3.4022	44.01	1.50	8.4215	0	0
Methane	94.2460	94.2375	16.043	15.12	85.0332	1010	952
Ethane	0.5306	0.5306	30.07	0.16	0.8973	1770	9
Hydrogen Sulfide	0.0000	0.0090	34.08	0.00	0.0173	637	0
Propane	0.4499	0.4499	44.097	0.20	1.1157	2516	11
I-Butane	0.1121	0.1121	58.123	0.07	0.3664	3252	4
N-Butane	0.2822	0.2822	58.123	0.16	0.9225	3262	9
I-Pentane	0.1271	0.1271	72.15	0.09	0.5157	4001	5
N-Pentane	0.1080	0.1080	72.15	0.08	0.4382	4009	4
Other/Iso Hexanes	0.0696	0.0696	86.177	0.06	0.3373	4750	3
N-Hexane	0.0388	0.0388	86.177	0.03	0.1880	4756	2
Methylcyclopentane	0.0000	0.0000	84.1608	0.00	0.0000	4501	0
Benzene	0.0089	0.0089	78.114	0.01	0.0391	3742	0
Cyclohexane	0.0222	0.0222	84.1608	0.02	0.1051	4482	1
Heptane	0.0608	0.0608	100.204	0.06	0.3426	5503	3
Methylcyclohexane	0.0242	0.0242	98.188	0.02	0.1336	5216	1
Toluene	0.0035	0.0035	92.141	0.00	0.0181	4475	0
Iso-Octane/224-Trimethylpentane	0.0000	0.0000	114.231	0.00	0.0000	6232	0
Octanes	0.0264	0.0264	114.231	0.03	0.1696	6249	2
Ethylbenzene	0.0004	0.0004	106.167	0.00	0.0024	5222	0
Xylenes	0.0031	0.0031	106.167	0.00	0.0185	5209	0
Nonanes	0.0169	0.0169	128.258	0.02	0.1219	6997	1
Decanes Plus	0.0094	0.0094	142.285	0.01	0.0752	7743	1
TOTALS	**100.0000**	**100.0000**	**MW=**	**17.78**	**100.0000**	**btu/scf =**	**1009.81452**
				sg	**0.6131**		
Max Total Hydrogen Sulfide:	**0.009**	mol%		**VOC wt%**	**4.9101**		
				Toxic wt%	**0.2662**		

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

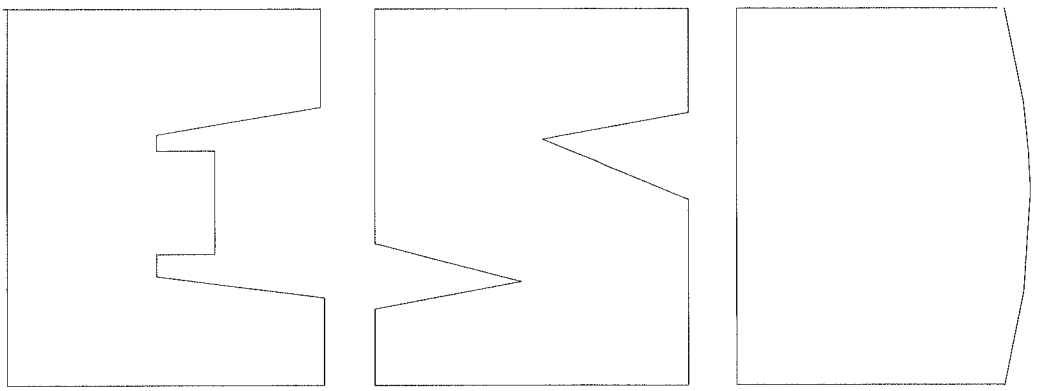

TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

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.

Normalized Component Calculation (Hydrogen Sulfide)

Fugitive Emission Speciation - Light-Liquid Service

COMPONENT	mole %	Normalized mole %	COMPONENT MW	Fuel Weight	Normalized WT %	Component BTU/scf	Partial Heating Values
Water	0.0000	0.0000	18	0.00	0.0000	0	0
Nitrogen	0.0000	0.0000	28.0134	0.00	0.0000	0	0
Carbon Dioxide	0.0000	0.0000	44.01	0.00	0.0000	0	0
Methane	86.3875	86.3797	16.043	13.86	61.2917	1010	872
Ethane	7.1428	7.1421	30.07	2.15	9.4987	1770	126
Hydrogen Sulfide	0.0000	0.0090	34.08	0.00	0.0136	637	0
Propane	0.0000	0.0000	44.097	0.00	0.0000	2516	0
I-Butane	0.0000	0.0000	58.123	0.00	0.0000	3252	0
N-Butane	0.0000	0.0000	58.123	0.00	0.0000	3262	0
I-Pentane	0.0000	0.0000	72.15	0.00	0.0000	4001	0
N-Pentane	0.0000	0.0000	72.15	0.00	0.0000	4009	0
Other/Iso Hexanes	0.0000	0.0000	86.177	0.00	0.0000	4750	0
N-Hexane	0.0000	0.0000	86.177	0.00	0.0000	4756	0
Methylcyclopentane	0.0000	0.0000	84.1608	0.00	0.0000	4501	0
Benzene	0.0078	0.0078	78.114	0.01	0.0270	3742	0
Cyclohexane	0.0000	0.0000	84.1608	0.00	0.0000	4482	0
Heptane	0.0000	0.0000	100.204	0.00	0.0000	5503	0
Methylcyclohexane	0.0000	0.0000	98.188	0.00	0.0000	5216	0
Toluene	0.0184	0.0184	92.141	0.02	0.0750	4475	1
Iso-Octane/224-Trimethylpentane	0.0000	0.0000	114.231	0.00	0.0000	6232	0
Octanes	0.0000	0.0000	114.231	0.00	0.0000	6249	0
Ethylbenzene	0.0036	0.0036	106.167	0.00	0.0170	5222	0
Xylenes	0.0077	0.0077	106.167	0.01	0.0360	5209	0
Nonanes	0.0000	0.0000	128.258	0.00	0.0000	6997	0
Decanes	0.0000	0.0000	142.285	0.00	0.0000	7743	0
Other NM/NE HC	6.4323	6.4317	102.09	6.57	29.0411	5200	334
TOTALS	**100.0000**	**100.0000**	**MW=**	**22.61**	**100.0000**	**btu/scf =**	**1335.05966**
				sg	**0.7796**		
Max Total Hydrogen Sulfide:	**0.009**	mol%		**VOC wt%**	**29.1960**		
				Toxic wt%	**0.1550**		

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

Tank ID	**19-13-CST**
Tank Description	**10-13,000 Gallon Chemical Storage Tanks**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Horizontal**
Tank Diameter (D ft)	**11.80**
Vertical Height/Horizontal Length (H_S ft)	**16.00**
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	**11.80**
Avg Liquid Height (H_L ft)	**5.90**
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)	**3,095.24**
Annual Turnovers, N	**9.93**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**1,749.74**
vapor space outage (H_{VO} ft)	**4.634**
vapor space volume (V_V ft^3)	**874.87**

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):

component	mole%	MW	lb/mole	wt%	Antoine constants (log 10, mmHg, °C) A	B	C
Hexane N-	100.000	86.180	86.18000	100.00000	6.878	1171.500	224.370
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		86.180	100.000			

	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)	52.67	57.91	67.35	77.82	87.34	94.41	96.49	95.28	87.92	75.04	62.07	53.49	75.64
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	27.23	40.51
daily average liquid surface temperature (T_{LA} °F)	50.77	55.38	64.02	73.54	82.65	89.49	91.70	90.79	84.09	71.98	59.83	51.73	72.16
daily maximum liquid surface temperature (T_{LX} °F)	57.70	63.82	74.07	85.39	94.92	102.07	103.89	102.57	94.85	81.71	67.90	58.53	82.29
daily minimum liquid surface temperature (T_{LN} °F)	43.83	46.94	53.98	61.69	70.38	76.91	79.52	79.00	73.32	62.24	51.76	44.92	62.03
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.496	1.693	2.121	2.691	3.348	3.923	4.125	4.040	3.463	2.589	1.903	1.535	2.601
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	1.800	2.110	2.726	3.569	4.433	5.186	5.394	5.243	4.427	3.275	2.340	1.840	3.319
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.235	1.347	1.631	1.998	2.489	2.921	3.109	3.071	2.676	2.026	1.536	1.273	2.015
daily vapor pressure range (ΔP_V)	0.5657	0.7633	1.0951	1.5717	1.9438	2.2659	2.2851	2.1726	1.7505	1.2492	0.8034	0.5671	1.3043
vapor space expansion factor (K_E)	0.0977	0.1250	0.1649	0.2216	0.2642	0.3051	0.3079	0.2926	0.2373	0.1778	0.1257	0.0969	0.1855
vapor molecular weight (M_V lb/lbmole)	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18
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	1,476	1,333	1,476	1,428	1,476	1,428	1,476	1,476	1,428	1,476	1,428	1,476	17,377
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)	0.7314	0.7063	0.6575	0.6021	0.5488	0.5093	0.4968	0.5020	0.5404	0.6113	0.6814	0.7262	0.6102
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)	0.0234	0.0263	0.0323	0.0402	0.0492	0.0569	0.0596	0.0585	0.0508	0.0389	0.0293	0.0240	0.0390
standing storage losses (L_S lb/month & avg is lb/yr)	71.95	72.82	99.20	119.42	150.85	168.86	182.80	179.43	150.83	119.36	87.02	73.72	1476.26
working losses (L_W lb/month & avg is lb/yr)	34.60	35.02	47.70	57.42	72.54	81.20	87.90	86.28	72.53	57.40	41.85	35.45	709.89
total losses (L_T lb/month & avg is lb/yr)	106.55	107.84	146.90	176.84	223.39	250.06	270.70	265.72	223.36	176.76	128.87	109.17	2186.15
max hourly Q in bbl/hour	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.047	0.052	0.064	0.080	0.097	0.113	0.118	0.116	0.101	0.077	0.058	0.048	
breathing/standing loss (L_S lb/hr)	0.097	0.108	0.133	0.196	0.260	0.322	0.332	0.313	0.237	0.160	0.121	0.099	
max hourly total loss (L_T lb/hr)	0.143	0.160	0.197	0.275	0.357	0.435	0.450	0.429	0.338	0.238	0.179	0.147	

L_S sum months	L_W sum months	L_T sum months
1476.26	709.89	2186.15

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	**0.161**	**0.332**	**1,410.123**
Working Loss L_W	**0.077**	**0.118**	**678.087**
Total Loss L_T	**0.238**	**0.450**	**2,088.210**

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	**20-13-CST**
Tank Description	**50-1,000 Gallon Chemical Storage Tanks**
Company Name	**Denbury Onshore, LLC**

Tank Orientation	**Horizontal**
Tank Diameter (D ft)	**5.00**
Vertical Height/Horizontal Length (H_S ft)	**7.00**
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	**5.00**
Avg Liquid Height (H_L ft)	**2.50**
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)	**2,380.95**
Annual Turnovers, N	**97.25**
Annual Hours	**8,760**
tank max liquid volume (V_{LX} ft^3)	**137.44**
vapor space outage (H_{VO} ft)	**1.963**
vapor space volume (V_V ft^3)	**68.72**

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	**0.475**

*sales oil data determines RVP per API pub 4683

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

component	*mole%*	*MW*	*lb/mole*	*wt%*	*Antoine constants (log 10, mmHg, °C) A*	*B*	*C*
Hexane N-	100.000	86.180	86.18000	100.00000	6.878	1171.500	224.370
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						
0	0.000						
	100.000		86.180	100.000			

	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)	52.64	57.86	67.29	77.75	87.25	94.32	96.40	95.20	87.85	74.99	62.03	53.46	75.58
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	27.24	40.51
daily average liquid surface temperature (T_{LA} °F)	50.75	55.36	63.99	73.50	82.61	89.45	91.66	90.75	84.05	71.95	59.81	51.71	72.13
daily maximum liquid surface temperature (T_{LX} °F)	57.69	63.80	74.04	85.35	94.87	102.02	103.85	102.53	94.82	81.69	67.88	58.52	82.25
daily minimum liquid surface temperature (T_{LN} °F)	43.81	46.92	53.95	61.65	70.34	76.87	79.47	78.96	73.28	62.21	51.74	44.90	62.00
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.495	1.692	2.119	2.688	3.345	3.919	4.121	4.036	3.460	2.588	1.902	1.534	2.599
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	1.800	2.109	2.724	3.566	4.429	5.182	5.389	5.239	4.423	3.273	2.339	1.839	3.317
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.234	1.346	1.630	1.996	2.487	2.918	3.106	3.068	2.674	2.024	1.536	1.272	2.014
daily vapor pressure range (ΔP_V)	0.5655	0.7629	1.0944	1.5705	1.9422	2.2640	2.2833	2.1710	1.7493	1.2485	0.8030	0.5672	1.3035
vapor space expansion factor (K_E)	0.0977	0.1249	0.1649	0.2214	0.2640	0.3048	0.3076	0.2924	0.2371	0.1778	0.1257	0.0969	0.1854
vapor molecular weight (M_V lb/lbmole)	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18	86.18
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	1,135	1,025	1,135	1,099	1,135	1,099	1,135	1,135	1,099	1,135	1,099	1,135	13,367
monthly turnovers (N/month) with avg = total annual	8.26	7.46	8.26	7.99	8.26	7.99	8.26	8.26	7.99	8.26	7.99	8.26	97.25
vented vapor saturation factor (K_S)	0.8654	0.8503	0.8193	0.7814	0.7418	0.7103	0.6999	0.7042	0.7353	0.7878	0.8347	0.8623	0.7871
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)	0.0234	0.0263	0.0323	0.0402	0.0491	0.0568	0.0595	0.0584	0.0507	0.0389	0.0293	0.0240	0.0390
standing storage losses (L_S lb/month & avg is lb/yr)	7.28	7.37	10.04	12.08	15.27	17.09	18.50	18.16	15.27	12.08	8.81	7.46	149.41
working losses (L_W lb/month & avg is lb/yr)	12.64	12.79	17.42	20.97	26.49	29.65	32.10	31.51	26.49	20.97	15.29	12.95	259.28
total losses (L_T lb/month & avg is lb/yr)	19.92	20.16	27.46	33.06	41.76	46.74	50.60	49.67	41.76	33.05	24.10	20.42	408.70
max hourly Q in bbl/hour	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.036	0.040	0.049	0.061	0.075	0.087	0.091	0.089	0.077	0.059	0.045	0.037	
breathing/standing loss (L_S lb/hr)	0.010	0.011	0.013	0.020	0.028	0.035	0.037	0.034	0.025	0.016	0.012	0.010	
max hourly total loss (L_T lb/hr)	0.046	0.051	0.063	0.081	0.102	0.122	0.127	0.124	0.103	0.076	0.057	0.047	

L_S sum months	L_W sum months	L_T sum months
149.41	259.28	408.70

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	**0.016**	**0.037**	**142.724**
Working Loss L_W	**0.028**	**0.091**	**247.677**
Total Loss L_T	**0.045**	**0.127**	**390.401**

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

CORRELATION EQUATIONS TO PREDICT REID VAPOR PRESSURE AND PROPERTIES OF GASEOUS EMISSIONS FOR EXPLORATION AND PRODUCTION FACILITIES

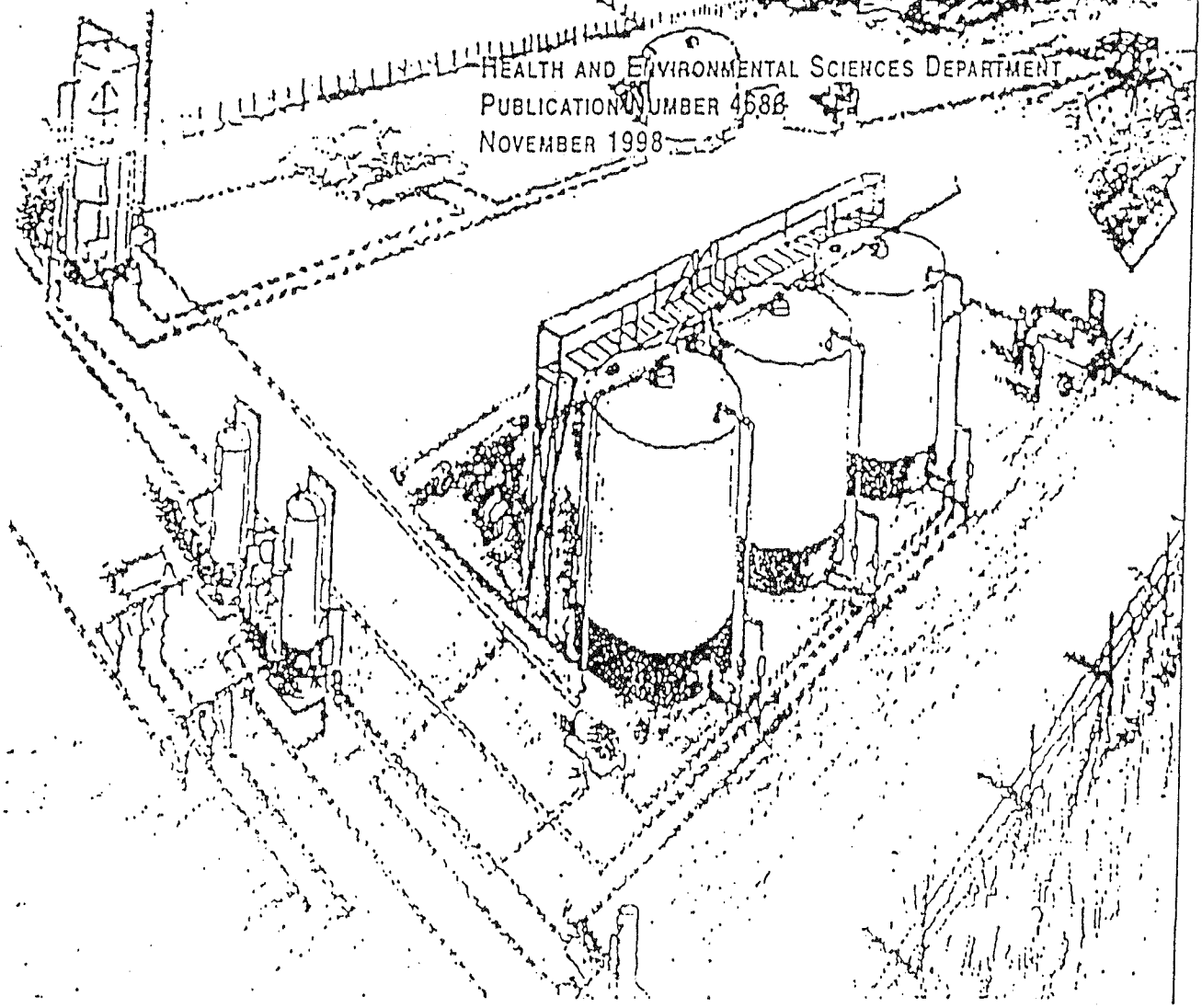

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Table 3-2 summarizes Pearson correlation coefficients (r) calculated for the sales oil RVP relative to the other variables. Better correlations are indicated as |r| approaches 1. Table 3-2 shows that sales oil APIG is the best predictor of RVP. (Note that the sales oil bubble point is an equally good predictor, r = 0.78.)

Table 3-2. Single-parameter correlation coefficients for RVP.

Variable	Pearson Correlation With RVP
SP	0.52
ln(SP)	0.51
ST	-0.37
APIG	0.79

REGRESSION ANALYSIS

A multivariate linear regression was developed, represented by the equation shown below.

$$RVP = 0.003 + 0.075 \ln(SP) - 0.016 ST + 0.165 APIG$$

(Equation 3-4)

The correlation coefficient for Equation 3-4 (r = 0.80) is not significantly better than the single-parameter coefficient for sales oil APIG shown in Table 3-2. Therefore, the single-parameter fit based on sales oil APIG is recommended for use (see Figure 3-2).

$$RVP = -1.699 + 0.179 APIG$$

(Equation 3-5)

The error of the estimate (E) is one measure of the performance of a model or assumption, where the error equals the observed value (Obs) less the estimated value (Est), E = Obs - Est. In Figure 3-2, it is obvious that the error associated with the regression line is much less than the error associated with the default assumption, RVP = 5 psia.

$$P = \exp\left\{\left[\left(\frac{2{,}799}{T+459.6}\right) - 2.227\right]\log_{10}(RVP) - \left(\frac{7{,}261}{T+459.6}\right) + 12.82\right\}$$

Where:

P = stock true vapor pressure, in pounds per square inch absolute.
T = stock temperature, in degrees Fahrenheit.
RVP = Reid vapor pressure, in pounds per square inch.

Note: This equation was derived from a regression analysis of points read off Figure 7.1-13a over the full range of Reid vapor pressures, slopes of the ASTM distillation curve at 10 percent evaporated, and stock temperatures. In general, the equation yields *P* values that are within +0.05 pound per square inch absolute of the values obtained directly from the nomograph.

Figure 7.1-13b. Equation for true vapor pressure of crude oils with a Reid vapor pressure of 2 to 15 pounds per square inch.[4] See note at Figure 7.1-13a.

$$P = \exp\left\{\left[0.7553 - \left(\frac{413.0}{T+459.6}\right)\right]S^{0.5}\log_{10}(RVP) - \left[1.854 - \left(\frac{1{,}042}{T+459.6}\right)\right]S^{0.5}$$

$$+\left[\left(\frac{2{,}416}{T+459.6}\right) - 2.013\right]\log_{10}(RVP) - \left(\frac{8{,}742}{T+459.6}\right) + 15.64\right\}$$

Where:

P = stock true vapor pressure, in pounds per square inch absolute.
T = stock temperature, in degrees Fahrenheit.
RVP = Reid vapor pressure, in pounds per square inch.
S = slope of the ASTM distillation curve at 10 percent evaporated, in degrees Fahrenheit per percent.

Note: This equation was derived from a regression analysis of points read off Figure 7.1-14a over the full range of Reid vapor pressures, slopes of the ASTM distillation curve at 10 percent evaporated, and stock temperatures. In general, the equation yields *P* values that are within +0.05 pound per square inch absolute of the values obtained directly from the nomograph.

Figure 7.1-14b. Equation for true vapor pressure of refined petroleum stocks with a Reid vapor pressure of 1 to 20 pounds per square inch.[4] See note at Figure 7.1-14a.

$$A = 15.64 - 1.854\ S^{0.5} - (0.8742 - 0.3280\ S^{0.5})\ln(RVP)$$
$$B = 8{,}742 - 1{,}042\ S^{0.5} - (1{,}049 - 179.4\ S^{0.5})\ln(RVP)$$

where:

RVP = stock Reid vapor pressure, in pounds per square inch
ln = natural logarithm function
S = stock ASTM-D86 distillation slope at 10 volume percent evaporation (°F/vol %)

Figure 7.1-15. Equations to determine vapor pressure constants A and B for refined petroleum stocks.[22]

Table 7.1-2. PROPERTIES (M_V, M_L, P_{VA}, W_L) OF SELECTED PETROLEUM LIQUIDS[a, e]

Petroleum Liquid Mixture	Vapor Molecular Weight[a]	Liquid Molecular Weight[b]	Liquid Density [a]	ASTM D86 Distillation Slope[c]	Vapor Pressure Equation Constant[d]	Vapor Pressure Equation Constant[d]	True Vapor Pressure (at 60 °F)
	M_V	M_L	W_L	S	A	B	P_{VA}
	lb/lb-mole	lb/lb-mole	lb/gal	ºF/vol %	dimensionless	ºR	psia
Midcontinent Crude Oil	50	207	7.1	–	Figure 7.1-16	Figure 7.1-16	–
Refined Petroleum Stocks	–	–	–	–	Figure 7.1-15	Figure 7.1-15	–
Motor Gasoline RVP 13	62	92	5.6	3.0	11.644	5043.6	7.0
Motor Gasoline RVP 10	66 [e]	92	5.6	3.0	11.724	5237.3	5.2
Motor Gasoline RVP 7	68	92	5.6	3.0	11.833	5500.6	3.5
Light Naphtha RVP 9-14	–	–	–	3.5	–	–	–
Naphtha RVP 2-8	–	–	–	2.5	–	–	–
Aviation Gasoline	–	–	–	2.0	–	–	–
Jet Naphtha (JP-4)	80	120	6.4	–	11.368	5784.3	1.3
Jet Kerosene (Jet A)	130	162	7.0	–	12.390	8933.0	0.008
No. 2 Fuel Oil (Diesel)	130	188	7.1	–	12.101	8907.0	0.006
No. 6 Fuel Oil [f]	130	387	7.9	–	10.781	8933.0	0.002
Vacuum Residual Oil[g]	190	387	7.9	–	10.104	10,475.5	0.00004

[a] References 10 and 11

[b] Liquid molecular weights from "Memorandum from Patrick B. Murphy, Radian/RTP to James F. Durham, EPA/CPB Concerning Petroleum Refinery Liquid HAP and Properties Data, August 10, 1993," as adopted in versions 3.1 and 4.0 of EPA's TANKS software.

[c] Reference 4.

[d] For motor gasolines, see Figure 7.1-15;

for crude oil, see Figure 7.1-16;

for Jet Naphtha, Jet Kerosene, and No. 2 Fuel Oil, see Barnett and Hibbard[10];

for No. 6 Fuel Oil.[22]

[e] Alternatively, in the absence of measured data, a value of 66 lb/lb-mole may be assumed for all gasolines, in that the variability shown as a function of RVP is speculative.

[f] This is for a blend of Vacuum Residual Oil with a light distillate cutter stock, or similar mixture. Vapor pressure constants given will result in higher vapor pressure values than shown previously in AP-42 for Residual Oil No. 6.

[g] This is the straight residue from the bottom of the vacuum distillation column, prior to any further processing or blending. Properties given for Vacuum Residual Oil are those given for Residual Oil No. 6 previously in AP-42.

5.2 Transportation And Marketing Of Petroleum Liquids[1-3]

5.2.1 General

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. Crude oil is transported from production operations to a refinery by tankers, barges, rail tank cars, tank trucks, and pipelines. Refined petroleum products are conveyed to fuel marketing terminals and petrochemical industries by these same modes. From the fuel marketing terminals, the fuels are delivered by tank trucks to service stations, commercial accounts, and local bulk storage plants. The final destination for gasoline is usually a motor vehicle gasoline tank. Similar distribution paths exist for fuel oils and other petroleum products. A general depiction of these activities is shown in Figure 5.2-1.

5.2.2 Emissions And Controls

Evaporative emissions from the transportation and marketing of petroleum liquids may be considered, by storage equipment and mode of transportation used, in four categories:

1. Rail tank cars, tank trucks, and marine vessels: loading, transit, and ballasting losses.
2. Service stations: bulk fuel drop losses and underground tank breathing losses.
3. Motor vehicle tanks: refueling losses.
4. Large storage tanks: breathing, working, and standing storage losses. (See Chapter 7, "Liquid Storage Tanks".)

Evaporative and exhaust emissions are also associated with motor vehicle operation, and these topics are discussed in AP-42 *Volume II: Mobile Sources*.

5.2.2.1 Rail Tank Cars, Tank Trucks, And Marine Vessels -

Emissions from these sources are from loading losses, ballasting losses, and transit losses.

5.2.2.1.1 Loading Losses -

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations. Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is, therefore, a function of the following parameters:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

The principal methods of cargo carrier loading are illustrated in Figure 5.2-2, Figure 5.2-3, and Figure 5.2-4. In the splash loading method, the fill pipe dispensing the cargo is lowered only part way into the cargo tank. Significant turbulence and vapor/liquid contact occur during the splash

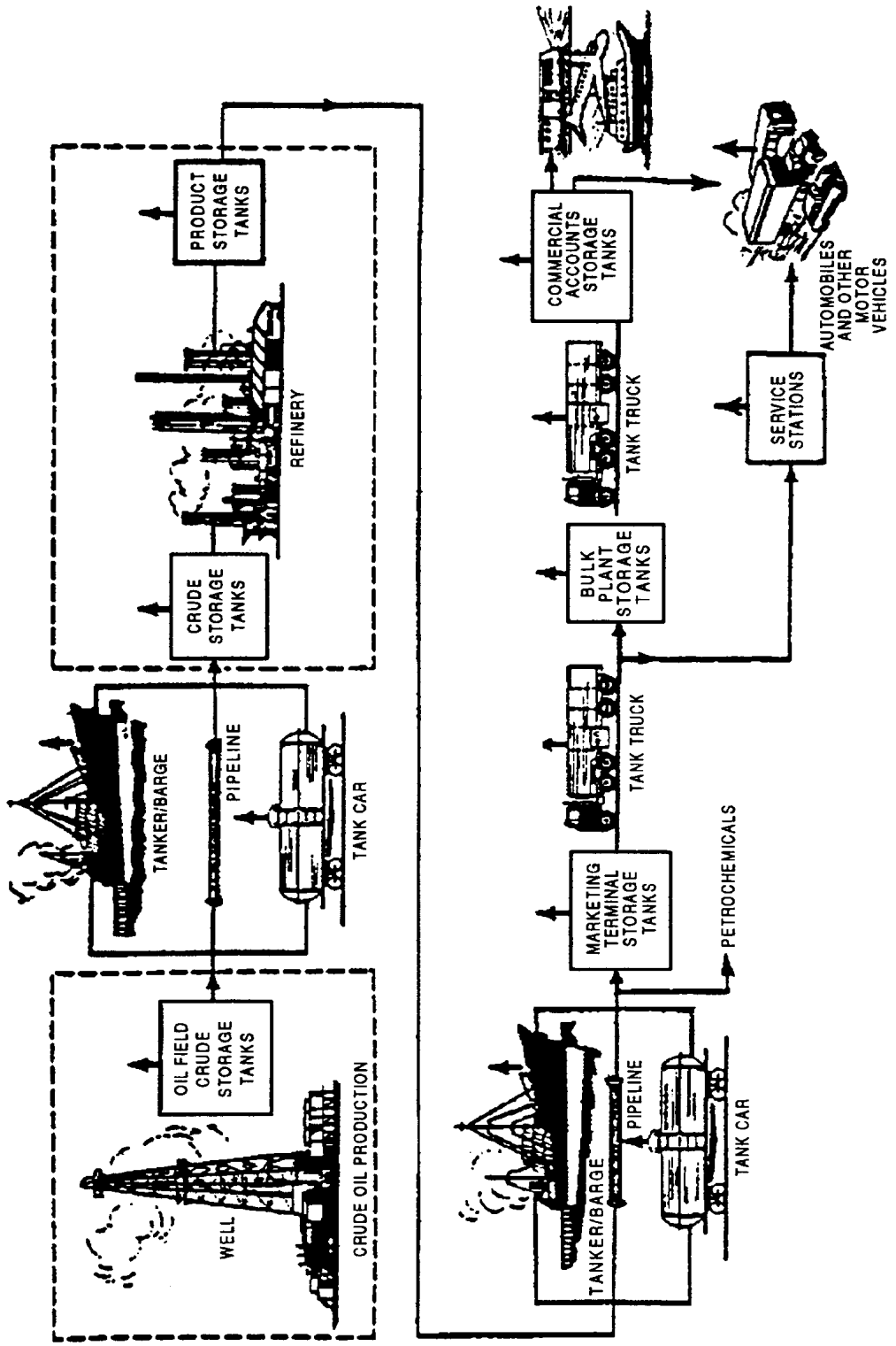

Figure 5.2-1. Flow sheet of petroleum production, refining, and distribution systems. (Points of organic emissions are indicated by vertical arrows.)

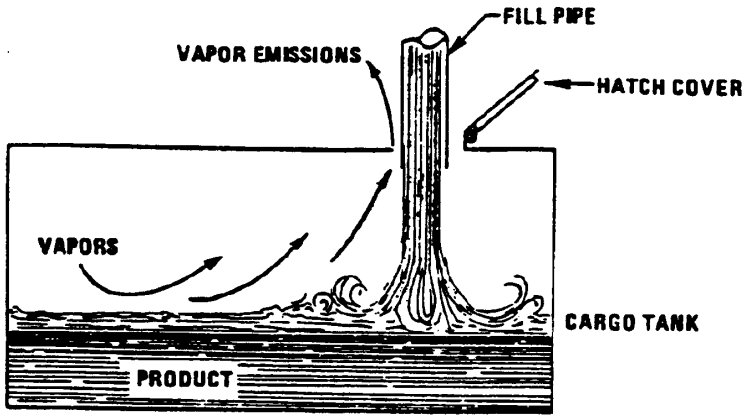

Figure 5.2-2. Splash loading method.

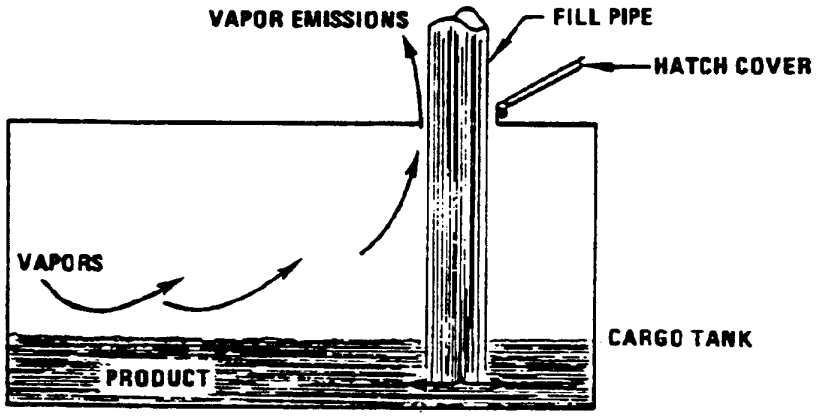

Figure 5.2-3. Submerged fill pipe.

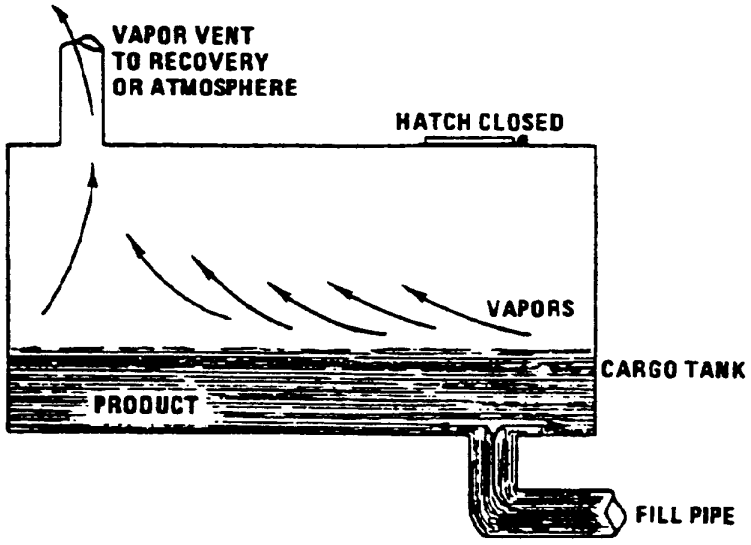

Figure 5.2-4. Bottom loading.

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

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

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

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

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

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

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

where:

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

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

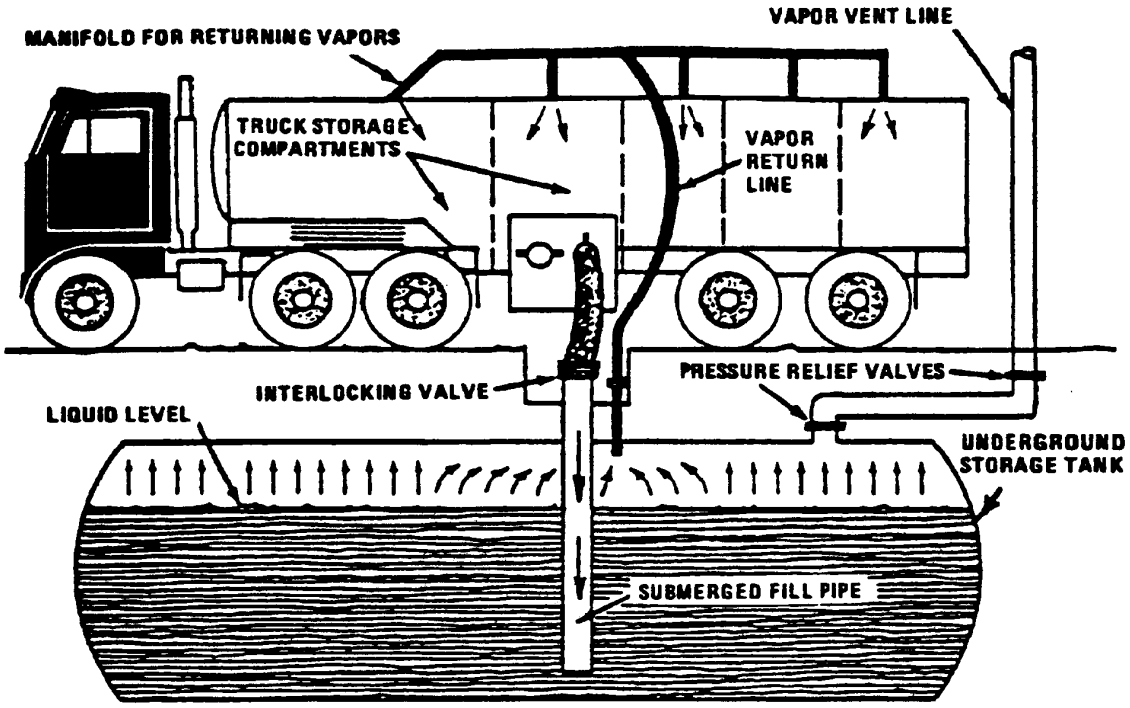

Figure 5.2-5. Tank truck unloading into a service station underground storage tank and practicing "vapor balance" form of emission control.

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode Of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.50
	Submerged loading: dedicated normal service	0.60
	Submerged loading: dedicated vapor balance service	1.00
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.00
Marine vessels[a]	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

The saturation factor, S, represents the expelled vapor's fractional approach to saturation, and it accounts for the variations observed in emission rates from the different unloading and loading methods. Table 5.2-1 lists suggested saturation factors.

Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate calculated in Equation 1 by an overall reduction efficiency term:

$$\left(1 - \frac{\text{eff}}{100}\right)$$

The overall reduction efficiency should account for the capture efficiency of the collection system as well as both the control efficiency and any downtime of the control device. Measures to reduce loading emissions include selection of alternate loading methods and application of vapor recovery equipment. The latter captures organic vapors displaced during loading operations and recovers the vapors by the use of refrigeration, absorption, adsorption, and/or compression. The recovered product is piped back to storage. Vapors can also be controlled through combustion in a thermal oxidation unit, with no product recovery. Figure 5.2-6 demonstrates the recovery of gasoline vapors from tank trucks during loading operations at bulk terminals. Control efficiencies for the recovery units range from 90 to over 99 percent, depending on both the nature of the vapors and the type of control equipment used.[5-6] However, not all of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 99.2 percent for tanker trucks passing the MACT-level annual leak test (not more than 1 inch water column pressure change in 5 minutes after pressurizing to 18 inches water followed by pulling a vacuum of 6 inches water).[7] A collection efficiency of 98.7 percent (a 1.3 percent leakage rate) should be assumed for trucks passing the NSPS-level annual test (3 inches pressure change) A collection efficiency of 70 percent should be assumed for trucks not passing one of these annual leak tests[6].

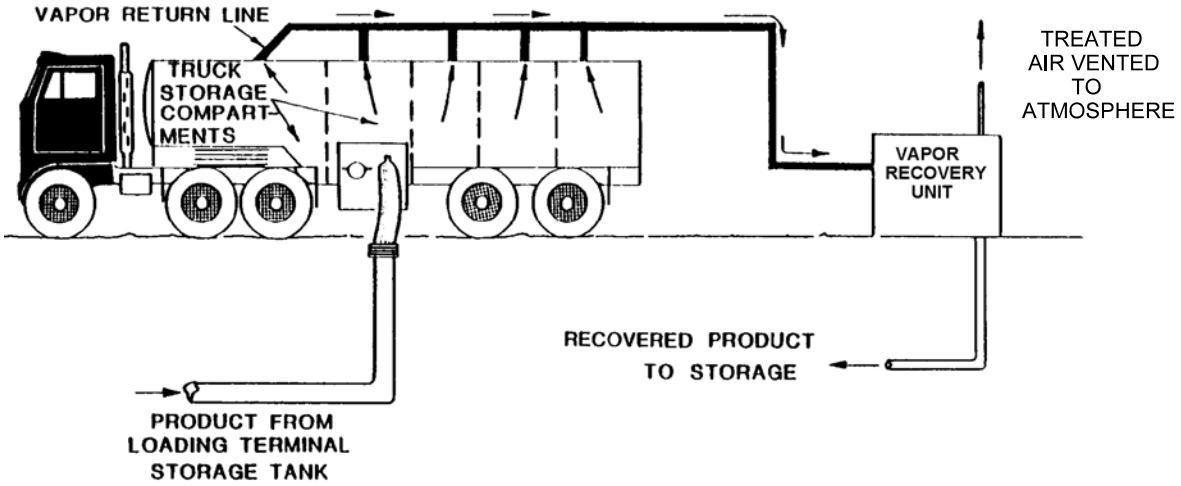

Figure 5.2-6. Tank truck loading with vapor recovery.

Sample Calculation -

Loading losses (L_L) from a gasoline tank truck in dedicated vapor balance service and practicing vapor recovery would be calculated as follows, using Equation 1:

Design basis -

Cargo tank volume is 8000 gal
Gasoline Reid vapor pressure (RVP) is 9 psia
Product temperature is 80°F
Vapor recovery efficiency is 95 percent
Vapor collection efficiency is 98.7 percent (NSPS-level annual leak test)

Loading loss equation -

$$L_L = 12.46 \frac{SPM}{T}\left(1 - \frac{eff}{100}\right)$$

where:

S = saturation factor (see Table 5.2-1) - 1.00
P = true vapor pressure of gasoline = 6.6 psia
M = molecular weight of gasoline vapors = 66
T = temperature of gasoline = 540°R
eff = overall reduction efficiency (95 percent control x 98.7 percent collection) = 94 percent

$$L_L = 12.46 \frac{(1.00)(6.6)(66)}{540}\left(1 - \frac{94}{100}\right)$$

$$= 0.60 \text{ lb}/10^3 \text{ gal}$$

Total loading losses are:

$$(0.60 \text{ lb}/10^3 \text{ gal})(8.0 \times 10^3 \text{ gal}) = 4.8 \text{ pounds (lb)}$$

Measurements of gasoline loading losses from ships and barges have led to the development of emission factors for these specific loading operations.[8] These factors are presented in Table 5.2-2 and should be used instead of Equation 1 for gasoline loading operations at marine terminals. Factors are expressed in units of milligrams per liter (mg/L) and pounds per 1000 gallons (lb/10^3 gal).

Table 5.2-2 (Metric And English Units). VOLATILE ORGANIC COMPOUND (VOC) EMISSION FACTORS FOR GASOLINE LOADING OPERATIONS AT MARINE TERMINALS[a]

Vessel Tank Condition	Previous Cargo	Ships/Ocean Barges[b]		Barges[b]	
		mg/L Transferred	lb/10^3 gal Transferred	mg/L Transferred	lb/10^3 gal Transferred
Uncleaned	Volatile[c]	315	2.6	465	3.9
Ballasted	Volatile	205	1.7	—[d]	—[d]
Cleaned	Volatile	180	1.5	ND	ND
Gas-freed	Volatile	85	0.7	ND	ND
Any condition	Nonvolatile	85	0.7	ND	ND
Gas-freed	Any cargo	ND	ND	245	2.0
Typical overall situation[e]	Any cargo	215	1.8	410	3.4

[a] References 2,9. Factors are for both VOC emissions (which excludes methane and ethane) and total organic emissions, because methane and ethane have been found to constitute a negligible weight fraction of the evaporative emissions from gasoline. ND = no data.
[b] Ocean barges (tank compartment depth about 12.2 m [40 ft]) exhibit emission levels similar to tank ships. Shallow draft barges (compartment depth 3.0 to 3.7 m [10 to 12 ft]) exhibit higher emission levels.
[c] Volatile cargoes are those with a true vapor pressure greater than 10 kilopascals (kPa) (1.5 psia).
[d] Barges are usually not ballasted.
[e] Based on observation that 41% of tested ship compartments were uncleaned, 11% ballasted, 24% cleaned, and 24% gas-freed. For barges, 76% were uncleaned.

In addition to Equation 1, which estimates emissions from the loading of petroleum liquids, Equation 2 has been developed specifically for estimating emissions from the loading of crude oil into ships and ocean barges:

$$C_L = C_A + C_G \quad (2)$$

where:

C_L = total loading loss, lb/10^3 gal of crude oil loaded
C_A = arrival emission factor, contributed by vapors in the empty tank compartment before loading, lb/10^3 gal loaded (see Note below)
C_G = generated emission factor, contributed by evaporation during loading, lb/10^3 gal loaded

Note: Values of C_A for various cargo tank conditions are listed in Table 5.2-3.

5.2-3 (English Units). AVERAGE ARRIVAL EMISSION FACTORS, C_A, FOR CRUDE OIL LOADING EMISSION EQUATION[a]

Ship/Ocean Barge Tank Condition	Previous Cargo	Arrival Emission Factor, lb/10^3 gal
Uncleaned	Volatile[b]	0.86
Ballasted	Volatile	0.46
Cleaned or gas-freed	Volatile	0.33
Any condition	Nonvolatile	0.33

[a] Arrival emission factors (C_A) to be added to generated emission factors (C_G) calculated in Equation 3 to produce total crude oil loading loss (C_L). Factors are for total organic compounds; VOC emission factors average about 15% lower, because VOC does not include methane or ethane.
[b] Volatile cargoes are those with a true vapor pressure greater than 10 kPa (1.5 psia).

This equation was developed empirically from test measurements of several vessel compartments.[8] The quantity C_G can be calculated using Equation 3:

$$C_G = 1.84\ (0.44\ P - 0.42)\ \frac{M\ G}{T} \qquad (3)$$

where:

P = true vapor pressure of loaded crude oil, psia
M = molecular weight of vapors, lb/lb-mole
G = vapor growth factor = 1.02 (dimensionless)
T = temperature of vapors, °R (°F + 460)

Emission factors derived from Equation 3 and Table 5.2-3 represent total organic compounds. Volatile organic compound (VOC) emission factors (which exclude methane and ethane because they are exempted from the regulatory definition of "VOC") for crude oil vapors have been found to range from approximately 55 to 100 weight percent of these total organic factors. When specific vapor composition information is not available, the VOC emission factor can be estimated by taking 85 percent of the total organic factor.[3]

5.2.2.1.2 Ballasting Losses -

Ballasting operations are a major source of evaporative emissions associated with the unloading of petroleum liquids at marine terminals. It is common practice to load several cargo tank compartments with sea water after the cargo has been unloaded. This water, termed "ballast", improves the stability of the empty tanker during the subsequent voyage. Although ballasting practices vary, individual cargo tanks are ballasted typically about 80 percent, and the total vessel 15 to 40 percent, of capacity. Ballasting emissions occur as vapor-laden air in the "empty" cargo tank is displaced to the atmosphere by ballast water being pumped into the tank. Upon arrival at a loading port, the ballast water is pumped from the cargo tanks before the new cargo is loaded. The ballasting of cargo tanks reduces the quantity of vapors returning in the empty tank, thereby reducing the quantity of vapors emitted during subsequent tanker loading. Regulations administered by the U. S. Coast Guard require that, at marine terminals located in ozone nonattainment areas, large tankers with crude oil washing systems contain the organic vapors from ballasting.[10] This is accomplished principally by displacing the vapors during ballasting into a cargo tank being simultaneously unloaded. In other areas, marine vessels emit organic vapors directly to the atmosphere.

Equation 4 has been developed from test data to calculate the ballasting emissions from crude oil ships and ocean barges[8]:

$$L_B = 0.31 + 0.20\ P + 0.01\ PU_A \qquad (4)$$

where:

L_B = ballasting emission factor, lb/10^3 gal of ballast water
P = true vapor pressure of discharged crude oil, psia
U_A = arrival cargo true ullage, before dockside discharge, measured from the deck, feet; (the term "ullage" here refers to the distance between the cargo surface level and the deck level)

Table 5.2-4 lists average total organic emission factors for ballasting into uncleaned crude oil cargo compartments. The first category applies to "full" compartments wherein the crude oil true ullage just before cargo discharge is less than 1.5 meters (m) (5 ft). The second category applies to lightered, or short-loaded, compartments (part of cargo previously discharged, or original load a partial fill), with an arrival true ullage greater than 1.5 m (5 ft). It should be remembered that these tabulated emission factors are examples only, based on average conditions, to be used when crude oil vapor pressure is unknown. Equation 4 should be used when information about crude oil vapor pressure and cargo compartment condition is available. The following sample calculation illustrates the use of Equation 4.

5.2-4 (Metric And English Units). TOTAL ORGANIC EMISSION FACTORS FOR CRUDE OIL BALLASTING[a]

Compartment Condition Before Cargo Discharge	Average Emission Factors			
	By Category		Typical Overall[b]	
	mg/L Ballast Water	lb/10^3 gal Ballast Water	mg/L Ballast Water	lb/10^3 gal Ballast Water
Fully loaded[c]	111	0.9	129	1.1
Lightered or previously short loaded[d]	171	1.4		

[a] Assumes crude oil temperature of 16°C (60°F) and RVP of 34 kPa (5 psia). VOC emission factors average about 85% of these total organic factors, because VOCs do not include methane or ethane.
[b] Based on observation that 70% of tested compartments had been fully loaded before ballasting. May not represent average vessel practices.
[c] Assumed typical arrival ullage of 0.6 m (2 ft).
[d] Assumed typical arrival ullage of 6.1 m (20 ft).