Denbury

April 2, 2025

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

APR 2025

RE: **Notice of Intent for Coverage Under the Oil Production General Permit**
Denbury Onshore, LLC
Heidelberg Central Facility
AI No.: 38197; Permit No.: 1300-00074
Jasper 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 Simpson County News. Additionally, a copy of the public notice and the complete OPGP NOI will be provided to the Mary Weems Parker 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

Heidelberg Central Facility
Jasper County, MS

April 2025

Denbury

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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*): Heidelberg Central Facility

C. Facility Air Permit/Coverage No. (*if known*): 1300-00074

D. Agency Interest No. (*if known*): 38197

RECEIVED
APR 8 2025
MDEQ

E. Physical Address
1. Street Address: 239 County Road 359
2. City: Heidelberg 3. State: MS
4. County: Jasper 5. Zip Code: 39439
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

ORIGINAL

G. Latitude/Longitude Data
1. Collection Point (*check one*):
☐ Site Entrance ☑ Other: facility center
2. Method of Collection (*check one*):
☐ GPS Specify coordinate system (NAD 83, etc.)
☐ Map Interpolation (Google Earth, etc.) ☑ Other: Plot plan
3. Latitude (*degrees/minutes/seconds*): 31 51 55.00
4. Longitude (*degrees/minutes/seconds*): 89 01 35.00
5. Elevation (*feet*): 440±

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	8,000	barrels/day
Water	40,000	barrels/day
Other (Specify)		

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

Produced Material	Throughput	Units
Flared Gas	0.45	MMCF/day
Oil	8,000	barrels/day
Water	40,000	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

3/27/25
Date

Rusty Shaw
Printed Name

Director of Regulatory Affairs
Title

Denbury Onshore, LLC
Simplified Block Flow Diagram
Heidelberg Central Facility

<u>MBD-1101</u>
Slug Catcher

<u>MAM-1102A</u>
Free Water Knockout

<u>NBK-1104</u>
Heater Treater

<u>ABJ-1111</u>
Gun Barrel Tank
5000 BBL
EPN: 5a-08-GBT-CV

<u>ABJ-117</u>
Wet/Dry Oil Tank
5000 BBL
EPN: 5e-08-OST-CV

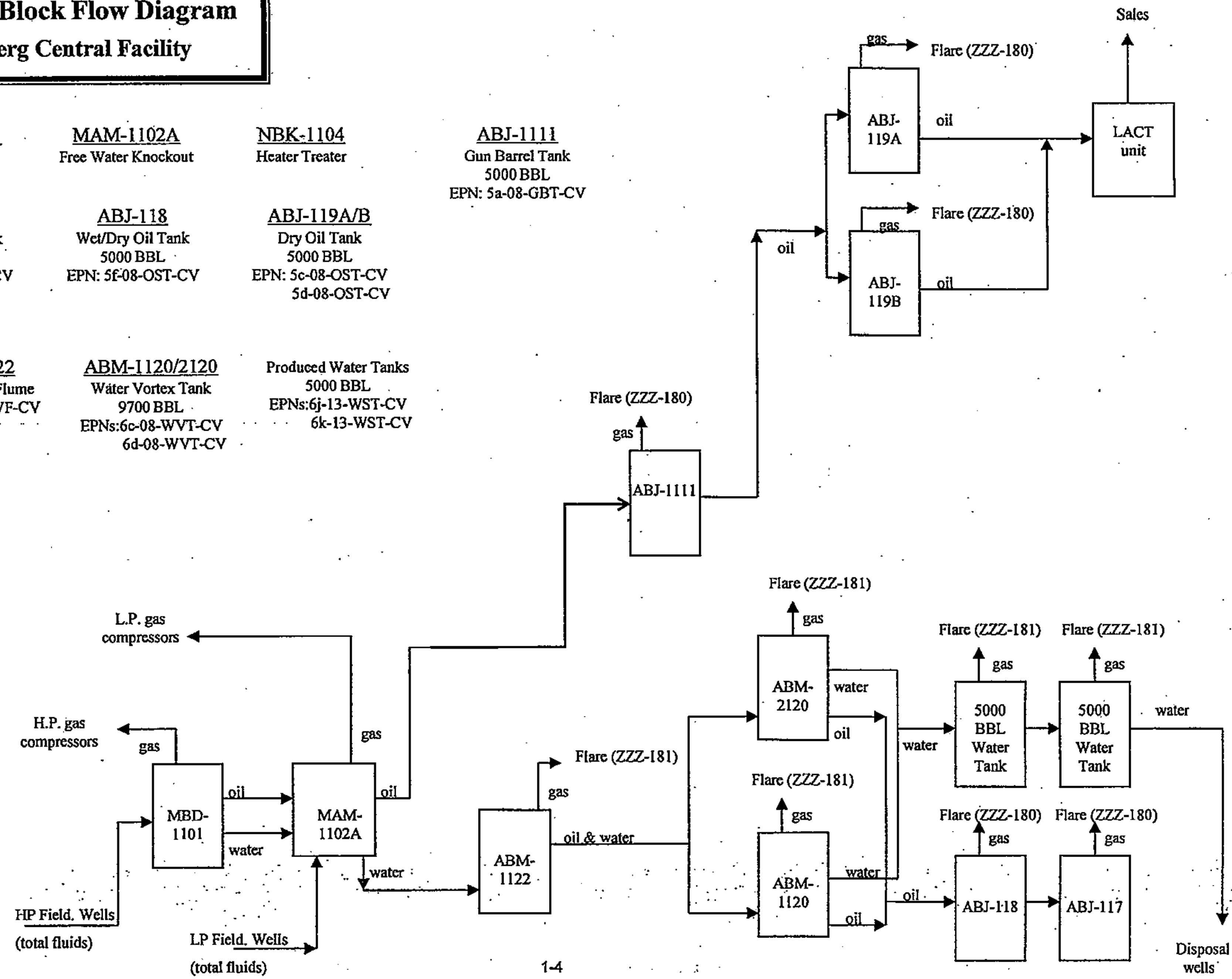
<u>ABJ-118</u>
Wet/Dry Oil Tank
5000 BBL
EPN: 5f-08-OST-CV

<u>ABJ-119A/B</u>
Dry Oil Tank
5000 BBL
EPN: 5c-08-OST-CV
5d-08-OST-CV

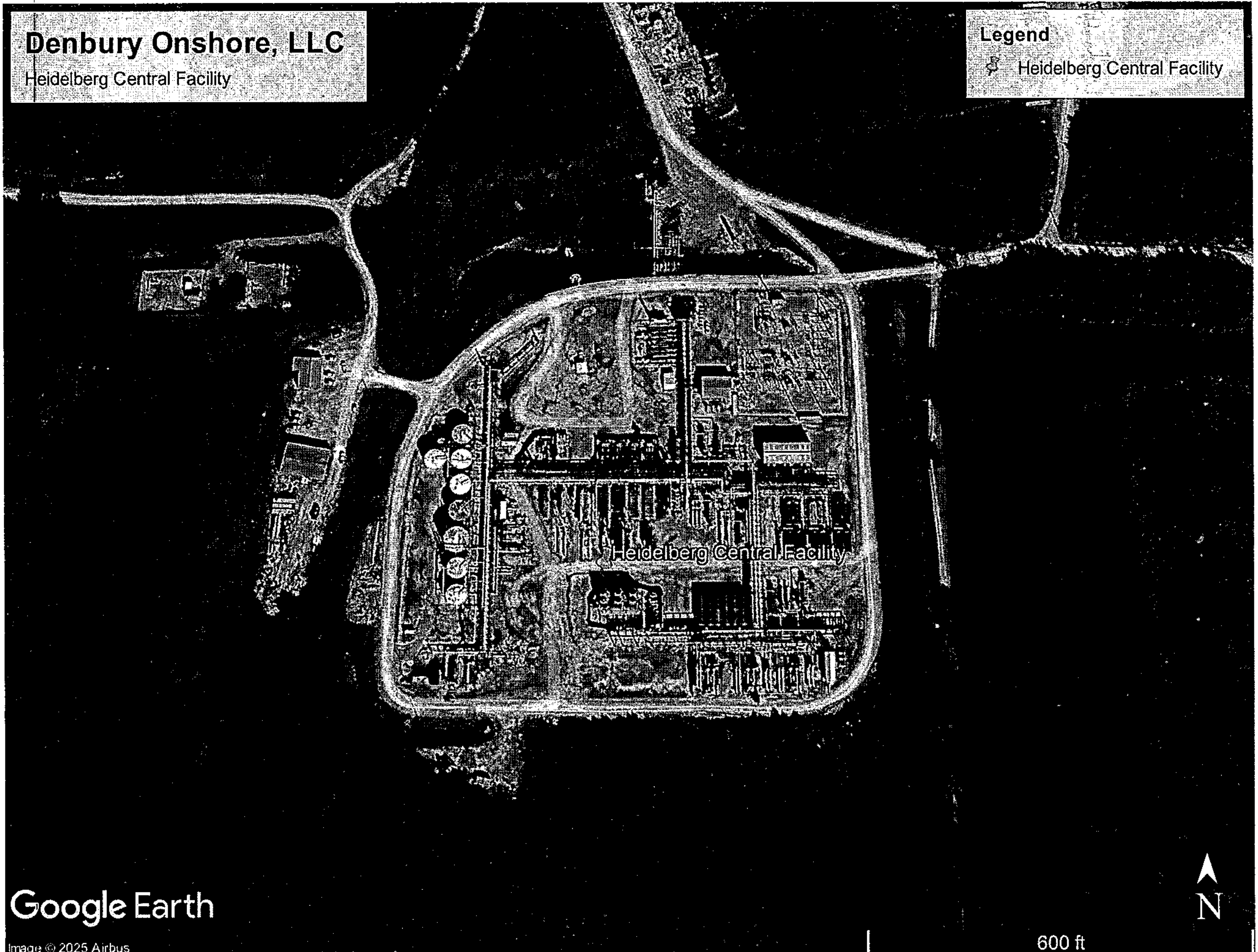
<u>ABM-1122</u>
Water Vortex Flume
EPN: 6a-08-WVF-CV

<u>ABM-1120/2120</u>
Water Vortex Tank
9700 BBL
EPNs:6c-08-WVT-CV
6d-08-WVT-CV

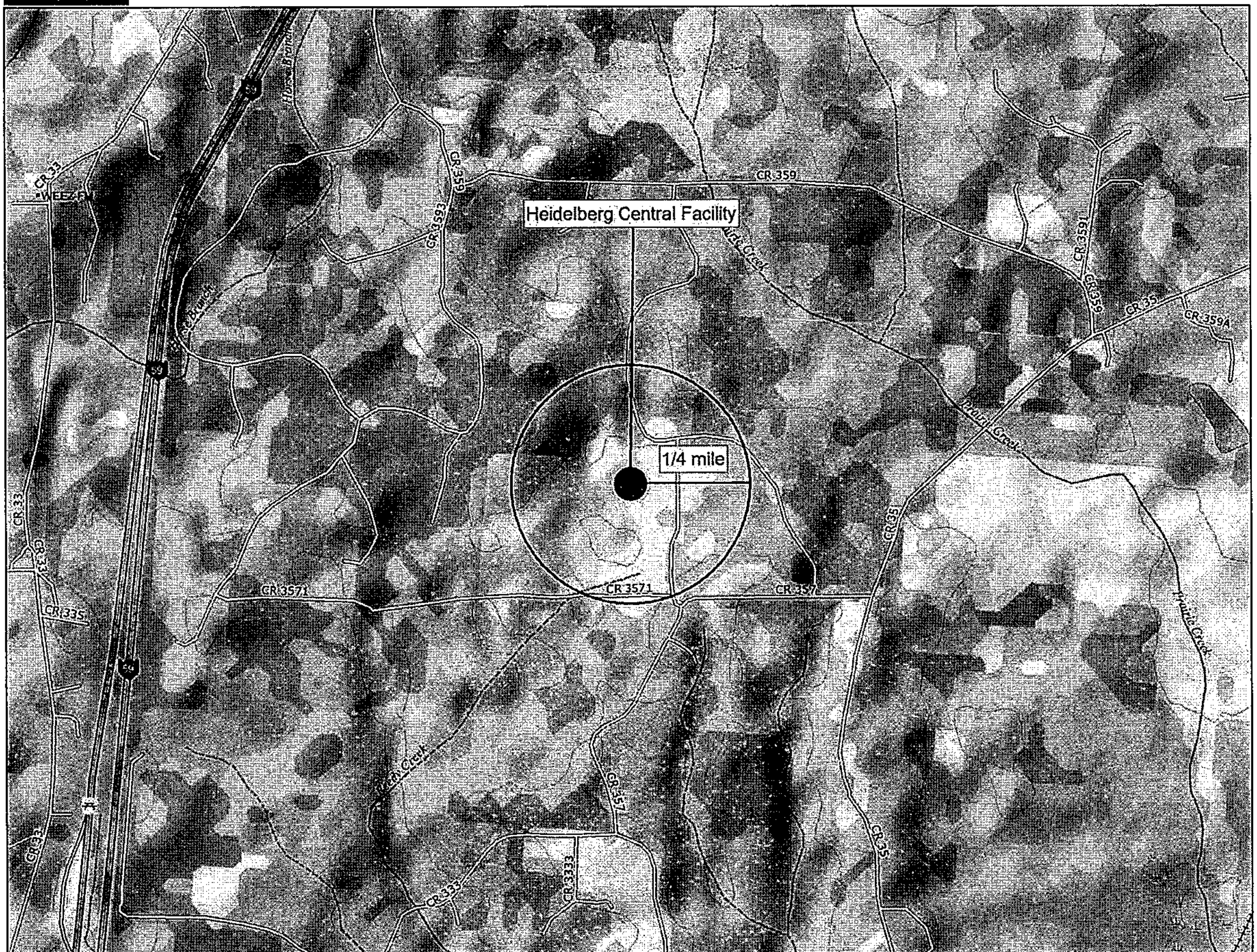
Produced Water Tanks
5000 BBL
EPNs:6j-13-WST-CV
6k-13-WST-CV



Denbury Onshore, LLC
Heidelberg Central Facility
Legend
Heidelberg Central Facility
3593
3593
Heidelberg Central Facility
3571
3571
357
Google Earth
Image © 2025 Airbus
N
2000 ft



Denbury Onshore, LLC
Heidelberg Central Facility
Legend
Heidelberg Central Facility
Heidelberg Central Facility
Google Earth
Image © 2025 Airbus
N
600 ft



Scale 1 : 20,000

1" = 1,666.7 ft . Data Zoom 13-3

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
3a-08-H-BS	0.02	0.10	0.02	0.10	0.02	0.10	0.00	0.02	0.31	1.35	0.26	1.14	0.02	0.07	0.00	0.00	-	-	0.01	0.02
3b-08-H-BS	0.02	0.10	0.02	0.10	0.02	0.10	0.00	0.02	0.31	1.35	0.26	1.14	0.02	0.07	0.00	0.00	-	-	0.01	0.02
5a-08-GBT-CV	-	-	-	-	-	-	-	-	-	-	-	-	285.13	1248.87	0.00	0.00	-	-	26.61	116.55
5c-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	5.35	23.43	0.00	0.00	-	-	0.50	2.19
5d-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	5.35	23.43	0.00	0.00	-	-	0.50	2.19
5e-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.82	3.60	0.00	0.00	-	-	0.08	0.34
5f-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.82	3.60	0.00	0.00	-	-	0.08	0.34
6a-08-WVF-CV	-	-	-	-	-	-	-	-	-	-	-	-	8.57	37.54	0.00	0.00	-	-	0.94	4.10
6b-08-WVF-CV	-	-	-	-	-	-	-	-	-	-	-	-	8.57	37.54	0.00	0.00	-	-	0.94	4.10
6c-08-WVT-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.91	3.98	0.00	0.00	-	-	0.10	0.43
6d-08-WVT-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.91	3.98	0.00	0.00	-	-	0.10	0.43
6i-08-ST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.06	0.00	0.00	-	-	0.00	0.01
6j-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	25.97	113.74	0.00	0.00	-	-	2.83	12.41
6k-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	25.97	113.74	0.00	0.00	-	-	2.83	12.41
6l-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	25.97	113.74	0.00	0.00	-	-	2.83	12.41
6m-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	25.97	113.74	0.00	0.00	-	-	2.83	12.41
7-08-SBP	-	-	-	-	-	-	-	-	-	-	-	-	0.11	0.04	0.00	0.00	-	-	0.01	0.00
8-08-F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9-08-F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-08-FE	-	-	-	-	-	-	-	-	-	-	-	-	1.31	5.71	0.00	0.00	-	-	0.02	0.07
11-08-CB	-	-	-	-	-	-	-	-	-	-	-	-	145.28	9.59	0.00	0.00	-	-	12.01	0.79
15-13-LL	-	-	-	-	-	-	-	-	-	-	-	-	0.16	0.00	0.00	0.00	-	-	0.01	0.00
17-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.02	0.00	0.00	-	-	0.00	0.02
18-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	0.00	0.00	-	-	0.00	0.01
19-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	0.00	0.00	-	-	0.00	0.01
20-13-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00
21-13-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00
22-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00
23-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00
24-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00
25-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00
Totals	0.04	0.20	0.04	0.20	0.04	0.20	0.00	0.04	0.62	2.70	0.52	2.28	567.24	1856.51	0.00	0.00	0.00	0.00	53.24	181.26

[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
3a-08-H-BS	0.02	0.10	0.02	0.10	0.02	0.10	0.00	0.02	0.31	1.35	0.26	1.14	0.02	0.07	0.00	0.00	-	-
3b-08-H-BS	0.02	0.10	0.02	0.10	0.02	0.10	0.00	0.02	0.31	1.35	0.26	1.14	0.02	0.07	0.00	0.00	-	-
5a-08-GBT-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.98	4.28	0.00	0.00	-	-
5c-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.03	0.15	0.00	0.00	-	-
5d-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.03	0.15	0.00	0.00	-	-
5e-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	0.00	0.00	-	-
5f-08-OST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	0.00	0.00	-	-
6a-08-WVF-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.26	0.00	0.00	-	-
6b-08-WVF-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.26	0.00	0.00	-	-
6c-08-WVT-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.00	0.00	-	-
6d-08-WVT-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.00	0.00	-	-
6i-08-ST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.06	0.00	0.00	-	-
6j-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.10	0.00	0.00	-	-
6k-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.10	0.00	0.00	-	-
6l-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.10	0.00	0.00	-	-
6m-13-WST-CV	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.10	0.00	0.00	-	-
7-08-SBP	-	-	-	-	-	-	-	-	-	-	-	-	0.11	0.04	0.00	0.00	-	-
8-08-F	0.08	0.36	0.08	0.36	0.08	0.36	0.00	0.00	0.42	1.82	3.56	15.60	5.79	25.38	0.00	0.00	-	-
9-08-F	0.13	0.56	0.13	0.56	0.13	0.56	0.00	0.00	0.18	0.80	1.56	6.84	2.42	10.60	0.00	0.00	-	-
10-08-FE	-	-	-	-	-	-	-	-	-	-	-	-	1.31	5.71	0.00	0.00	-	-
11-08-CB	-	-	-	-	-	-	-	-	-	-	-	-	145.28	9.59	0.00	0.00	-	-
15-13-LL	-	-	-	-	-	-	-	-	-	-	-	-	0.16	0.00	0.00	0.00	-	-
17-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.02	0.00	0.00	-	-
18-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	0.00	0.00	-	-
19-13-CST	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	0.00	0.00	-	-
20-13-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-
21-13-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-

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
22-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-
23-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-
24-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-
25-15-LOT	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-
Totals	0.25	1.12	0.25	1.12	0.25	1.12	0.00	0.04	1.22	5.32	5.64	24.72	156.40	57.14	0.00	0.00	0.00	0.00

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

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

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

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

In the table below, report the Proposed Allowable Emissions (Potential to Emit) for each HAP from each regulated emission unit if the HAP > 0.01 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources. Use the HAP nomenclature as it appears in the Instructions. Emission Point numbering must be consistent throughout the application package. For each HAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected or the pollutant is emitted in a quantity less than the threshold amounts described above. Additional columns may be added as necessary to address each HAP.

Emission Point ID	Total HAPs		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
3a-08-H-BS	0.01	0.02	-	-	0.00	0.00	-	-	0.00	0.00	0.01	0.02	-	-	-	-
3b-08-H-BS	0.01	0.02	-	-	0.00	0.00	-	-	0.00	0.00	0.01	0.02	-	-	-	-
5a-08-GBT-CV	0.09	0.39	0.00	0.00	0.00	0.02	0.00	0.00	-	-	0.09	0.37	0.00	0.00	0.00	0.00
5c-08-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
5d-08-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
5e-08-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
5f-08-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
6a-08-WVF-CV	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.01	0.03	0.00	0.00	0.00	0.00
6b-08-WVF-CV	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.01	0.03	0.00	0.00	0.00	0.00
6c-08-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
6d-08-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
6i-08-ST-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
6j-13-WST-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
6k-13-WST-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
6l-13-WST-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
6m-13-WST-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
7-08-SBP	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	0.00
8-08-F	0.55	2.44	0.00	0.00	0.03	0.12	0.00	0.00	-	-	0.52	2.29	0.00	0.02	0.00	0.01
9-08-F	0.26	1.18	0.00	0.00	0.01	0.06	0.00	0.00	-	-	0.25	1.08	0.00	0.02	0.00	0.02
10-08-FE	0.01	0.07	0.00	0.00	0.00	0.01	0.00	0.00	-	-	0.01	0.03	0.00	0.02	0.00	0.01
11-08-CB	12.01	0.79	0.00	0.00	0.63	0.04	0.08	0.01	-	-	9.27	0.61	0.93	0.06	1.10	0.07

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
15-13-LL	0.01	0.00	-	-	0.00	0.00	-	-	-	-	0.01	0.00	-	-	-	-
17-13-CST	0.01	0.02	-	-	-	-	-	-	-	-	0.01	0.02	-	-	-	-
18-13-CST	0.00	0.01	-	-	-	-	-	-	-	-	-	-	0.00	0.01	-	-
19-13-CST	0.00	0.01	-	-	-	-	-	-	-	-	-	-	0.00	0.01	-	-
20-13-LOT	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21-13-LOT	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22-15-LOT	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23-15-LOT	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-15-LOT	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25-15-LOT	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals:	12.99	5.08	0.00	0.00	0.67	0.25	0.08	0.01	0.00	0.00	10.21	4.57	0.93	0.14	1.10	0.11

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						
3a-08-H-BS	mass GHG	1600.58	0.00	0.00	0.03	0.00	0.00					1600.61	
	CO_2e	1600.58	0.00	0.00	0.93	0.00	0.00						1601.50
3b-08-H-BS	mass GHG	1600.58	0.00	0.00	0.03	0.00	0.00					1600.61	
	CO_2e	1600.58	0.00	0.00	0.93	0.00	0.00						1601.50
5a-08-GBT-CV	mass GHG	9.02	0.00	0.00	0.01	0.00	0.00					9.03	
	CO_2e	9.02	0.00	0.00	0.31	0.00	0.00						9.33
5c-08-OST-CV	mass GHG	0.32	0.00	0.00	0.00	0.00	0.00					0.32	
	CO_2e	0.32	0.00	0.00	0.00	0.00	0.00						0.32
5d-08-OST-CV	mass GHG	0.32	0.00	0.00	0.00	0.00	0.00					0.32	
	CO_2e	0.32	0.00	0.00	0.00	0.00	0.00						0.32
5e-08-OST-CV	mass GHG	0.03	0.00	0.00	0.00	0.00	0.00					0.03	
	CO_2e	0.03	0.00	0.00	0.00	0.00	0.00						0.03
5f-08-OST-CV	mass GHG	0.03	0.00	0.00	0.00	0.00	0.00					0.03	
	CO_2e	0.03	0.00	0.00	0.00	0.00	0.00						0.03
6a-08-WVF-CV	mass GHG	2.58	0.00	0.00	0.00	0.00	0.00					2.58	
	CO_2e	2.58	0.00	0.00	0.00	0.00	0.00						2.58
6b-08-WVF-CV	mass GHG	2.58	0.00	0.00	0.00	0.00	0.00					2.58	
	CO_2e	2.58	0.00	0.00	0.00	0.00	0.00						2.58
6c-08-WVT-CV	mass GHG	0.26	0.00	0.00	0.00	0.00	0.00					0.26	
	CO_2e	0.26	0.00	0.00	0.00	0.00	0.00						0.26
6d-08-WVT-CV	mass GHG	0.26	0.00	0.00	0.00	0.00	0.00					0.26	
	CO_2e	0.26	0.00	0.00	0.00	0.00	0.00						0.26
6i-08-ST-CV	mass GHG	2.41	0.00	0.00	0.02	0.00	0.00					2.44	
	CO_2e	2.41	0.00	0.00	0.62	0.00	0.00						3.03
6j-13-WST-CV	mass GHG	1.03	0.00	0.00	0.00	0.00	0.00					1.03	
	CO_2e	1.03	0.00	0.00	0.00	0.00	0.00						1.03
6k-13-WST-CV	mass GHG	1.03	0.00	0.00	0.00	0.00	0.00					1.03	
	CO_2e	1.03	0.00	0.00	0.00	0.00	0.00						1.03
6l-13-WST-CV	mass GHG	1.03	0.00	0.00	0.00	0.00	0.00					1.03	
	CO_2e	1.03	0.00	0.00	0.00	0.00	0.00						1.03
6m-13-WST-CV	mass GHG	1.03	0.00	0.00	0.00	0.00	0.00					1.03	
	CO_2e	1.03	0.00	0.00	0.00	0.00	0.00						1.03
7-08-SBP	mass GHG	3.00	0.00	0.00	0.02	0.00	0.00					3.02	
	CO_2e	3.00	0.00	0.00	0.62	0.00	0.00						3.62

		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						
8-08-F	mass GHG	6065.00	0.00	0.01	0.63	0.00	0.00					6065.64	
	CO_2e	6065.00	0.00	2.92	17.59	0.00	0.00						6085.52
9-08-F	mass GHG	6850.72	0.00	0.00	0.57	0.00	0.00					6851.29	
	CO_2e	6850.72	0.00	0.00	16.05	0.00	0.00						6866.77
10-08-FE	mass GHG	37.57	0.00	0.00	0.29	0.00	0.00					37.85	
	CO_2e	37.57	0.00	0.00	8.02	0.00	0.00						45.59
11-08-CB	mass GHG	707.02	0.00	0.00	5.47	0.00	0.00					712.49	
	CO_2e	707.02	0.00	0.00	153.09	0.00	0.00						860.11
15-13-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
17-13-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
18-13-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
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-LOT	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
21-13-LOT	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
22-15-LOT	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
23-15-LOT	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
24-15-LOT	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
25-15-LOT	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	16886.39	0.00	0.01	7.08	0.00	0.00					16893.48	0.00
	CO_2e	16886.39	0.00	2.92	198.15	0.00	0.00					0.00	17087.46

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

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

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

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

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

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

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

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

Emission Point numbering must be consistent throughout the application package.

Emission Point ID	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Base Elevation (ft)	Exit Temp. (°F)	Inside Diameter or Dimensions (ft)	Velocity (ft/sec)	Moisture by Volume (%)	Geographic Position (degrees/minutes/seconds) Latitude	Longitude
3a-08-H-BS	V	No	40±	440±	500	1.0	23.3	0	31 51 55.00	89 01 35.00
3b-08-H-BS	V	No	40±	440±	500	1.0	23.3	0	31 51 55.00	89 01 35.00
5a-08-GBT-CV	V	No	26±	440±	80	.2	0.21	0	31 51 55.00	89 01 35.00
5c-08-OST-CV	V	No	26±	440±	80	.2	0.01	0	31 51 55.00	89 01 35.00
5d-08-OST-CV	V	No	26±	440±	80	.2	0.01	0	31 51 55.00	89 01 35.00
5e-08-OST-CV	V	No	26±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
5f-08-OST-CV	V	No	26±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
6a-08-WVF-CV	V	No	45±	440±	80	0.2	0.05	0	31 51 55.00	89 01 35.00
6b-08-WVF-CV	V	No	45±	440±	80	0.2	0.05	0	31 51 55.00	89 01 35.00
6c-08-WVT-CV	V	No	34±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
6d-08-WVT-CV	V	No	34±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
6i-08-ST-CV	V	No	22±	440±	80	0.2	0.04	0	31 51 55.00	89 01 35.00
6j-13-WST-CV	V	No	26±	440±	80	0.2	0.02	0	31 51 55.00	89 01 35.00
6k-13-WST-CV	V	No	26±	440±	80	0.2	0.02	0	31 51 55.00	89 01 35.00
6l-13-WST-CV	V	No	26±	440±	80	0.2	0.02	0	31 51 55.00	89 01 35.00
6m-13-WST-CV	V	No	26±	440±	80	0.2	0.02	0	31 51 55.00	89 01 35.00
7-08-SBP	V	No	25±	440±	80	0.2	0.64	0	31 51 55.00	89 01 35.00
8-08-F	V	No	25±	440±	1500	0.5	826	0	31 51 55.00	89 01 35.00
9-08-F	V	No	25±	440±	1500	0.6	899	0	31 51 55.00	89 01 35.00
11-08-CB	V	No	15±	440±	80	0.4	3.17	0	31 51 55.00	89 01 35.00
15-13-LL	H	No	5±	440±	80	0.3	0.01	0	31 51 55.00	89 01 35.00
17-13-CST	H	No	5±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
18-13-CST	H	No	5±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00

Emission Point ID	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Base Elevation (ft)	Exit Temp. (°F)	Inside Diameter or Dimensions (ft)	Velocity (ft/sec)	Moisture by Volume (%)	Geographic Position (degrees/minutes/seconds)	
									Latitude	Longitude
19-13-CST	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
20-13-LOT	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
21-13-LOT	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
22-15-LOT	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
23-15-LOT	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
24-15-LOT	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00
25-15-LOT	H	No	6±	440±	80	0.2	<0.01	0	31 51 55.00	89 01 35.00

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

Denbury Onshore, LLC
Heidelberg Central Facility
Jasper 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
3a-08-H-BS	AA-003		2.5 MMBTU/Hr Line Heater-Burner Stack		2.5 MMBTU/Hr	24	7	52.143
3b-08-H-BS	AA-003		2.5 MMBTU/Hr Line Heater-Burner Stack		2.5 MMBTU/Hr	24	7	52.143
5a-08-GBT-CV	AA-005	a	5000 BBL Gun Barrel Tank-Common Vent (ABJ-1111)	8-08-F	2,920,000 BOPY	24	7	52.143
5c-08-OST-CV	AA-007	a	5000 BBL Dry Oil Tank-Common Vent (ABJ-119A)	8-08-F	1,460,000 BOPY	24	7	52.143
5d-08-OST-CV	AA-008	a	5000 BBL Dry Oil Tank-Common Vent (ABJ-119B)	8-08-F	1,460,000 BOPY	24	7	52.143
5c-08-OST-CV	AA-009	a	5000 BBL Wet/Dry Oil Tank-Common Vent (ABJ-118)	8-08-F	7,300 BOPY	24	7	52.143
5f-08-OST-CV	AA-010	a	5000 BBL Wet/Dry Oil Tank-Common Vent (ABJ-117)	8-08-F	7,300 BOPY	24	7	52.143
6a-08-WVF-CV	AA-011	b	Water Vortex Flume (ABM-1122)	9-08-F	7,300,000 BWPY & 7,300 BOPY	24	7	52.143
6b-08-WVF-CV	AA-012	b	Water Vortex Flume (ABM-2122)	9-08-F	7,300,000 BWPY & 7,300 BOPY	24	7	52.143
6c-08-WVT-CV	AA-013	b	9700 BBL Water Vortex Tank-Common Vent (ABM-1120)	9-08-F	7,300,000 BWPY & 7,300 BOPY	24	7	52.143
6d-08-WVT-CV	AA-014	b	9700 BBL Water Vortex Tank-Common Vent (ABM-2120)	9-08-F	7,300,000 BWPY & 7,300 BOPY	24	7	52.143
6i-08-ST-CV	AA-019		400 BBL Sand Blowdown Pit Tank-Common Vent (ABJ-165)		7,592 BWPY	24	7	52.143
6j-13-WST-CV	AA-028	b	5000 BBL Produced Water Storage Tank-Common Vent	9-08-F	3,650,000 BWPY & 3,650 BOPY	24	7	52.143
6k-13-WST-CV	AA-029	b	5000 BBL Produced Water Storage Tank-Common Vent	9-08-F	3,650,000 BWPY & 3,650 BOPY	24	7	52.143
6l-13-WST-CV	AA-030	b	5000 BBL Produced Water Storage Tank-Common Vent	9-08-F	3,650,000 BWPY & 3,650 BOPY	24	7	52.143
6m-13-WST-CV	AA-031	b	5000 BBL Produced Water Storage Tank-Common Vent	9-08-F	3,650,000 BWPY & 3,650 BOPY	24	7	52.143
7-08-SBP	AA-020		Sand Blowdown Pit (ZZZ-130)		7,592 BWPY	(730)	-	-
8-08-F	AA-021	c	Control Flare (ZZZ-180)		64.6 MMSCF/Yr	24	7	52.143
9-08-F	AA-022	d	Control Flare (ZZZ-181)		101 MMSCF/Yr	24	7	52.143
10-08-FE	AA-026		Fugitive Emissions		N/A	24	7	52.143
11-08-CB	AA-023		Compressor Blowdowns		12.6 MMSCF/Yr	(132)	-	-

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
15-13-LL	AA-027		Loading Losses-Water Transfer to Tank Truck		7,592 BWPY	(42.2)	-	-
17-13-CST	AA-032		120 Gallon Chemical Storage Tank		1,440 Gallons/Yr	24	7	52.143
18-13-CST	AA-033		350 Gallon Asphaltene Inhibitor Tank		4,200 Gallons/Yr	24	7	52.143
19-13-CST	AA-034		500 Gallon Corrosion Inhibitor Tank		6,000 Gallons/Yr	24	7	52.143
20-13-LOT	AA-035		500 Gallon Lube Oil Tank		6,000 Gallons/Yr	24	7	52.143
21-13-LOT	AA-036		500 Gallon Lube Oil Tank		6,000 Gallons/Yr	24	7	52.143
22-15-LOT	AA-037		500 Gallon Lube Oil Tank		6,000 Gallons/Yr	24	7	52.143
23-15-LOT	AA-038		300 Gallon Lube Oil Tank		3,600 Gallons/Yr	24	7	52.143
24-15-LOT	AA-039		300 Gallon Lube Oil Tank		3,600 Gallons/Yr	24	7	52.143
25-15-LOT	AA-040		300 Gallon Lube Oil Tank		3,600 Gallons/Yr	24	7	52.143

Footnotes:

a *Vapors from this source are routed to the control flare (EPN: 8-08-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: 9-08-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, assist gas, and the pilot gas stream. 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, assist gas, and the pilot gas stream. This source may also combust gas from the facility's pressure release system on an emergency and non-routine basis.*

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

Fuel Burning Equipment – External Combustion Sources

Section OPGP-C

1. Emission Point Description

A. Emission Point Designation (Ref. No.): AA-003 [3a-08-H-BS & 3b-08-H-BS]

B. Equipment Description: 2.5 MMBTU/Hr Line Heater-Burner Stack

C. Manufacturer: Unknown

D. Date of Manufacture and No.: Unknown

E. Maximum Heat Input (higher heating value): 2.5 MMBtu/hr

F. Nominal Heat Input Capacity: 2.5 MMBtu/hr

G. Use: ☒ Line Heater ☐ Heater Treater ☐ TEG Burner ☐ Space Heat ☐ Process Heat ☐ Other (describe): ______

H. Heat Mechanism: ☐ Direct ☒ Indirect

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

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

K. Status: ☒ Operating ☐ Proposed ☐ Under Construction

2008

2. Fuel Type

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

FUEL TYPE	HEAT CONTENT	% SULFUR	% ASH	MAXIMUM HOURLY USAGE	MAXIMUM YEARLY USAGE
Natural Gas	1101 BTU/ft^3	<0.0007	N/A	3,091.00 scf	27.1 MMscf

Please list any fuel components that are hazardous air pollutants and the percentage in the fuel:

______

______

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-005 [5a-08-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: 2008

2. Tank Data

A. Tank Specifications:

1.	Design capacity	210,000	gallons		
2.	True vapor pressure at storage temperature:	2.827	psia @	69.51	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	3.304	psia @	77.58	°F
4.	Reid vapor pressure at storage temperature:	4.30	psia @	69.51	°F
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: 8-08-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

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: 38.67 feet
3. Maximum Liquid Height: 23.0 feet
4. Average Liquid Height: 11.50 feet
5. Working Volume: 210,000 gal
6. Turnovers per year: 606.86
7. Maximum throughput: 2,920,000 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

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	152.22*	3.22*	155.44*

**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 & AA-008 [5c-08-OST-CV (ABJ-119A) & 5d-08-OST-CV (ABJ-119B)]

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: 2008

2. Tank Data

A. Tank Specifications:

1.	Design capacity	210,000	gallons		
2.	True vapor pressure at storage temperature:	2.827	psia @	69.51	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	3.304	psia @	77.58	°F
4.	Reid vapor pressure at storage temperature:	4.30	psia @	69.51	°F
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: 8-08-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: 38.67 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: 303.43
7. Maximum throughput: 1,460,000 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

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	20.21*	3.22*	23.43*

**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".

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Tank Summary — Section OPGP-E

1. Emission Point Description

A. Emission Point Designation (Ref. No.): AA-009 & AA-010 [5e-08-OST-CV (ABJ-118) & 5f-08-OST-CV (ABJ-117)]

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: 2008

2. Tank Data

A. Tank Specifications:

1.	Design capacity	210,000	gallons		
2.	True vapor pressure at storage temperature:	2.827	psia @	69.51	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	3.304	psia @	77.58	°F
4.	Reid vapor pressure at storage temperature:	4.30	psia @	69.51	°F
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: 8-08-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

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 feet
2. Shell Diameter: 38.67 feet
3. Maximum Liquid Height: 23 feet
4. Average Liquid Height: 11.5 feet
5. Working Volume: 210,000 gal
6. Turnovers per year: 1.52
7. Maximum throughput: 7,300 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

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	0.38*	3.22*	3.60*

*****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-011 & AA-012 [6a-08-WVF-CV (ABM-1122) & 6b-08-WVF-CV (ABM-2122)]

B. Product(s) Stored: Produced Oil & 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: 2008

2. Tank Data

A. Tank Specifications:

1.	Design capacity	1,000	gallons		
2.	True vapor pressure at storage temperature:	0.342	psia @	68.07	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.450	psia @	76.15	°F
4.	Reid vapor pressure at storage temperature:	4.30	psia @	68.07	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	18.27	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: 9-08-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

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: 2.0 feet
3. Maximum Liquid Height: 41.50 feet
4. Average Liquid Height: 20.75 feet
5. Working Volume: 1,000 gal
6. Turnovers per year: 314,652.64
7. Maximum throughput: 7,307,300 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: 0.06 feet

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	16.95*	0.00*	16.95*

**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-013 & AA-014 [6c-08-WVT-CV (ABM-1120) & 6d-08-WVT-CV (ABM-2120)]

B. Product(s) Stored: Produced Oil & 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: 2008

2. Tank Data

A. Tank Specifications:

1.	Design capacity	407,400	gallons		
2.	True vapor pressure at storage temperature:	0.359	psia @	69.44	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.470	psia @	77.52	°F
4.	Reid vapor pressure at storage temperature:	4.30	psia @	69.44	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	18.27	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: 9-08-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

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: 32.0 feet
2. Shell Diameter: 46.75 feet
3. Maximum Liquid Height: 31.0 feet
4. Average Liquid Height: 15.5 feet
5. Working Volume: 407,400 gal
6. Turnovers per year: 770.93
7. Maximum throughput: 7,307,300 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

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	3.63*	0.35*	3.98*

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-019 [6i-08-ST-CV (ABJ-165)]

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: 2008

2. Tank Data

A. Tank Specifications:

1.	Design capacity	16,800	gallons		
2.	True vapor pressure at storage temperature:	0.349	psia @	68.87	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.459	psia @	76.95	°F
4.	Reid vapor pressure at storage temperature:	0.349	psia @	68.87	°F
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.

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: 20.0 feet
2. Shell Diameter: 12.0 feet
3. Maximum Liquid Height: 19.0 feet
4. Average Liquid Height: 9.50 feet
5. Working Volume: 16,800 gal
6. Turnovers per year: 19.83
7. Maximum throughput: 7,592 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: 0.38 feet

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	0.02	0.02	0.04

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-028, AA-029, AA-030, AA-031 [6j-13-WST-CV through 6m-13-WST-CV]

B. Product(s) Stored: Produced Oil & 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: 2011 or Later

2. Tank Data

A. Tank Specifications:

1.	Design capacity	210,000	gallons		
2.	True vapor pressure at storage temperature:	0.360	psia @	69.50	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.471	psia @	77.58	°F
4.	Reid vapor pressure at storage temperature:	4.30	psia @	69.50	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	18.27	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: 9-08-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

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: 24.1 feet
2. Shell Diameter: 38.63 feet
3. Maximum Liquid Height: 23.10 feet
4. Average Liquid Height: 11.55 feet
5. Working Volume: 210,000 gal
6. Turnovers per year: 757.61
7. Maximum throughput: 3,653,650 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

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	1.83*	0.19*	2.02*

**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-032 [17-13-CST]

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	120	gallons		
2.	True vapor pressure at storage temperature:	2.553	psia @	71.40	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	3.277	psia @	81.74	°F
4.	Reid vapor pressure at storage temperature:	2.533	psia @	71.40	°F
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

Tank Summary — Section OPGP-E

3. Horizontal Fixed Roof Tank

A. Shell Length: 5.0 feet
B. Shell Diameter: 3.0 feet
C. Working Volume: 120 gal
D. Maximum Throughput: 1,440 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

Tank Summary | **Section OPGP-E**

5. Internal Floating Roof Tank

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

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

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

6. External Floating Roof Tank

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

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

Tank Summary — Section OPGP-E

6. External Floating Roof Tank (continued)

A. Tank Characteristics (continued):

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

7. Paint Condition: ☐ Good ☐ Poor

B. Roof Characteristics

1. Roof Type: ☐ Pontoon ☐ Double Deck

2. Roof Fitting Category: ☐ Typical ☐ Detail

C. Tank Construction and Rim-Seal System:

1. Tank Construction: ☐ Welded ☐ Riveted

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

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

7. Pollutant Emissions

A. Fixed Roof Emissions:

Pollutant[1]	Working Loss (tons/yr)	Breathing Loss (tons/yr)	Total Emissions (tons/yr)
VOC	0.00	0.02	0.02

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-033 [18-13-CST]

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

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2013

2. Tank Data

A. Tank Specifications:

1.	Design capacity	350	gallons		
2.	True vapor pressure at storage temperature:	0.464	psia @	71.14	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.625	psia @	81.49	°F
4.	Reid vapor pressure at storage temperature:	0.464	psia @	71.14	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	92.14	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

Tank Summary | Section OPGP-E

3. Horizontal Fixed Roof Tank

A. Shell Length: 6.7 feet
B. Shell Diameter: 3.0 feet
C. Working Volume: 350 gal
D. Maximum Throughput: 4,200 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	0.00	0.01	0.01

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-034 [19-13-CST]

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

C. Status: ☒ Operating ☐ Proposed ☐ Under Construction

D. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction: 2013

2. Tank Data

A. Tank Specifications:

1.	Design capacity	500	gallons		
2.	True vapor pressure at storage temperature:	0.471	psia @	71.67	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.634	psia @	82.02	°F
4.	Reid vapor pressure at storage temperature:	0.471	psia @	71.67	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	92.14	lb/lbmol		

B. Tank Orientation: ☐ Vertical ☒ Horizontal

C. Type of Tank:

☒ Fixed Roof ☐ External Floating Roof ☐ Internal Floating Roof

☐ Pressure ☐ Variable Vapor Space ☐ Other: ______

D. Is the tank equipped with a Vapor Recovery System and/or flare? ☐ Yes ☒ No
If yes, describe below and include the efficiency of each.

E. Closest City:
☒ Jackson, MS ☐ Meridian, MS ☐ Tupelo, MS ☐ Mobile, AL

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

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

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

Tank Summary | **Section OPGP-E**

3. Horizontal Fixed Roof Tank

A. Shell Length: 5.0 feet
B. Shell Diameter: 4.0 feet
C. Working Volume: 500 gal
D. Maximum Throughput: 6,000 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

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	0.00	0.01	0.01

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-035, AA-036, & AA-037 [20-13-LOT, 21-13-LOT, & 22-15-LOT]

B. Product(s) Stored: Lube Oil (assumes 100% No. 2 fuel oil (diesel) 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 (20-13-LOT & 21-13-LOT) & 2015 (22-15-LOT)

2. Tank Data

A. Tank Specifications:

1.	Design capacity	500	gallons		
2.	True vapor pressure at storage temperature:	0.009	psia @	71.67	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.013	psia @	82.02	°F
4.	Reid vapor pressure at storage temperature:	0.009	psia @	71.67	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	130	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

Tank Summary — Section OPGP-E

3. Horizontal Fixed Roof Tank

A. Shell Length: 5.0 feet
B. Shell Diameter: 4.0 feet
C. Working Volume: 500 gal
D. Maximum Throughput: 6,000 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

Tank Summary — Section OPGP-E

5. Internal Floating Roof Tank

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

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

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

6. External Floating Roof Tank

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

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

Tank Summary | Section OPGP-E

6. External Floating Roof Tank (continued)

A. Tank Characteristics (continued):

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

7. Paint Condition: ☐ Good ☐ Poor

B. Roof Characteristics

1. Roof Type: ☐ Pontoon ☐ Double Deck

2. Roof Fitting Category: ☐ Typical ☐ Detail

C. Tank Construction and Rim-Seal System:

1. Tank Construction: ☐ Welded ☐ Riveted

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

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

7. Pollutant Emissions

A. Fixed Roof Emissions:

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

B. Floating Roof Emissions:

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

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

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

Tank Summary — Section OPGP-E

1. Emission Point Description

A. Emission Point Designation (Ref. No.): AA-038, AA-039, & AA-040 [23-15-LOT, 24-15-LOT, & 25-15-LOT]

B. Product(s) Stored: Lube Oil (assumes 100% No. 2 fuel oil (diesel) 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: 2015

2. Tank Data

A. Tank Specifications:

1.	Design capacity	300	gallons			
2.	True vapor pressure at storage temperature:	0.009	psia @	71.47	°F
3.	Maximum true vapor pressure (as defined in §60.111b)	0.013	psia @	81.82	°F
4.	Reid vapor pressure at storage temperature:	0.009	psia @	71.47	°F
5.	Density of product at storage temperature:	N/A	lb/gal		
6.	Molecular weight of product vapor at storage temp.	130	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

Tank Summary — Section OPGP-E

3. Horizontal Fixed Roof Tank

A. Shell Length: 5.0 feet
B. Shell Diameter: 3.25 feet
C. Working Volume: 300 gal
D. Maximum Throughput: 3,600 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

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	0.00	0.00	0.00

B. Floating Roof Emissions:

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

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

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

Flare	**Section OPGP-F**

1. Equipment Description

A. Emission Point Designation (Ref. No.): AA-021 (8-08-F)

B. Equipment Description (include the process(es) that the flare controls emissions from): Control flare to combust emissions from oil storage tanks (EPNs: 5a-08-GBT-CV through 5f-08-OST-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: 897 Btu/scf

3. Design exit velocity: 826 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-022 (9-08-F)

B. Equipment Description (include the process(es) that the flare controls emissions from): Control flare to combust emissions from oil storage tanks (EPNs: 6a-08-WVF-CV through 6d-08-WVT-CV & 6j-13-WST-CV through 6m-13-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: 250 Btu/scf
3. Design exit velocity: 899 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.

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
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.A.	2008	2008	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.B.	2008	2008	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.D(1)(a)	2008	2008	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.D(1)(b)	2008	2008	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.4.A(1)	2008	2008	N/A
7-08-SBP *Sand Blowdown Pit*	11 Miss. Admin. Code Pt. 2, R.2.2.B(10).	2008	2008	N/A
8-08-F *Control Flare* 9-08-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.1.4.B(2)	2008	2008	N/A
8-08-F *Control Flare* 9-08-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.2.2.B(10).	2008	2008	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 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
8-08-F *Control Flare* 9-08-F *Control Flare*	11 Miss. Admin. Code Pt. 2, R.2.2.B(11).	2008	2008	N/A
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR 60-Subpart OOOOa)	After 9/18/2015	After 9/18/2015	N/A

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
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3.A.	Opacity	40%	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss Admin Code Pt. 2, R. 1.3 B.	Opacity	Equivalent Opacity	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3. D(1)(a).	PM	0.6 lb/MMBTU	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R. 1.3. D(1)(b).	PM	$E = 0.8808*I^{-0.1667}$	N/A
3a-08-HT-BS *Line Heater* 3b-08-HT-BS *Line Heater*	11 Miss. Admin. Code Pt. 2, R.1.4.A(1).	SO_2	4.8 lbs/MMBTU	N/A
7-08-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.
8-08-F *Control Flare* 9-08-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.

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
8-08-F *Control Flare* 9-08-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.

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
8-08-F *Control Flare* 9-08-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.

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
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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

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
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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

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
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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

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
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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

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
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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

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
10-08-FE *Fugitive Emissions*	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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
	Standards of Performance for Crude Oil and Natural Gas Facilities (40 CFR Part 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

This is a sample calculation for EPNs: 3a-08-H-BS & 3b-08-H-BS.

POINT SOURCE I.D. NUMBER: *"See Above"*

EMISSION SOURCE DESCRIPTION: ***2.5 MMBTU/Hr Line Heater-Burner Stack***

DATA:

Emission Source:	*External Combustion Burner*
Annual Hours of Operation:	*8760*
Maximum Burner Rating (MMBTU/Hr):	*2.5*
Fuel Gas Heat of Combustion (BTU/scf): *(based on an actual fuel gas analysis)*	*1011*
Sulfur Concentration of Fuel Gas (ppmv): *(conservative estimate)*	*7*
Fuel Source:	*Natural Gas*

Max. Hourly Fuel Consumption (SCFH):	=	burner rating/fuel gas heat of combustion/80% efficiency	=	*3,091.00*
Max. Annual Fuel Consumption (MSCF/Yr):	=	hourly fuel consumption x annual hours	=	*27,077.16*

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

EMISSION CALCULATIONS:

POLLUTANT:	EMISSION FACTOR ($LBS/10^6$ SCF)	CALCULATED EMISSION RATES:	
		Hourly (lb/hr)	Annual (TPY)
Particulate Matter (filterable + condensable)	7.6	0.0235	0.1029
Sulfur Dioxide	1.182	0.0037	0.0160
Nitrogen Oxides	100	0.3091	1.3539
Carbon Monoxide	84	0.2596	1.1372
Methane (excluded from VOC total)	2.3	0.0071	0.0311
VOC	5.5	0.0170	0.0745
TOC	11	0.0340	0.1489
2-Methylnaphthalene (TAP)	0.0000240	0.0000	0.0000
3-Methylchloranthrene (TAP)	0.0000018	0.0000	0.0000
7,12-Dimethylbenz(a)anthrancene (TAP)	0.0000160	0.0000	0.0000
Acenaphthene (TAP)	0.0000018	0.0000	0.0000
Acenaphthylene (TAP)	0.0000018	0.0000	0.0000

POLLUTANT:	EMISSION FACTOR ($LBS/10^6$ SCF)	CALCULATED EMISSION RATES:	
		Hourly (lb/hr)	Annual (TPY)
Anthracene (TAP)	0.0000024	0.0000	0.0000
Benz(a)anthracene (TAP)	0.0000018	0.0000	0.0000
Benzene (TAP)	0.0021000	0.0000	0.0000
Benzo(a)pyrene (TAP)	0.0000012	0.0000	0.0000
Benzo(b)fluoranthene (TAP)	0.0000018	0.0000	0.0000
Benzo(g,h,I)perylene (TAP)	0.0000012	0.0000	0.0000
Benzo(k)fluoranthene (TAP)	0.0000018	0.0000	0.0000
Chrysene (TAP)	0.0000018	0.0000	0.0000
Dibenzo(a,h)anthrancene (TAP)	0.0000012	0.0000	0.0000
Dichlorobenzene (TAP)	0.0012000	0.0000	0.0000
Fluorathene (TAP)	0.0000030	0.0000	0.0000
Fluorene (TAP)	0.0000028	0.0000	0.0000
Formaldehyde (TAP)	0.0750000	0.0002	0.0010
Hexane (TAP)	1.8000000	0.0056	0.0244
Indeno(1,2,3-cd)pyrene (TAP)	0.0000018	0.0000	0.0000
Naphthalene (TAP)	0.0006100	0.0000	0.0000
Phenanathrene (TAP)	0.0000170	0.0000	0.0000
Pyrene (TAP)	0.0000050	0.0000	0.0000
Toluene (TAP)	0.0034000	0.0000	0.0000
Arsenic (TAP)	0.0002000	0.0000	0.0000
Beryllium (TAP)	0.0000120	0.0000	0.0000
Cadmium (TAP)	0.0011000	0.0000	0.0000
Chromium (TAP)	0.0014000	0.0000	0.0000
Cobalt (TAP)	0.0000840	0.0000	0.0000
Manganese (TAP)	0.0003800	0.0000	0.0000
Mercury (TAP)	0.0002600	0.0000	0.0000
Nickel (TAP)	0.0021000	0.0000	0.0000
Selenium (TAP)	0.0000240	0.0000	0.0000
	Total TAPs	0.01	0.03
	Total VOC-TAPs	0.01	0.03
	Total Non VOC & Non TAP-HC	0.01	0.03
	Total VOC	**0.02**	**0.07**

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: 8-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: *5a-08-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})	*8000*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*8000*
Average VOC Working Losses - L_W (lb/yr):	*304,447.053*
Average VOC Standing Losses - L_S (lb/yr):	*6,441.684*
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) * 3.1134/8760	=	**110.49**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 3.1134/8760	=	**110.49**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**483.96**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-001A 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)	67.7203	74.8269	74.8269	327.7418
Methane (excluded from VOC total)	0.0836	0.0924	0.0924	0.4047
Ethane (excluded from VOC total)	0.0771	0.0852	0.0852	0.3733
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	1.9173	1.9173	8.3976
Iso-Butane	2.3267	2.5708	2.5708	11.2603
N-Butane	6.6912	7.3934	7.3934	32.3832
Iso-Pentane	5.2911	5.8464	5.8464	25.6072
N-Pentane	6.0983	6.7383	6.7383	29.5135
Iso-Hexane	4.2954	4.7462	4.7462	20.7884
N-Hexane (TAP)	2.8149	3.1103	3.1103	13.6233
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1501	0.1658	0.1658	0.7262

Cyclohexane	0.5917	0.6538	0.6538	2.8634
Heptanes	1.5739	1.7391	1.7391	7.6173
Methylcyclohexane	0.1883	0.2080	0.2080	0.9112
Toluene (TAP)	0.0180	0.0199	0.0199	0.0870
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	0.2477	0.2477	1.0847
Ethylbenzene (TAP)	0.0015	0.0016	0.0016	0.0070
Xylenes (TAP)	0.0131	0.0145	0.0145	0.0633
Nonanes	0.1001	0.1106	0.1106	0.4846
Decanes Plus	0.0054	0.0059	0.0059	0.0259
Total Weight Percent:	100.0000			
Total TAP Emissions		3.31	3.31	14.51
Total VOC Emissions		**35.49**	**35.49**	**155.44**
Total Non VOC & Non TAP-HC		0.18	0.18	0.78
Total Hydrocarbon Emissions		110.49	110.49	483.96

DATA:

Emission Source:	*Flash Gas from Oil*
Flash Gas Specific Gravity:	*1.7146*
Average Oil Throughput: (BBLD)	*8000*
Maximum Oil Throughput: (BBLD)	*8000*
Basis of Emission Estimates:	*Representative GOR & Actual Flare Gas Analysis*
Flash Gas Analysis Report Number:	*Southern Petroleum Laboratories Report No.: 172-24050251-001A*

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 another site under similar conditions (pressure & temperature), refer to PENCOR Reprt No.: 31554-5006038374 in supporting documentation. This representative analysis is expected to yield a comparable VOC total but individual component values may vary from site to site. The following table shows the field conditions compared to the results from the laboratory test:

API Oil Gravity @ 60°F	**Process Conditions**		**Gas/Oil Ratio**
	Pressure (PSIG)	**Temperature (°F)**	**(SCF/BBL)**
Actual Facility Conditions:			
31	50	84	
	0	80	Unknown
Laboratory Conditions:			
35.7	39	120	
	0	80	15
		Prorated GOR Estimate:	**17.80**

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Oil Rate * GOR	=	**5933.33**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**777.24**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Oil Rate to Avg. Oil Rate	=	**777.24**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * 8760/2000	=	**3404.31**

SPECIATION FACTORS:

Speciation of the flash gas mixture taken from the referenced laboratory results and normalized to account for the removal of Nitrogen; 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)	67.7203	526.3485	526.3485	2305.4090
Methane (excluded from VOC total)	0.0836	0.6499	0.6499	2.8464
Ethane (excluded from VOC total)	0.0771	0.5994	0.5994	2.6255
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	13.4864	13.4864	59.0704
Iso-Butane	2.3267	18.0839	18.0839	79.2074
N-Butane	6.6912	52.0070	52.0070	227.7907
Iso-Pentane	5.2911	41.1248	41.1248	180.1266
N-Pentane	6.0983	47.3983	47.3983	207.6048
Iso-Hexane	4.2954	33.3858	33.3858	146.2300
N-Hexane (TAP)	2.8149	21.8788	21.8788	95.8291
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1501	1.1663	1.1663	5.1085
Cyclohexane	0.5917	4.5986	4.5986	20.1420
Heptanes	1.5739	12.2333	12.2333	53.5818
Methylcyclohexane	0.1883	1.4634	1.4634	6.4099
Toluene (TAP)	0.0180	0.1398	0.1398	0.6123
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	1.7421	1.7421	7.6303
Ethylbenzene (TAP)	0.0015	0.0113	0.0113	0.0495
Xylenes (TAP)	0.0131	0.1017	0.1017	0.4455
Nonanes	0.1001	0.7783	0.7783	3.4090
Decanes Plus	0.0054	0.0417	0.0417	0.1825
Total Weight Percent:	100.0000			
Total TAP Emissions		23.30	23.30	102.04
Total VOC Emissions		**249.64**	**249.64**	**1093.43**
Total Non VOC & Non TAP-HC		1.25	1.25	5.47
Total Emissions		777.24	777.24	3404.31

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Oil Flash Gas	=	**1248.87**

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.7146*
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)	*73.98*

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**3.04**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**73.98**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**13.32**

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)	67.7203	2.059	50.099	9.018
Methane (excluded from VOC total)	0.0836	0.003	0.062	0.011
Ethane (excluded from VOC total)	0.0771	0.002	0.057	0.010
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	1.7352	0.053	1.284	0.231
Iso-Butane	2.3267	0.071	1.721	0.310
N-Butane	6.6912	0.203	4.950	0.891
Iso-Pentane	5.2911	0.161	3.914	0.705
N-Pentane	6.0983	0.185	4.512	0.812
Iso-Hexane	4.2954	0.131	3.178	0.572
N-Hexane (TAP)	2.8149	0.086	2.082	0.375
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1501	0.005	0.111	0.020
Cyclohexane	0.5917	0.018	0.438	0.079
Heptanes	1.5739	0.048	1.164	0.210
Methylcyclohexane	0.1883	0.006	0.139	0.025
Toluene (TAP)	0.0180	0.001	0.013	0.002
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.2241	0.007	0.166	0.030
Ethylbenzene (TAP)	0.0015	0.000	0.001	0.000
Xylenes (TAP)	0.0131	0.000	0.010	0.002
Nonanes	0.1001	0.003	0.074	0.013

Decanes Plus	0.0054	0.000	0.004	0.001
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.09	2.22	0.40
Total VOC Emissions		**0.98**	**23.76**	**4.28**
Total Non VOC & Non TAP-HC		0.00	0.12	0.02
Total Emissions		3.04	73.98	13.32

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: 8-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***5c-08-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Dry Oil Tank-Common Vent (ABJ-119A)***

DATA:

Emission Source:	*Crude Oil Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD - Q_{avg})	*4000*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*8000*
Average VOC Working Losses - L_W (lb/yr):	*40,420.842*
Average VOC Standing Losses - L_S (lb/yr):	*6,441.684*
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) * 3.1134/8760	=	**16.66**
Max. Hourly Uncontrolled THC Losses (lb/hr)	=	(Ls + (Lw * QMax ÷ Qavg)) * 3.1134/8760	=	**31.02**
Annual Potential Uncontrolled THC Losses (TPY)	=	Hourly * 8760/2000	=	**72.95**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-001A 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)	67.7203	11.2792	21.0080	49.4029
Methane (excluded from VOC total)	0.0836	0.0139	0.0259	0.0610
Ethane (excluded from VOC total)	0.0771	0.0128	0.0239	0.0563
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	0.2890	0.5383	1.2658
Iso-Butane	2.3267	0.3875	0.7218	1.6973
N-Butane	6.6912	1.1145	2.0757	4.8814
Iso-Pentane	5.2911	0.8813	1.6414	3.8600
N-Pentane	6.0983	1.0157	1.8918	4.4488
Iso-Hexane	4.2954	0.7154	1.3325	3.1336
N-Hexane (TAP)	2.8149	0.4688	0.8732	2.0535
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000

Benzene (TAP)	0.1501	0.0250	0.0466	0.1095
Cyclohexane	0.5917	0.0985	0.1835	0.4316
Heptanes	1.5739	0.2621	0.4883	1.1482
Methylcyclohexane	0.1883	0.0314	0.0584	0.1374
Toluene (TAP)	0.0180	0.0030	0.0056	0.0131
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	0.0373	0.0695	0.1635
Ethylbenzene (TAP)	0.0015	0.0002	0.0005	0.0011
Xylenes (TAP)	0.0131	0.0022	0.0041	0.0095
Nonanes	0.1001	0.0167	0.0311	0.0731
Decanes Plus	0.0054	0.0009	0.0017	0.0039
Total Weight Percent:	100.0000			
Total TAP Emissions		0.50	0.93	2.19
Total VOC Emissions		**5.35**	**9.96**	**23.43**
Total Non VOC & Non TAP-HC		0.03	0.05	0.12
Total Hydrocarbon Emissions		16.66	31.02	72.95

Uncontrolled VOC Emission Total (TPY) Storage Vapors = 23.43

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.7146*
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)	*2.59*

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.11**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**2.59**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.47**

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)	67.7203	0.073	1.754	0.315
Methane (excluded from VOC total)	0.0836	0.000	0.002	0.000
Ethane (excluded from VOC total)	0.0771	0.000	0.002	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	1.7352	0.002	0.045	0.008
Iso-Butane	2.3267	0.002	0.060	0.011
N-Butane	6.6912	0.007	0.173	0.031

Iso-Pentane	5.2911	0.006	0.137	0.025
N-Pentane	6.0983	0.007	0.158	0.028
Iso-Hexane	4.2954	0.005	0.111	0.020
N-Hexane (TAP)	2.8149	0.003	0.073	0.013
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1501	0.000	0.004	0.001
Cyclohexane	0.5917	0.001	0.015	0.003
Heptanes	1.5739	0.002	0.041	0.007
Methylcyclohexane	0.1883	0.000	0.005	0.001
Toluene (TAP)	0.0180	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.2241	0.000	0.006	0.001
Ethylbenzene (TAP)	0.0015	0.000	0.000	0.000
Xylenes (TAP)	0.0131	0.000	0.000	0.000
Nonanes	0.1001	0.000	0.003	0.000
Decanes Plus	0.0054	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	0.08	0.01
Total VOC Emissions		**0.03**	**0.83**	**0.15**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.11	2.59	0.47

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: 8-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***5d-08-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Dry Oil Tank-Common Vent (ABJ-119B)***

DATA:

Emission Source:	*Crude Oil Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD - Q_{avg})	*4000*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*8000*
Average VOC Working Losses - L_W (lb/yr):	*40,420.842*
Average VOC Standing Losses - L_S (lb/yr):	*6,441.684*
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) * 3.1134/8760	=	**16.66**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 3.1134/8760	=	**31.02**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**72.95**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-001A 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)	67.7203	11.2792	21.0080	49.4029
Methane (excluded from VOC total)	0.0836	0.0139	0.0259	0.0610
Ethane (excluded from VOC total)	0.0771	0.0128	0.0239	0.0563
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	0.2890	0.5383	1.2658
Iso-Butane	2.3267	0.3875	0.7218	1.6973
N-Butane	6.6912	1.1145	2.0757	4.8814
Iso-Pentane	5.2911	0.8813	1.6414	3.8600
N-Pentane	6.0983	1.0157	1.8918	4.4488
Iso-Hexane	4.2954	0.7154	1.3325	3.1336
N-Hexane (TAP)	2.8149	0.4688	0.8732	2.0535
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1501	0.0250	0.0466	0.1095

Cyclohexane	0.5917	0.0985	0.1835	0.4316
Heptanes	1.5739	0.2621	0.4883	1.1482
Methylcyclohexane	0.1883	0.0314	0.0584	0.1374
Toluene (TAP)	0.0180	0.0030	0.0056	0.0131
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	0.0373	0.0695	0.1635
Ethylbenzene (TAP)	0.0015	0.0002	0.0005	0.0011
Xylenes (TAP)	0.0131	0.0022	0.0041	0.0095
Nonanes	0.1001	0.0167	0.0311	0.0731
Decanes Plus	0.0054	0.0009	0.0017	0.0039
Total Weight Percent:	100.0000			
Total TAP Emissions		0.50	0.93	2.19
Total VOC Emissions		**5.35**	**9.96**	**23.43**
Total Non VOC & Non TAP-HC		0.03	0.05	0.12
Total Hydrocarbon Emissions		16.66	31.02	72.95

Uncontrolled VOC Emission Total (TPY)	Storage Vapors	=	23.43

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.7146*
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)	*2.59*

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.11**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**2.59**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.47**

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)	67.7203	0.073	1.754	0.315
Methane (excluded from VOC total)	0.0836	0.000	0.002	0.000
Ethane (excluded from VOC total)	0.0771	0.000	0.002	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	1.7352	0.002	0.045	0.008
Iso-Butane	2.3267	0.002	0.060	0.011
N-Butane	6.6912	0.007	0.173	0.031
Iso-Pentane	5.2911	0.006	0.137	0.025

N-Pentane	6.0983	0.007	0.158	0.028
Iso-Hexane	4.2954	0.005	0.111	0.020
N-Hexane (TAP)	2.8149	0.003	0.073	0.013
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1501	0.000	0.004	0.001
Cyclohexane	0.5917	0.001	0.015	0.003
Heptanes	1.5739	0.002	0.041	0.007
Methylcyclohexane	0.1883	0.000	0.005	0.001
Toluene (TAP)	0.0180	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.2241	0.000	0.006	0.001
Ethylbenzene (TAP)	0.0015	0.000	0.000	0.000
Xylenes (TAP)	0.0131	0.000	0.000	0.000
Nonanes	0.1001	0.000	0.003	0.000
Decanes Plus	0.0054	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	0.08	0.01
Total VOC Emissions		**0.03**	**0.83**	**0.15**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.11	2.59	0.47

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the wet/dry oil tank are routed to the control flare (EPN: 8-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***5e-08-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Wet/Dry Oil Tank-Common Vent (ABJ-118)***

DATA:

Emission Source:	*Crude Oil Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average: BBLD - Q_{avg})	*20*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*40*
Average VOC Working Losses - L_W (lb/yr):	*761.118*
Average VOC Standing Losses - L_S (lb/yr):	*6,441.684*
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) * 3.1134/8760	=	**2.56**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 3.1134/8760	=	**2.83**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**11.21**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-001A 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)	67.7203	1.7336	1.9168	7.5933
Methane (excluded from VOC total)	0.0836	0.0021	0.0024	0.0094
Ethane (excluded from VOC total)	0.0771	0.0020	0.0022	0.0086
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	0.0444	0.0491	0.1946
Iso-Butane	2.3267	0.0596	0.0659	0.2609
N-Butane	6.6912	0.1713	0.1894	0.7503
Iso-Pentane	5.2911	0.1355	0.1498	0.5933
N-Pentane	6.0983	0.1561	0.1726	0.6838
Iso-Hexane	4.2954	0.1100	0.1216	0.4816
N-Hexane (TAP)	2.8149	0.0721	0.0797	0.3156
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1501	0.0038	0.0042	0.0168

Cyclohexane	0.5917	0.0151	0.0167	0.0663
Heptanes	1.5739	0.0403	0.0446	0.1765
Methylcyclohexane	0.1883	0.0048	0.0053	0.0211
Toluene (TAP)	0.0180	0.0005	0.0005	0.0020
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	0.0057	0.0063	0.0251
Ethylbenzene (TAP)	0.0015	0.0000	0.0000	0.0002
Xylenes (TAP)	0.0131	0.0003	0.0004	0.0015
Nonanes	0.1001	0.0026	0.0028	0.0112
Decanes Plus	0.0054	0.0001	0.0002	0.0006
Total Weight Percent:	100.0000			
Total TAP Emissions		0.08	0.08	0.34
Total VOC Emissions		**0.82**	**0.91**	**3.60**
Total Non VOC & Non TAP-HC		0.00	0.00	0.02
Total Hydrocarbon Emissions		2.56	2.83	11.21

Uncontrolled VOC Emission Total (TPY)	Storage Vapors	=	3.60

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.7146*
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)	*0.24*

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	=	**0.24**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.04**

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)	67.7203	0.006	0.163	0.029
Methane (excluded from VOC total)	0.0836	0.000	0.000	0.000
Ethane (excluded from VOC total)	0.0771	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	1.7352	0.000	0.004	0.001
Iso-Butane	2.3267	0.000	0.006	0.001
N-Butane	6.6912	0.001	0.016	0.003
Iso-Pentane	5.2911	0.000	0.013	0.002

N-Pentane	6.0983	0.001	0.015	0.003
Iso-Hexane	4.2954	0.000	0.010	0.002
N-Hexane (TAP)	2.8149	0.000	0.007	0.001
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1501	0.000	0.000	0.000
Cyclohexane	0.5917	0.000	0.001	0.000
Heptanes	1.5739	0.000	0.004	0.001
Methylcyclohexane	0.1883	0.000	0.000	0.000
Toluene (TAP)	0.0180	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.2241	0.000	0.001	0.000
Ethylbenzene (TAP)	0.0015	0.000	0.000	0.000
Xylenes (TAP)	0.0131	0.000	0.000	0.000
Nonanes	0.1001	0.000	0.000	0.000
Decanes Plus	0.0054	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	0.01	0.00
Total VOC Emissions		**0.00**	**0.08**	**0.01**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.01	0.24	0.04

Emission Calculations

Emission calculations shown below are presented for informational purposes only as vapors from the wet/dry oil tank are routed to the control flare (EPN: 8-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***5f-08-OST-CV***

EMISSION SOURCE DESCRIPTION: ***5000 BBL Wet/Dry Oil Tank-Common Vent (ABJ-117)***

DATA:

Emission Source:	*Crude Oil Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average: BBLD - Q_{avg})	*20*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*40*
Average VOC Working Losses - L_W (lb/yr):	*761.118*
Average VOC Standing Losses - L_S (lb/yr):	*6,441.684*
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) * 3.1134/8760	=	**2.56**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 3.1134/8760	=	**2.83**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**11.21**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-001A 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)	67.7203	1.7336	1.9168	7.5933
Methane (excluded from VOC total)	0.0836	0.0021	0.0024	0.0094
Ethane (excluded from VOC total)	0.0771	0.0020	0.0022	0.0086
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	0.0444	0.0491	0.1946
Iso-Butane	2.3267	0.0596	0.0659	0.2609
N-Butane	6.6912	0.1713	0.1894	0.7503
Iso-Pentane	5.2911	0.1355	0.1498	0.5933
N-Pentane	6.0983	0.1561	0.1726	0.6838
Iso-Hexane	4.2954	0.1100	0.1216	0.4816
N-Hexane (TAP)	2.8149	0.0721	0.0797	0.3156
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1501	0.0038	0.0042	0.0168

Cyclohexane	0.5917	0.0151	0.0167	0.0663
Heptanes	1.5739	0.0403	0.0446	0.1765
Methylcyclohexane	0.1883	0.0048	0.0053	0.0211
Toluene (TAP)	0.0180	0.0005	0.0005	0.0020
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	0.0057	0.0063	0.0251
Ethylbenzene (TAP)	0.0015	0.0000	0.0000	0.0002
Xylenes (TAP)	0.0131	0.0003	0.0004	0.0015
Nonanes	0.1001	0.0026	0.0028	0.0112
Decanes Plus	0.0054	0.0001	0.0002	0.0006
Total Weight Percent:	100.0000			
Total TAP Emissions		0.08	0.08	0.34
Total VOC Emissions		**0.82**	**0.91**	**3.60**
Total Non VOC & Non TAP-HC		0.00	0.00	0.02
Total Hydrocarbon Emissions		2.56	2.83	11.21

Uncontrolled VOC Emission Total (TPY)	Storage Vapors	=	3.60

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.7146*
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)	*0.24*

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	=	**0.24**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.04**

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)	67.7203	0.006	0.163	0.029
Methane (excluded from VOC total)	0.0836	0.000	0.000	0.000
Ethane (excluded from VOC total)	0.0771	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	1.7352	0.000	0.004	0.001
Iso-Butane	2.3267	0.000	0.006	0.001
N-Butane	6.6912	0.001	0.016	0.003
Iso-Pentane	5.2911	0.000	0.013	0.002

N-Pentane	6.0983	0.001	0.015	0.003
Iso-Hexane	4.2954	0.000	0.010	0.002
N-Hexane (TAP)	2.8149	0.000	0.007	0.001
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.1501	0.000	0.000	0.000
Cyclohexane	0.5917	0.000	0.001	0.000
Heptanes	1.5739	0.000	0.004	0.001
Methylcyclohexane	0.1883	0.000	0.000	0.000
Toluene (TAP)	0.0180	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.2241	0.000	0.001	0.000
Ethylbenzene (TAP)	0.0015	0.000	0.000	0.000
Xylenes (TAP)	0.0131	0.000	0.000	0.000
Nonanes	0.1001	0.000	0.000	0.000
Decanes Plus	0.0054	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	0.01	0.00
Total VOC Emissions		**0.00**	**0.08**	**0.01**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.01	0.24	0.04

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: 9-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***6a-08-WVF-CV***

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

DATA:

Emission Source:	*Crude Oil/Water Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD - Q_{avg})	*20*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*40*
Average Daily Water Throughput: (Annual Average; BBLD - Q_{avg})	*20000*
Maximum Daily Water Throughput: (BBLD - Q_{max})	*40000*
Average VOC Working Losses - L_W (lb/yr):	*33,901.386*
Average VOC Standing Losses - L_S (lb/yr):	*1,474*
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) * 11.0335/8760	=	**42.70**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 11.0335/8760	=	**85.40**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**187.03**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-002A 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)	90.9109	38.8206	77.6395	170.0342
Methane (excluded from VOC total)	0.0126	0.0054	0.0108	0.0235
Ethane (excluded from VOC total)	0.0132	0.0056	0.0112	0.0246
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.1277	0.2554	0.5594
Iso-Butane	0.5318	0.2271	0.4541	0.9946
N-Butane	1.5117	0.6455	1.2910	2.8274
Iso-Pentane	1.4350	0.6128	1.2255	2.6840
N-Pentane	1.7373	0.7419	1.4837	3.2494
Iso-Hexane	1.3643	0.5826	1.1651	2.5516

N-Hexane (TAP)	0.9059	0.3868	0.7737	1.6944
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0229	0.0459	0.1005
Cyclohexane	0.2247	0.0960	0.1919	0.4203
Heptanes	0.6263	0.2674	0.5349	1.1714
Methylcyclohexane	0.0949	0.0405	0.0810	0.1774
Toluene (TAP)	0.0156	0.0066	0.0133	0.0291
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0630	0.1260	0.2759
Ethylbenzene (TAP)	0.0013	0.0006	0.0011	0.0025
Xylenes (TAP)	0.0126	0.0054	0.0108	0.0236
Nonanes	0.0958	0.0409	0.0819	0.1793
Decanes Plus	0.0058	0.0025	0.0049	0.0108
Total Weight Percent:	100.0000			
Total TAP Emissions		0.42	0.84	1.85
Total VOC Emissions		**3.87**	**7.74**	**16.95**
Total Non VOC & Non TAP-HC		0.01	0.02	0.05
Total Hydrocarbon Emissions		42.70	85.40	187.03

DATA:

Emission Source:	*Flash Gas from Oil*
Flash Gas Specific Gravity:	*1.5730*
Average Oil Throughput: (BBLD)	*20*
Maximum Oil Throughput: (BBLD)	*40*
Basis of Emission Estimates:	*Representative GOR & Actual Flare Gas Analysis*
Flash Gas Analysis Report Number:	*Southern Petroleum Laboratories Report No.: 172-240502S1-002A*

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 another site under similar conditions (pressure & temperature), refer to PENCOR Reprt No.: 31554-5006038374 in supporting documentation. This representative analysis is expected to yield a comparable VOC total but individual component values may vary from site to site. The following table shows the field conditions compared to the results from the laboratory test:

API Oil Gravity @ 60°F	Process Conditions		Gas/Oil Ratio
	Pressure (PSIG)	Temperature (°F)	(SCF/BBL)
Actual Facility Conditions:			
31	50	84	
	0	80	Unknown
Laboratory Conditions:			
35.7	39	120	
	0	80	15
		Prorated GOR Estimate:	**17.80**

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Oil Rate * GOR	=	**14.83**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**1.78**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Oil Rate to Avg. Oil Rate	=	**3.56**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * 8760/2000	=	**7.80**

SPECIATION FACTORS:

Speciation of the flash gas mixture taken from the referenced laboratory results and normalized to account for the removal of Nitrogen; 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)	90.9109	1.6202	3.2405	7.0878
Methane (excluded from VOC total)	0.0126	0.0002	0.0004	0.0010
Ethane (excluded from VOC total)	0.0132	0.0002	0.0005	0.0010
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.0053	0.0107	0.0233
Iso-Butane	0.5318	0.0095	0.0190	0.0415
N-Butane	1.5117	0.0269	0.0539	0.1179
Iso-Pentane	1.4350	0.0256	0.0512	0.1119
N-Pentane	1.7373	0.0310	0.0619	0.1354
Iso-Hexane	1.3643	0.0243	0.0486	0.1064
N-Hexane (TAP)	0.9059	0.0161	0.0323	0.0706
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0010	0.0019	0.0042
Cyclohexane	0.2247	0.0040	0.0080	0.0175
Heptanes	0.6263	0.0112	0.0223	0.0488
Methylcyclohexane	0.0949	0.0017	0.0034	0.0074
Toluene (TAP)	0.0156	0.0003	0.0006	0.0012
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0026	0.0053	0.0115
Ethylbenzene (TAP)	0.0013	0.0000	0.0000	0.0001
Xylenes (TAP)	0.0126	0.0002	0.0004	0.0010
Nonanes	0.0958	0.0017	0.0034	0.0075
Decanes Plus	0.0058	0.0001	0.0002	0.0005
Total Weight Percent:	100.0000			
Total TAP Emissions		0.02	0.04	0.08
Total VOC Emissions		**0.16**	**0.32**	**0.71**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		1.78	3.56	7.80

DATA:

Emission Source:	*Flash Gas from Brine Solution*
Approx. Pressure Drop of Brine Solution: (psig)	*50*
Approx. Temperature of Brine Solution: (°F)	*84*
Flash Gas Specific Gravity:	*1.5730*
Avg. Water Throughput: (BBLD)	*20000*
Max. Water Throughput: (BBLD)	*40000*
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.: 172-24050251-002A*

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	= Brine Rate * GWR	=	**416.67**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	= Flash Gas Gravity * Density of Air * Flash Rate	=	**50.07**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	= Avg. Emissions * Ratio of Max. Water Rate to Avg. Water Rate	=	**100.15**
Annual Potential Uncontrolled Flash Emissions (TPY)	= Hourly * 8760/2000	=	**219.31**

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.

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)	90.9109	45.5230	91.0459	199.3737
Methane (excluded from VOC total)	0.0126	0.0063	0.0126	0.0276
Ethane (excluded from VOC total)	0.0132	0.0066	0.0132	0.0289
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.1498	0.2995	0.6559
Iso-Butane	0.5318	0.2663	0.5326	1.1662
N-Butane	1.5117	0.7570	1.5139	3.3152
Iso-Pentane	1.4350	0.7186	1.4371	3.1471
N-Pentane	1.7373	0.8699	1.7399	3.8100
Iso-Hexane	1.3643	0.6831	1.3663	2.9919
N-Hexane (TAP)	0.9059	0.4536	0.9073	1.9867
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0269	0.0538	0.1178
Cyclohexane	0.2247	0.1125	0.2251	0.4929
Heptanes	0.6263	0.3136	0.6272	1.3736
Methylcyclohexane	0.0949	0.0475	0.0950	0.2080

Toluene (TAP)	0.0156	0.0078	0.0156	0.0341
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0739	0.1477	0.3235
Ethylbenzene (TAP)	0.0013	0.0007	0.0013	0.0029
Xylenes (TAP)	0.0126	0.0063	0.0126	0.0277
Nonanes	0.0958	0.0480	0.0960	0.2102
Decanes Plus	0.0058	0.0029	0.0058	0.0127
Total Weight Percent:	100.0000			
Total TAP Emissions		0.50	0.99	2.17
Total VOC Emissions		**4.54**	**9.08**	**19.88**
Total Non VOC & Non TAP-HC		0.01	0.03	0.06
Total Emissions		50.07	100.15	219.31

DATA:

Emission Source:	*Blanket Gas*
Average Annual Tank Throughput (BBLs/Yr):	*7,307,300*
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	=	37.54

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.5730*
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)	*15.76*

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.65**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**15.76**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**2.84**

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)	90.9109	0.589	14.328	2.579
Methane (excluded from VOC total)	0.0126	0.000	0.002	0.000
Ethane (excluded from VOC total)	0.0132	0.000	0.002	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	0.2991	0.002	0.047	0.008
Iso-Butane	0.5318	0.003	0.084	0.015

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
N-Butane	1.5117	0.010	0.238	0.043
Iso-Pentane	1.4350	0.009	0.226	0.041
N-Pentane	1.7373	0.011	0.274	0.049
Iso-Hexane	1.3643	0.009	0.215	0.039
N-Hexane (TAP)	0.9059	0.006	0.143	0.026
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0537	0.000	0.008	0.002
Cyclohexane	0.2247	0.001	0.035	0.006
Heptanes	0.6263	0.004	0.099	0.018
Methylcyclohexane	0.0949	0.001	0.015	0.003
Toluene (TAP)	0.0156	0.000	0.002	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1475	0.001	0.023	0.004
Ethylbenzene (TAP)	0.0013	0.000	0.000	0.000
Xylenes (TAP)	0.0126	0.000	0.002	0.000
Nonanes	0.0958	0.001	0.015	0.003
Decanes Plus	0.0058	0.000	0.001	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.01	0.16	0.03
Total VOC Emissions		**0.06**	**1.43**	**0.26**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.65	15.76	2.84

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: 9-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***6b-08-WVF-CV***

EMISSION SOURCE DESCRIPTION: ***Water Vortex Flume (ABM-2122)***

DATA:

Emission Source:	*Crude Oil/Water Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD - Q_{avg})	*20*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*40*
Average Daily Water Throughput: (Annual Average; BBLD - Q_{avg})	*20000*
Maximum Daily Water Throughput: (BBLD - Q_{max})	*40000*
Average VOC Working Losses - L_W (lb/yr):	*33,901.386*
Average VOC Standing Losses - L_S (lb/yr):	*1.474*
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) * 11.0335/8760	=	**42.70**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 11.0335/8760	=	**85.40**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**187.03**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-002A 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)	90.9109	38.8206	77.6395	170.0342
Methane (excluded from VOC total)	0.0126	0.0054	0.0108	0.0235
Ethane (excluded from VOC total)	0.0132	0.0056	0.0112	0.0246
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.1277	0.2554	0.5594
Iso-Butane	0.5318	0.2271	0.4541	0.9946
N-Butane	1.5117	0.6455	1.2910	2.8274
Iso-Pentane	1.4350	0.6128	1.2255	2.6840
N-Pentane	1.7373	0.7419	1.4837	3.2494
Iso-Hexane	1.3643	0.5826	1.1651	2.5516

N-Hexane (TAP)	0.9059	0.3868	0.7737	1.6944
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0229	0.0459	0.1005
Cyclohexane	0.2247	0.0960	0.1919	0.4203
Heptanes	0.6263	0.2674	0.5349	1.1714
Methylcyclohexane	0.0949	0.0405	0.0810	0.1774
Toluene (TAP)	0.0156	0.0066	0.0133	0.0291
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0630	0.1260	0.2759
Ethylbenzene (TAP)	0.0013	0.0006	0.0011	0.0025
Xylenes (TAP)	0.0126	0.0054	0.0108	0.0236
Nonanes	0.0958	0.0409	0.0819	0.1793
Decanes Plus	0.0058	0.0025	0.0049	0.0108
Total Weight Percent:	100.0000			
Total TAP Emissions		0.42	0.84	1.85
Total VOC Emissions		**3.87**	**7.74**	**16.95**
Total Non VOC & Non TAP-HC		0.01	0.02	0.05
Total Hydrocarbon Emissions		42.70	85.40	187.03

DATA:

Emission Source:	*Flash Gas from Oil*
Flash Gas Specific Gravity:	*1.5730*
Average Oil Throughput: (BBLD)	*20*
Maximum Oil Throughput: (BBLD)	*40*
Basis of Emission Estimates:	*Representative GOR & Actual Flare Gas Analysis*
Flash Gas Analysis Report Number:	*Southern Petroleum Laboratories Report No.: 172-24050251-002A*

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 another site under similar conditions (pressure & temperature), refer to PENCOR Reprt No.: 31554-5006038374 in supporting documentation. This representative analysis is expected to yield a comparable VOC total but individual component values may vary from site to site. The following table shows the field conditions compared to the results from the laboratory test:

API Oil Gravity @ 60°F	**Process Conditions**		**Gas/Oil Ratio**
	Pressure (PSIG)	**Temperature (°F)**	**(SCF/BBL)**
Actual Facility Conditions:			
31	50	84	[redacted]
	0	80	Unknown
Laboratory Conditions:			
35.7	39	120	[redacted]
	0	80	15
		Prorated GOR Estimate:	**17.80**

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Oil Rate * GOR	=	**14.83**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**1.78**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Oil Rate to Avg. Oil Rate	=	**3.56**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * 8760/2000	=	**7.80**

SPECIATION FACTORS:

Speciation of the flash gas mixture taken from the referenced laboratory results and normalized to account for the removal of Nitrogen; 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)	90.9109	1.6202	3.2405	7.0878
Methane (excluded from VOC total)	0.0126	0.0002	0.0004	0.0010
Ethane (excluded from VOC total)	0.0132	0.0002	0.0005	0.0010
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.0053	0.0107	0.0233
Iso-Butane	0.5318	0.0095	0.0190	0.0415
N-Butane	1.5117	0.0269	0.0539	0.1179
Iso-Pentane	1.4350	0.0256	0.0512	0.1119
N-Pentane	1.7373	0.0310	0.0619	0.1354
Iso-Hexane	1.3643	0.0243	0.0486	0.1064
N-Hexane (TAP)	0.9059	0.0161	0.0323	0.0706
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0010	0.0019	0.0042
Cyclohexane	0.2247	0.0040	0.0080	0.0175
Heptanes	0.6263	0.0112	0.0223	0.0488
Methylcyclohexane	0.0949	0.0017	0.0034	0.0074
Toluene (TAP)	0.0156	0.0003	0.0006	0.0012
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0026	0.0053	0.0115
Ethylbenzene (TAP)	0.0013	0.0000	0.0000	0.0001
Xylenes (TAP)	0.0126	0.0002	0.0004	0.0010
Nonanes	0.0958	0.0017	0.0034	0.0075
Decanes Plus	0.0058	0.0001	0.0002	0.0005
Total Weight Percent:	100.0000			
	Total TAP Emissions	0.02	0.04	0.08
	Total VOC Emissions	**0.16**	**0.32**	**0.71**
	Total Non VOC & Non TAP-HC	0.00	0.00	0.00
	Total Emissions	1.78	3.56	7.80

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
N-Butane	1.5117	0.010	0.238	0.043
Iso-Pentane	1.4350	0.009	0.226	0.041
N-Pentane	1.7373	0.011	0.274	0.049
Iso-Hexane	1.3643	0.009	0.215	0.039
N-Hexane (TAP)	0.9059	0.006	0.143	0.026
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0537	0.000	0.008	0.002
Cyclohexane	0.2247	0.001	0.035	0.006
Heptanes	0.6263	0.004	0.099	0.018
Methylcyclohexane	0.0949	0.001	0.015	0.003
Toluene (TAP)	0.0156	0.000	0.002	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1475	0.001	0.023	0.004
Ethylbenzene (TAP)	0.0013	0.000	0.000	0.000
Xylenes (TAP)	0.0126	0.000	0.002	0.000
Nonanes	0.0958	0.001	0.015	0.003
Decanes Plus	0.0058	0.000	0.001	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.01	0.16	0.03
Total VOC Emissions		**0.06**	**1.43**	**0.26**
Total Non VOC & Non TAP HC		0.00	0.00	0.00
Total Emissions		0.65	15.76	2.84

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: 9-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***6c-08-WVT-CV***

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

DATA:

Emission Source:	*Crude Oil/Water Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD - Q_{avg})	*20*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*40*
Average Daily Water Throughput: (Annual Average; BBLD - Q_{avg})	*20000*
Maximum Daily Water Throughput: (BBLD - Q_{max})	*40000*
Average VOC Working Losses - L_W (lb/yr):	*7,264.112*
Average VOC Standing Losses - L_S (lb/yr):	*694.340*
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) * 11.0335/8760	=	**10.02**
Max. Hourly Uncontrolled THC Losses (lb/hr)	=	(Ls + (Lw * QMax ÷ Qavg)) * 11.0335/8760	=	**19.17**
Annual Potential Uncontrolled THC Losses (TPY)	=	Hourly * 8760/2000	=	**43.90**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-002A 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)	90.9109	9.1129	17.4306	39.9143
Methane (excluded from VOC total)	0.0126	0.0013	0.0024	0.0055
Ethane (excluded from VOC total)	0.0132	0.0013	0.0025	0.0058
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.0300	0.0573	0.1313
Iso-Butane	0.5318	0.0533	0.1020	0.2335
N-Butane	1.5117	0.1515	0.2898	0.6637
Iso-Pentane	1.4350	0.1438	0.2751	0.6300
N-Pentane	1.7373	0.1741	0.3331	0.7628

Iso-Hexane	1.3643	0.1368	0.2616	0.5990
N-Hexane (TAP)	0.9059	0.0908	0.1737	0.3977
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0054	0.0103	0.0236
Cyclohexane	0.2247	0.0225	0.0431	0.0987
Heptanes	0.6263	0.0628	0.1201	0.2750
Methylcyclohexane	0.0949	0.0095	0.0182	0.0417
Toluene (TAP)	0.0156	0.0016	0.0030	0.0068
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0148	0.0283	0.0648
Ethylbenzene (TAP)	0.0013	0.0001	0.0003	0.0006
Xylenes (TAP)	0.0126	0.0013	0.0024	0.0055
Nonanes	0.0958	0.0096	0.0184	0.0421
Decanes Plus	0.0058	0.0006	0.0011	0.0025
Total Weight Percent:	100.0000			
Total TAP Emissions		0.10	0.19	0.43
Total VOC Emissions		**0.91**	**1.74**	**3.98**
Total Non VOC & Non TAP-HC		0.00	0.00	0.01
Total Hydrocarbon Emissions		10.02	19.17	43.90

DATA:

Emission Source:	*Blanket Gas*
Average Annual Tank Throughput (BBLs/Yr):	*7,307,300*
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	=	3.98

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.5730*
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)	*1.60*

Avg. Hourly Emissions (lb/hr)	= Annual Total/8760 (hrs/yr)	=	**0.07**
Maximum Hourly Emissions (lb/hr)	= Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**1.60**
Maximum Annual Emissions (TPY)	= Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.29**

EMISSION SUMMARY (based on the above referenced flare gas analysis):				
		CALCULATED EMISSION RATES		
POLLUTANT:	Weight Percent	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)	90.9109	0.060	1.455	0.261
Methane (excluded from VOC total)	0.0126	0.000	0.000	0.000
Ethane (excluded from VOC total)	0.0132	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	0.2991	0.000	0.005	0.001
Iso-Butane	0.5318	0.000	0.009	0.002
N-Butane	1.5117	0.001	0.024	0.004
Iso-Pentane	1.4350	0.001	0.023	0.004
N-Pentane	1.7373	0.001	0.028	0.005
Iso-Hexane	1.3643	0.001	0.022	0.004
N-Hexane (TAP)	0.9059	0.001	0.014	0.003
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0537	0.000	0.001	0.000
Cyclohexane	0.2247	0.000	0.004	0.001
Heptanes	0.6263	0.000	0.010	0.002
Methylcyclohexane	0.0949	0.000	0.002	0.000
Toluene (TAP)	0.0156	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1475	0.000	0.002	0.000
Ethylbenzene (TAP)	0.0013	0.000	0.000	0.000
Xylenes (TAP)	0.0126	0.000	0.000	0.000
Nonanes	0.0958	0.000	0.002	0.000
Decanes Plus	0.0058	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	0.02	0.00
	Total VOC Emissions	**0.01**	**0.15**	**0.03**
	Total Non VOC & Non TAP-HC	0.00	0.00	0.00
	Total Emissions	0.07	1.60	0.29

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: 9-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: ***6d-08-WVT-CV***

EMISSION SOURCE DESCRIPTION: ***9700 BBL Water Vortex Tank-Common Vent (ABM-2120)***

DATA:

Emission Source:	*Crude Oil/Water Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD - Q_{avg})	*20*
Maximum Daily Oil Throughput: (BBLD - Q_{max})	*40*
Average Daily Water Throughput: (Annual Average; BBLD - Q_{avg})	*20000*
Maximum Daily Water Throughput: (BBLD - Q_{max})	*40000*
Average VOC Working Losses - L_W (lb/yr):	*7,264.112*
Average VOC Standing Losses - L_S (lb/yr):	*694.340*
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) * 11.0335/8760	=	**10.02**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 11.0335/8760	=	**19.17**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**43.90**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-002A 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)	90.9109	9.1129	17.4306	39.9143
Methane (excluded from VOC total)	0.0126	0.0013	0.0024	0.0055
Ethane (excluded from VOC total)	0.0132	0.0013	0.0025	0.0058
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.0300	0.0573	0.1313
Iso-Butane	0.5318	0.0533	0.1020	0.2335
N-Butane	1.5117	0.1515	0.2898	0.6637
Iso-Pentane	1.4350	0.1438	0.2751	0.6300
N-Pentane	1.7373	0.1741	0.3331	0.7628

Iso-Hexane	1.3643	0.1368	0.2616	0.5990
N-Hexane (TAP)	0.9059	0.0908	0.1737	0.3977
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0054	0.0103	0.0236
Cyclohexane	0.2247	0.0225	0.0431	0.0987
Heptanes	0.6263	0.0628	0.1201	0.2750
Methylcyclohexane	0.0949	0.0095	0.0182	0.0417
Toluene (TAP)	0.0156	0.0016	0.0030	0.0068
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0148	0.0283	0.0648
Ethylbenzene (TAP)	0.0013	0.0001	0.0003	0.0006
Xylenes (TAP)	0.0126	0.0013	0.0024	0.0055
Nonanes	0.0958	0.0096	0.0184	0.0421
Decanes Plus	0.0058	0.0006	0.0011	0.0025
Total Weight Percent:	100.0000			
Total TAP Emissions		0.10	0.19	0.43
Total VOC Emissions		**0.91**	**1.74**	**3.98**
Total Non VOC & Non TAP-HC		0.00	0.00	0.01
Total Hydrocarbon Emissions		10.02	19.17	43.90

DATA:

Emission Source:	*Blanket Gas*
Average Annual Tank Throughput (BBLs/Yr):	*7,307,300*
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	=	3.98

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.5730*
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)	*1.60*

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.07**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**1.60**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**0.29**

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)	90.9109	0.060	1.455	0.261
Methane (excluded from VOC total)	0.0126	0.000	0.000	0.000
Ethane (excluded from VOC total)	0.0132	0.000	0.000	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	0.2991	0.000	0.005	0.001
Iso-Butane	0.5318	0.000	0.009	0.002
N-Butane	1.5117	0.001	0.024	0.004
Iso-Pentane	1.4350	0.001	0.023	0.004
N-Pentane	1.7373	0.001	0.028	0.005
Iso-Hexane	1.3643	0.001	0.022	0.004
N-Hexane (TAP)	0.9059	0.001	0.014	0.003
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0537	0.000	0.001	0.000
Cyclohexane	0.2247	0.000	0.004	0.001
Heptanes	0.6263	0.000	0.010	0.002
Methylcyclohexane	0.0949	0.000	0.002	0.000
Toluene (TAP)	0.0156	0.000	0.000	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1475	0.000	0.002	0.000
Ethylbenzene (TAP)	0.0013	0.000	0.000	0.000
Xylenes (TAP)	0.0126	0.000	0.000	0.000
Nonanes	0.0958	0.000	0.002	0.000
Decanes Plus	0.0058	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	0.02	0.00
Total VOC Emissions		**0.01**	**0.15**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Emissions		0.07	1.60	0.29

Emission Calculations

POINT SOURCE I.D. NUMBER: ***6i-08-ST-CV***

EMISSION SOURCE DESCRIPTION: ***400 BBL Sand Blowdown Pit Tank-Common Vent (ABJ-165)***

DATA:

Emission Source:	*Water Storage Vapors ('Working' & 'Standing')*
Average Daily Water Throughput: (Annual Average: BBLD - Q_{avg})	*20.8*
Maximum Daily Water Throughput: (BBLD - Q_{max})	*20.8*
Average VOC Working Losses - L_W (lb/yr):	*35.336*
Average VOC Standing Losses - L_S (lb/yr):	*30.355*
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) * 1.134/8760	=	**0.01**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * (Total QMax ÷ Total Qavg))) * 1.134/8760	=	**0.01**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.04**

SPECIATION FACTORS:

Speciation factors were taken from "Air Emissions Species Manual - Volume I: Volatile Organic Compound Species Profiles", 2nd edition; Report No.: EPA-450/2-90-001a; page 258; reference supporting documentation.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Hydrogen Sulfide (excluded from VOC total)	0.00	0.0000	0.0000	0.0000
Methane (excluded from VOC total)	6.20	0.0005	0.0005	0.0023
Ethane (excluded from VOC total)	5.60	0.0005	0.0005	0.0021
Propane	17.60	0.0015	0.0015	0.0066
Iso-Butane	1.50	0.0001	0.0001	0.0006
N-Butane	27.10	0.0023	0.0023	0.0101
Iso-Pentane	1.50	0.0001	0.0001	0.0006
N-Pentane	14.60	0.0012	0.0012	0.0054
Heptane	9.20	0.0008	0.0008	0.0034
Octane	6.90	0.0006	0.0006	0.0026
Other NM/NE Hydrocarbons	1.80	0.0002	0.0002	0.0007

N-Hexane (TAP)	7.90	0.0007	0.0007	0.0029
Benzene (TAP)	0.10	0.0000	0.0000	0.0000
Total Weight Percent:	100.00			
Total TAP Emissions		0.00	0.00	0.00
Total VOC Emissions		**0.01**	**0.01**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.00	0.00
Total Hydrocarbon Emissions		0.01	0.01	0.04

DATA:

Emission Source:	*Blanket Gas*
Average Annual Tank Throughput (BBLs/Yr):	*7,592*
Gross Blanket Gas Required (MSCF/Yr):	*43*
Maximum Hourly Fill Rate (BBLs/Hr):	*0.9*
Blanket Gas Specific Gravity:	*1.5108*
Basis of Emission Estimates:	*Manufacturers Gas Consumption Data & Actual Inlet Gas Analysis (Refer to supporting documentation)*
Fuel Gas Analysis Report Number:	*Southern Petroleum Laboratories Report No.: 172-23080192-003A*

Avg. Hourly Uncontrolled Emissions (lb/hr)	= Annual Gas Rate/ 8760 Hrs/Yr * 0.0764 * SG	=	**0.57**
Max. Hourly Uncontrolled Emissions (lb/hr)	= Max. Fill Rate * 42/7.48 * 0.0764 * SG	=	**0.65**
Annual Potential Uncontrolled Emissions (TPY)	= Annual Gas Rate * 0.0764 * SG/2000	=	**2.48**

SPECIATION FACTORS:

Speciation of the blanket gas is based on the referenced analysis.

UNCONTROLLED EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES: Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.4280	0.0024	0.0028	0.0106
Carbon Dioxide (excluded from VOC total)	97.4189	0.5520	0.6314	2.4176
Methane (excluded from VOC total)	0.7537	0.0043	0.0049	0.0187
Ethane (excluded from VOC total)	0.0782	0.0004	0.0005	0.0019
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.1707	0.0010	0.0011	0.0042
Iso-Butane	0.0955	0.0005	0.0006	0.0024
N-Butane	0.2372	0.0013	0.0015	0.0059
Iso-Pentane	0.1374	0.0008	0.0009	0.0034
N-Pentane	0.1553	0.0009	0.0010	0.0039
Iso-Hexane	0.1131	0.0006	0.0007	0.0028
N-Hexane (TAP)	0.0843	0.0005	0.0005	0.0021
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0057	0.0000	0.0000	0.0001
Cyclohexane	0.0306	0.0002	0.0002	0.0008
Heptanes	0.1004	0.0006	0.0007	0.0025

Methylcyclohexane	0.0316	0.0002	0.0002	0.0008
Toluene (TAP)	0.0085	0.0000	0.0001	0.0002
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.0669	0.0004	0.0004	0.0017
Ethylbenzene (TAP)	0.0007	0.0000	0.0000	0.0000
Xylenes (TAP)	0.0100	0.0001	0.0001	0.0002
Nonanes	0.0507	0.0003	0.0003	0.0013
Decanes Plus	0.0226	0.0001	0.0001	0.0006
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.00	0.00
Total VOC Emissions		**0.01**	**0.01**	**0.03**
Total Non VOC & Non TAP-HC		0.00	0.01	0.02
Total Emissions		0.57	0.65	2.48

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	0.06

Emission Calculations

This is a sample calculation for EPNs: 6j-13-WST-CV through 6m-13-WST-CV.

Emission calculations shown below are presented for informational purposes only as vapors from the water storage tanks are routed to the control flare (EPN: 9-08-F) for combustion, except during brief intervals when thief hatches are opened for purposes of sampling, gauging, etc.

POINT SOURCE I.D. NUMBER: *"See Above"*

EMISSION SOURCE DESCRIPTION: ***5000 BBL Produced Water Storage Tank-Common Vent***

DATA:

Emission Source:	*Crude Oil/Water Storage Vapors ('Working' & 'Standing')*
Average Daily Oil Throughput: (Annual Average; BBLD/Tank - Q_{avg})	*10*
Maximum Daily Oil Throughput: (BBLD/Tank - Q_{max})	*40*
Average Daily Water Throughput: (Annual Average; BBLD/Tank - Q_{avg})	*10000*
Maximum Daily Water Throughput: (BBLD/Tank - Q_{max})	*40000*
Average VOC Working Losses - L_W (lb/yr):	*3,650.737*
Average VOC Standing Losses - L_S (lb/yr):	*384.375*
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) * 11.0335/8760	=	**5.08**
Max. Hourly Uncontrolled THC Losses (lb/hr)	= (Ls + (Lw * QMax ÷ Qavg)) * 11.0335/8760	=	**18.88**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**22.26**

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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-002A 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)	90.9109	4.6204	17.1613	20.2375
Methane (excluded from VOC total)	0.0126	0.0006	0.0024	0.0028
Ethane (excluded from VOC total)	0.0132	0.0007	0.0025	0.0029
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.0152	0.0565	0.0666
Iso-Butane	0.5318	0.0270	0.1004	0.1184
N-Butane	1.5117	0.0768	0.2854	0.3365
Iso-Pentane	1.4350	0.0729	0.2709	0.3194

N-Pentane	1.7373	0.0883	0.3280	0.3867
Iso-Hexane	1.3643	0.0693	0.2575	0.3037
N-Hexane (TAP)	0.9059	0.0460	0.1710	0.2017
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0027	0.0101	0.0120
Cyclohexane	0.2247	0.0114	0.0424	0.0500
Heptanes	0.6263	0.0318	0.1182	0.1394
Methylcyclohexane	0.0949	0.0048	0.0179	0.0211
Toluene (TAP)	0.0156	0.0008	0.0029	0.0035
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0075	0.0278	0.0328
Ethylbenzene (TAP)	0.0013	0.0001	0.0003	0.0003
Xylenes (TAP)	0.0126	0.0006	0.0024	0.0028
Nonanes	0.0958	0.0049	0.0181	0.0213
Decanes Plus	0.0058	0.0003	0.0011	0.0013
Total Weight Percent:	100.0000			
Total TAP Emissions		0.05	0.19	0.22
Total VOC Emissions		**0.46**	**1.71**	**2.02**
Total Non VOC & Non TAP-HC		0.00	0.00	0.01
Total Hydrocarbon Emissions		5.08	18.88	22.26

DATA:

Emission Source:	*Blanket Gas*
Average Annual Tank Throughput (BBLs/Yr):	*3,653,650*
Gross Blanket Gas Required (MSCF/Yr):	*20,515*
Maximum Hourly Fill Rate (BBLs/Hr):	*417*
Blanket Gas Specific Gravity:	*1.5730*
Basis of Emission Estimates:	*Manufacturers Gas Consumption Data & Actual Flare Gas Analysis (Refer to supporting documentation)*
Fuel Gas Analysis Report Number:	*Southern Petroleum Laboratories Report No.: 172-24050251-002A*

Avg. Hourly Uncontrolled Emissions (lb/hr)	=	Annual Gas Rate/ 8760 Hrs/Yr * 0.0764 * SG	=	**281.44**
Max. Hourly Uncontrolled Emissions (lb/hr)	=	Max. Fill Rate * 42/7.48 * 0.0764 * SG	=	**281.39**
Annual Potential Uncontrolled Emissions (TPY)	=	Annual Gas Rate * 0.0764 * SG/2000	=	**1232.72**

SPECIATION FACTORS:

Speciation of the blanket gas is based on the referenced analysis and normalized to account for the removal of Nitrogen.

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)	90.9109	255.8619	255.8126	1120.6753
Methane (excluded from VOC total)	0.0126	0.0354	0.0354	0.1552

Ethane (excluded from VOC total)	0.0132	0.0370	0.0370	0.1623
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.8417	0.8415	3.6866
Iso-Butane	0.5318	1.4966	1.4963	6.5551
N-Butane	1.5117	4.2545	4.2537	18.6348
Iso-Pentane	1.4350	4.0387	4.0380	17.6897
N-Pentane	1.7373	4.8895	4.8886	21.4162
Iso-Hexane	1.3643	3.8396	3.8388	16.8174
N-Hexane (TAP)	0.9059	2.5496	2.5491	11.1673
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.1512	0.1512	0.6624
Cyclohexane	0.2247	0.6325	0.6324	2.7703
Heptanes	0.6263	1.7627	1.7624	7.7207
Methylcyclohexane	0.0949	0.2670	0.2669	1.1694
Toluene (TAP)	0.0156	0.0438	0.0438	0.1918
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.4152	0.4151	1.8184
Ethylbenzene (TAP)	0.0013	0.0037	0.0037	0.0164
Xylenes (TAP)	0.0126	0.0355	0.0355	0.1555
Nonanes	0.0958	0.2698	0.2697	1.1815
Decanes Plus	0.0058	0.0163	0.0163	0.0713
Total Weight Percent:	100.0000			
Total TAP Emissions		2.78	2.78	12.19
Total VOC Emissions		**25.51**	**25.50**	**111.72**
Total Non VOC & Non TAP-HC		0.07	0.07	0.32
Total Emissions		281.44	281.39	1232.72

Uncontrolled VOC Emission Total (TPY)	Storage Vapors + Blanket Gas	=	113.74

DATA:

Emission Source:	*Losses When Opening Thief Hatches*
Specific Gravity of Gas:	*1.5730*
Maximum Thief Hatch Venting (Hrs/Yr) (Under Normal/Routine Operating Conditions)	*30*
Number of Tanks in Vent System:	*4*
Max. Minutes a Hatch is Opened in a Single Hour:	*5*
Maximum Hourly Emission Rate (lb/hr): (from preceding tank emission estimates)	*25.02*

Avg. Hourly Emissions (lb/hr)	=	Annual Total/8760 (hrs/yr)	=	**0.26**
Maximum Hourly Emissions (lb/hr)	=	Max. Emission Rate * Max. Minutes/Hr Hatch is Open	=	**25.02**
Maximum Annual Emissions (TPY)	=	Max. Hourly THC Rate * Hours/Yr Hatch is Open	=	**1.13**

EMISSION SUMMARY (based on the above referenced flare gas analysis):				
		CALCULATED EMISSION RATES		
POLLUTANT:	Weight Percent	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)	90.9109	0.235	22.746	1.024
Methane (excluded from VOC total)	0.0126	0.000	0.003	0.000
Ethane (excluded from VOC total)	0.0132	0.000	0.003	0.000
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.000	0.000	0.000
Propane	0.2991	0.001	0.075	0.003
Iso-Butane	0.5318	0.001	0.133	0.006
N-Butane	1.5117	0.004	0.378	0.017
Iso-Pentane	1.4350	0.004	0.359	0.016
N-Pentane	1.7373	0.004	0.435	0.020
Iso-Hexane	1.3643	0.004	0.341	0.015
N-Hexane (TAP)	0.9059	0.002	0.227	0.010
Methylcyclopentane	0.0000	0.000	0.000	0.000
Benzene (TAP)	0.0537	0.000	0.013	0.001
Cyclohexane	0.2247	0.001	0.056	0.003
Heptanes	0.6263	0.002	0.157	0.007
Methylcyclohexane	0.0949	0.000	0.024	0.001
Toluene (TAP)	0.0156	0.000	0.004	0.000
2,2,4-Trimethylpentane (TAP)	0.0000	0.000	0.000	0.000
Octanes	0.1475	0.000	0.037	0.002
Ethylbenzene (TAP)	0.0013	0.000	0.000	0.000
Xylenes (TAP)	0.0126	0.000	0.003	0.000
Nonanes	0.0958	0.000	0.024	0.001
Decanes Plus	0.0058	0.000	0.001	0.000
Other NM/NE HC	0.0000	0.000	0.000	0.000
Total Weight Percent:	100.0000			
Total TAP Emissions		0.00	0.25	0.01
Total VOC Emissions		**0.02**	**2.27**	**0.10**
Total Non VOC & Non TAP-HC		0.00	0.01	0.00
Total Emissions		0.26	25.02	1.13

Emission Calculations

POINT SOURCE I.D. NUMBER: *7-08-SBP*

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

DATA:

Emission Source:	*Flash Gas from Brine Solution**
Approx. Pressure Drop of Brine Solution: (psig)	*700*
Approx. Temperature of Brine Solution: (°F)	*80*
Flash Gas Specific Gravity:	*1.5108*
Avg. Water Throughput: (BBLD)	*250*
Max. Water Throughput: (BBLD)	*250*
Blowdown Hours per Year:	*730*
Gas to Water Ratio: (SCF/BBL of Brine: GWR)	*7.0*
Basis of Emission Estimates:	*API Documentation & Actual Inlet Gas Analysis (Refer to supporting documentation)*
Flash Gas Analysis Report Number:	*Southern Petroleum Laboratories Report No.: 172-23080192-003A*

**Associated with vessel blowdowns.*

Avg. Hourly Uncontrolled Flash Rate (SCF/Hr)	=	Brine Rate * GWR	=	**72.92**
Avg. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Flash Gas Gravity * Density of Air * Flash Rate	=	**8.42**
Max. Hourly Uncontrolled Total Flash Emissions (lb/hr)	=	Avg. Emissions * Ratio of Max. Water Rate to Avg. Water Rate	=	**8.42**
Annual Potential Uncontrolled Flash Emissions (TPY)	=	Hourly * Blowdown Hours/2000	=	**3.07**

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.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.4280	0.0360	0.0360	0.0132
Carbon Dioxide (excluded from VOC total)	97.4189	8.1996	8.1996	2.9940
Methane (excluded from VOC total)	0.7537	0.0634	0.0634	0.0232
Ethane (excluded from VOC total)	0.0782	0.0066	0.0066	0.0024
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.1707	0.0144	0.0144	0.0052
Iso-Butane	0.0955	0.0080	0.0080	0.0029
N-Butane	0.2372	0.0200	0.0200	0.0073
Iso-Pentane	0.1374	0.0116	0.0116	0.0042
N-Pentane	0.1553	0.0131	0.0131	0.0048
Iso-Hexane	0.1131	0.0095	0.0095	0.0035

N-Hexane (TAP)	0.0843	0.0071	0.0071	0.0026
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0057	0.0005	0.0005	0.0002
Cyclohexane	0.0306	0.0026	0.0026	0.0009
Heptanes	0.1004	0.0085	0.0085	0.0031
Methylcyclohexane	0.0316	0.0027	0.0027	0.0010
Toluene (TAP)	0.0085	0.0007	0.0007	0.0003
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.0669	0.0056	0.0056	0.0021
Ethylbenzene (TAP)	0.0007	0.0001	0.0001	0.0000
Xylenes (TAP)	0.0100	0.0008	0.0008	0.0003
Nonanes	0.0507	0.0043	0.0043	0.0016
Decanes Plus	0.0226	0.0019	0.0019	0.0007
Total Weight Percent:	100.0000			
Total TAP Emissions		0.01	0.01	0.00
Total VOC Emissions		**0.11**	**0.11**	**0.04**
Total Non VOC & Non TAP-HC		0.07	0.07	0.03
Total Emissions		8.42	8.42	3.07

Uncontrolled VOC Emission Total (TPY)	Brine Flash Gas	0.04

Emission Calculations

POINT SOURCE I.D. NUMBER: *8-08-F*

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

DATA:

Emission Source:	*Unburned Hydrocarbons and Products of Combustion*
Atmospheric Gas Streams:	
Gas Stream #1:	*Oil Storage Tank Vapors*
Gas Heat of Combustion (BTU/Ft^3-actual flare gas analysis):	*892*
Assist Gas Feed:	*Yes*
Gas Heat of Combustion (BTU/Ft^3-actual fuel gas analysis):	*1011*
Pilot Feed:	*Yes*
Gas Heat of Combustion (BTU/Ft^3-actual fuel gas analysis):	*1011*
Combustion Efficiency:	*99% for C3 HC and lighter & 98% for all other HC*

Gas Stream #1 - Oil Storage Tank Vapors

Gas volume estimates are supported by the calculations associated with EPNs: 5a-08-GBT-CV through 5f-08-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*
7,070.24	*8760*	*98*	*892*	*1.7146*

CALCULATIONS

Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*7,070.24*	*x*	*0.98*	*x*	*8,760*
	=	***60,696,596***	***scf/yr***	=	***6,928.84 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*60,696,596*	*x*	*892*		
	=	***6.1805 MMBTU/Hr***				
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*1.7146*	*x*	*0.0764*	*x*	*7,070.24*
	=	***926.19***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*1.7146*	*x*	*0.0000382*	*x*	*61,935,302*
	=	***4,056.71***	***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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-001A 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)	67.7203	627.2184	627.2184	2747.2164
Methane (excluded from VOC total)	0.0836	0.0077	0.0077	0.0339
Ethane (excluded from VOC total)	0.0771	0.0071	0.0071	0.0313
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	1.7352	0.1607	0.1607	0.7039
Iso-Butane	2.3267	0.4310	0.4310	1.8877
N-Butane	6.6912	1.2395	1.2395	5.4289
Iso-Pentane	5.2911	0.9801	0.9801	4.2929
N-Pentane	6.0983	1.1296	1.1296	4.9478
Iso-Hexanes	4.2954	0.7957	0.7957	3.4851
N-Hexane (TAP)	2.8149	0.5214	0.5214	2.2839
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.1501	0.0278	0.0278	0.1218
Cyclohexane	0.5917	0.1096	0.1096	0.4800
Heptanes	1.5739	0.2916	0.2916	1.2770
Methylcyclohexane	0.1883	0.0349	0.0349	0.1528
Toluene (TAP)	0.0180	0.0033	0.0033	0.0146
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.2241	0.0415	0.0415	0.1819
Ethylbenzene (TAP)	0.0015	0.0003	0.0003	0.0012
Xylenes (TAP)	0.0131	0.0024	0.0024	0.0106
Nonanes	0.1001	0.0185	0.0185	0.0812
Decanes Plus	0.0054	0.0010	0.0010	0.0043
Other NM/NE HC	0.0000	0.0000	0.0000	0.0000
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.56	0.56	2.43
TOTAL VOC EMISSIONS:		**5.79**	**5.79**	**25.36**
TOTAL Non-VOC & Non-TAP HC:		0.01	0.01	0.07
TOTAL EMISSIONS:		633.02	633.02	2772.64

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*
150.00	*8760*	*98*	*1011*	*0.5750*

CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*150.00*	*x*	*0.98*	*x*	*8,760*
	=	***1,287,720***	***scf/yr***	=	***147.00 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*1,287,720*	*x*	*1011*		
	=	***0.1486 MMBTU/Hr***				
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*0.5750*	*x*	*0.0764*	*x*	*150.00*
	=	***6.59***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*0.5750*	*x*	*0.0000382*	*x*	*1,314,000*
	=	***28.86***	***TPY***			

SPECIATION FACTORS:

Speciation of the supply gas is based on an actual fuel gas analysis; refer to Southern Flow Companies Report No.: A80606-154919 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)	2.9550	0.1947	0.1947	0.8529
Carbon Dioxide (excluded from VOC total)	0.3299	0.0217	0.0217	0.0952
Methane (excluded from VOC total)	93.4031	0.0615	0.0615	0.2696
Ethane (excluded from VOC total)	0.7628	0.0005	0.0005	0.0022
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.3570	0.0002	0.0002	0.0010
Iso-Butane	0.2091	0.0003	0.0003	0.0012
N-Butane	0.2684	0.0004	0.0004	0.0015
Iso-Pentane	0.2466	0.0003	0.0003	0.0014
N-Pentane	0.2380	0.0003	0.0003	0.0014
Iso-Hexanes	0.7458	0.0010	0.0010	0.0043
N-Hexane (TAP)	0.1727	0.0002	0.0002	0.0010
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0350	0.0000	0.0000	0.0002
Cyclohexane	0.0000	0.0000	0.0000	0.0000

Heptanes	0.0933	0.0001	0.0001	0.0005
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000
Toluene (TAP)	0.0356	0.0000	0.0000	0.0002
2,2,4-Trimethylpentane (TAP)	0.0413	0.0001	0.0001	0.0002
Octanes Plus	0.0938	0.0001	0.0001	0.0005
Ethylbenzene (TAP)	0.0020	0.0000	0.0000	0.0000
Xylenes (TAP)	0.0104	0.0000	0.0000	0.0001
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.00	0.00	0.00
TOTAL VOC EMISSIONS:		**0.00**	**0.00**	**0.01**
TOTAL Non-VOC & Non-TAP HC:		0.06	0.06	0.27
TOTAL EMISSIONS:		0.28	0.28	1.23

Pilot 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*
150.00	*8760*	*98*	*1011*	*0.5750*

CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*150.00*	*x*	*0.98*	*x*	*8,760*
	=	***1,287,720***	***scf/yr***	=	***147.00 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*1,287,720*	*x*	*1011*		
	=				***0.1486 MMBTU/Hr***	
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*0.5750*	*x*	*0.0764*	*x*	*150.00*
	=	***6.59***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*0.5750*	*x*	*0.0000382*	*x*	*1,314,000*
	=	***28.86***	***TPY***			

SPECIATION FACTORS:

Speciation of the pilot gas is based on an actual fuel gas analysis; refer to Southern Flow Companies Report No.: A80606-154919 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)	2.9550	0.1947	0.1947	0.8529
Carbon Dioxide (excluded from VOC total)	0.3299	0.0217	0.0217	0.0952
Methane (excluded from VOC total)	93.4031	0.0615	0.0615	0.2696
Ethane (excluded from VOC total)	0.7628	0.0005	0.0005	0.0022
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.3570	0.0002	0.0002	0.0010
Iso-Butane	0.2091	0.0003	0.0003	0.0012
N-Butane	0.2684	0.0004	0.0004	0.0015
Iso-Pentane	0.2466	0.0003	0.0003	0.0014
N-Pentane	0.2380	0.0003	0.0003	0.0014
Iso-Hexanes	0.7458	0.0010	0.0010	0.0043
N-Hexane (TAP)	0.1727	0.0002	0.0002	0.0010
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0350	0.0000	0.0000	0.0002
Cyclohexane	0.0000	0.0000	0.0000	0.0000
Heptanes	0.0933	0.0001	0.0001	0.0005
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000
Toluene (TAP)	0.0356	0.0000	0.0000	0.0002
2,2,4-Trimethylpentane (TAP)	0.0413	0.0001	0.0001	0.0002
Octanes Plus	0.0938	0.0001	0.0001	0.0005
Ethylbenzene (TAP)	0.0020	0.0000	0.0000	0.0000
Xylenes (TAP)	0.0104	0.0000	0.0000	0.0001
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.00	0.00	0.00
TOTAL VOC EMISSIONS:		**0.00**	**0.00**	**0.01**
TOTAL Non-VOC & Non-TAP HC:		0.06	0.06	0.27
TOTAL EMISSIONS:		0.28	0.28	1.23

Total of Average Hourly VOC emissions estimated for this source:	**5.79 Lbs/Hr**
Total of Maximum Hourly VOC emissions estimated for this source:	**5.79 Lbs/Hr**
Total of Maximum Annual VOC emissions estimated for this source:	**25.38 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. Oil Storage Tank Vapors	8760	7070.24	7070.24	6.1805	6.1805
Assist Gas Feed	8760	150.00	150.00	0.1486	0.1486
Pilot Feed	8760	150.00	150.00	0.1486	0.1486
Totals:		7,370.24	7,370.24	6.48	6.48

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	0.08	0.08	0.36
Soot (expressed as $PM_{2.5}$)	0.000011	0.08	0.08	0.36
SO_2	N/A	0.00	0.00	0.00

Emission factors for nitrogen oxide and carbon monoxide are from a 1983 CMA document entitled "A Report on a Flare Efficiency Study", for a non-assisted industrial burn flares. (refer to 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	0.42	0.42	1.82
CO	0.5496	3.56	3.56	15.60

Emission Calculations

POINT SOURCE I.D. NUMBER: *9-08-F*

EMISSION SOURCE DESCRIPTION: *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):	*230*
Assist Gas Feed:	*Yes*
Gas Heat of Combustion (BTU/Ft^3-actual fuel gas analysis):	*1011*
Pilot Feed:	*Yes*
Gas Heat of Combustion (BTU/Ft^3-actual fuel gas analysis):	*1011*
Combustion Efficiency:	*99% for C3 HC and lighter & 98% for all other HC*

Gas Stream #1 - Water Storage Tank Vapors

Gas volume estimates are supported by the calculations associated with EPNs: 6a-08-WVF-CV through 6d-08-WVT-CV & 6j-13-WST-CV through 6m-13-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
11,276.96	8760	98	230	1.5730

CALCULATIONS

Gas Combusted (annual hourly average)	=	gas rate (scf/hr)	x	efficiency	x	usage (hrs/yr)
	=	11,276.96	x	0.98	x	8,760
	=	**96,810,446**	scf/yr	=	**11,051.42 SCF/hr**	
Heat Content (annual hourly average)	=	gas rate (scf/yr)	x	gas heat of combustion (BTU/scf)		
	=	96,810,446	x	230		
	=	**2.5418 MMBTU/Hr**				
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	gas specific gravity	x	density of air (lb/SCF)	x	Maximum Gas Rate (SCF/Hr)
	=	1.5730	x	0.0764	x	11,276.96
	=	**1,355.26**	**lbs/hr**			
Uncontrolled Annual Emissions (TPY)	=	gas specific gravity	x	density of air (tons/SCF)	x	Total Gas Rate (SCF/Yr)
	=	1.5730	x	0.0000382	x	98,786,170
	=	**5,936.06**	**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; refer to Southern Petroleum Laboratories Report No.: 172-24050251-002A 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)	90.9109	1232.0832	1232.0832	5396.5245
Methane (excluded from VOC total)	0.0126	0.0017	0.0017	0.0075
Ethane (excluded from VOC total)	0.0132	0.0018	0.0018	0.0078
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.2991	0.0405	0.0405	0.1775
Iso-Butane	0.5318	0.1441	0.1441	0.6313
N-Butane	1.5117	0.4097	0.4097	1.7947
Iso-Pentane	1.4350	0.3890	0.3890	1.7037
N-Pentane	1.7373	0.4709	0.4709	2.0626
Iso-Hexanes	1.3643	0.3698	0.3698	1.6197
N-Hexane (TAP)	0.9059	0.2455	0.2455	1.0755
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0537	0.0146	0.0146	0.0638
Cyclohexane	0.2247	0.0609	0.0609	0.2668
Heptanes	0.6263	0.1698	0.1698	0.7436
Methylcyclohexane	0.0949	0.0257	0.0257	0.1126
Toluene (TAP)	0.0156	0.0042	0.0042	0.0185
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.1475	0.0400	0.0400	0.1751
Ethylbenzene (TAP)	0.0013	0.0004	0.0004	0.0016
Xylenes (TAP)	0.0126	0.0034	0.0034	0.0150
Nonanes	0.0958	0.0260	0.0260	0.1138
Decanes Plus	0.0058	0.0016	0.0016	0.0069
Other NM/NE HC	0.0000	0.0000	0.0000	0.0000
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.27	0.27	1.17
TOTAL VOC EMISSIONS:		**2.42**	**2.42**	**10.58**
TOTAL Non-VOC & Non-TAP HC:		0.00	0.00	0.02
TOTAL EMISSIONS:		1234.50	1234.50	5407.12

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*
150.00	*8760*	*98*	*1011*	*0.5750*

CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*150.00*	*x*	*0.98*	*x*	*8,760*
	=	***1,287,720***	***scf/yr***	=	***147.00 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*1,287,720*	*x*	*1011*		
	=			***0.1486 MMBTU/Hr***		
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*0.5750*	*x*	*0.0764*	*x*	*150.00*
	=	***6.59***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*0.5750*	*x*	*0.0000382*	*x*	*1,314,000*
	=	***28.86***	***TPY***			

SPECIATION FACTORS:

Speciation of the supply gas is based on an actual fuel gas analysis; refer to Southern Flow Companies Report No.: A80606-154919 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)	2.9550	0.1947	0.1947	0.8529
Carbon Dioxide (excluded from VOC total)	0.3299	0.0217	0.0217	0.0952
Methane (excluded from VOC total)	93.4031	0.0615	0.0615	0.2696
Ethane (excluded from VOC total)	0.7628	0.0005	0.0005	0.0022
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.3570	0.0002	0.0002	0.0010
Iso-Butane	0.2091	0.0003	0.0003	0.0012
N-Butane	0.2684	0.0004	0.0004	0.0015
Iso-Pentane	0.2466	0.0003	0.0003	0.0014
N-Pentane	0.2380	0.0003	0.0003	0.0014
Iso-Hexanes	0.7458	0.0010	0.0010	0.0043
N-Hexane (TAP)	0.1727	0.0002	0.0002	0.0010
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0350	0.0000	0.0000	0.0002

Cyclohexane	0.0000	0.0000	0.0000	0.0000
Heptanes	0.0933	0.0001	0.0001	0.0005
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000
Toluene (TAP)	0.0356	0.0000	0.0000	0.0002
2,2,4-Trimethylpentane (TAP)	0.0413	0.0001	0.0001	0.0002
Octanes Plus	0.0938	0.0001	0.0001	0.0005
Ethylbenzene (TAP)	0.0020	0.0000	0.0000	0.0000
Xylenes (TAP)	0.0104	0.0000	0.0000	0.0001
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.00	0.00	0.00
TOTAL VOC EMISSIONS:		**0.00**	**0.00**	**0.01**
TOTAL Non-VOC & Non-TAP HC:		0.06	0.06	0.27
TOTAL EMISSIONS:		0.28	0.28	1.23

Pilot 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*
150.00	*8760*	*98*	*1011*	*0.5750*

CALCULATIONS						
Gas Combusted (annual hourly average)	=	*gas rate (scf/hr)*	*x*	*efficiency*	*x*	*usage (hrs/yr)*
	=	*150.00*	*x*	*0.98*	*x*	*8,760*
	=	***1,287,720***	***scf/yr***	=	***147.00 SCF/hr***	
Heat Content (annual hourly average)	=	*gas rate (scf/yr)*	*x*	*gas heat of combustion (BTU/scf)*		
	=	*1,287,720*	*x*	*1011*		
	=	***0.1486 MMBTU/Hr***				
Uncontrolled Max. Hourly Emissions (lbs/hr)	=	*gas specific gravity*	*x*	*density of air (lb/SCF)*	*x*	*Maximum Gas Rate (SCF/Hr)*
	=	*0.5750*	*x*	*0.0764*	*x*	*150.00*
	=	***6.59***	***lbs/hr***			
Uncontrolled Annual Emissions (TPY)	=	*gas specific gravity*	*x*	*density of air (tons/SCF)*	*x*	*Total Gas Rate (SCF/Yr)*
	=	*0.5750*	*x*	*0.0000382*	*x*	*1,314,000*
	=	***28.86***	***TPY***			

SPECIATION FACTORS:

Speciation of the pilot gas is based on an actual fuel gas analysis; refer to Southern Flow Companies Report No.: A80606-154919 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)	2.9550	0.1947	0.1947	0.8529
Carbon Dioxide (excluded from VOC total)	0.3299	0.0217	0.0217	0.0952
Methane (excluded from VOC total)	93.4031	0.0615	0.0615	0.2696
Ethane (excluded from VOC total)	0.7628	0.0005	0.0005	0.0022
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.3570	0.0002	0.0002	0.0010
Iso-Butane	0.2091	0.0003	0.0003	0.0012
N-Butane	0.2684	0.0004	0.0004	0.0015
Iso-Pentane	0.2466	0.0003	0.0003	0.0014
N-Pentane	0.2380	0.0003	0.0003	0.0014
Iso-Hexanes	0.7458	0.0010	0.0010	0.0043
N-Hexane (TAP)	0.1727	0.0002	0.0002	0.0010
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0350	0.0000	0.0000	0.0002
Cyclohexane	0.0000	0.0000	0.0000	0.0000
Heptanes	0.0933	0.0001	0.0001	0.0005
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000
Toluene (TAP)	0.0356	0.0000	0.0000	0.0002
2,2,4-Trimethylpentane (TAP)	0.0413	0.0001	0.0001	0.0002
Octanes Plus	0.0938	0.0001	0.0001	0.0005
Ethylbenzene (TAP)	0.0020	0.0000	0.0000	0.0000
Xylenes (TAP)	0.0104	0.0000	0.0000	0.0001
TOTAL WEIGHT PERCENT:	100.0000			
TOTAL TAP EMISSIONS:		0.00	0.00	0.00
TOTAL VOC EMISSIONS:		**0.00**	**0.00**	**0.01**
TOTAL Non-VOC & Non-TAP HC:		0.06	0.06	0.27
TOTAL EMISSIONS:		0.28	0.28	1.23

Total of Average Hourly VOC emissions estimated for this source:	**2.42 Lbs/Hr**
Total of Maximum Hourly VOC emissions estimated for this source:	**2.42 Lbs/Hr**
Total of Maximum Annual VOC emissions estimated for this source:	**10.60 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)*
1. Water Storage Tank Vapors	8760	11276.96	11276.96	2.5418	2.5418
Assist Gas Feed	8760	150.00	150.00	0.1486	0.1486
Pilot Feed	8760	150.00	150.00	0.1486	0.1486
Totals:		*11,576.96*	*11,576.96*	*2.84*	*2.84*

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	0.13	0.13	0.56
Soot (expressed as $PM_{2.5}$)	0.000011	0.13	0.13	0.56
SO_2	N/A	0.00	0.00	0.00

Emission factors for nitrogen oxide and carbon monoxide are from a 1983 CMA document entitled "A Report on a Flare Efficiency Study", for a non-assisted industrial burn flares. (refer to 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	0.18	0.18	0.80
CO	0.5496	1.56	1.56	6.84

Emission Calculations

POINT SOURCE I.D. NUMBERS: ***10-08-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	1430	2,672	4102	2.1E-04	2.0E-04	0.662	1.178	2.90	5.16
Flanges	585	433	1018	1.1E-04	3.9E-04	0.142	0.372	0.62	1.63
Open Ends	51	96	147	1.4E-03	2.0E-03	0.157	0.423	0.69	1.85
Pumps[a]	2		2	1.3E-02	2.4E-03	0.057	N/A	0.25	N/A
Valves	475	575	1050	2.5E-03	4.5E-03	2.618	5.704	11.47	24.99
"Others"[b]	26	58	84	7.5E-03	8.8E-03	0.430	1.125	1.88	4.93
TOTALS:	**2,569**	**3,834**	**6,403**			**4.07**	**8.80**	**17.81**	**38.56**

[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".

EMISSIONS SUMMARY:

Component	Weight Percent	Calculated Emission Rate	
		Avg. Hourly (lb/hr)	Avg. Annual (TPY)
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0	0.0000	0.0000
NMEHC (expressed as VOC)	29.2	1.1874	5.2010
Benzene (TAP)	0.027	0.0011	0.0048
Ethylbenzene (TAP)	0.0170	0.0007	0.0030

Toluene (TAP)	0.075	0.0030	0.0134
Xylenes (m,p,o) (TAP)	0.036	0.0015	0.0064
	TOTAL TAP EMISSIONS:	0.01	0.03
	TOTAL VOC EMISSIONS:	**1.19**	**5.20**

GAS SERVICE SPECIATION FACTORS:

Speciation of the emission stream from components in gas service is based on an actual inlet gas analysis; refer to Southern Petroleum Laboratories Report No.: 172-23080192-003A in supporting documentation.

EMISSIONS SUMMARY:

Component	Weight Percent	Calculated Emission Rate	
		Avg. Hourly (lb/hr)	Avg. Annual (TPY)
Nitrogen (excluded from VOC total)	0.4280	0.0377	0.1650
Carbon Dioxide (excluded from VOC total)	97.4189	8.5763	37.5640
Methane (excluded from VOC total)	0.7537	0.0664	0.2906
Ethane (excluded from VOC total)	0.0782	0.0069	0.0302
Hydrogen Sulfide (TAP; excluded from VOC total)	0.0000	0.0000	0.0000
Propane	0.1707	0.0150	0.0658
Iso-Butane	0.0955	0.0084	0.0368
N-Butane	0.2372	0.0209	0.0915
Iso-Pentane	0.1374	0.0121	0.0530
N-Pentane	0.1553	0.0137	0.0599
Iso-Hexanes	0.1131	0.0100	0.0436
N-Hexane (TAP)	0.0843	0.0074	0.0325
Methylcyclopentane	0.0000	0.0000	0.0000
Benzene (TAP)	0.0057	0.0005	0.0022
Cyclohexane	0.0306	0.0027	0.0118
Heptanes	0.1004	0.0088	0.0387
Methylcyclohexane	0.0316	0.0028	0.0122
Toluene (TAP)	0.0085	0.0007	0.0033
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000
Octanes	0.0669	0.0059	0.0258
Ethylbenzene (TAP)	0.0007	0.0001	0.0003
Xylenes (TAP)	0.0100	0.0009	0.0039
Nonanes	0.0507	0.0045	0.0195
Decanes Plus	0.0226	0.0020	0.0087
TOTAL WEIGHT PERCENT:	100.0000		
	TOTAL TAP EMISSIONS:	0.01	0.04
	TOTAL VOC EMISSIONS:	**0.12**	**0.51**
	TOTAL Non-VOC & Non-TAP HC:	0.07	0.32
	TOTAL Emissions:	8.80	38.56

Facility-Wide VOC Fugitive Totals	=	1.31 lb/hr	5.71 TPY

Emission Calculations

POINT SOURCE I.D. NUMBER: ***11-08-CB***

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

DATA:

Emission Source:	*Compressor Blowdowns*
Gas Specific Gravity:	*1.5108*
Maximum Volume per Blowdown Rate (SCF): *(conservative estimate provided by operator)*	*95267*
Maximum Number of Blowdowns per Year:	*132*
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.: 172-23080192-003A*

Total Blowdown Gas Volume (SCF/Yr)	=	Volume per Event * Number of Events	=	**12575244.00**
Avg. Hourly Uncontrolled Total Emissions (lb/hr)	=	Gas Gravity * Density of Air * Volume per Blowdown	=	**10996.20**
Max. Hourly Uncontrolled Total Emissions (lb/hr)	=	Gas Gravity * Density of Air * Volume per Blowdown	=	**10996.20**
Annual Potential Uncontrolled Total Emissions (TPY)	=	Hourly * Number of Events per Year/2000	=	**725.75**

SPECIATION FACTORS:

Speciation of the well gas relief is based on the referenced analysis.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Nitrogen (excluded from VOC total)	0.4280	47.0638	47.0638	3.1062
Carbon Dioxide (excluded from VOC total)	97.4189	10712.3819	10712.3819	707.0169
Methane (excluded from VOC total)	0.7537	82.8784	82.8784	5.4700
Ethane (excluded from VOC total)	0.0782	8.5990	8.5990	0.5675
Hydrogen Sulfide (excluded from VOC total)	0.0000	0.0000	0.0000	0.0000
Propane	0.1707	18.7705	18.7705	1.2389
Iso-Butane	0.0955	10.5014	10.5014	0.6931
N-Butane	0.2372	26.0830	26.0830	1.7215
Iso-Pentane	0.1374	15.1088	15.1088	0.9972
N-Pentane	0.1553	17.0771	17.0771	1.1271
Iso-Hexane	0.1131	12.4367	12.4367	0.8208
N-Hexane (TAP)	0.0843	9.2698	9.2698	0.6118
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000
Benzene (TAP)	0.0057	0.6268	0.6268	0.0414
Cyclohexane	0.0306	3.3648	3.3648	0.2221
Heptanes	0.1004	11.0402	11.0402	0.7287
Methylcyclohexane	0.0316	3.4748	3.4748	0.2293

Toluene (TAP)	0.0085	0.9347	0.9347	0.0617
2,2,4-Trimethylpentane (TAP)	0.0000	0.0000	0.0000	0.0000
Octanes	0.0669	7.3565	7.3565	0.4855
Ethylbenzene (TAP)	0.0007	0.0770	0.0770	0.0051
Xylenes (TAP)	0.0100	1.0996	1.0996	0.0726
Nonanes	0.0507	5.5751	5.5751	0.3680
Decanes Plus	0.0226	2.4851	2.4851	0.1640
Total Weight Percent:	100.0000			
Total TAP Emissions		12.01	12.01	0.79
Total VOC Emissions		**145.28**	**145.28**	**9.59**
Total Non VOC & Non TAP-HC		91.48	91.48	6.04
Total Emissions		10996.20	10996.20	725.75

Uncontrolled VOC Emission Total (TPY)	Compressor Blowdowns	=	9.59

Emission Calculations

POINT SOURCE I.D. NUMBER: *15-13-LL*

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

DATA:

Emission Source:	*Vapors from Water Truck Loading*
Maximum Annual Loading Volume-Barrels (Q):	*7,592*
Average Oil Temperature - °F:	*80*
Average Oil Temperature - °R (T):	*540*
API Oil Gravity @ 100 °F (APIG):	*33.5*
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)	*4.30*
True Vapor Pressure (P): (from Fig. 7.1-13b of AP-42)	*3.48*
Loading Rate-Barrels/Hr (R): (conservative estimate)	*180*
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 * 99% Red	=	**0.00**
Hourly Uncontrolled Total Emissions (lb/hr)	=	12.46 * S * P * M/T*R*42/1000 gallons loaded * 99% Red	=	**0.18**
Max. Hourly Uncontrolled Total Emissions (lb/hr)	=	12.46 * S * P * M/T*R*42/1000 gallons loaded * 99% Red	=	**0.18**

**Emissions are calculated using the total volume of produced water loaded as crude oil and are then reduced based on the assumption that this total volume is 99% water and 1% hydrocarbons.*

SPECIATION FACTORS:

Speciation factors were taken from "Air Emissions Species Manual - Volume I: Volatile Organic Compound Species Profiles", 2nd edition; Report No.: EPA-450/2-90-001a; page 258; reference supporting documentation.

EMISSIONS SUMMARY:

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Hydrogen Sulfide (excluded from VOC total)	0.00	0.0000	0.0000	0.0000
Methane (excluded from VOC total)	6.20	0.0112	0.0112	0.0000
Ethane (excluded from VOC total)	5.60	0.0101	0.0101	0.0000
Propane	17.60	0.0317	0.0317	0.0000
Iso-Butane	1.50	0.0027	0.0027	0.0000
N-Butane	27.10	0.0488	0.0488	0.0000
Iso-Pentane	1.50	0.0027	0.0027	0.0000
N-Pentane	14.60	0.0263	0.0263	0.0000
Heptane	9.20	0.0166	0.0166	0.0000
Octane	6.90	0.0124	0.0124	0.0000

POLLUTANT:	Weight Percent	CALCULATED EMISSION RATES		
		Average Hourly (lb/hr)	Maximum Hourly (lb/hr)	Annual (TPY)
Other NM/NE Hydrocarbons	1.80	0.0032	0.0032	0.0000
N-Hexane (TAP)	7.90	0.0142	0.0142	0.0000
Benzene (TAP)	0.10	0.0002	0.0002	0.0000
Total Weight Percent	100.00			
Total TAP Emissions		0.01	0.01	0.00
Total VOC Emissions		**0.16**	**0.16**	**0.00**
Total Non VOC & Non TAP-HC		0.02	0.02	0.00
Total Emissions		0.18	0.18	0.00

Calculated Max. Gas Flowrate (SCFH) = **1.33**

Emission Calculations

POINT SOURCE I.D. NUMBER: *17-13-CST*

EMISSION SOURCE DESCRIPTION: *120 Gallon Chemical Storage Tank*

DATA:

Emission Source:	*"Working" & "Standing" Losses*		
Maximum Annual Throughput: (Gallons/Yr)	*1,440*		
Average VOC Working Losses - L_W (lb/yr):	*7.385*		
Average VOC Standing Losses - L_S (lb/yr):	*40.124*		
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	=	**0.01**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.02**

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 1,440 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: ***18-13-CST***

EMISSION SOURCE DESCRIPTION: ***350 Gallon Asphaltene Inhibitor Tank***

DATA:

Emission Source:	*"Working" & "Standing" Losses*		
Maximum Annual Throughput: (Gallons/Yr)	*4,200*		
Average VOC Working Losses - L_W (lb/yr):	*4.187*		
Average VOC Standing Losses - L_S (lb/yr):	*6.162*		
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	=	**0.00**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.01**

For purposes of permitting and/or providing conservative emission estimates, emissions were calculated using Toluene as the stored material for this tank. A throughput of approximately 4,200 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: ***19-13-CST***

EMISSION SOURCE DESCRIPTION: ***500 Gallon Corrosion Inhibitor Tank***

DATA:

Emission Source:	*"Working" & "Standing" Losses*		
Maximum Annual Throughput: (Gallons/Yr)	*6,000*		
Average VOC Working Losses - L_W (lb/yr):	*6.064*		
Average VOC Standing Losses - L_S (lb/yr):	*8.223*		
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	=	**0.00**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.01**

For purposes of permitting and/or providing conservative emission estimates, emissions were calculated using Toluene as the stored material for this tank. A throughput of approximately 6,000 gallons/yr was used in the emissions model in an effort to demonstrate a conservative potential emissions estimate.

Emission Calculations

This is a sample calculation for EPNs: 20-13-LOT through 22-15-LOT.

POINT SOURCE I.D. NUMBER: *"See Above"*

EMISSION SOURCE DESCRIPTION: ***500 Gallon Lube Oil Tank***

DATA:

Emission Source:	*"Working" & "Standing" Losses*		
Maximum Annual Throughput: (Gallons/Yr)	*6,000*		
Average VOC Working Losses - L_W (lb/yr):	*0.172*		
Average VOC Standing Losses - L_S (lb/yr):	*0.192*		
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	=	**0.00**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.00**

For purposes of permitting and/or providing conservative emission estimates, emissions were calculated using No. 2 fuel oil (diesel) as the stored material for this tank. A throughput of approximately 6,000 gallons/yr was used in the emissions model in an effort to demonstrate a conservative potential emissions estimate.

Emission Calculations

This is a sample calculation for EPNs: 23-15-LOT through 25-15-LOT.

POINT SOURCE I.D. NUMBER: ***"See Above"***

EMISSION SOURCE DESCRIPTION: ***300 Gallon Lube Oil Tank***

DATA:

Emission Source:	*"Working" & "Standing" Losses*		
Maximum Annual Throughput: (Gallons/Yr)	*3,600*		
Average VOC Working Losses - L_W (lb/yr):	*0.102*		
Average VOC Standing Losses - L_S (lb/yr):	*0.126*		
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	=	**0.00**
Annual Potential Uncontrolled THC Losses (TPY)	= Hourly * 8760/2000	=	**0.00**

For purposes of permitting and/or providing conservative emission estimates, emissions were calculated using No. 2 fuel oil (diesel) as the stored material for this tank. A throughput of approximately 3,600 gallons/yr was used in the emissions model in an effort to demonstrate a conservative potential emissions estimate.

SOUTHERN FLOW COMPANIES

SOUTHERN FLOW
P O DRWR 13988
JACKSON MS 39236-3988
(601) 957-2004

CUST 3291-01 FOR: DENBURY ONSHORE LLC — SAMPLE DENBURY ONSHORE LLC
FLD 1501 ATTN DANNY LINSEY — IDENT WEST HEIDELBERG X02200016
STA 015 P O BOX 1003 — A.L.MCINTOSH SALES CHECK NO: A80606-154919
DATE 06/06/08
GC # 001 HEIDELBURG MS 39439 — TYPE GAS SAMPLE ANALYSIS GPA

SAMPLE: DATE 05/28/08 CYL NO 16 PSIG 329 GRAV 0.000 DIFF/IN H2O 0 WATER LBS/MMCF 0.0
DATA: TIME NA FLOW MMCF 0 TEMP 80 F SAMPLED BY - R.K.
MEMO: TAG 002506

COMPONENT ANALYSIS		MOL PERCENT	GPM PSIA 15.025
CO2	CARBON DIOXIDE	.125	.022
N2	NITROGEN	1.759	.197
C1	METHANE	97.083	16.784
C2	ETHANE	.423	.115
C3	PROPANE	.135	.038
IC4	ISO-BUTANE	.060	.020
NC4	N-BUTANE	.077	.025
IC5	ISO-PENTANE	.057	.021
NC5	N-PENTANE	.055	.020
C6	HEXANES	.113	.047
C7+	HEPTANES PLUS	.113	.055
	TOTAL	100.000	

TOTAL ETHANE + GPM 0.341
TOTAL ISO-PENTANE + GPM 0.143

COMPRESSIBILITY FACTOR @ 15.025 PSIA 0.9979
SPECIFIC GRAVITY - 60 DEG F (AIR = 1) 0.577
C7+ MOLECULAR WEIGHT 104.423

THE FOLLOWING VALUES BASED
ON BTU (PSIA, 60 DEG F) PB 15.025 14.730

BTU / CU FT (Z)		15.025	14.730
	DRY	1037.1	1016.7
	WET	1020.4	1000.4

26 LB NAT GASOLINE GPM 0.191

Fuel Gas Analysis; Southern Flow Companies Report No.: A80606-154919

COMPONENT	mole %	MOLE FRACTION	MW	fuel weight	WT frac	Wt %	dh°	Heat Value (BTU/SCF)	Carbon Weight %	C-H ratio	
Nitrogen	1.7590	0.018	28.0134	0.49	0.0296	**2.9550**	0	0.00	0.0000	0	0
Carbon Dioxide	0.1250	0.001	44.01	0.06	0.0033	**0.3299**	0	0.00	0.0150	0	0
Methane	97.0830	0.971	16.043	15.58	0.9340	**93.4031**	1010	980.54	11.6501	0.25	0.2427075
Ethane	0.4230	0.004	30.07	0.13	0.0076	**0.7628**	1770	7.49	0.1015	0.33333	0.001409986
Hydrogen Sulfide	0.0000	0.000	34.08	0.00	0.0000	**0.0000**	637.1	0.00	0.0000	0	0
Propane	0.1350	0.001	44.097	0.06	0.0036	**0.3570**	2516	3.40	0.0486	0.375	0.00050625
I-Butane	0.0600	0.001	58.123	0.03	0.0021	**0.2091**	3252	1.95	0.0288	0.4	0.00024
N-Butane	0.0770	0.001	58.123	0.04	0.0027	**0.2684**	3262	2.51	0.0370	0.4	0.000308
I-Pentane	0.0570	0.001	72.15	0.04	0.0025	**0.2466**	4001	2.28	0.0342	0.41667	0.000237502
N-Pentane	0.0550	0.001	72.15	0.04	0.0024	**0.2380**	4009	2.20	0.0330	0.41667	0.000229169
Other hexanes	0.1443	0.001	86.177	0.12	0.0075	**0.7458**	4750	6.85	0.1039	0.42857	0.000618431
N-hexane	0.0334	0.000	86.177	0.03	0.0017	**0.1727**	4756	1.59	0.0241	0.42857	0.000143251
benzene	0.0075	0.000	78.114	0.01	0.0004	**0.0350**	3742	0.28	0.0054	1	0.000074806
heptane	0.0155	0.000	100.204	0.02	0.0009	**0.0933**	5503	0.85	0.0130	0.4375	6.79271E-05
toluene	0.0064	0.000	92.141	0.01	0.0004	**0.0356**	4475	0.29	0.0054	0.875	5.63588E-05
iso-octane	0.0060	0.000	114.231	0.01	0.0004	**0.0413**	6232	0.38	0.0058	0.4444	2.6816E-05
octanes+	0.0108	0.000	144.231	0.02	0.0009	**0.0938**	6500	0.71	0.0130	0.4444	4.82085E-05
ethylbenzene	0.0003	0.000	106.167	0.00	0.0000	**0.0020**	5222	0.02	0.0003	0.8	2.5312E-06
xylene	0.0016	0.000	106.167	0.00	0.0001	**0.0104**	5209	0.08	0.0016	0.8	1.30176E-05
TOTALS	**100.0000**	**1.000**		**16.68**	**1.0000**	**100.0000**		***1011***	***12.1207***		0.246689754

		sg	**0.5750**
hexanes+	0.2260	**VOC wt%**	**2.5491**
		Toxic wt%	**0.2971**

Carbon wt% 72.68741

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

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

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

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

References For Section 1.4

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

Tank ID	5a-08-GBT-CV
Tank Description	5000 BBL Gun Barrel Tank-Common Vent (ABJ-1111)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	38.67
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4028

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	2,920,000.00
Annual Turnovers, N	606.86
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	27,012.58
vapor space outage (H_{VO} ft)	12.903
vapor space volume (V_V ft^3)	15,153.84

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	crude oil
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

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):

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.83	55.59	64.36	73.50	82.82	89.42	91.97	90.84	83.98	71.90	59.86	51.76	72.24
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.17	28.42	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	27.96	23.82	32.30
daily average liquid surface temperature (T_{LA} °F)	49.32	53.58	61.71	70.18	79.13	85.59	88.23	87.33	81.01	69.49	58.09	50.36	69.51
daily maximum liquid surface temperature (T_{LX} °F)	55.36	60.68	69.96	79.50	88.65	95.03	97.47	96.27	89.39	77.46	65.08	56.32	77.58
daily minimum liquid surface temperature (T_{LN} °F)	43.28	46.47	53.45	60.85	69.61	76.15	78.98	78.39	72.63	61.52	51.10	44.41	61.43
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.874	2.049	2.421	2.864	3.402	3.838	4.029	3.963	3.525	2.826	2.249	1.915	2.827
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	2.126	2.371	2.852	3.426	4.060	4.556	4.757	4.658	4.115	3.296	2.590	2.169	3.304
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.646	1.763	2.044	2.379	2.833	3.214	3.393	3.354	3.004	2.411	1.945	1.687	2.407
daily vapor pressure range (ΔP_V)	0.4802	0.6076	0.8086	1.0472	1.2272	1.3412	1.3649	1.3030	1.1111	0.8846	0.6447	0.4818	0.8966
vapor space expansion factor (K_E)	0.0856	0.1042	0.1303	0.1605	0.1814	0.1952	0.1980	0.1892	0.1634	0.1361	0.1067	0.0850	0.1380
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	1,392,272	1,257,536	1,392,272	1,347,360	1,392,272	1,347,360	1,392,272	1,392,272	1,347,360	1,392,272	1,347,360	1,392,272	16,392,880
monthly turnovers (N/month) with avg = total annual	51.54	46.55	51.54	49.88	51.54	49.88	51.54	51.54	49.88	51.54	49.88	51.54	606.86
vented vapor saturation factor (K_S)	0.4384	0.4165	0.3766	0.3380	0.3006	0.2759	0.2663	0.2695	0.2932	0.3410	0.3940	0.4329	0.3409
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)	0.0171	0.0185	0.0215	0.0250	0.0292	0.0326	0.0340	0.0335	0.0302	0.0248	0.0202	0.0175	0.0248
standing storage losses (L_S lb/month & avg is lb/yr)	377.82	369.73	475.52	535.16	645.57	696.40	751.86	741.13	645.88	547.25	431.22	385.55	6603.07
working losses (L_W lb/month & avg is lb/yr)	17856.35	17473.99	22474.02	25292.56	30510.81	32913.35	35534.35	35027.28	30525.43	25864.11	20380.49	18221.66	312074.40
total losses (L_T lb/month & avg is lb/yr)	18234.16	17843.72	22949.54	25827.72	31156.37	33609.75	36286.21	35768.41	31171.30	26411.36	20811.71	18607.21	318677.47
max hourly Q in bbl/hour	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	1871.33	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	24.000	26.003	30.207	35.129	41.009	45.713	47.761	47.080	42.396	34.764	28.306	24.491	
breathing/standing loss (L_S lb/hr)	0.508	0.550	0.667	0.858	1.006	1.108	1.133	1.080	0.914	0.736	0.599	0.518	
max hourly total loss (L_T lb/hr)	24.508	26.553	30.874	35.986	42.015	46.821	48.894	48.160	43.310	35.499	28.905	25.010	

L_S sum months	L_W sum months	L_T sum months
6603.07	312074.40	318677.47

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	0.735	1.133	6,441.684
Working Loss L_W	34.754	47.761	304,447.053
Total Loss L_T	35.490	48.894	310,888.737

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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SPL

Certificate of Analysis

Number: 172-24050251-001A

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:	HEIDELBERG EOR FACILITY	Sampled By:	Tim Keene
Sample Point:	FLARE INLET GAS ZZZ-180	Sample Of:	Gas Spot
Method:	GPA 2286	Sample Date:	05/07/2024 08:45
Analyzed:	05/23/2024 10:27:30	Sample Conditions:	78 °F
		PO/Ref. No:	4300204782

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia		
Nitrogen	41.2706	28.3617		GPM TOTAL C2+	4.823
Methane	0.1522	0.0599			
Carbon Dioxide	44.9359	48.5138			
Ethane	0.0749	0.0552	0.0201		
Propane	1.1491	1.2430	0.3174		
Iso-Butane	1.1690	1.6668	0.3835		
n-Butane	3.3619	4.7935	1.0625		
Iso-Pentane	2.1416	3.7905	0.7851		
n-Pentane	2.4683	4.3687	0.8969		
Hexanes	1.4556	3.0771	0.5989		
n-Hexane	0.9539	2.0166	0.3932		
Benzene	0.0561	0.1075	0.0157		
Cyclohexane	0.2053	0.4239	0.0700		
Heptanes	0.4587	1.1275	0.2122		
Methylcyclohexane	0.0560	0.1349	0.0226		
Toluene	0.0057	0.0129	0.0019		
Octanes	0.0573	0.1606	0.0294		
Ethylbenzene	0.0004	0.0010	0.0002		
Xylenes	0.0036	0.0094	0.0014		
Nonanes	0.0228	0.0717	0.0129		
Decanes Plus	0.0011	0.0038	0.0007		
	100.0000	100.0000	4.8246		

Calculated Physical Properties	**Total**	**C10+**
Calculated Molecular Weight	40.76	142.28
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Higher Heating Value, Real Gas Dry BTU	526.5	7742.9
Water Sat. Gas Base BTU	517.5	7607.8
Relative Density Real Gas	1.4140	4.9126
Compressibility Factor	0.9950	

Manikia Milton

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; Southern Petroleum Laboratories Report No.: 172-24050251-001A

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	41.2706	0.0000	28.0134	0.00	0.0000	0	0
Carbon Dioxide	44.9359	76.5135	44.01	33.67	67.7203	0	0
Methane	0.1522	0.2592	16.043	0.04	0.0836	1010	3
Ethane	0.0749	0.1275	30.07	0.04	0.0771	1770	2
Hydrogen Sulfide	0.0000	0.0000	34.08	0.00	0.0000	637	0
Propane	1.1491	1.9566	44.097	0.86	1.7352	2516	49
I-Butane	1.1690	1.9905	58.123	1.16	2.3267	3252	65
N-Butane	3.3619	5.7244	58.123	3.33	6.6912	3262	187
I-Pentane	2.1416	3.6466	72.15	2.63	5.2911	4001	146
N-Pentane	2.4683	4.2028	72.15	3.03	6.0983	4009	168
Other/Iso Hexanes	1.4556	2.4785	86.177	2.14	4.2954	4750	118
N-Hexane	0.9539	1.6242	86.177	1.40	2.8149	4756	77
Methylcyclopentane	0.0000	0.0000	84.1608	0.00	0.0000	4501	0
Benzene	0.0561	0.0955	78.114	0.07	0.1501	3742	4
Cyclohexane	0.2053	0.3496	84.1608	0.29	0.5917	4482	16
Heptane	0.4587	0.7810	100.204	0.78	1.5739	5503	43
Methylcyclohexane	0.0560	0.0954	98.188	0.09	0.1883	5216	5
Toluene	0.0057	0.0097	92.141	0.01	0.0180	4475	0
Iso-Octane/224-Trimethylpentane	0.0000	0.0000	114.231	0.00	0.0000	6232	0
Octanes	0.0573	0.0976	114.231	0.11	0.2241	6249	6
Ethylbenzene	0.0004	0.0007	106.167	0.00	0.0015	5222	0
Xylenes	0.0036	0.0061	106.167	0.01	0.0131	5209	0
Nonanes	0.0228	0.0388	128.258	0.05	0.1001	6997	3
Decanes Plus	0.0011	0.0019	142.285	0.00	0.0054	7743	0
TOTALS	100.0000	100.0000	MW=	49.72	100.0000	btu/scf =	891.873734
				sg	1.7146		
				VOC wt%	32.1190		
				Toxic wt%	2.9975		

H.L.P. Engineering, Inc.
Engr: Mr. Thomas LaSalle

LA Environmental Laboratory Accreditatio..
Cert. No. 01995
Denbury Onshore, LLC
Brookhaven Field Central Facility
Lincoln County, Mississippi

Multi-Stage Separator Test

Separator Conditions Pressure (psig)	Separator Conditions Temperature (°F)	Liquid Density (g/cm^3)	Gas Density (g/cm^3)	Gas Gravity	Solution GOR, Rs (scf/stb)	Solution GOR, Rs (scf/sep bbl)	Liberated GOR, Rl (scf/stb)	Separator Shrinkage (stb / bbl @ P,T)
200	**86**	**0.820**	**N/A**	**N/A**	**90**	**85**	0	**0.948**
39	120	0.826	0.0059	1.512	15	14	75	0.984
0	80	0.838	0.0020	1.635	0	0	15	1.000

Summary Data

Total Separator Gas-Oil Ratio	90	scf/stb
Stock Tank Oil Gravity	37.2	°API at 80 °F 35.7 @ 60°F
Separator Volume Factor	1.055	bbls@ Psat/stb
Color	Crude	

Notes:

- stb: stock tank barrel @ 80 °F.
- sep bbl: volume of separator liquid at P,T.
- Solution GOR is given as the gas volume per stock tank barrel (stb) and per separator barrel (sep bbl).
- Separator Volume Factor is the inverse of the Separator Shrinkage Factor.
- Standard Conditions: 0 psig at 80 °F.

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

Tank ID	5c-08-OST-CV & 5d-08-OST-CV
Tank Description	5000 BBL Dry Oil Tank-Common Vent (ABJ-119A/B)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	38.67
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4028

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	1,460,000.00
Annual Turnovers, N	303.43
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	27,012.58
vapor space outage (H_{VO} ft)	12.903
vapor space volume (V_V ft^3)	15,153.84

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	crude oil
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

Working Loss Product Factor (K_P)	0.75
working loss turnover factor K_N	0.266

*sales oil data determines RVP per API pub 4683

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

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.83	55.59	64.36	73.50	82.82	89.42	91.97	90.84	83.98	71.90	59.86	51.76	72.24
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.17	28.42	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	27.96	23.82	32.30
daily average liquid surface temperature (T_{LA} °F)	49.32	53.58	61.71	70.18	79.13	85.59	88.23	87.33	81.01	69.49	58.09	50.36	69.51
daily maximum liquid surface temperature (T_{LX} °F)	55.36	60.68	69.96	79.50	88.65	95.03	97.47	96.27	89.39	77.46	65.08	56.32	77.58
daily minimum liquid surface temperature (T_{LN} °F)	43.28	46.47	53.45	60.85	69.61	76.15	78.98	78.39	72.63	61.52	51.10	44.41	61.43
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.874	2.049	2.421	2.864	3.402	3.838	4.029	3.963	3.525	2.826	2.249	1.915	2.827
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	2.126	2.371	2.852	3.426	4.060	4.556	4.757	4.658	4.115	3.296	2.590	2.169	3.304
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.646	1.763	2.044	2.379	2.833	3.214	3.393	3.354	3.004	2.411	1.945	1.687	2.407
daily vapor pressure range (ΔP_V)	0.4802	0.6076	0.8086	1.0472	1.2272	1.3412	1.3649	1.3030	1.1111	0.8846	0.6447	0.4818	0.8966
vapor space expansion factor (K_E)	0.0856	0.1042	0.1303	0.1605	0.1814	0.1952	0.1980	0.1892	0.1634	0.1361	0.1067	0.0850	0.1380
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	696,136	628,768	696,136	673,680	696,136	673,680	696,136	696,136	673,680	696,136	673,680	696,136	8,196,440
monthly turnovers (N/month) with avg = total annual	25.77	23.28	25.77	24.94	25.77	24.94	25.77	25.77	24.94	25.77	24.94	25.77	303.43
vented vapor saturation factor (K_S)	0.4384	0.4165	0.3766	0.3380	0.3006	0.2759	0.2663	0.2695	0.2932	0.3410	0.3940	0.4329	0.3409
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)	0.0171	0.0185	0.0215	0.0250	0.0292	0.0326	0.0340	0.0335	0.0302	0.0248	0.0202	0.0175	0.0248
standing storage losses (L_S lb/month & avg is lb/yr)	377.82	369.73	475.52	535.16	645.57	696.40	751.86	741.13	645.88	547.25	431.22	385.55	6603.07
working losses (L_W lb/month & avg is lb/yr)	2370.75	2319.99	2983.83	3358.04	4050.86	4369.84	4717.83	4650.50	4052.80	3433.93	2705.88	2419.25	41433.51
total losses (L_T lb/month & avg is lb/yr)	2748.57	2689.71	3459.35	3893.20	4696.43	5066.24	5469.69	5391.63	4698.68	3981.18	3137.10	2804.80	48036.58
max hourly Q in bbl/hour	935.67	935.67	935.67	935.67	935.67	935.67	935.67	935.67	935.67	935.67	935.67	935.67	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	12.000	13.001	15.104	17.564	20.505	22.856	23.881	23.540	21.198	17.382	14.153	12.246	
breathing/standing loss (L_S lb/hr)	0.508	0.550	0.667	0.858	1.006	1.108	1.133	1.080	0.914	0.736	0.599	0.518	
max hourly total loss (L_T lb/hr)	12.508	13.552	15.771	18.422	21.511	23.964	25.014	24.620	22.112	18.117	14.752	12.764	

L_S sum months	L_W sum months	L_T sum months
6603.07	41433.51	48036.58

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	0.735	1.133	6,441.684
Working Loss L_W	4.614	23.881	40,420.842
Total Loss L_T	5.350	25.014	46,862.526

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	5e-08-OST-CV
Tank Description	5000 BBL Wet/Dry Oil Tank-Common Vent (ABJ-118)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	38.67
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4028

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	7,300.00
Annual Turnovers, N	1.52
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	27,012.58
vapor space outage (H_{VO} ft)	12.903
vapor space volume (V_V ft^3)	15,153.84

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	crude oil
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

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):

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.83	55.59	64.36	73.50	82.82	89.42	91.97	90.84	83.98	71.90	59.86	51.76	72.24
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.17	28.42	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	27.96	23.82	32.30
daily average liquid surface temperature (T_{LA} °F)	49.32	53.58	61.71	70.18	79.13	85.59	88.23	87.33	81.01	69.49	58.09	50.36	69.51
daily maximum liquid surface temperature (T_{LX} °F)	55.36	60.68	69.96	79.50	88.65	95.03	97.47	96.27	89.39	77.46	65.08	56.32	77.58
daily minimum liquid surface temperature (T_{LN} °F)	43.28	46.47	53.45	60.85	69.61	76.15	78.98	78.39	72.63	61.52	51.10	44.41	61.43
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.874	2.049	2.421	2.864	3.402	3.838	4.029	3.963	3.525	2.826	2.249	1.915	2.827
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	2.126	2.371	2.852	3.426	4.060	4.556	4.757	4.658	4.115	3.296	2.590	2.169	3.304
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.646	1.763	2.044	2.379	2.833	3.214	3.393	3.354	3.004	2.411	1.945	1.687	2.407
daily vapor pressure range (ΔP_V)	0.4802	0.6076	0.8086	1.0472	1.2272	1.3412	1.3649	1.3030	1.1111	0.8846	0.6447	0.4818	0.8966
vapor space expansion factor (K_E)	0.0856	0.1042	0.1303	0.1605	0.1814	0.1952	0.1980	0.1892	0.1634	0.1361	0.1067	0.0850	0.1380
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	3,481	3,144	3,481	3,368	3,481	3,368	3,481	3,481	3,368	3,481	3,368	3,481	40,982
monthly turnovers (N/month) with avg = total annual	0.13	0.12	0.13	0.12	0.13	0.12	0.13	0.13	0.12	0.13	0.12	0.13	1.52
vented vapor saturation factor (K_S)	0.4384	0.4165	0.3766	0.3380	0.3006	0.2759	0.2663	0.2695	0.2932	0.3410	0.3940	0.4329	0.3409
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)	0.0171	0.0185	0.0215	0.0250	0.0292	0.0326	0.0340	0.0335	0.0302	0.0248	0.0202	0.0175	0.0248
standing storage losses (L_S lb/month & avg is lb/yr)	377.82	369.73	475.52	535.16	645.57	696.40	751.86	741.13	645.88	547.25	431.22	385.55	6603.07
working losses (L_W lb/month & avg is lb/yr)	44.64	43.68	56.19	63.23	76.28	82.28	88.84	87.57	76.31	64.66	50.95	45.55	780.19
total losses (L_T lb/month & avg is lb/yr)	422.46	413.41	531.70	598.39	721.84	778.68	840.69	828.70	722.19	611.91	482.17	431.10	7383.25
max hourly Q in bbl/hour	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.060	0.065	0.076	0.088	0.103	0.114	0.119	0.118	0.106	0.087	0.071	0.061	
breathing/standing loss (L_S lb/hr)	0.508	0.550	0.667	0.858	1.006	1.108	1.133	1.080	0.914	0.736	0.599	0.518	
max hourly total loss (L_T lb/hr)	0.568	0.615	0.743	0.945	1.109	1.222	1.253	1.198	1.020	0.822	0.670	0.579	

L_S sum months	L_W sum months	L_T sum months
6603.07	780.19	7383.25

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	0.735	1.133	6,441.684
Working Loss L_W	0.087	0.119	761.118
Total Loss L_T	0.822	1.253	7,202.802

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	5f-08-OST-CV
Tank Description	5000 BBL Wet/Dry Oil Tank-Common Vent (ABJ-117)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	38.67
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4028

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	7,300.00
Annual Turnovers, N	1.52
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	27,012.58
vapor space outage (H_{VO} ft)	12.903
vapor space volume (V_V ft^3)	15,153.84

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	crude oil
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

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):

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.83	55.59	64.36	73.50	82.82	89.42	91.97	90.84	83.98	71.90	59.86	51.76	72.24
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.17	28.42	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	27.96	23.82	32.30
daily average liquid surface temperature (T_{LA} °F)	49.32	53.58	61.71	70.18	79.13	85.59	88.23	87.33	81.01	69.49	58.09	50.36	69.51
daily maximum liquid surface temperature (T_{LX} °F)	55.36	60.68	69.96	79.50	88.65	95.03	97.47	96.27	89.39	77.46	65.08	56.32	77.58
daily minimum liquid surface temperature (T_{LN} °F)	43.28	46.47	53.45	60.85	69.61	76.15	78.98	78.39	72.63	61.52	51.10	44.41	61.43
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.874	2.049	2.421	2.864	3.402	3.838	4.029	3.963	3.525	2.826	2.249	1.915	2.827
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	2.126	2.371	2.852	3.426	4.060	4.556	4.757	4.658	4.115	3.296	2.590	2.169	3.304
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.646	1.763	2.044	2.379	2.833	3.214	3.393	3.354	3.004	2.411	1.945	1.687	2.407
daily vapor pressure range (ΔP_V)	0.4802	0.6076	0.8086	1.0472	1.2272	1.3412	1.3649	1.3030	1.1111	0.8846	0.6447	0.4818	0.8966
vapor space expansion factor (K_E)	0.0856	0.1042	0.1303	0.1605	0.1814	0.1952	0.1980	0.1892	0.1634	0.1361	0.1067	0.0850	0.1380
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	3,481	3,144	3,481	3,368	3,481	3,368	3,481	3,481	3,368	3,481	3,368	3,481	40,982
monthly turnovers (N/month) with avg = total annual	0.13	0.12	0.13	0.12	0.13	0.12	0.13	0.13	0.12	0.13	0.12	0.13	1.52
vented vapor saturation factor (K_S)	0.4384	0.4165	0.3766	0.3380	0.3006	0.2759	0.2663	0.2695	0.2932	0.3410	0.3940	0.4329	0.3409
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)	0.0171	0.0185	0.0215	0.0250	0.0292	0.0326	0.0340	0.0335	0.0302	0.0248	0.0202	0.0175	0.0248
standing storage losses (L_S lb/month & avg is lb/yr)	377.82	369.73	475.52	535.16	645.57	696.40	751.86	741.13	645.88	547.25	431.22	385.55	6603.07
working losses (L_W lb/month & avg is lb/yr)	44.64	43.68	56.19	63.23	76.28	82.28	88.84	87.57	76.31	64.66	50.95	45.55	780.19
total losses (L_T lb/month & avg is lb/yr)	422.46	413.41	531.70	598.39	721.84	778.68	840.69	828.70	722.19	611.91	482.17	431.10	7383.25
max hourly Q in bbl/hour	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.060	0.065	0.076	0.088	0.103	0.114	0.119	0.118	0.106	0.087	0.071	0.061	
breathing/standing loss (L_S lb/hr)	0.508	0.550	0.667	0.858	1.006	1.108	1.133	1.080	0.914	0.736	0.599	0.518	
max hourly total loss (L_T lb/hr)	0.568	0.615	0.743	0.945	1.109	1.222	1.253	1.198	1.020	0.822	0.670	0.579	

L_S sum months	L_W sum months	L_T sum months
6603.07	780.19	7383.25

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	0.735	1.133	6,441.684
Working Loss L_W	0.087	0.119	761.118
Total Loss L_T	0.822	1.253	7,202.802

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	6a-08-WVF-CV
Tank Description	Water Vortex Flume (ABM-1122)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	2.00
Vertical Height/Horizontal Length (H_S ft)	42.50
Roof Height (H_R ft)	0.06
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.0208

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	7,307,300.00
Annual Turnovers, N	314652.64
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	130.38
vapor space outage (H_{VO} ft)	21.771
vapor space volume (V_V ft^3)	68.40

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

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):

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Crude Oil	0.100	50.000	0.04995	0.27678	11.410	5487.803	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			

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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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	49.25	53.48	61.58	70.02	78.95	85.41	88.05	87.16	80.87	69.37	58.00	50.30	69.38
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	26.50	30.32	33.68	37.31	38.07	37.77	36.98	35.78	33.52	33.27	30.55	26.40	32.30
daily average liquid surface temperature (T_{LA} °F)	48.53	52.52	60.32	68.43	77.19	83.58	86.27	85.49	79.45	68.23	57.15	49.63	68.07
daily maximum liquid surface temperature (T_{LX} °F)	55.15	60.10	68.74	77.76	86.71	93.03	95.51	94.44	87.83	76.54	64.79	56.23	76.15
daily minimum liquid surface temperature (T_{LN} °F)	41.90	44.94	51.90	59.11	67.68	74.14	77.02	76.55	71.07	59.91	49.52	43.03	60.00
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.170	0.197	0.261	0.347	0.465	0.573	0.624	0.609	0.501	0.344	0.233	0.177	0.342
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.217	0.259	0.350	0.474	0.633	0.771	0.833	0.806	0.656	0.455	0.306	0.226	0.450
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.132	0.149	0.193	0.250	0.338	0.420	0.463	0.455	0.379	0.257	0.176	0.138	0.258
daily vapor pressure range (ΔP_V)	0.0848	0.1107	0.1576	0.2239	0.2953	0.3509	0.3699	0.3501	0.2767	0.1979	0.1292	0.0875	0.1913
vapor space expansion factor (K_E)	0.0581	0.0669	0.0759	0.0865	0.0920	0.0948	0.0944	0.0909	0.0820	0.0770	0.0682	0.0579	0.0747
vapor molecular weight (M_V lb/lbmole)	18.36	18.34	18.30	18.27	18.24	18.22	18.21	18.22	18.23	18.27	18.32	18.36	18.27
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	3,484,161	3,146,984	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	41,023,182
monthly turnovers (N/month) with avg = total annual	26,723.92	24,137.74	26,723.92	25,861.86	26,723.92	25,861.86	26,723.92	26,723.92	25,861.86	26,723.92	25,861.86	26,723.92	314,652.64
vented vapor saturation factor (K_S)	0.8360	0.8147	0.7684	0.7143	0.6507	0.6020	0.5813	0.5873	0.6336	0.7158	0.7879	0.8303	0.7168
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	0.0011	0.0015	0.0018	0.0019	0.0019	0.0016	0.0011	0.0008	0.0006	0.0011
standing storage losses (L_S lb/month & avg is lb/yr)	0.06	0.07	0.10	0.12	0.17	0.20	0.22	0.21	0.17	0.13	0.08	0.07	1.60
working losses (L_W lb/month & avg is lb/yr)	1493.90	1549.73	2233.19	2817.41	3837.12	4513.02	5054.22	4939.82	3983.29	2894.19	1945.23	1552.79	36813.92
total losses (L_T lb/month & avg is lb/yr)	1493.96	1549.80	2233.29	2817.53	3837.29	4513.22	5054.44	4940.04	3983.46	2894.31	1945.31	1552.86	36815.52
max hourly Q in bbl/hour	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	2.008	2.306	3.002	3.913	5.157	6.268	6.793	6.640	5.532	3.890	2.702	2.087	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
max hourly total loss (L_T lb/hr)	2.008	2.306	3.002	3.913	5.158	6.268	6.794	6.640	5.533	3.890	2.702	2.087	

L_S sum months	L_W sum months	L_T sum months
1.60	36813.92	36815.52

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	0.000	0.000	1.474
Working Loss L_W	3.870	6.793	33,901.386
Total Loss L_T	3.870	6.794	33,902.860

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

Williston Laboratory
3111 1st Ave W
Williston, ND 58801

Certificate of Analysis

Number: 172-24050251-002A

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

May 28, 2024

Station Name: HEIDELBERG EOR FACILITY
Sample Point: FLARE INLET GAS ZZZ-181
Method: GPA 2286
Analyzed: 05/23/2024 10:39:24

Sampled By: Tim Keene
Sample Of: Gas Spot
Sample Date: 05/07/2024 08:15
Sample Conditions: 78 °F
PO/Ref. No: 4300204782

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia		
Nitrogen	29.8919	20.7500		GPM TOTAL C2+	1.459
Methane	0.0251	0.0100			
Carbon Dioxide	66.0647	72.0469			
Ethane	0.0140	0.0104	0.0037		
Propane	0.2169	0.2370	0.0598		
Iso-Butane	0.2926	0.4214	0.0959		
n-Butane	0.8318	1.1980	0.2626		
Iso-Pentane	0.6361	1.1372	0.2330		
n-Pentane	0.7701	1.3768	0.2796		
Hexanes	0.5063	1.0812	0.2081		
n-Hexane	0.3362	0.7179	0.1385		
Benzene	0.0220	0.0426	0.0062		
Cyclohexane	0.0854	0.1781	0.0291		
Heptanes	0.1999	0.4964	0.0924		
Methylcyclohexane	0.0309	0.0752	0.0124		
Toluene	0.0054	0.0123	0.0018		
Octanes	0.0413	0.1169	0.0212		
Ethylbenzene	0.0004	0.0011	0.0002		
Xylenes	0.0038	0.0100	0.0015		
Nonanes	0.0239	0.0760	0.0135		
Decanes Plus	0.0013	0.0046	0.0008		
	100.0000	100.0000	1.4603		

Calculated Physical Properties	**Total**	**C10+**
Calculated Molecular Weight	40.36	142.28
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Higher Heating Value, Real Gas Dry BTU	161.7	7742.9
Water Sat. Gas Base BTU	159.0	7607.8
Relative Density Real Gas	1.3985	4.9126
Compressibility Factor	0.9959	

Manikia Milton

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; Southern Petroleum Laboratories Report No.: 172-24050251-002A

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	29.8919	0.0000	28.0134	0.00	0.0000	0	0
Carbon Dioxide	66.0647	94.2326	44.01	41.47	90.9109	0	0
Methane	0.0251	0.0358	16.043	0.01	0.0126	1010	0
Ethane	0.0140	0.0200	30.07	0.01	0.0132	1770	0
Hydrogen Sulfide	0.0000	0.0000	34.08	0.00	0.0000	637	0
Propane	0.2169	0.3094	44.097	0.14	0.2991	2516	8
I-Butane	0.2926	0.4174	58.123	0.24	0.5318	3252	14
N-Butane	0.8318	1.1865	58.123	0.69	1.5117	3262	39
I-Pentane	0.6361	0.9073	72.15	0.65	1.4350	4001	36
N-Pentane	0.7701	1.0984	72.15	0.79	1.7373	4009	44
Other/Iso Hexanes	0.5063	0.7222	86.177	0.62	1.3643	4750	34
N-Hexane	0.3362	0.4795	86.177	0.41	0.9059	4756	23
Methylcyclopentane	0.0000	0.0000	84.1608	0.00	0.0000	4501	0
Benzene	0.0220	0.0314	78.114	0.02	0.0537	3742	1
Cyclohexane	0.0854	0.1218	84.1608	0.10	0.2247	4482	5
Heptane	0.1999	0.2851	100.204	0.29	0.6263	5503	16
Methylcyclohexane	0.0309	0.0441	98.188	0.04	0.0949	5216	2
Toluene	0.0054	0.0077	92.141	0.01	0.0156	4475	0
Iso-Octane/224-Trimethylpentane	0.0000	0.0000	114.231	0.00	0.0000	6232	0
Octanes	0.0413	0.0589	114.231	0.07	0.1475	6249	4
Ethylbenzene	0.0004	0.0006	106.167	0.00	0.0013	5222	0
Xylenes	0.0038	0.0054	106.167	0.01	0.0126	5209	0
Nonanes	0.0239	0.0341	128.258	0.04	0.0958	6997	2
Decanes Plus	0.0013	0.0019	142.285	0.00	0.0058	7743	0
TOTALS	100.0000	100.0000	MW=	45.62	100.0000	btu/scf =	229.712604
				sg	1.5730		
				VOC wt%	9.0633		
				Toxic wt%	0.9891		

DRILLING AND PRODUCTION PRACTICE

1944

Sponsored by the

CENTRAL COMMITTEE ON DRILLING AND PRODUCTION PRACTICE

DIVISION OF PRODUCTION

AMERICAN PETROLEUM INSTITUTE

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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 1.0330 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

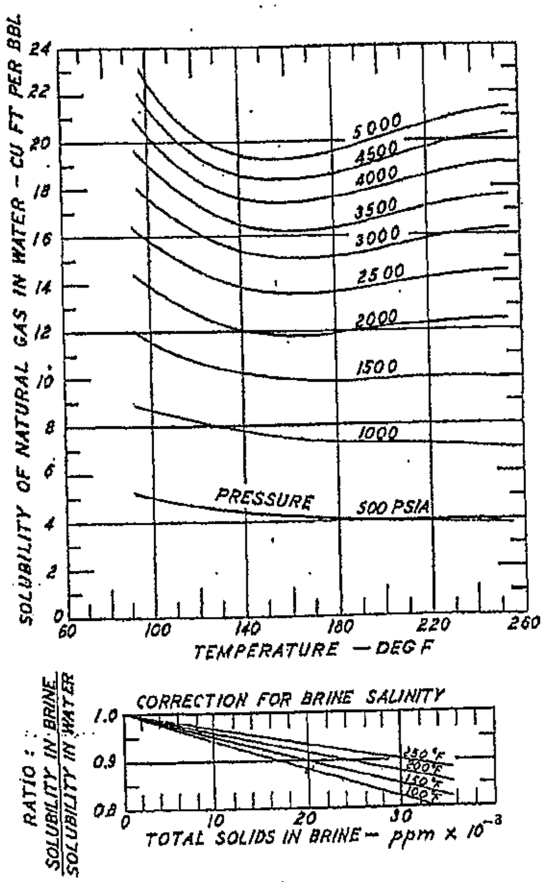
Formation Volumes of Pure Water and Mixtures of Natural Gas and Water

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. 8.

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	6b-08-WVF-CV
Tank Description	Water Vortex Flume (ABM-2122)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical	*Tank Shell Color/Shade*	Gray - Light	*Major City for Meterological Data*	Meridian, MS
Tank Diameter (D ft)	2.00	*Tank Shell Paint Condition*	average	*Site Elevation (ft)*	400
Vertical Height/Horizontal Length (H_S ft)	42.50	*Tank Roof Color/Shade*	Gray - Light	*Atmospheric Pressure (P_A psia)*	14.485
Roof Height (H_R ft)	0.06	*Tank Roof Paint Condition*	average	*Table 7.1-2 Liquid*	
Max Liquid Height (H_{LX} ft)	41.50	*Roof Type*	vertical tank with cone roof	*RVP**	4.30
Avg Liquid Height (H_L ft)	20.75	*Tank Insulation*	no insulation	*API gravity**	30.9
Breather Vent Pressure Setting (P_{BP} psig)		*Tank Underground?*	no	*°F basis for gv**	60.0
Breather Vent Vacuum Setting (P_{BV} psig)		*Annual Throughput (Q bbl/year)*	7,307,300.00	*bubble point psia*	
actual tank pressure (P_I psig)	0.0	*Annual Turnovers, N*	314652.64	*API gravity at 60F*	30.9
Shell Paint Solar Absorptance (S_A)	0.58	*Annual Hours*	8,760	*API gravity at 100F*	33.5
Roof Paint Solar Absorptance (R_A)	0.58	*tank max liquid volume (V_{LX} ft^3)*	130.38		
breather vent pressure range (ΔP_B psi)	0.00	*vapor space outage (H_{VO} ft)*	21.771	*Working Loss Product Factor (K_P)*	0.75
roof outage (H_{RO} ft)	0.0208	*vapor space volume (V_V ft^3)*	68.40	*working loss turnover factor K_N*	1.000

*sales oil data determines RVP per API pub 4683

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

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Crude Oil	0.100	50.000	0.04995	0.27678	11.410	5487.803	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			

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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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft² day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	49.25	53.48	61.58	70.02	78.95	85.41	88.05	87.16	80.87	69.37	58.00	50.30	69.38
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	26.50	30.32	33.68	37.31	38.07	37.77	36.98	35.78	33.52	33.27	30.55	26.40	32.30
daily average liquid surface temperature (T_{LA} °F)	48.53	52.52	60.32	68.43	77.19	83.58	86.27	85.49	79.45	68.23	57.15	49.63	68.07
daily maximum liquid surface temperature (T_{LX} °F)	55.15	60.10	68.74	77.76	86.71	93.03	95.51	94.44	87.83	76.54	64.79	56.23	76.15
daily minimum liquid surface temperature (T_{LN} °F)	41.90	44.94	51.90	59.11	67.68	74.14	77.02	76.55	71.07	59.91	49.52	43.03	60.00
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.170	0.197	0.261	0.347	0.465	0.573	0.624	0.609	0.501	0.344	0.233	0.177	0.342
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.217	0.259	0.350	0.474	0.633	0.771	0.833	0.806	0.656	0.455	0.306	0.226	0.450
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.132	0.149	0.193	0.250	0.338	0.420	0.463	0.455	0.379	0.257	0.176	0.138	0.258
daily vapor pressure range (ΔP_V)	0.0848	0.1107	0.1576	0.2239	0.2953	0.3509	0.3699	0.3501	0.2767	0.1979	0.1292	0.0875	0.1913
vapor space expansion factor (K_E)	0.0581	0.0669	0.0759	0.0865	0.0920	0.0948	0.0944	0.0909	0.0820	0.0770	0.0682	0.0579	0.0747
vapor molecular weight (M_V lb/lbmole)	18.36	18.34	18.30	18.27	18.24	18.22	18.21	18.22	18.23	18.27	18.32	18.36	18.27
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft³/month) and avg = total annual	3,484,161	3,146,984	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	41,023,182
monthly turnovers (N/month) with avg = total annual	26,723.92	24,137.74	26,723.92	25,861.86	26,723.92	25,861.86	26,723.92	26,723.92	25,861.86	26,723.92	25,861.86	26,723.92	314,652.64
vented vapor saturation factor (K_S)	0.8360	0.8147	0.7684	0.7143	0.6507	0.6020	0.5813	0.5873	0.6336	0.7158	0.7879	0.8303	0.7168
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/ft³)	0.0006	0.0007	0.0009	0.0011	0.0015	0.0018	0.0019	0.0019	0.0016	0.0011	0.0008	0.0006	0.0011
standing storage losses (L_S lb/month & avg is lb/yr)	0.06	0.07	0.10	0.12	0.17	0.20	0.22	0.21	0.17	0.13	0.08	0.07	1.60
working losses (L_W lb/month & avg is lb/yr)	1493.90	1549.73	2233.19	2817.41	3837.12	4513.02	5054.22	4939.82	3983.29	2894.19	1945.23	1552.79	36813.92
total losses (L_T lb/month & avg is lb/yr)	1493.96	1549.80	2233.29	2817.53	3837.29	4513.22	5054.44	4940.04	3983.46	2894.31	1945.31	1552.86	36815.52
max hourly Q in bbl/hour	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	2.008	2.306	3.002	3.913	5.157	6.268	6.793	6.640	5.532	3.890	2.702	2.087	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
max hourly total loss (L_T lb/hr)	2.008	2.306	3.002	3.913	5.158	6.268	6.794	6.640	5.533	3.890	2.702	2.087	

L_S sum months	L_W sum months	L_T sum months
1.60	36813.92	36815.52

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	0.000	0.000	1.474
Working Loss L_W	3.870	6.793	33,901.386
Total Loss L_T	3.870	6.794	33,902.860

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	6c-08-WVT-CV
Tank Description	9700 BBL Water Vortex Tank-Common Vent (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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4870

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	7,307,300.00
Annual Turnovers, N	770.93
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	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

Working Loss Product Factor (K_P)	0.75
working loss turnover factor K_N	0.206

*sales oil data determines RVP per API pub 4683

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

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Crude Oil	0.100	50.000	0.04995	0.27678	11.410	5487.803	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			

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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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.76	55.49	64.24	73.34	82.65	89.24	91.80	90.68	83.84	71.79	59.78	51.70	72.12
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.27	28.46	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	28.08	23.93	32.30
daily average liquid surface temperature (T_{LA} °F)	49.28	53.53	61.65	70.10	79.04	85.50	88.14	87.25	80.94	69.43	58.04	50.33	69.44
daily maximum liquid surface temperature (T_{LX} °F)	55.35	60.64	69.90	79.43	88.56	94.94	97.39	96.19	89.32	77.40	65.06	56.31	77.52
daily minimum liquid surface temperature (T_{LN} °F)	43.22	46.41	53.39	60.77	69.53	76.06	78.90	78.31	72.56	61.46	51.03	44.35	61.37
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.175	0.205	0.274	0.367	0.494	0.609	0.662	0.644	0.526	0.359	0.241	0.182	0.359
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.219	0.264	0.364	0.501	0.671	0.818	0.882	0.850	0.687	0.469	0.309	0.226	0.470
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.139	0.157	0.204	0.265	0.360	0.448	0.492	0.483	0.399	0.272	0.187	0.145	0.271
daily vapor pressure range (ΔP_V)	0.0795	0.1072	0.1609	0.2353	0.3113	0.3701	0.3894	0.3675	0.2886	0.1965	0.1220	0.0811	0.1992
vapor space expansion factor (K_E)	0.0532	0.0630	0.0747	0.0871	0.0929	0.0960	0.0957	0.0920	0.0827	0.0742	0.0628	0.0526	0.0752
vapor molecular weight (M_V lb/lbmole)	18.36	18.33	18.30	18.26	18.23	18.22	18.21	18.21	18.23	18.27	18.31	18.35	18.27
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	3,484,161	3,146,984	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	41,023,182
monthly turnovers (N/month) with avg = total annual	65.48	59.14	65.48	63.36	65.48	63.36	65.48	65.48	63.36	65.48	63.36	65.48	770.93
vented vapor saturation factor (K_S)	0.8640	0.8445	0.8023	0.7517	0.6920	0.6458	0.6265	0.6330	0.6786	0.7559	0.8218	0.8593	0.7558
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	0.0016	0.0011	0.0008	0.0006	0.0011
standing storage losses (L_S lb/month & avg is lb/yr)	30.10	31.46	45.75	58.21	79.55	93.61	104.64	101.96	81.69	58.98	39.32	31.23	756.51
working losses (L_W lb/month & avg is lb/yr)	314.88	329.18	478.63	609.01	832.28	979.31	1094.76	1066.67	854.66	617.09	411.39	326.67	7914.53
total losses (L_T lb/month & avg is lb/yr)	344.98	360.64	524.38	667.23	911.83	1072.91	1199.40	1168.63	936.35	676.07	450.71	357.90	8671.04
max hourly Q in bbl/hour	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	2.059	2.383	3.129	4.114	5.441	6.616	7.158	6.974	5.774	4.035	2.779	2.136	
breathing/standing loss (L_S lb/hr)	0.040	0.047	0.065	0.093	0.121	0.142	0.148	0.140	0.113	0.079	0.055	0.042	
max hourly total loss (L_T lb/hr)	2.099	2.430	3.194	4.208	5.562	6.758	7.306	7.114	5.887	4.114	2.834	2.178	

L_S sum months	L_W sum months	L_T sum months
756.51	7914.53	8671.04

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	0.079	0.148	694.340
Working Loss L_W	0.829	7.158	7,264.112
Total Loss L_T	0.908	7.306	7,958.452

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	6d-08-WVT-CV
Tank Description	9700 BBL Water Vortex Tank-Common Vent (ABM-2120)
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4870

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	7,307,300.00
Annual Turnovers, N	770.93
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	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	.
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5
Working Loss Product Factor (K_P)	0.75
working loss turnover factor K_N	0.206

*sales oil data determines RVP per API pub 4683

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

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Crude Oil	0.100	50.000	0.04995	0.27678	11.410	5487.803	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			

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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)	57.10	61.40	68.80	76 20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.76	55.49	64.24	73.34	82.65	89.24	91.80	90.68	83.84	71.79	59.78	51.70	72.12
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.27	28.46	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	28.08	23.93	32.30
daily average liquid surface temperature (T_{LA} °F)	49.28	53.53	61.65	70.10	79.04	85.50	88.14	87.25	80.94	69.43	58.04	50.33	69.44
daily maximum liquid surface temperature (T_{LX} °F)	55.35	60.64	69.90	79.43	88.56	94.94	97.39	96.19	89.32	77.40	65.06	56.31	77.52
daily minimum liquid surface temperature (T_{LN} °F)	43.22	46.41	53.39	60.77	69.53	76.06	78.90	78.31	72.56	61.46	51.03	44.35	61.37
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.175	0.205	0.274	0.367	0.494	0.609	0.662	0.644	0.526	0.359	0.241	0.182	0.359
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.219	0.264	0.364	0.501	0.671	0.818	0.882	0.850	0.687	0.469	0.309	0.226	0.470
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.139	0.157	0.204	0.265	0.360	0.448	0.492	0.483	0.399	0.272	0.187	0.145	0.271
daily vapor pressure range (ΔP_V)	0.0795	0.1072	0.1609	0.2353	0.3113	0.3701	0.3894	0.3675	0.2886	0.1965	0.1220	0.0811	0.1992
vapor space expansion factor (K_E)	0.0532	0.0630	0.0747	0.0871	0.0929	0.0960	0.0957	0.0920	0.0827	0.0742	0.0628	0.0526	0.0752
vapor molecular weight (M_V lb/lbmole)	18.36	18.33	18.30	18.26	18.23	18.22	18.21	18.21	18.23	18.27	18.31	18.35	18.27
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	3,484,161	3,146,984	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	3,484,161	3,371,768	3,484,161	3,371,768	3,484,161	41,023,182
monthly turnovers (N/month) with avg = total annual	65.48	59.14	65.48	63.36	65.48	63.36	65.48	65.48	63.36	65.48	63.36	65.48	770.93
vented vapor saturation factor (K_S)	0.8640	0.8445	0.8023	0.7517	0.6920	0.6458	0.6265	0.6330	0.6786	0.7559	0.8218	0.8593	0.7558
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	0.0016	0.0011	0.0008	0.0006	0.0011
standing storage losses (L_S lb/month & avg is lb/yr)	30.10	31.46	45.75	58.21	79.55	93.61	104.64	101.96	81.69	58.98	39.32	31.23	756.51
working losses (L_W lb/month & avg is lb/yr)	314.88	329.18	478.63	609.01	832.28	979.31	1094.76	1066.67	854.66	617.09	411.39	326.67	7914.53
total losses (L_T lb/month & avg is lb/yr)	344.98	360.64	524.38	667.23	911.83	1072.91	1199.40	1168.63	936.35	676.07	450.71	357.90	8671.04
max hourly Q in bbl/hour	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	4683.01	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	2.059	2.383	3.129	4.114	5.441	6.616	7.158	6.974	5.774	4.035	2.779	2.136	
breathing/standing loss (L_S lb/hr)	0.040	0.047	0.065	0.093	0.121	0.142	0.148	0.140	0.113	0.079	0.055	0.042	
max hourly total loss (L_T lb/hr)	2.099	2.430	3.194	4.208	5.562	6.758	7.306	7.114	5.887	4.114	2.834	2.178	

L_S sum months	L_W sum months	L_T sum months
756.51	7914.53	8671.04

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	0.079	0.148	694.340
Working Loss L_W	0.829	7.158	7,264.112
Total Loss L_T	0.908	7.306	7,958.452

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	6i-08-ST-CV
Tank Description	400 BBL Sand Blowdown Pit Tank-Common Vent (ABJ-165)
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	12.00
Vertical Height/Horizontal Length (H_S ft)	20.00
Roof Height (H_R ft)	0.38
Max Liquid Height (H_{LX} ft)	19.00
Avg Liquid Height (H_L ft)	9.50
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.1250

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	7,592.00
Annual Turnovers, N	19.83
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	2,148.85
vapor space outage (H_{VO} ft)	10.625
vapor space volume (V_V ft^3)	1,201.66

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
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	1.000

*sales oil data determines RVP per API pub 4683

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

Antoine constants ($\log_{10}$, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.13	54.65	63.13	71.95	81.11	87.64	90.23	89.21	82.60	70.78	59.04	51.11	70.97
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	25.20	29.23	33.08	37.31	38.07	37.77	36.98	35.78	33.52	32.37	29.11	24.96	32.30
daily average liquid surface temperature (T_{LA} °F)	48.97	53.11	61.09	69.40	78.27	84.70	87.36	86.52	80.32	68.93	57.67	50.04	68.87
daily maximum liquid surface temperature (T_{LX} °F)	55.27	60.42	69.36	78.73	87.79	94.14	96.60	95.46	88.70	77.02	64.95	56.28	76.95
daily minimum liquid surface temperature (T_{LN} °F)	42.67	45.80	52.82	60.08	68.75	75.26	78.11	77.57	71.94	60.84	50.40	43.80	60.80
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.171	0.200	0.266	0.356	0.479	0.591	0.643	0.626	0.513	0.350	0.236	0.178	0.349
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.216	0.260	0.355	0.487	0.652	0.795	0.857	0.828	0.671	0.460	0.305	0.224	0.459
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.135	0.152	0.197	0.257	0.348	0.434	0.477	0.468	0.388	0.264	0.181	0.141	0.264
daily vapor pressure range (ΔP_V)	0.0813	0.1082	0.1578	0.2297	0.3036	0.3610	0.3802	0.3592	0.2827	0.1959	0.1245	0.0834	0.1952
vapor space expansion factor (K_E)	0.0552	0.0646	0.0746	0.0868	0.0924	0.0954	0.0951	0.0914	0.0823	0.0751	0.0650	0.0548	0.0749
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	3,620	3,270	3,620	3,503	3,620	3,503	3,620	3,620	3,503	3,620	3,503	3,620	42,621
monthly turnovers (N/month) with avg = total annual	1.68	1.52	1.68	1.63	1.68	1.63	1.68	1.68	1.63	1.68	1.63	1.68	19.83
vented vapor saturation factor (K_S)	0.9121	0.8990	0.8696	0.8331	0.7875	0.7504	0.7342	0.7394	0.7760	0.8353	0.8828	0.9088	0.8356
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	0.0011	0.0015	0.0018	0.0020	0.0019	0.0016	0.0011	0.0008	0.0006	0.0011
standing storage losses (L_S lb/month & avg is lb/yr)	1.31	1.37	1.99	2.54	3.47	4.09	4.58	4.46	3.58	2.58	1.72	1.37	33.07
working losses (L_W lb/month & avg is lb/yr)	1.53	1.60	2.32	2.95	4.04	4.76	5.33	5.20	4.17	3.01	2.00	1.59	38.50
total losses (L_T lb/month & avg is lb/yr)	2.84	2.97	4.32	5.49	7.51	8.85	9.90	9.66	7.75	5.59	3.73	2.96	71.56
max hourly Q in bbl/hour	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.002	0.002	0.003	0.004	0.005	0.007	0.007	0.007	0.006	0.004	0.003	0.002	
breathing/standing loss (L_S lb/hr)	0.002	0.002	0.003	0.004	0.005	0.006	0.007	0.006	0.005	0.003	0.002	0.002	
max hourly total loss (L_T lb/hr)	0.004	0.004	0.006	0.008	0.011	0.013	0.014	0.013	0.011	0.008	0.005	0.004	

L_S sum months	L_W sum months	L_T sum months
33.07	38.50	71.56

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	0.003	0.007	30.355
Working Loss L_W	0.004	0.007	35.336
Total Loss L_T	0.007	0.014	65.690

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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VOC Profile Speciation Report

Profile Name : Fixed Roof Tank - Crude Oil Production
Profile Number : 0296
Data Quality : C

Control Device : Uncontrolled
Reference(s) : 59, 72
Data Source : Engineering evaluation of test data and literature data

SCC Assignments: 40301010, 40301011, 40301012, 40301109

Saroad	CAS Number	Name	Spec_MW	Spec_WT	Peak
43115		C-7 CYCLOPARAFFINS	98.19	1.30	
43116		C-8 CYCLOPARAFFINS	112.23	0.50	
43122		ISOMERS OF PENTANE	72.15	1.50	
43201	74-82-8	METHANE	16.04	6.20	
43202	74-84-0	ETHANE	30.07	5.60	
43204	74-98-6	PROPANE	44.09	17.60	
43212	106-97-8	N-BUTANE	58.12	27.10	
43214	75-28-5	ISO-BUTANE	58.12	1.50	
43220	109-66-0	N-PENTANE	72.15	14.60	
43231	110-54-3	HEXANE	86.17	7.90	
43232	142-82-5	HEPTANE	100.20	9.20	
43233	111-65-9	OCTANE	114.23	6.90	
45201	71-43-2	BENZENE	78.11	0.10	
TOTAL				100.00	

Williston Laboratory
3111 1st Ave W
Williston, ND 58801

Certificate of Analysis

Number: 172-23080192-003A

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

Aug. 29, 2023

Station Name: MS Heidelberg EOR Facility
Sample Point: Facility Inlet Separator
Method: GPA 2286
Cylinder No: 9061
Analyzed: 08/18/2023 11:37:18

Sampled By: Tim Keene
Sample Of: Gas Spot
Sample Date: 08/07/2023 08:10
Sample Conditions: 727 psig, @ 89 °F
PO/Ref. No: 4300204782

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia		
Nitrogen	0.6650	0.4280		GPM TOTAL C2+	0.323
Methane	2.0448	0.7537			
Carbon Dioxide	96.3485	97.4189			
Ethane	0.1132	0.0782	0.0304		
Propane	0.1685	0.1707	0.0466		
Iso-Butane	0.0715	0.0955	0.0235		
n-Butane	0.1776	0.2372	0.0562		
Iso-Pentane	0.0829	0.1374	0.0304		
n-Pentane	0.0937	0.1553	0.0341		
Hexanes	0.0571	0.1131	0.0235		
n-Hexane	0.0426	0.0843	0.0176		
Benzene	0.0032	0.0057	0.0009		
Cyclohexane	0.0158	0.0306	0.0054		
Heptanes	0.0436	0.1004	0.0202		
Methylcyclohexane	0.0140	0.0316	0.0056		
Toluene	0.0040	0.0085	0.0013		
Octanes	0.0255	0.0669	0.0131		
Ethylbenzene	0.0003	0.0007	0.0001		
Xylenes	0.0041	0.0100	0.0016		
Nonanes	0.0172	0.0507	0.0097		
Decanes Plus	0.0069	0.0226	0.0042		
	100.0000	100.0000	0.3244		

Calculated Physical Properties	**Total**	**C10+**
Calculated Molecular Weight	43.53	142.28
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Higher Heating Value, Real Gas Dry BTU	54.83	7742.9
Water Sat. Gas Base BTU	53.92	7607.8
Relative Density Real Gas	1.5108	4.9126
Compressibility Factor	0.9944	

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.

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

Tank ID	6j-13-WST-CV through 6m-13-WST-CV
Tank Description	5000 BBL Produced Water Storage Tank-Common Vent
Company Name	Denbury Onshore, LLC

Tank Orientation	Vertical
Tank Diameter (D ft)	38.63
Vertical Height/Horizontal Length (H_S ft)	24.10
Roof Height (H_R ft)	1.21
Max Liquid Height (H_{LX} ft)	23.10
Avg Liquid Height (H_L ft)	11.55
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)	0.58
Roof Paint Solar Absorptance (R_A)	0.58
breather vent pressure range (ΔP_B psi)	0.00
roof outage (H_{RO} ft)	0.4024

Tank Shell Color/Shade	Gray - Light
Tank Shell Paint Condition	average
Tank Roof Color/Shade	Gray - Light
Tank Roof Paint Condition	average
Roof Type	vertical tank with cone roof
Tank Insulation	no insulation
Tank Underground?	no
Annual Throughput (Q bbl/year)	3,653,650.00
Annual Turnovers, N	757.61
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	27,073.93
vapor space outage (H_{VO} ft)	12.952
vapor space volume (V_V ft^3)	15,180.62

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	
*RVP**	4.30
*API gravity**	30.9
*°F basis for gv**	60.0
bubble point psia	
API gravity at 60F	30.9
API gravity at 100F	33.5

Working Loss Product Factor (K_P)	0.75
working loss turnover factor K_N	0.206

*sales oil data determines RVP per API pub 4683

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

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Crude Oil	0.100	50.000	0.04995	0.27678	11.410	5487.803	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			

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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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft² day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	47.81	51.57	59.05	66.85	75.44	81.76	84.48	83.82	78.04	67.08	56.31	48.96	66.77
average vapor temperature (T_V °F)	50.82	55.58	64.36	73.49	82.81	89.41	91.96	90.83	83.97	71.89	59.86	51.76	72.24
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	24.17	28.42	33.02	37.31	38.07	37.77	36.98	35.78	33.52	31.88	27.97	23.82	32.30
daily average liquid surface temperature (T_{LA} °F)	49.32	53.57	61.70	70.17	79.12	85.58	88.22	87.33	81.00	69.49	58.08	50.36	69.50
daily maximum liquid surface temperature (T_{LX} °F)	55.36	60.68	69.96	79.50	88.64	95.03	97.47	96.27	89.38	77.46	65.08	56.32	77.58
daily minimum liquid surface temperature (T_{LN} °F)	43.27	46.47	53.45	60.84	69.61	76.14	78.98	78.38	72.62	61.51	51.09	44.41	61.43
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.175	0.205	0.274	0.368	0.496	0.611	0.664	0.645	0.527	0.359	0.241	0.182	0.360
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.219	0.265	0.365	0.502	0.673	0.820	0.884	0.852	0.689	0.469	0.309	0.226	0.471
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.139	0.157	0.204	0.266	0.361	0.449	0.493	0.484	0.400	0.272	0.187	0.146	0.272
daily vapor pressure range (ΔP_V)	0.0793	0.1072	0.1612	0.2358	0.3120	0.3709	0.3903	0.3682	0.2891	0.1968	0.1217	0.0808	0.1996
vapor space expansion factor (K_E)	0.0530	0.0629	0.0747	0.0871	0.0930	0.0960	0.0957	0.0920	0.0827	0.0742	0.0626	0.0524	0.0752
vapor molecular weight (M_V lb/lbmole)	18.36	18.33	18.30	18.26	18.23	18.22	18.21	18.21	18.23	18.27	18.31	18.35	18.27
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft³/month) and avg = total annual	1,742,080	1,573,492	1,742,080	1,685,884	1,742,080	1,685,884	1,742,080	1,742,080	1,685,884	1,742,080	1,685,884	1,742,080	20,511,591
monthly turnovers (N/month) with avg = total annual	64.35	58.12	64.35	62.27	64.35	62.27	64.35	64.35	62.27	64.35	62.27	64.35	757.61
vented vapor saturation factor (K_S)	0.8927	0.8767	0.8415	0.7984	0.7461	0.7046	0.6869	0.6930	0.7343	0.8022	0.8579	0.8889	0.8021
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/ft³)	0.0006	0.0007	0.0009	0.0012	0.0016	0.0019	0.0020	0.0020	0.0016	0.0012	0.0008	0.0006	0.0012
standing storage losses (L_S lb/month & avg is lb/yr)	16.65	17.41	25.33	32.24	44.06	51.85	57.96	56.46	45.23	32.65	21.76	17.27	418.85
working losses (L_W lb/month & avg is lb/yr)	158.14	165.37	240.55	306.19	418.50	492.44	550.46	536.26	429.55	310.06	206.63	164.05	3978.20
total losses (L_T lb/month & avg is lb/yr)	174.79	182.78	265.87	338.43	462.57	544.29	608.41	592.72	474.78	342.71	228.39	181.32	4397.06
max hourly Q in bbl/hour	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	2341.51	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	1.030	1.193	1.567	2.062	2.727	3.316	3.587	3.494	2.892	2.020	1.391	1.069	
breathing/standing loss (L_S lb/hr)	0.022	0.026	0.035	0.052	0.068	0.081	0.085	0.080	0.063	0.044	0.030	0.023	
max hourly total loss (L_T lb/hr)	1.053	1.219	1.603	2.113	2.795	3.397	3.672	3.575	2.956	2.064	1.422	1.092	

L_S sum months	L_W sum months	L_T sum months
418.85	3978.20	4397.06

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	0.044	0.085	384.375
Working Loss L_W	0.417	3.587	3,650.737
Total Loss L_T	0.461	3.672	4,035.113

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

Weighted Average for Tank Vapors to Control Flare (EPN: 8-08-F)

Total Working & Standing Losses from OSTs:	148.93	lb/hr
Total Oil Flash Vapors from OSTs:	5933.33	SCFH
Total Stream Flowrate:	7070.24	SCFH

TNRCC

June 1998
RG-109

Air Permit Technical Guidance
for Chemical Sources:

Flares and Vapor Oxidizers

New Source Review Permits Division

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Flare Emission Factors

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

Flare Destruction Efficiencies

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

Table 4. Flare Factors

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

Technical Guidance Package for
Chemical Sources

Flare Sources

Texas
Natural
Resource
Conservati
on
Commissio
n

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

Compiled by TNRCC Chemical Section Engineers
November 1994

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Post Office Box 13087
Austin, Texas 78711-3087
(512) 239-1250

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

A. Tip Velocities and Flow rates (maximum)

B. Heating Values (minimum).

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

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

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

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

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

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

<u>NO_x and CO Emissions</u>

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

Table 3: Flare Factors.

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

Example 2:

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

Table 4: Calculation of constituents in mole percent.

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

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

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

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 Tank Vapors to Control Flare (EPN: 9-08-F)

Total Working & Standing Losses from WSTs:	125.76	lb/hr
Total Oil Flash from WSTs:	29.66	SCFH
Total Brine Flash from WSTs:	833.34	SCFH
Total Blanket Gas from WSTs:	1125.76	lb/hr
Total Stream Flowrate:	11276.96	SCFH

United States
Environmental Protection
Agency

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

EPA-453/R-95-017
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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.*

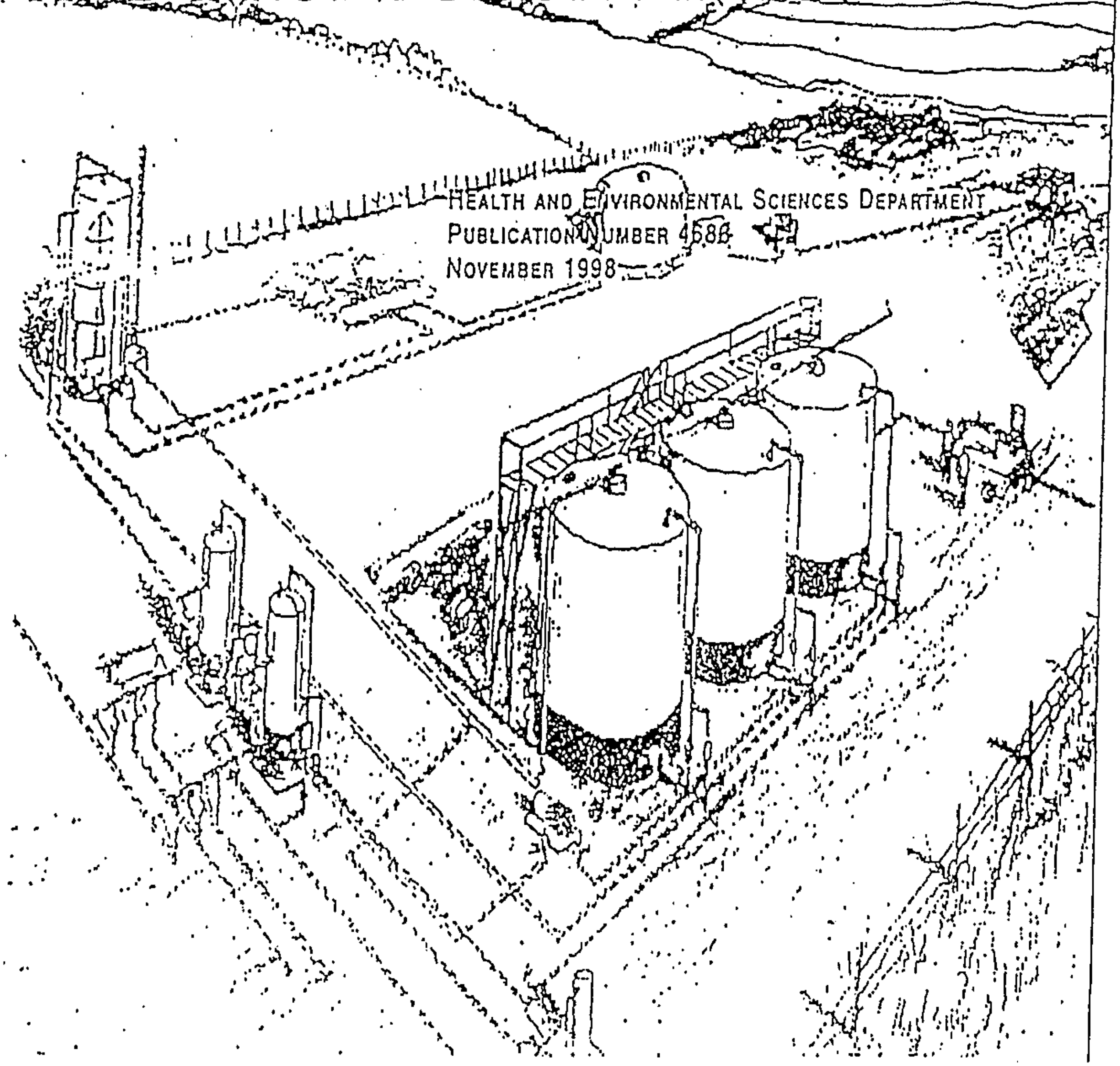
To calculate speciated fugitive emissions for BTEX, methane, NMHC, and NMEHC, composition data obtained during a joint American Petroleum Institute (API)/GRI fugitive testing program are used with the THC emission factors above. The average compositions of fugitive leaks from production facilities and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

Correlation Equations to Predict Reid Vapor Pressure and Properties of Gaseous Emissions for Exploration and Production Facilities



Health and Environmental Sciences Department

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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.

$$RVP = 0.003 + 0.075 \ln(SP) - 0.016\ ST + 0.165\ APIG \quad \text{(Equation 3-4)}$$

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).

$$RVP = -1.699 + 0.179\ APIG \quad \text{(Equation 3-5)}$$

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.

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

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

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**	**°F/vol %**	**dimensionless**	**°R**	**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

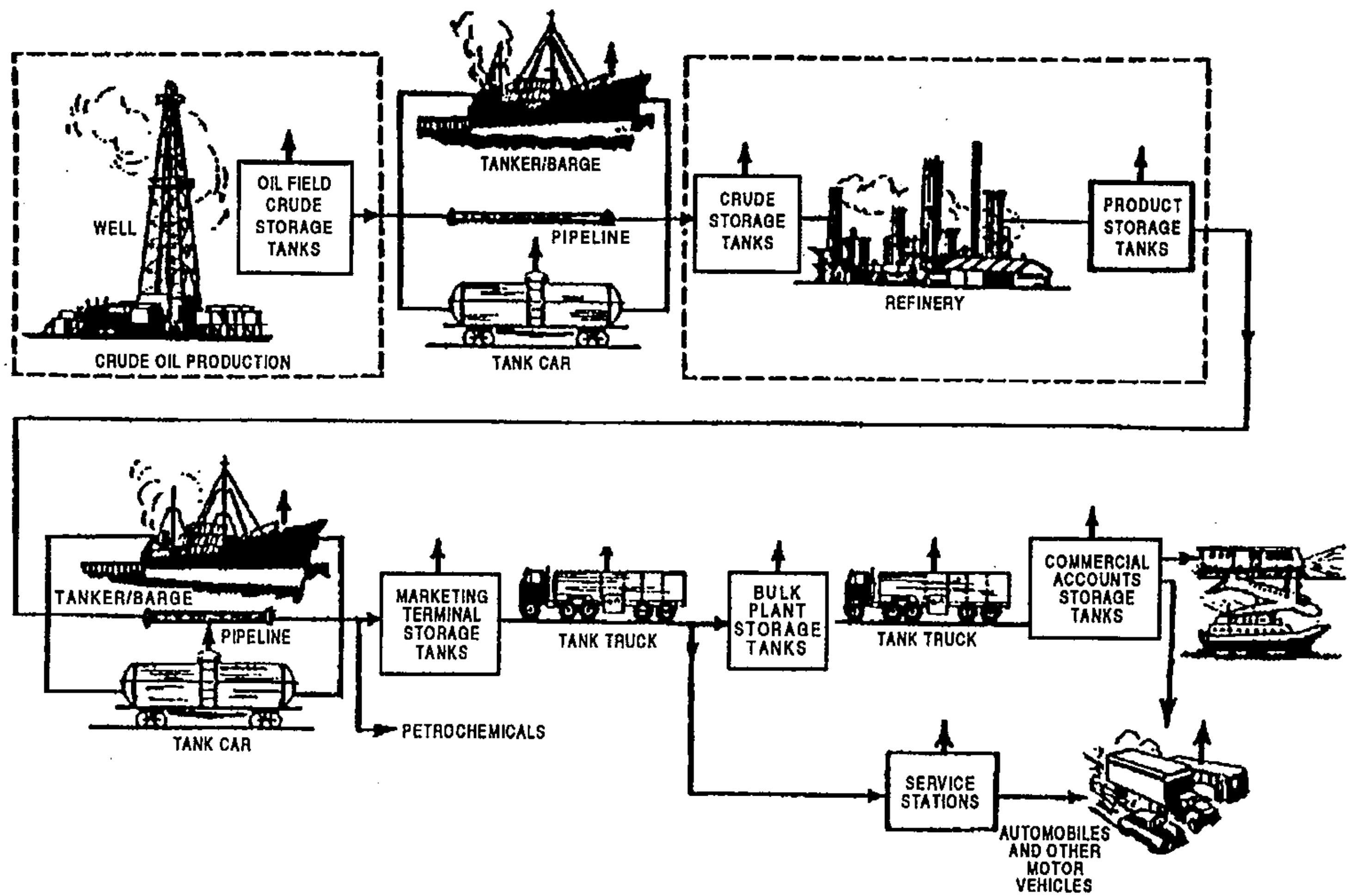

Figure 5.2-1. Flow sheet of petroleum production, refining, and distribution systems. (Points of organic emissions are indicated by vertical arrows.)

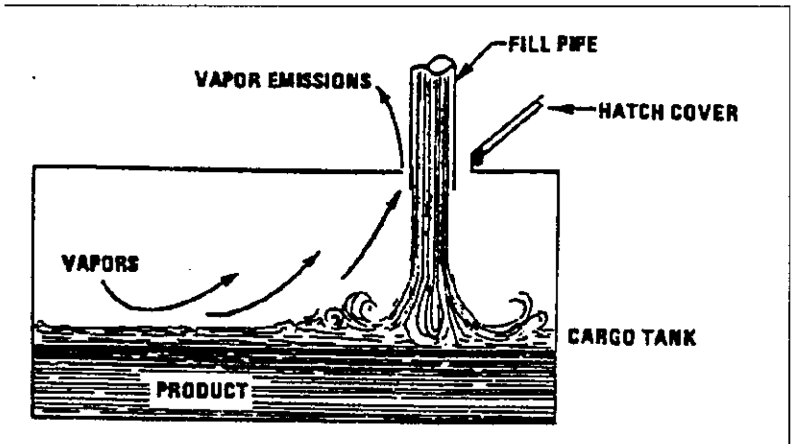

Figure 5.2-2. Splash loading method.

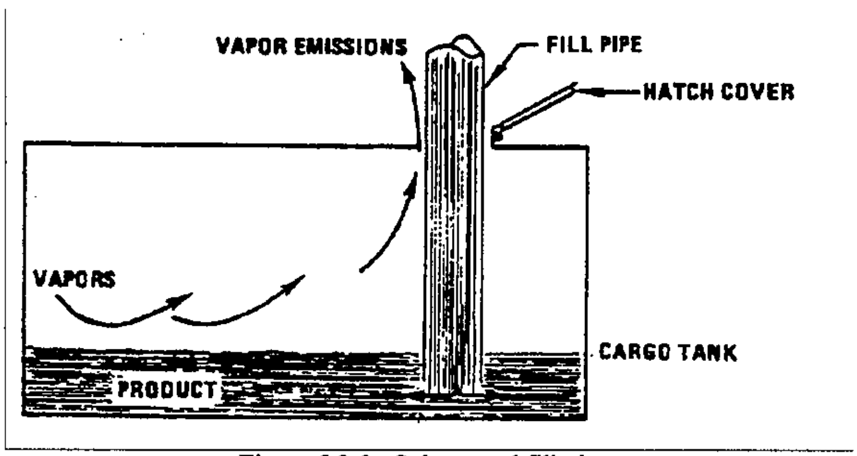

Figure 5.2-3. Submerged fill pipe.

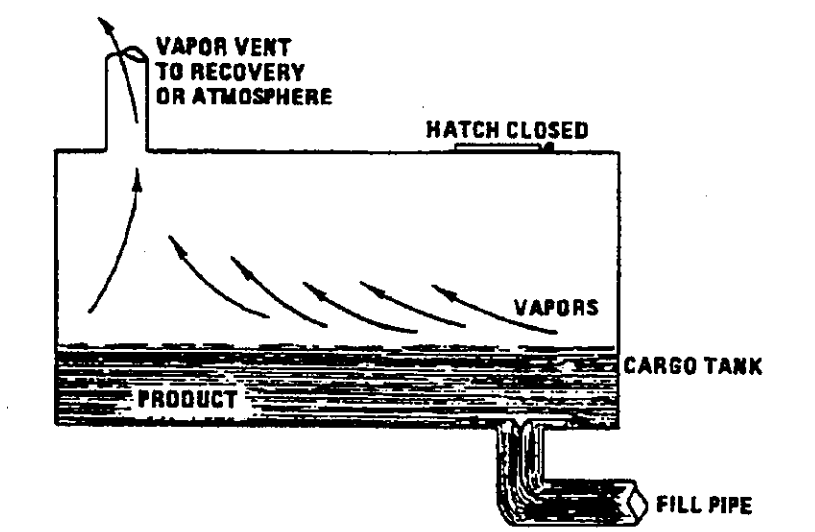

Figure 5.2-4. Bottom loading.

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:

$$L_L = 12.46 \frac{SPM}{T} \tag{1}$$

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)

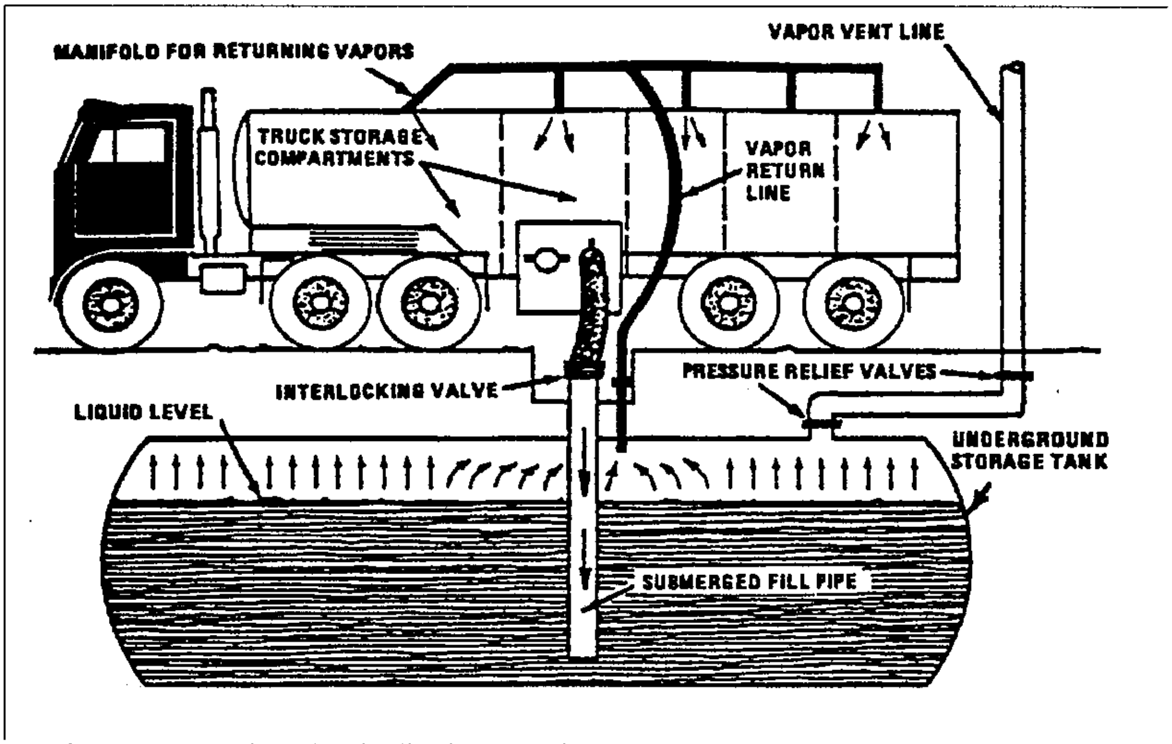

Figure 5.2-5. Tank truck unloading into a service station underground storage tank and practicing "vapor balance" form of emission control.

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].

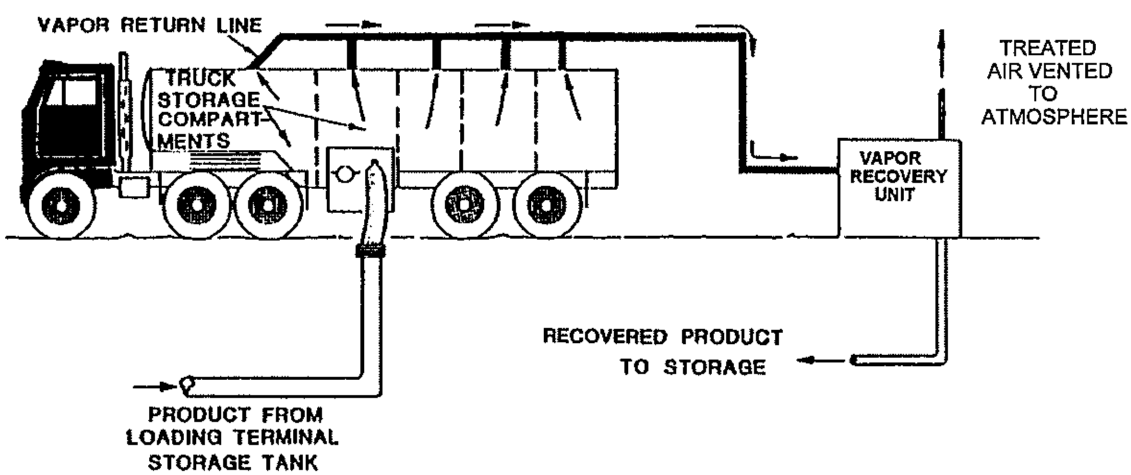

Figure 5.2-6. Tank truck loading with vapor recovery.

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:

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

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:

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

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]:

$$L_B = 0.31 + 0.20 \ P + 0.01 \ PU_A \tag{4}$$

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]

	Average Emission Factors			
	By Category		Typical Overall[b]	
Compartment Condition Before Cargo Discharge	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).

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

Tank ID	17-13-CST
Tank Description	120 Gallon Chemical Storage Tank
Company Name	Denbury Onshore, LLC

Tank Orientation	Horizontal
Tank Diameter (D ft)	3.00
Vertical Height/Horizontal Length (H_S ft)	5.00
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	3.00
Avg Liquid Height (H_L ft)	1.50
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)	34.29
Annual Turnovers, N	5.45
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	35.34
vapor space outage (H_{VO} ft)	1.178
vapor space volume (V_V ft^3)	17.67

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	
Working Loss Product Factor (K_P)	1
working loss turnover factor K_N	1.000

*sales oil data determines RVP per API pub 4683

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

Antoine constants ($\log_{10}$, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
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			

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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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	48.56	52.57	60.38	68.51	77.28	83.67	86.35	85.57	79.52	68.28	57.19	49.66	68.14
average vapor temperature (T_V °F)	52.16	57.36	66.70	76.43	86.07	92.79	95.27	93.93	86.60	74.02	61.43	53.00	74.65
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	29.04	35.10	41.85	48.36	50.34	50.50	49.43	47.44	43.40	39.90	33.71	28.53	41.40
daily average liquid surface temperature (T_{LA} °F)	50.36	54.96	63.54	72.47	81.68	88.23	90.81	89.75	83.06	71.15	59.31	51.33	71.40
daily maximum liquid surface temperature (T_{LX} °F)	57.62	63.74	74.00	84.56	94.26	100.86	103.17	101.61	93.91	81.13	67.74	58.46	81.74
daily minimum liquid surface temperature (T_{LN} °F)	43.10	46.19	53.08	60.38	69.09	75.61	78.45	77.89	72.21	61.18	50.89	44.20	61.05
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	1.479	1.674	2.095	2.621	3.272	3.811	4.042	3.946	3.380	2.537	1.878	1.519	2.553
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	1.796	2.106	2.722	3.501	4.369	5.052	5.311	5.136	4.335	3.230	2.331	1.837	3.277
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	1.209	1.319	1.592	1.931	2.411	2.830	3.031	2.990	2.604	1.971	1.500	1.247	1.965
daily vapor pressure range (ΔP_V)	0.5869	0.7869	1.1296	1.5701	1.9583	2.2224	2.2803	2.1456	1.7302	1.2586	0.8302	0.5891	1.3129
vapor space expansion factor (K_E)	0.1021	0.1296	0.1712	0.2232	0.2676	0.3004	0.3082	0.2899	0.2358	0.1805	0.1308	0.1013	0.1880
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	16	15	16	16	16	16	16	16	16	16	16	16	192
monthly turnovers (N/month) with avg = total annual	0.46	0.42	0.46	0.45	0.46	0.45	0.46	0.46	0.45	0.46	0.45	0.46	5.45
vented vapor saturation factor (K_S)	0.9155	0.9054	0.8843	0.8594	0.8303	0.8078	0.7985	0.8023	0.8257	0.8632	0.8950	0.9134	0.8625
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)	0.0232	0.0260	0.0320	0.0393	0.0482	0.0554	0.0585	0.0572	0.0497	0.0382	0.0289	0.0238	0.0384
standing storage losses (L_S lb/month & avg is lb/yr)	2.06	2.09	2.84	3.38	4.28	4.76	5.20	5.08	4.27	3.39	2.49	2.11	41.95
working losses (L_W lb/month & avg is lb/yr)	0.38	0.38	0.52	0.62	0.79	0.88	0.96	0.94	0.79	0.62	0.46	0.39	7.72
total losses (L_T lb/month & avg is lb/yr)	2.44	2.47	3.36	4.00	5.06	5.64	6.15	6.02	5.06	4.02	2.95	2.50	49.67
max hourly Q in bbl/hour	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	
breathing/standing loss (L_S lb/hr)	0.003	0.003	0.004	0.006	0.008	0.010	0.011	0.010	0.007	0.005	0.003	0.003	
max hourly total loss (L_T lb/hr)	0.003	0.004	0.005	0.006	0.009	0.011	0.012	0.011	0.008	0.005	0.004	0.003	

L_S sum months	L_W sum months	L_T sum months
41.95	7.72	49.67

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	0.005	0.011	40.124
Working Loss L_W	0.001	0.001	7.385
Total Loss L_T	0.005	0.012	47.509

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	18-13-CST
Tank Description	350 Gallon Asphaltene Inhibitor Tank
Company Name	Denbury Onshore, LLC

Tank Orientation	Horizontal
Tank Diameter (D ft)	3.00
Vertical Height/Horizontal Length (H_S ft)	6.70
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	3.00
Avg Liquid Height (H_L ft)	1.50
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)	100.00
Annual Turnovers, N	11.85
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	47.36
vapor space outage (H_{VO} ft)	1.178
vapor space volume (V_V ft^3)	23.68

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	

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

*sales oil data determines RVP per API pub 4683

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

Antoine constants ($\log_{10}$, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Toluene	100.000	92.141	92.14100	100.00000	7.017	1377.600	222.640
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
	100.000		92.141	100.000			

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
hourly average maximum ambient temperature (T_{AX} °F)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	48.56	52.57	60.38	68.51	77.28	83.67	86.35	85.57	79.52	68.28	57.19	49.66	68.14
average vapor temperature (T_V °F)	51.87	56.98	66.21	75.80	85.38	92.08	94.57	93.28	86.04	73.57	61.10	52.74	74.14
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	29.15	35.10	41.85	48.36	50.34	50.50	49.43	47.44	43.40	39.90	33.75	28.67	41.40
daily average liquid surface temperature (T_{LA} °F)	50.22	54.77	63.29	72.16	81.33	87.87	90.46	89.42	82.78	70.93	59.15	51.20	71.14
daily maximum liquid surface temperature (T_{LX} °F)	57.51	63.55	73.75	84.25	93.92	100.50	102.82	101.29	93.63	80.90	67.58	58.37	81.49
daily minimum liquid surface temperature (T_{LN} °F)	42.93	46.00	52.83	60.07	68.75	75.25	78.10	77.56	71.93	60.95	50.71	44.03	60.79
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.243	0.281	0.366	0.478	0.622	0.746	0.801	0.778	0.648	0.461	0.322	0.250	0.464
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.306	0.369	0.501	0.675	0.878	1.044	1.109	1.066	0.872	0.615	0.417	0.315	0.625
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.191	0.211	0.264	0.332	0.432	0.523	0.568	0.559	0.475	0.341	0.246	0.198	0.339
daily vapor pressure range (ΔP_V)	0.1156	0.1581	0.2368	0.3434	0.4466	0.5216	0.5413	0.5070	0.3972	0.2737	0.1707	0.1168	0.2857
vapor space expansion factor (K_E)	0.0653	0.0794	0.0968	0.1154	0.1253	0.1302	0.1294	0.1234	0.1087	0.0947	0.0771	0.0643	0.0984
vapor molecular weight (M_V lb/lbmole)	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft^3/month) and avg = total annual	48	43	48	46	48	46	48	48	46	48	46	48	561
monthly turnovers (N/month) with avg = total annual	1.01	0.91	1.01	0.97	1.01	0.97	1.01	1.01	0.97	1.01	0.97	1.01	11.85
vented vapor saturation factor (K_S)	0.9851	0.9828	0.9776	0.9710	0.9626	0.9555	0.9524	0.9537	0.9611	0.9720	0.9803	0.9846	0.9719
vent setting correction factor (K_B)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
vapor density (W_V lb/ft^3)	0.0041	0.0047	0.0060	0.0077	0.0098	0.0116	0.0124	0.0121	0.0102	0.0074	0.0053	0.0042	0.0075
standing storage losses (L_S lb/month & avg is lb/yr)	0.29	0.30	0.42	0.52	0.69	0.79	0.87	0.85	0.69	0.52	0.36	0.29	6.58
working losses (L_W lb/month & avg is lb/yr)	0.19	0.20	0.29	0.35	0.47	0.54	0.59	0.58	0.47	0.35	0.25	0.20	4.47
total losses (L_T lb/month & avg is lb/yr)	0.48	0.50	0.70	0.87	1.16	1.32	1.46	1.42	1.16	0.87	0.61	0.49	11.06
max hourly Q in bbl/hour	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.000	
max hourly total loss (L_T lb/hr)	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	

L_S sum months	L_W sum months	L_T sum months
6.58	4.47	11.06

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

Emissions Summary:

	avg lbs/hr	max lbs/hr	lbs/yr
Standing/Breathing Loss L_S	0.001	0.002	6.162
Working Loss L_W	0.000	0.001	4.187
Total Loss L_T	0.001	0.002	10.349

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	19-13-CST
Tank Description	500 Gallon Corrosion Inhibitor Tank
Company Name	Denbury Onshore, LLC

Tank Orientation	Horizontal
Tank Diameter (D ft)	4.00
Vertical Height/Horizontal Length (H_S ft)	5.00
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	4.00
Avg Liquid Height (H_L ft)	2.00
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)	142.86
Annual Turnovers, N	12.76
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	62.83
vapor space outage (H_{VO} ft)	1.571
vapor space volume (V_V ft^3)	31.42

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	
Working Loss Product Factor (K_P)	1
working loss turnover factor K_N	1.000

*sales oil data determines RVP per API pub 4683

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

Antoine constants (log_{10}, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
Toluene	100.000	92.141	92.14100	100.00000	7.017	1377.600	222.640
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
0	0.000						
	100.000		92.141	100.000			

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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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft² day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	48.56	52.57	60.38	68.51	77.28	83.67	86.35	85.57	79.52	68.28	57.19	49.66	68.14
average vapor temperature (T_V °F)	52.46	57.76	67.24	77.10	86.82	93.56	96.03	94.64	87.20	74.51	61.79	53.28	75.21
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	29.00	35.10	41.85	48.36	50.34	50.50	49.43	47.44	43.40	39.90	33.71	28.37	41.40
daily average liquid surface temperature (T_{LA} °F)	50.51	55.17	63.81	72.80	82.05	88.62	91.19	90.11	83.36	71.39	59.49	51.47	71.67
daily maximum liquid surface temperature (T_{LX} °F)	57.76	63.94	74.27	84.89	94.63	101.24	103.55	101.97	94.21	81.37	67.92	58.56	82.02
daily minimum liquid surface temperature (T_{LN} °F)	43.26	46.39	53.35	60.71	69.46	75.99	78.83	78.25	72.51	61.42	51.06	44.38	61.32
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.245	0.284	0.372	0.487	0.635	0.761	0.816	0.793	0.659	0.467	0.326	0.253	0.471
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.309	0.374	0.508	0.687	0.895	1.065	1.130	1.085	0.885	0.623	0.421	0.316	0.634
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.193	0.214	0.268	0.338	0.441	0.534	0.580	0.570	0.483	0.346	0.249	0.200	0.345
daily vapor pressure range (ΔP_V)	0.1160	0.1597	0.2399	0.3489	0.4542	0.5306	0.5502	0.5149	0.4026	0.2769	0.1721	0.1164	0.2895
vapor space expansion factor (K_E)	0.0650	0.0794	0.0969	0.1157	0.1257	0.1308	0.1300	0.1239	0.1090	0.0949	0.0771	0.0637	0.0986
vapor molecular weight (M_V lb/lbmole)	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14	92.14
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft³/month) and avg = total annual	68	62	68	66	68	66	68	68	66	68	66	68	802
monthly turnovers (N/month) with avg = total annual	1.08	0.98	1.08	1.05	1.08	1.05	1.08	1.08	1.05	1.08	1.05	1.08	12.76
vented vapor saturation factor (K_S)	0.9800	0.9769	0.9700	0.9610	0.9498	0.9404	0.9364	0.9381	0.9480	0.9626	0.9736	0.9794	0.9623
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/ft³)	0.0041	0.0047	0.0061	0.0078	0.0100	0.0118	0.0126	0.0123	0.0103	0.0075	0.0054	0.0042	0.0076
standing storage losses (L_S lb/month & avg is lb/yr)	0.38	0.39	0.56	0.70	0.92	1.06	1.17	1.13	0.92	0.69	0.48	0.39	8.79
working losses (L_W lb/month & avg is lb/yr)	0.28	0.29	0.41	0.51	0.68	0.78	0.86	0.84	0.68	0.51	0.35	0.29	6.49
total losses (L_T lb/month & avg is lb/yr)	0.66	0.68	0.97	1.21	1.60	1.84	2.02	1.97	1.61	1.21	0.83	0.68	15.28
max hourly Q in bbl/hour	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W 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	
breathing/standing loss (L_S lb/hr)	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	
max hourly total loss (L_T lb/hr)	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.003	0.002	0.002	0.001	0.001	

L_S sum months	L_W sum months	L_T sum months
8.79	6.49	15.28

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

Emissions Summary:

	avg lbs/hr	max lbs/hr	lbs/yr
Standing/Breathing Loss L_S	0.001	0.002	8.223
Working Loss L_W	0.001	0.001	6.064
Total Loss L_T	0.002	0.003	14.287

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	20-13-LOT through 22-15-LOT
Tank Description	500 Gallon Lube Oil Tank
Company Name	Denbury Onshore, LLC

Tank Orientation	Horizontal
Tank Diameter (D ft)	4.00
Vertical Height/Horizontal Length (H_S ft)	5.00
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	4.00
Avg Liquid Height (H_L ft)	2.00
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)	142.86
Annual Turnovers, N	12.76
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	62.83
vapor space outage (H_{VO} ft)	1.571
vapor space volume (V_V ft^3)	31.42

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	No. 2 fuel oil (diesel)
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	
Working Loss Product Factor (K_P)	1
working loss turnover factor K_N	1.000

*sales oil data determines RVP per API pub 4683

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

Antoine constants ($\log_{10}$, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft² day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	48.56	52.57	60.38	68.51	77.28	83.67	86.35	85.57	79.52	68.28	57.19	49.66	68.14
average vapor temperature (T_V °F)	52.46	57.76	67.24	77.10	86.82	93.56	96.03	94.64	87.20	74.51	61.79	53.28	75.21
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	29.00	35.10	41.85	48.36	50.34	50.50	49.43	47.44	43.40	39.90	33.71	28.37	41.40
daily average liquid surface temperature (T_{LA} °F)	50.51	55.17	63.81	72.80	82.05	88.62	91.19	90.11	83.36	71.39	59.49	51.47	71.67
daily maximum liquid surface temperature (T_{LX} °F)	57.76	63.94	74.27	84.89	94.63	101.24	103.55	101.97	94.21	81.37	67.92	58.56	82.02
daily minimum liquid surface temperature (T_{LN} °F)	43.26	46.39	53.35	60.71	69.46	75.99	78.83	78.25	72.51	61.42	51.06	44.38	61.32
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.005	0.006	0.007	0.010	0.013	0.016	0.017	0.017	0.014	0.009	0.006	0.005	0.009
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.006	0.007	0.010	0.014	0.019	0.023	0.024	0.023	0.019	0.013	0.008	0.006	0.013
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.004	0.004	0.005	0.007	0.009	0.011	0.012	0.012	0.010	0.007	0.005	0.004	0.007
daily vapor pressure range (ΔP_V)	0.0024	0.0033	0.0051	0.0076	0.0101	0.0120	0.0126	0.0117	0.0090	0.0060	0.0036	0.0024	0.0062
vapor space expansion factor (K_E)	0.0570	0.0684	0.0803	0.0913	0.0936	0.0929	0.0906	0.0871	0.0805	0.0755	0.0652	0.0557	0.0783
vapor molecular weight (M_V lb/lbmole)	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00
monthly hours with avg = total annual	744	672	744	720	744	720	744	744	720	744	720	744	8,760
throughputs (ft³/month) and avg = total annual	68	62	68	66	68	66	68	68	66	68	66	68	802
monthly turnovers (N/month) with avg = total annual	1.08	0.98	1.08	1.05	1.08	1.05	1.08	1.08	1.05	1.08	1.05	1.08	12.76
vented vapor saturation factor (K_S)	0.9996	0.9995	0.9994	0.9992	0.9989	0.9987	0.9986	0.9986	0.9989	0.9992	0.9995	0.9996	0.9992
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/ft³)	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0004	0.0003	0.0002	0.0001	0.0001	0.0002
standing storage losses (L_S lb/month & avg is lb/yr)	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.21
working losses (L_W lb/month & avg is lb/yr)	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.19
total losses (L_T lb/month & avg is lb/yr)	0.02	0.02	0.02	0.03	0.04	0.05	0.05	0.05	0.04	0.03	0.02	0.02	0.39
max hourly Q in bbl/hour	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
max hourly total loss (L_T lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

L_S sum months	L_W sum months	L_T sum months
0.21	0.19	0.39

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	0.000	0.000	0.192
Working Loss L_W	0.000	0.000	0.172
Total Loss L_T	0.000	0.000	0.364

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	23-15-LOT through 25-15-LOT
Tank Description	300 Gallon Lube Oil Tank
Company Name	Denbury Onshore, LLC

Tank Orientation	Horizontal
Tank Diameter (D ft)	3.25
Vertical Height/Horizontal Length (H_S ft)	5.00
Roof Height (H_R ft)	
Max Liquid Height (H_{LX} ft)	3.25
Avg Liquid Height (H_L ft)	1.63
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)	85.71
Annual Turnovers, N	11.60
Annual Hours	8,760
tank max liquid volume (V_{LX} ft^3)	41.48
vapor space outage (H_{VO} ft)	1.276
vapor space volume (V_V ft^3)	20.74

Major City for Meterological Data	Meridian, MS
Site Elevation (ft)	400
Atmospheric Pressure (P_A psia)	14.485
Table 7.1-2 Liquid	No. 2 fuel oil (diesel)
*RVP**	
*API gravity**	
*°F basis for gv**	
bubble point psia	
API gravity at 60F	
API gravity at 100F	
Working Loss Product Factor (K_P)	1
working loss turnover factor K_N	1.000

*sales oil data determines RVP per API pub 4683

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

Antoine constants ($\log_{10}$, mmHg, °C)

component	*mole%*	*MW*	*lb/mole*	*wt%*	*A*	*B*	*C*
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)	57.10	61.40	68.80	76.20	83.40	88.80	91.40	91.10	86.50	77.30	66.90	58.50	75.60
hourly average minimum ambient temperature (T_{AN} °F)	35.80	38.10	44.50	51.50	60.80	67.80	70.80	70.20	64.20	52.50	42.50	36.90	53.00
daily total solar insolation factor (I btu/ft^2 day)	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727	1421
daily average ambient temperature (T_{AA} °F)	46.45	49.75	56.65	63.85	72.10	78.30	81.10	80.65	75.35	64.90	54.70	47.70	64.30
liquid bulk temperature (T_B °F)	48.56	52.57	60.38	68.51	77.28	83.67	86.35	85.57	79.52	68.28	57.19	49.66	68.14
average vapor temperature (T_V °F)	52.24	57.47	66.85	76.61	86.28	93.00	95.48	94.12	86.76	74.15	61.53	53.07	74.80
daily ambient temperature range (ΔT_A °R)	21.30	23.30	24.30	24.70	22.60	21.00	20.60	20.90	22.30	24.80	24.40	21.60	22.60
daily vapor temperature range (ΔT_V °R)	29.01	35.10	41.85	48.36	50.34	50.50	49.43	47.44	43.40	39.90	33.71	28.48	41.40
daily average liquid surface temperature (T_{LA} °F)	50.40	55.02	63.61	72.56	81.78	88.34	90.91	89.85	83.14	71.22	59.36	51.37	71.47
daily maximum liquid surface temperature (T_{LX} °F)	57.65	63.79	74.08	84.65	94.36	100.96	103.27	101.71	93.99	81.19	67.79	58.49	81.82
daily minimum liquid surface temperature (T_{LN} °F)	43.15	46.24	53.15	60.47	69.19	75.71	78.56	77.99	72.29	61.24	50.93	44.25	61.12
vapor pressure at daily avg liq surface temp T_{LA} (P_{VA} psia)	0.005	0.005	0.007	0.010	0.013	0.016	0.017	0.016	0.013	0.009	0.006	0.005	0.009
vapor pressure at daily max liq surface temp T_{LX} (P_{VX} psia)	0.006	0.007	0.010	0.014	0.019	0.023	0.024	0.023	0.019	0.013	0.008	0.006	0.013
vapor pressure at daily min liq surface temp T_{LN} (P_{VN} psia)	0.004	0.004	0.005	0.007	0.009	0.011	0.012	0.012	0.010	0.007	0.005	0.004	0.007
daily vapor pressure range (ΔP_V)	0.0023	0.0033	0.0050	0.0075	0.0100	0.0120	0.0125	0.0117	0.0089	0.0059	0.0036	0.0024	0.0062
vapor space expansion factor (K_E)	0.0570	0.0684	0.0803	0.0914	0.0937	0.0930	0.0906	0.0871	0.0806	0.0756	0.0652	0.0559	0.0784
vapor molecular weight (M_V lb/lbmole)	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00
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	41	37	41	40	41	40	41	41	40	41	40	41	481
monthly turnovers (N/month) with avg = total annual	0.99	0.89	0.99	0.95	0.99	0.95	0.99	0.99	0.95	0.99	0.95	0.99	11.60
vented vapor saturation factor (K_S)	0.9997	0.9996	0.9995	0.9993	0.9991	0.9989	0.9989	0.9989	0.9991	0.9994	0.9996	0.9997	0.9994
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)	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0004	0.0003	0.0002	0.0001	0.0001	0.0002
standing storage losses (L_S lb/month & avg is lb/yr)	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.14
working losses (L_W lb/month & avg is lb/yr)	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.11
total losses (L_T lb/month & avg is lb/yr)	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.25
max hourly Q in bbl/hour	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
max hourly working loss at P_{VX} & Q/hr & K_N=1 (L_W lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
breathing/standing loss (L_S lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
max hourly total loss (L_T lb/hr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

L_S sum months	L_W sum months	L_T sum months
0.14	0.11	0.25

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	0.000	0.000	0.126
Working Loss L_W	0.000	0.000	0.102
Total Loss L_T	0.000	0.000	0.228

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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