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EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

January 30, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
Dallas Dome Battery
Fremont County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the Dallas Dome Battery in Fremont County, Wyoming. EDGE is submitting this air permit application for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

HOUSTON | BATON ROUGE | ASHEVILLE | DENVER

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

General Notes

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil & Gas Corp.
Facility/Well Name	Dallas Dome Battery
Field Name	Pitchfork Oil Field
Nearest City/Town	Lander
API Number/SIC Code	
Latitude/Longitude	42.7430, -108.61690
County	Fremont
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	200
Produced Water Site Throughput (bbl/day):	24000
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

*****Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.*****

Equipment/Process Types	How many for this project?	How many for this site?
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers		
Oil / Condensate Tanks	3	3
Produced Water Tanks		
Miscellaneous Tanks		
Loading Jobs	1	1
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors	1	1
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil & Gas Corp.
Dallas Dome Battery

Gas and Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** **fill out this table.**

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	0.0000
VOC weight fraction =	0.0000

VOC content of hydrocarbon fraction only

VOC weight% =	#DIV/0!
VOC weight fraction =	#DIV/0!

Hydrogen Sulfide

H2S weight% =	0.0000
H2S weight fraction =	0.00E+00
H2S ppm_V =	
H2S ppm_{WT}=	0.00

Benzene

Benzene content of total sample

Benzene weight% =	0.0000
Benzene weight fraction =	0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% =	#DIV/0!
Benzene weight fraction =	#DIV/0!

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	LBB Embar 3 Stable Oil
What site is the sample from?	LBB Embar 3 Stable Oil
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	A representative oil analysis was taken at LBB Embar 3. Both Dallas Dome and LBB Embar 3 extract well emulsion from the same formation. Petroleum liquids have a similar API gravity, within 3 degrees. Both sites have similar operations where a sample could be taken at the tanks (post flash).
Where in the process was the sample taken?	Atmospheric Oil
What is the temperature and pressure of the sample (include units)?	0psig, 60°F
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	22-Jan-18

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.0830	34.08188	3	0.0069
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.0322	30.06904	1	0.0024
propane (C3)	0.1656	44.09562	7	0.0179
butanes (C4)	0.6340	58.12220	37	0.0901
pentanes (C5)	1.6580	72.14878	120	0.2925
benzene	0.0117	78.110000	1	0.0022
other hexanes (C6)	3.5785	86.18000	308	0.7540
toluene	0.0970	92.140000	9	0.0219
other heptanes (C7)	3.0426	100.20000	305	0.7453
ethylbenzene	0.1870	106.170000	20	0.0485
xylenes (o, m, p)	0.5775	106.170000	61	0.1499
other octanes (C8)	2.9614	114.23000	338	0.8270
nonanes (C9)	3.0514	128.26000	391	0.9568
decanes plus (C10+)	83.9201	468.31494	39301	96.0846
Totals:	100.0000	409.03	40902.53824	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	99.9907
VOC weight fraction =	0.9999

VOC content of hydrocarbon fraction only

VOC weight% =	99.9976
VOC weight fraction =	1.0000

Hydrogen Sulfide

H2S weight% =	0.0069
H2S weight fraction =	6.92E-05
H2S ppm_V =	830.00
H2S ppm_{WT}=	69.16

Benzene

Benzene content of total sample

Benzene weight% =	0.0022
Benzene weight fraction =	0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% =	0.0022
Benzene weight fraction =	0.0000

Enter any notes here:

The representative liquid analysis was taken from LBB Embar 3. The extended report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benezene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n-hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

H2S was not included in the liquid analysis so the H2S concentration from the site field gas was included as a conservative estimate.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	5		
Separators		Separator	3		
Meters/piping [2]		Heater-treater	2		
Compressors		Header			
In-Line Heaters		Tanks	3	Tanks	1
Dehydrators		Pumps	2	Pumps	1
Scrubbers [3]		Sample Ports	1	Sample Ports	1

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	91	Valves	13
Pump Seals	0	Pump Seals	4	Pump Seals	2
Connectors	0	Connectors	128	Connectors	14
Flange	0	Flange	172	Flange	24
Open-Ended Lines	0	Open-Ended Lines	1	Open-Ended Lines	1
Other	0	Other	5	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(i)(A) dictates counting one meters/piping per well-pad for production operations.

[3] Scrubbers assumed to have the same fugitive components as separators.

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil & Gas Corp.
Dallas Dome Battery

Fugitives Emissions

EPN	FUG
Name	Fugitive Emissions

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.9976
Benzene wt %	0.0022
H_2S wt %	0.0069

(3)

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
91	Valve	0.005500	0.5005	2.19219
4	Pump Seal	0.028660	0.11464	0.5021232
128	Connector	0.000463	0.059264	0.25957632
172	Flange	0.000243	0.041796	0.18306648
1	Open-ended Line	0.003090	0.00309	0.0135342
5	Other	0.016500	0.0825	0.36135
		Total:	0.80179	3.5118402

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0069	
Pump Seal	99.9976	0.0022	0.0069	
Connector	99.9976	0.0022	0.0069	
Flange	99.9976	0.0022	0.0069	
Open-ended Line	99.9976	0.0022	0.0069	
Other	99.9976	0.0022	0.0069	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.50	2.19	0.00	0.00	0.00	0.00
Pump Seal	0.11	0.50	0.00	0.00	0.00	0.00
Connector	0.06	0.26	0.00	0.00	0.00	0.00
Flange	0.04	0.18	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.01	0.00	0.00	0.00	0.00
Other	0.08	0.36	0.00	0.00	0.00	0.00
Total:	0.80	3.51	0.00	0.00	0.00	0.00

(4)

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
13	Valve	0.000216	0.002808	0.01229904
2	Pump Seal	0.000052	0.000104	0.00045552
14	Connector	0.000243	0.003402	0.01490076
24	Flange	0.000006	0.000144	0.00063072
1	Open-ended Line	0.000550	0.00055	0.002409
0	Other	0.030900	0	0
		Total:	0.007008	0.03069504

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0069	
Pump Seal	99.9976	0.0022	0.0069	
Connector	99.9976	0.0022	0.0069	
Flange	99.9976	0.0022	0.0069	
Open-ended Line	99.9976	0.0022	0.0069	
Other	99.9976	0.0022	0.0069	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.00	0.01	0.00	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00	0.00
Connector	0.00	0.01	0.00	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.01	0.03	0.00	0.00	0.00	0.00

(5)

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	0.81	3.54
benzene	0.00	0.00
H_2S	0.00	0.00

Notes:

Reference to Emission factors used:

1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4.

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

Citation Oil & Gas Corp.
Dallas Dome Tank Battery
Emissions from Flash and Standing, Working, and Breathing Losses

Flow at Dallas Dome was measured on 7/10/18, 7/12/18, and 7/13/18 with a Fox Thermal Instruments Model FT4A meter. Total flow to the combustor was measured for a total of 75 hours. Flow totaled 64 mcf during that time for an average of 20.48 mcfd. Measured flow includes GOR, GWR, and tank S/W/B losses.

Site	Dallas Dome
Flow Test Date	7/10/2018
Duration	75 hrs
Vent Temperature	100.0
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	20.48
Avg Gas Measured (mscf/day)	15.78
Water Vapor Flow (mscf/day)	1.09
Dry Flow (mscf/day)	14.69
MW (lb/lb-mol)	20.734
Sample Site	Dallas Dome Field
Sample Location and Date	Lease Gas 7/19/18
days/yr	365
lb/ton	2000
Total Gas Emitted (tpy)	146.6844
wt % VOC	15.8880
wt % Benzene	0.0301
wt % H2S	0.1364
Total Emissions	
VOC Emissions (tpy)	23.3053
VOC Emissions (lb/hr)	5.3208
Benzene Emissions (tpy)	0.0442
Benzene Emissions (lb/hr)	0.0101
H2S Emissions (tpy)	0.2001
H2S Emissions (lb/hr)	0.0457

Vent Stream Water Concetration

Moisture Content (lb H2O/lb Air)	0.043
MW H2O	18.02
MW Air	28.97
mol % Water	6.91

From Perry's Table 12-3; Assuming tank vapors are saturated (100% RH) at 100 F = 0.043 lb water per lb of dry air.

Standard Conditions

scf/lb-mol	379
Deg F	60
psia	14.7
Deg R	520

Citation Oil & Gas Corp.
Dallas Dome Battery

Flare / Vapor Combustor

A) Enter information into the yellow boxes.

B) See notes/instructions incuded below.

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

D) Make sure to select the correct *Emission Type* from the pull down menu below.

General Information		
Unit Name:	Gunbarrel and Oil Tanks Flare	
Unit EPN:	FLR - 1	
Which is utilized for this device?	continuous pilot	

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.138	lb/MMBtu
CO	0.2755	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

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

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Combined Gunbarrel and Oil Tanks Vent										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		0.61216132										15.6121613
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		5362.53315										136762.533
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		1037.43491										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Gunbarrel and Oil Tanks Vent										-
H2S	-	-	0.04569036										0.04569036
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	5.32083508										5.32083508
benzene	-	-	0.01009379										0.01009379

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.20012376										0.20012376
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	23.3052576										23.3052576
benzene	-	-	0.20012376										0.20012376

Controlled Emissions

Hourly (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Combined Gunbarrel and Oil Tanks Vent										-
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.09**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.11**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Annual (tpy)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Combined Gunbarrel and Oil Tanks Vent										-
NOx	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.376	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.38**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.466	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.47**
benzene	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.11	0.47
NOx	0.00	0.01
CO	0.00	0.01
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.09	0.38
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1021
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1021
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	
What is the diameter of the flare/burner tip(s) (in)?	
Total Flare/Burner Tip Surface Area (ft²)?	0
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.00

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Citation Oil & Gas Corp.
Dallas Dome Battery

Flare / Vapor Combustor

A) Enter information into the yellow boxes.

B) See notes/instructions incuded below.

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

D) Make sure to select the correct *Emission Type* from the pull down menu below.

General Information	
Unit Name:	Dedicated Gunbarrel Flare
Unit EPN:	FLR - 2
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.138	lb/MMBtu
CO	0.2755	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

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

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants

Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Dedicated Gunbarrel Flare										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		0.61216132										15.6121613
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		5362.53315										136762.533
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		1037.43491										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Dedicated Gunbarrel Flare										-
H2S	-	-	0.04569036										0.04569036
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	5.32083508										5.32083508
benzene	-	-	0.01009379										0.01009379

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.20012376										0.20012376
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	23.3052576										23.3052576
benzene	-	-	0.20012376										0.20012376

Controlled Emissions

Hourly (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Dedicated Gunbarrel Flare										-
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.09**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.11**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Annual (tpy)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Dedicated Gunbarrel Flare										-
NOx	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.376	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.38**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.466	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.47**
benzene	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.11	0.47
NOx	0.00	0.01
CO	0.00	0.01
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.09	0.38
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1021
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1021
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	
What is the diameter of the flare/burner tip(s) (in)?	
Total Flare/Burner Tip Surface Area (ft²)?	0
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.00

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Citation Oil & Gas Corp.
Dallas Dome Battery

Loading Emissions

EPN	LOAD
Identifier	Truck Loading

Truck Hourly Loading Emission Calculations

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

S =	0.60	Saturation Factor
P =	1.08	True vapor pressure of liquid loaded (psia)
M =	54.58	Molecular Weight of Vapors (lb/lb-mole)
T =	539.67	Temperature of bulk liquid loaded (in degrees Rankine)
Hourly Loading Rate	8000	Gallons Loaded per Hour
L_L =	0.82	Loading Loss (lb VOC released/1000 gal liquid loaded)
	6.53	VOC Uncontrolled Emissions (lb/hr)

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

Vapor Weight Percents

VOC	84.26	Vapor VOC wt%
benzene	0.03	Vapor Benzene wt%
H_2S	9.82	Vapor H_2S wt%

Produced Water Reduction

	0.00	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)

Uncontrolled Emissions

VOC	5.50	Emissions Uncontrolled VOC (lb/hr)
benzene	0.00	Emissions Uncontrolled Benzene (lb/hr)
H_2S	0.64	Emissions Uncontrolled H_2S (lb/hr)

Collection Efficiency

		Collection Efficiency (%)

Vapors Uncaptured by Control Device

VOC	0.00	VOC Uncaptured Vapors (lb/hr)
benzene	0.00	benzene Uncaptured Vapors (lb/hr)
H_2S	0.00	H_2S Uncaptured Vapors (lb/hr)

Vapors Captured by Control Device

VOC	0.00	VOC Uncaptured Vapors (lb/hr)
benzene	0.00	benzene Uncaptured Vapors (lb/hr)
H_2S	0.00	H_2S Uncaptured Vapors (lb/hr)

Enter temperature in Fahrenheit °F):	Temperature in Rankine (°R):
80	539.67

Enter Barrels of Liquid	Gallons of liquid:
	0

Enter gallons per year	Barrels per day:
	0

Enter any notes here:

Molecular weight and vapor weight percents were taken from the E&P Tanks report for KT-1 thru TK-4 Hourly Evaporative Losses. Hourly tank loading emissions are based on a upper temperature of 80°F. Converted to weight percents, each species is classified as VOC except for ethane. Tank vapors also contain 0.03 wt% of benzene and no hydrogen sulfide. The Reid Vapor Pressure from the LBB Embar 3 reports 1.74 psia, loaded oil uses true vapor pressure based on RVP 5 oil at 80F

Truck Annual Loading Emission Calculations

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

S =	0.60	= Saturation Factor
P =	0.67	= True vapor pressure of liquid loaded (psia)
M =	54.58	= Molecular Weight of Vapors (lb/lb-mole)
T =	519.67	= Temperature of bulk liquid loaded (in degrees Rankine)
Annual Loading Rate	3066000	= Gallons Loaded per Year
L_L =	0.53	Loading Loss (lb VOC released/1000 gal liquid loaded)
	0.81	VOC Uncontrolled Emissions (ton/yr)

Enter temperature in Fahrenheit °F):	Temperature in Rankine (°R):
60	519.67

Enter Barrels of Liquid	Gallons of liquid:
73000	3066000

Enter gallons per year	Barrels per day:
	0

Enter any notes here:

Same loading parameters are used for hourly and annual loading calculations. The annual loading rate is based on the yearly average of 191 barrel of oil per day. TVP is based on the same RVP oil but at 60F.

Vapor Weight Percents

VOC	84.26	Vapor VOC wt%
benzene	0.03	Vapor Benzene wt%
H_2S	9.82	Vapor H_2S wt%

Produced Water Reduction

	0.00	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)

Uncontrolled Emissions

VOC	0.68	Emissions Uncontrolled VOC (ton/yr)
benzene	0.00	Emissions Uncontrolled Benzene (ton/yr)
H_2S	0.08	Emissions Uncontrolled H_2S (ton/yr)

Collection Efficiency

		Collection Efficiency (%)

Vapors Uncaptured by Control Device

VOC	0.00	VOC Uncaptured Vapors (ton/yr)
benzene	0.00	benzene Uncaptured Vapors (ton/yr)
H_2S	0.00	H_2S Uncaptured Vapors (ton/yr)

Vapors Captured by Control Device

VOC	0.00	VOC captured Vapors (lb/hr)
benzene	0.00	benzene captured Vapors (lb/hr)
H_2S	0.00	H_2S captured Vapors (lb/hr)

Loading Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	5.50	0.68
benzene	0.00	0.00
H2S	0.64	0.08

Citation Oil & Gas Corp.
Dallas Dome Battery

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions* .

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates* .

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emissions	Total VOC	0.8088	3.5425
		Benzene	0.0000	0.0001
		Formaldehyde		
		H_2S	0.0001	0.0002
		SO_2		
		NO_X		
		CO		
		PM_{10}		
		$PM_{2.5}$		
LOAD	Truck Loading	Total VOC	5.5046	0.6796
		Benzene	0.0020	0.0002
		Formaldehyde		
		H_2S	0.6418	0.0792
		SO_2		
		NO_X		
		CO		
		PM_{10}		
		$PM_{2.5}$		
FLR - 1	Gunbarrel and Oil Tanks Flare	Total VOC	0.1065	0.4665
		Benzene	0.0002	0.0040
		Formaldehyde		
		H_2S	0.0009	0.0040
		SO_2	0.0859	0.3762
		NO_X	0.0016	0.0070
		CO	0.0014	0.0063
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004

FLR - 2	Dedicated Gunbarrel Flare	**Total VOC**	0.1065	0.4665
		Benzene	0.0002	0.0040
		Formaldehyde		
		H_2S	0.0009	0.0040
		SO_2	0.0859	0.3762
		NO_X	0.0016	0.0070
		CO	0.0014	0.0063
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004

Uncollected Emission Rates (emission rates are represented as the sum of all uncontrolled sources, excluding the flare)	**Air Contaminant Name (3)**	**Emission Rates**	
		lbs/hr	**TPY (4)**
	Total VOC	11.74	27.99
	Benzene	0.01	0.05
	Formaldehyde	0.00	0.00
	H_2S	0.69	0.28
	SO_2	0.17	0.75
	NO_X	3.175E-03	0.01
	CO	2.870E-03	0.01
	PM_{10}	2.373E-04	1.039E-03
	$PM_{2.5}$	1.780E-04	7.795E-04

Project Total Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)	**Air Contaminant Name (3)**	**Emission Rates**	
		lbs/hr	**TPY (4)**
	Total VOC	6.53	5.15
	Benzene	2.372E-03	0.01
	Formaldehyde	0.00	0.00
	H_2S	0.64	0.09
	SO_2	0.17	0.75
	NO_X	3.175E-03	0.01
	CO	2.870E-03	0.01
	PM_{10}	2.373E-04	1.039E-03
	$PM_{2.5}$	1.780E-04	7.795E-04

December 20, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Heater Treater Gas
Spot Sample @ 17 psig & 154 °F

Date Sampled: 12/06/17 Job Number: 74198.021

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	8.000	
Nitrogen	0.935	
Carbon Dioxide	58.670	
Methane	8.291	
Ethane	2.618	0.723
Propane	3.336	0.949
Isobutane	1.339	0.452
n-Butane	3.628	1.181
2-2 Dimethylpropane	0.015	0.006
Isopentane	2.573	0.971
n-Pentane	2.852	1.067
Hexanes	4.289	1.823
Heptanes Plus	3.454	1.545
Totals	100.000	8.717

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.507	(Air=1)
Molecular Weight	100.33	
Gross Heating Value	5424	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.621	(Air=1)
Compressibility (Z)	0.9878	
Molecular Weight	46.37	
Gross Heating Value		
Dry Basis	1068	BTU/CF
Saturated Basis	1050	BTU/CF

*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377)
Results: 5031.4 Gr/100 CF, 80000 PPMV or 8.000 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) RG
Analyst: MR
Processor: ANB
Cylinder ID: T-5967

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.021

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	8.000		5.880
Nitrogen	0.935		0.565
Carbon Dioxide	58.670		55.683
Methane	8.291		2.870
Ethane	2.618	0.723	1.698
Propane	3.336	0.949	3.172
Isobutane	1.339	0.452	1.678
n-Butane	3.628	1.181	4.547
2,2 Dimethylpropane	0.015	0.006	0.023
Isopentane	2.573	0.971	4.003
n-Pentane	2.852	1.067	4.438
2,2 Dimethylbutane	0.032	0.014	0.059
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.329	0.139	0.611
2 Methylpentane	1.347	0.577	2.503
3 Methylpentane	0.964	0.406	1.792
n-Hexane	1.617	0.686	3.005
Methylcyclopentane	0.442	0.157	0.802
Benzene	0.008	0.002	0.013
Cyclohexane	0.292	0.103	0.530
2-Methylhexane	0.241	0.116	0.521
3-Methylhexane	0.388	0.182	0.838
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.487	0.219	1.042
n-Heptane	0.501	0.239	1.083
Methylcyclohexane	0.231	0.096	0.489
Toluene	0.021	0.007	0.042
Other C8's	0.479	0.230	1.139
n-Octane	0.109	0.058	0.269
Ethylbenzene	0.015	0.006	0.034
M & P Xylenes	0.013	0.005	0.030
O-Xylene	0.003	0.001	0.007
Other C9's	0.148	0.078	0.403
n-Nonane	0.015	0.009	0.041
Other C10's	0.027	0.016	0.082
n-Decane	0.006	0.004	0.018
Undecanes (11)	0.028	0.018	0.090
Totals	100.000	8.717	100.000

Computed Real Characteristics of Total Sample

Specific Gravity	1.621	(Air=1)
Compressibility (Z)	0.9878	
Molecular Weight	46.37	

Gross Heating Value

Dry Basis	1068	BTU/CF
Saturated Basis	1050	BTU/CF

December 20, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

Sample: Citation Oil & Gas - LBB Embar 3
Heater Treater Gas
Spot Sample @ 17 psig & 154 °F

Date Sampled: 12/06/17 Job Number: 74198.021

GLYCALC FORMAT

COMPONENT	MOL%	GPM	Wt %
Carbon Dioxide	58.670		55.683
Hydrogen Sulfide	8.000		5.880
Nitrogen	0.935		0.565
Methane	8.291		2.870
Ethane	2.618	0.723	1.698
Propane	3.336	0.949	3.172
Isobutane	1.339	0.452	1.678
n-Butane	3.643	1.187	4.570
Isopentane	2.573	0.971	4.003
n-Pentane	2.852	1.067	4.438
Cyclopentane	0.000	0.000	0.000
n-Hexane	1.617	0.686	3.005
Cyclohexane	0.292	0.103	0.530
Other C6's	2.672	1.136	4.965
Heptanes	2.059	0.913	4.286
Methylcyclohexane	0.231	0.096	0.489
2,2,4 Trimethylpentane	0.000	0.000	0.000
Benzene	0.008	0.002	0.013
Toluene	0.021	0.007	0.042
Ethylbenzene	0.015	0.006	0.034
Xylenes	0.016	0.006	0.037
Octanes Plus	0.812	0.412	2.042
Totals	100.000	8.717	100.000

Real Characteristics Of Octanes Plus:

Specific Gravity ----------	4.077	(Air=1)
Molecular Weight ----------	116.63	
Gross Heating Value ----------	6120	BTU/CF

Real Characteristics Of Total Sample:

Specific Gravity ----------	1.621	(Air=1)
Compressibility (Z) ----------	0.9878	
Molecular Weight ----------	46.37	
Gross Heating Value		
Dry Basis ----------	1068	BTU/CF
Saturated Basis ----------	1050	BTU/CF

January 22, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74198.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Heptanes Plus	94.725	98.538	99.011
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.9481	(Water=1)
°API Gravity ----------	17.74	@ 60°F
Molecular Weight ----------	427.7	
Vapor Volume ----------	6.86	CF/Gal
Weight ----------	7.90	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.543	0.127	0.079
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
Other C-6's	1.788	0.538	0.376
Heptanes	3.193	0.989	0.750
Octanes	3.604	1.179	0.960
Nonanes	3.051	1.130	0.945
Decanes Plus	84.003	95.000	96.134
Benzene	0.012	0.002	0.002
Toluene	0.097	0.024	0.022
E-Benzene	0.187	0.053	0.049
Xylenes	0.577	0.161	0.150
n-Hexane	0.998	0.299	0.210
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.9548	(Water=1)
Molecular Weight----------	468.3	

Characteristics of Atmospheric Sample:

°API Gravity ----------	18.46	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)----------	1.74	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74198.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Methylcyclopentane	0.441	0.114	0.091
Benzene	0.012	0.002	0.002
Cyclohexane	0.352	0.087	0.072
2-Methylhexane	0.493	0.167	0.121
3-Methylhexane	0.536	0.179	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.464	0.138	0.113
n-Heptane	0.907	0.304	0.222
Methylcyclohexane	0.643	0.188	0.154
Toluene	0.097	0.024	0.022
Other C-8's	2.160	0.692	0.582
n-Octane	0.802	0.299	0.224
E-Benzene	0.187	0.053	0.049
M & P Xylenes	0.130	0.037	0.034
O-Xylene	0.447	0.124	0.116
Other C-9's	2.312	0.827	0.713
n-Nonane	0.740	0.303	0.232
Other C-10's	2.945	1.158	1.017
n-decane	0.580	0.259	0.202
Undecanes(11)	3.492	1.409	1.254
Dodecanes(12)	3.173	1.383	1.248
Tridecanes(13)	3.492	1.632	1.493
Tetradecanes(14)	3.255	1.630	1.511
Pentadecanes(15)	3.127	1.677	1.574
Hexadecanes(16)	2.866	1.643	1.555
Heptadecanes(17)	2.872	1.741	1.663
Octadecanes(18)	2.547	1.625	1.562
Nonadecanes(19)	2.576	1.713	1.656
Eicosanes(20)	2.259	1.561	1.518
Heneicosanes(21)	2.114	1.537	1.503
Docosanes(22)	2.014	1.526	1.501
Tricosanes(23)	1.828	1.436	1.420
Tetracosanes(24)	1.788	1.455	1.446
Pentacosanes(25)	1.726	1.457	1.455
Hexacosanes(26)	1.152	1.008	1.010
Heptacosanes(27)	1.426	1.294	1.304
Octacosanes(28)	1.487	1.394	1.409
Nonacosanes(29)	1.453	1.407	1.427
Triacontanes(30)	1.481	1.480	1.506
Hentriacontanes Plus(31+)	34.353	63.574	65.900
Total	100.000	100.000	100.000

January 22, 2018

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W Mayberry Trail
Peoria, Arizona 85383

Date Sampled: 12/06/17

Date Analyzed: 01/16/18

Job Number: J74198

Sample: Citation Oil & Gas - LBB Embar 3

FLASH LIBERATION OF HYDROCARBON LIQUID			
	Separator	**Stock Tank @ 12.5 psia & 70°F**	**Stock Tank @ 14.7 psia & 68°F**
Pressure	17 psig	12.5 psia	14.7 psia
Temperature	154 °F	70 °F	68 °F
Gas Oil Ratio (1)	------	4.41 CF/Bbl	3.75 CF/STBbl
Gas Specific Gravity	------	2.350 Air = 1.000	2.350 Air = 1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (2)	0.9764
Oil API Gravity at 60 °F	18.46
Reid Vapor Pressure Equivalent (D-6377), psi (3)	1.74

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1311	-----
Pressure, psig	17	19	------
Temperature, °F	154	154	------

Note: Study Conducted @ 12.5 psia & 70 °F

(1) - CF of flashed vapor per barrel of stock tank oil
(2) - Fraction of first stage separator liquid
(3) - Absolute pressure at 100 deg F
Analyst: E.J.

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Gas Liberated from Hydrocarbon Liquid
From 17 psig & 154 °F to 0 psig & 70 °F

Date Sampled: 12/06/17 Job Number: 74198.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	0.040	
Nitrogen	0.567	
Carbon Dioxide	18.217	
Methane	2.421	
Ethane	2.721	0.775
Propane	6.808	1.999
Isobutane	3.927	1.369
n-Butane	13.734	4.614
2-2 Dimethylpropane	1.825	0.743
Isopentane	8.855	3.451
n-Pentane	12.631	4.879
Hexanes	16.706	7.329
Heptanes Plus	11.548	4.914
Totals	100.000	30.072

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.425	(Air=1)
Molecular Weight	94.93	
Gross Heating Value	5065	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.339	(Air=1)
Compressibility (Z)	0.9570	
Molecular Weight	64.84	
Gross Heating Value		
Dry Basis	3332	BTU/CF
Saturated Basis	3275	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
Results: 25.16 Gr/100 CF, 400.0 PPMV or 0.040 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) ET
Analyst: RR
Processor: ANB
Cylinder ID: FL-5s

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	0.040		0.021
Nitrogen	0.567		0.245
Carbon Dioxide	18.217		12.365
Methane	2.421		0.597
Ethane	2.721	0.775	1.262
Propane	6.808	1.999	4.630
Isobutane	3.927	1.369	3.520
n-Butane	13.734	4.614	12.311
2,2 Dimethylpropane	1.825	0.743	2.031
Isopentane	8.855	3.451	9.853
n-Pentane	12.631	4.879	14.055
2,2 Dimethylbutane	0.173	0.077	0.230
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	1.405	0.613	1.867
2 Methylpentane	5.210	2.304	6.924
3 Methylpentane	3.632	1.580	4.827
n-Hexane	6.286	2.754	8.354
Methylcyclopentane	1.804	0.663	2.342
Benzene	0.911	0.272	1.097
Cyclohexane	1.077	0.391	1.397
2-Methylhexane	0.726	0.360	1.122
3-Methylhexane	1.089	0.529	1.683
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	1.617	0.750	2.474
n-Heptane	1.252	0.616	1.935
Methylcyclohexane	0.640	0.274	0.969
Toluene	0.980	0.350	1.393
Other C8's	0.803	0.398	1.365
n-Octane	0.178	0.097	0.314
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.219	0.090	0.359
O-Xylene	0.117	0.048	0.192
Other C9's	0.039	0.021	0.076
n-Nonane	0.096	0.058	0.190
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	30.072	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.339	(Air=1)
Compressibility (Z)	0.9570	
Molecular Weight	64.84	
Gross Heating Value		
Dry Basis	3332	BTU/CF
Saturated Basis	3275	BTU/CF

January 22, 2018

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W Mayberry Trail
Peoria, Arizona 85383

Date Sampled: 12/06/17

Date Analyzed: 12/14/17

Job Number: J74198

Sample: Citation Oil & Gas - LBB Embar 3

GAS LIBERATION OF PRESSURIZED WATER			
	Separator	**Stock Tank @12.5 psia & 70°F**	**Stock Tank @14.7 psia & 68°F**
Pressure	17 psig	12.5 psia	14.7 psia
Temperature	154 °F	70 °F	68 °F
Gas Water Ratio	------	0.51 CF/Bbl	0.43 CF/STBbl
Gas Specific Gravity	------	1.507 Air = 1.000	1.507 Air = 1.000

Note: Study Conducted @ 12.5 psia & 70 °F

Analyst : E.J.

Piston No. : PW-37699

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: LBB Embar 3
Gas Liberated from Separator Water
From 17 psig & 154 °F to 0 psig & 70 °F

Date Sampled: 12/06/17 Job Number: 74198.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	2.000	
Nitrogen	0.675	
Carbon Dioxide	94.641	
Methane	1.105	
Ethane	0.715	0.196
Propane	0.331	0.094
Isobutane	0.145	0.049
n-Butane	0.180	0.058
2-2 Dimethylpropane	0.028	0.011
Isopentane	0.056	0.021
n-Pentane	0.083	0.031
Hexanes	0.011	0.005
Heptanes Plus	0.030	0.011
Totals	100.000	0.475

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.182	(Air=1)
Molecular Weight	91.62	
Gross Heating Value	4629	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.507	(Air=1)
Compressibility (Z)	0.9942	
Molecular Weight	43.41	
Gross Heating Value		
Dry Basis	66	BTU/CF
Saturated Basis	66	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
Results: 1257.9 Gr/100 CF, 20000 PPMV or 2.000 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) ET
Analyst: RR
Processor: ANB
Cylinder ID: WF-11S

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	2.000		1.570
Nitrogen	0.675		0.436
Carbon Dioxide	94.641		95.957
Methane	1.105		0.408
Ethane	0.715	0.196	0.495
Propane	0.331	0.094	0.336
Isobutane	0.145	0.049	0.194
n-Butane	0.180	0.058	0.241
2,2 Dimethylpropane	0.028	0.011	0.047
Isopentane	0.056	0.021	0.093
n-Pentane	0.083	0.031	0.138
2,2 Dimethylbutane	0.000	0.000	0.000
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.003	0.001	0.006
2 Methylpentane	0.003	0.001	0.006
3 Methylpentane	0.003	0.001	0.006
n-Hexane	0.002	0.001	0.004
Methylcyclopentane	0.004	0.001	0.008
Benzene	0.004	0.001	0.007
Cyclohexane	0.005	0.002	0.010
2-Methylhexane	0.000	0.000	0.000
3-Methylhexane	0.001	0.000	0.002
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.000	0.000	0.000
n-Heptane	0.001	0.000	0.002
Methylcyclohexane	0.002	0.001	0.005
Toluene	0.007	0.002	0.015
Other C8's	0.000	0.000	0.000
n-Octane	0.000	0.000	0.000
Ethylbenzene	0.002	0.001	0.005
M & P Xylenes	0.003	0.001	0.007
O-Xylene	0.001	0.000	0.002
Other C9's	0.000	0.000	0.000
n-Nonane	0.000	0.000	0.000
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	0.475	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.507	(Air=1)
Compressibility (Z)	0.9942	
Molecular Weight	43.41	
Gross Heating Value		
Dry Basis	66	BTU/CF
Saturated Basis	66	BTU/CF

Bob Christofferson

From: Chris Sauter
Sent: Wednesday, July 11, 2018 8:17 AM
To: Bob Christofferson; Jeremy Wagner
Subject: hydrocarbon flow @ Dallas Dome

Meter
~~Unit~~ installed 7/10/2018 to atmosphere

Start up time @ 10am , 1st reading @ 6am 7/11/2 018 ..... total flow @ 15.739mcf/ 20hr run time, rate @ 21.51 mcfpd @ 6am reading
↳ 18.9 MCFD rate

Need 4 oz hatches for GB (or 3 oz?)

Combustor BGR-18, 0.2-1.0 psi, 3 MCFD rating

Need gas analysis.

TCRI 7/11/18
~~Jack 660-8066~~
Tim 660-0490

Bob Christofferson

From: Chris Sauter
Sent: Thursday, July 12, 2018 1:10 PM
To: Bob Christofferson; Jeremy Wagner
Subject: Dallas Dome hydrocarbon flow

7/12/18 7am.

Total flow @ 37.64 mcf, 45hr run, rate @ reading 18.23mcf

20.07 MCFD

Bob Christofferson

From: Chris Sauter
Sent: Friday, July 13, 2018 1:25 PM
To: Bob Christofferson; Jeremy Wagner
Subject: Dallas Dome hydrocarbon flow test

7/13/2018

1:15pm total flow @ 64mcf, 75.22hrs, rate @ reading 19.23 MCFD

Avg 20.4 MCFD

TISDALE CREEK RANCH, INC.

BARBER D-244 LEASE EXTENDED GAS STUDY

STUDY NO.	SAMPLE IDENTIFICATION / ANALYSIS REPORTED	SHEET NO.
CR-1	BARBER D-244 LEASE GAS / EXTENDED GLYCALC HYDROCARBONS	1
CR-2	BARBER D-244 LEASE GAS / EXTENDED SULFUR STUDY	2

AMERICAN MOBILE RESEARCH, INC.

P.O. BOX 2909 (307) 235-4590 PHONE
CASPER, WYOMING 82602 (307) 265-4489 FAX

EXTENDED HYDROCARBON GAS (GLYCALC) STUDY
CERTIFICATE OF ANALYSIS

Company ..... **TISDALE CREEK RANCH, INC.**
Lab Number CR-18631
Date Sampled 7-16-2018
Time Sampled..... N/A
Method of Analysis..... Dual TCD-FID Chromatography

Study Number CR-1
Date Tested 7-19-2018
Time Tested..... 1:18 PM
Ambient Temp at Sampling..... N/A

Sample Identification ..... **CITATION OIL & GAS - BARBER D-244 LEASE GAS**
METER NO. N/A

Sample Location ..... BARBER D-244 LEASE, DALLAS DOME FIELD, WYOMING.
Type Sample..... Spot
Flowrate, MCF ..... N/A
Sample Pressure ..... 1.89" DP
Cylinder ID ..... AMR 239
Instrument Used..... Shimadzu GC-2014
Sample Method..... Trap & Purge
Test Method GPA-2286

County ..... FREMONT
Composite From..... N/A
Sample Temperature ..... 98 F
Cylinders Heated to..... 130 F
Calibration Date..... 7-19-2018
Un-Normailized Total..... 101.41 %
Sampled By..... TCRI - T. Carsrud

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide.....	1.820	3.863	1.781
Hydrogen Sulfide.....	0.083	0.136	0.064
Nitrogen.....	11.112	15.014	7.010
Methane.....	78.493	60.734	76.310
Ethane.....	3.010	4.365	4.616
Propane.....	2.061	4.383	3.256
iso-Butane.....	0.415	1.163	0.779
n-Butane.....	1.311	3.675	2.370
iso-Pentane.....	0.507	1.764	1.063
n-Pentane.....	0.490	1.705	1.019
Cyclopentane.....	0.008	0.027	0.014
n-Hexane.....	0.106	0.441	0.250
Cyclohexane.....	0.027	0.110	0.053
Other Hexanes	0.213	0.885	0.502
Heptanes.....	0.189	0.913	0.500
Methylcyclohexane.....	0.013	0.062	0.030
2,2,4-Trimethylpentane..	0.007	0.039	0.021
Benzene.....	0.008	0.030	0.013
Toluene.....	0.023	0.102	0.044
Ethylbenzene.....	0.002	0.010	0.004
Xylenes.....	0.012	0.061	0.027
Octanes	0.070	0.386	0.206
Nonanes	0.009	0.056	0.029
Decanes + ...	0.011	0.075	0.039
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.008	0.027	0.014
Cyclohexane	0.027	0.110	0.053
2-Methylpentane	0.152	0.633	0.359
3-Methylpentane	0.061	0.252	0.143
n-Hexane	0.106	0.441	0.250
Methylcyclohexane	0.013	0.062	0.030
2,2,4-Trimethylpentane	0.007	0.039	0.021
Benzene	0.008	0.030	0.013
Toluene	0.023	0.102	0.044
Ethylbenzene	0.002	0.010	0.004
m-Xylene	0.002	0.009	0.004
p-Xylene	0.007	0.037	0.016
o-Xylene	0.003	0.015	0.007

SPECIFIC GRAVITY AT 60/60 F, calculated	0.71587
TOTAL GPM (ETHANE INCLUSIVE)	2.579
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis	1037.435
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis	1019.640
AVERAGE MOLECULAR WEIGHT	20.734
MOLAR MASS RATIO	0.71587
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.71777
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA, calculated	1032.307
COMPRESSIBILITY FACTOR (Z)	0.99735

PROPANE GPM	0.5663
BUTANE GPM	0.5477
GASOLINE GPM (PENTANE AND HEAVIER)	0.6625

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

James A. Kane, President
American Mobile Research, Inc.

AMERICAN MOBILE RESEARCH, INC.

1955 CBS COURT
CASPER, WYOMING 82604

(307) 235-4590 OFFICE PHONE
(307) 265-4489 OFFICE FAX

CERTIFICATE OF ANALYSIS

SULFUR FRACTIONAL STUDY OF GASEOUS PRODUCTS

COMPANY ..... TISDALE CREEK RANCH, INC.

LAB NUMBER CR-18631
DATE SAMPLED 7-16-2018

STUDY NUMBER..... CR-2
DATE TESTED..... 7-17-2018

SAMPLE IDENTIFICATION ..... CITATION OIL & GAS - BARBER D-244 LEASE GAS
METER NO. N/A

SAMPLE LOCATION..... DALLAS DOME FIELD, WYOMING
COUNTY..... FREMONT
SAMPLE PRESSURE..... 1.89" DP
SAMPLE TEMP..... 98 F
METHOD OF ANALYSIS..... SCD CHROMATOGRAPHY
SAMPLE METHOD... GPA-2166
TEST METHOD..... ASTM D-5504
CONTAINER..... TEDLAR BAG
INSTRUMENTATION..... SIEVERS MODEL 355 SULFUR CHEMILUMINESCENCE DETECTOR.

LIGHT END COMPONENTS	RESULTS PPM/VOLUME	RESULTS Mg/M3	RESULTS GRAINS / 100SCF
CARBONYL SULFIDE (COS)	31.989 PPMV	78.693 Mg/M3	2.073 GRAINS
HYDROGEN SULFIDE (H2S)	832.640 PPMV	1,157.370 Mg/M3	53.962 GRAINS
CARBON DISULFIDE (CS2)	0.085 PPMV	0.264 Mg/M3	0.006 GRAINS
DIMETHYL SULFIDE (CH3)2S)	0.129 PPMV	0.328 Mg/M3	0.008 GRAINS
DIMETHYL DISULFIDE (CH3)2S2)	0.071 PPMV	0.273 Mg/M3	0.005 GRAINS
SULFUR DIOXIDE (SO2)	< 0.010 PPMV	< 0.031 Mg/M3	< 0.001 GRAINS
TOTAL LIGHT END SULFURS	864.914 PPM	1,236.928 Mg/M3	56.054 GRAINS
MERCAPTANS & THIOPHENES			
METHYL MERCAPTAN	13.225 PPMV	26.053 Mg/M3	0.857 GRAINS
ETHYL MERCAPTAN	4.390 PPMV	11.151 Mg/M3	0.285 GRAINS
iso-PROPYL MERCAPTAN	1.376 PPMV	4.279 Mg/M3	0.089 GRAINS
n-PROPYL MERCAPTAN	0.543 PPMV	1.689 Mg/M3	0.035 GRAINS
ETHYL METHYL SULFIDE	0.119 PPMV	0.370 Mg/M3	0.008 GRAINS
iso-BUTYL MERCAPTAN	0.262 PPMV	0.967 Mg/M3	0.017 GRAINS
n-BUTYL MERCAPTAN	0.471 PPMV	1.738 Mg/M3	0.031 GRAINS
DIETHYL SULFIDE	0.214 PPMV	0.790 Mg/M3	0.014 GRAINS
sec-BUTYL MERCAPTAN	< 0.010 PPMV	< 0.037 Mg/M3	< 0.001 GRAINS
tert-BUTYL MERCAPTAN	0.878 PPMV	2.300 Mg/M3	0.057 GRAINS
PENTYL AND HEAVIER MERCAPTANS	< 0.010 PPMV	< 0.039 Mg/M3	< 0.001 GRAINS
2-METHYLTHIOPHENE	0.137 PPMV	0.471 Mg/M3	0.009 GRAINS
3-METHYLTHIOPHENE	0.240 PPMV	0.826 Mg/M3	0.016 GRAINS
THIOPHENE	0.766 PPMV	2.635 Mg/M3	0.050 GRAINS
TOTAL BENZOTHIOPHENES	< 0.010 PPMV	< 0.039 Mg/M3	< 0.001 GRAINS
TOTAL METHYLBENZOTHIOPHENES	< 0.010 PPMV	< 0.039 Mg/M3	< 0.001 GRAINS
TOTAL MERCAPTANS & THIOPHENES	22.621 PPMV	53.269 Mg/M3	1.466 GRAINS
TOTAL ALL SULFURS	887.535 PPMV	1,290.197 Mg/M3	57.520 GRAINS

ALL COMPONENTS ANALYZED AS PPM/VOLUME, THEN CONVERTED TO MILLIGRAMS PER CUBIC METER USING FACTORS OUTLINED IN ASTM D-5504.

James A. Kane, President
American Mobile Research, Inc.

Facility : F003333

Apr 9 2020, 10:55:39

- Facility Information

Facility ID: F003333

FacilityName: Dallas Dome Tank Battery

Facility Description:

Company Name: Citation Oil & Gas Corp.

Operating Status: Operating

AFS:

Facility Class: Minor

Facility Type: Storage Tank Battery

CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
14077 Cutten Road	Houston	Fremont	42.74380/-108.61690	S13-T32N-R99W	05/08/2012

Location Detail For : 14077 Cutten Road

Latitude: 42.74380

Longitude: -108.61690

Quarter Quarter:

Quarter:

Section: 13

Township: 32N

Range: 99W

County: Fremont

State: Wyoming

District: District 4

Physical Address 1: 14077 Cutten Road

Physical Address 2:

City: Houston

Zip: 77069

Effective Date: 05/08/2012

- API

API
1305370
1305371
1305372
1305384
1305386
1305389
1305391
1305393
1305396
1305400
1305401
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1305416
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DEQ Ex. 2 - 39

1305420
1305422
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1305461
1305464
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1305466
1305471
1305479
1306921
1306948
1306971
1308027
1308109
1308110
1320004
1320009
1320021
1320025
1320026
1320038
1320041
1320046
1320047
1320081
1320083
1320106
1320150
1320168
1320316
1320359
1321565
1321618
1321619
1323438
1323439
1323440

- Notes

User Name	Date	Note
Data, Legacy	05/08/2012	[AQDS_Site_Memo] AP-9347 was submitted by Citation to update equipment and emissions and to transfer ownership from Meritage to Citation. Meritage never filed change of ownership forms after taking possession from Quicksilver in 2004.

- NAICS Codes

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- Contacts

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	11/18/2019	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix:	Ms.	First Name:	Lee Ann
Middle Name:		Last Name:	Elsom
Suffix:			
Company Title:	Manager Regulatory Compliance	Contact's Company Name:	Citation Oil & Gas Corp.
Address 1:	14077 Cutten Road		
Address 2:			
City:	Houston	Zip Code:	77069
State:	Texas		
Work Phone No:	(281)891-1577	Secondary Phone No.:	
Address 2:	(281)517-7196	Secondary Ext. No.:	
Mobile Phone No.:		Pager No.:	
Fax No:		Pager PIN No.:	
Email:	lelsom@cogc.com		
Email Pager Address:			

- Rules & Regs

Subject to Part 60 NSPS:		Subject to 112(r) Accidental Release Prevention:	

DEQ Ex. 2 - 41

Subject to Part 61 NESHAP:

Subject to non-attainment NSR:

Subject Part 63 NESHAP:

Subject to PSD:

Subject to Title IV Acid Rain:

- **Attachments**

Description	Type	Modified By	Modified Date
Permit History as of 12/02/2014	Other	Coffman, Ella(inactive)	12/02/2014

- **Version**

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	04/07/2020		
58806	01/30/2020	04/07/2020	X
56671	10/02/2019	01/30/2020	X
3333	05/08/2012	10/02/2019	X

DEQ Ex. 2 - 42

Emission Unit : FLR001

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 0.02 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min): 0.2500

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-1

Company Equipment Description: Combined Gunbarrel and Oil Tanks Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC010

Process Name: FLR-1

Company Process Description: Combined Gunbarrel and Oil Tanks Vent

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER009

DEQ Ex. 2 - 43

Emission Unit : FLR002

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: FLR002

Emission Unit Type: Flare

Maximum Design Capacity: 0.02 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min): 0.2500

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-2

Company Equipment Description: Dedicated Gunbarrel Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: FLR-2

Company Process Description: Dedicated Gunbarrel Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER010

DEQ Ex. 2 - 44

Emission Unit : FUG001

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	78	4
Flanges	0	0	138	10
Open Ended Lines	0	0	1	1
Pump Seals	0	0	4	2
Valves	0	0	70	6
Other	0	0	5	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitive Emissions

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC008

Process Name: FUG

Company Process Description: Fugitive Emissions

Source Classification Code (SCC): 3-10-888-11

Release points(s) directly associated with this process

DEQ Ex. 2 - 45

VER008

DEQ Ex. 2 - 46

Emission Unit : LUD001

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: LUD001

Emission Unit Type: Loading/Unloading/Dump

Type of Material: Liquid

Material Description: Oil

Maximum Annual Throughput: 536550 Units: gallons/yr

Initial Operation Commencement Date: 08/22/2011

AQD Description: LUD0001

Company Equipment ID: OLD

Company Equipment Description: Oil Loading

Operating Status: Operating

Initial Construction Commencement Date: 08/22/2011

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC007

Process Name:

Company Process Description: Oil Loading

Source Classification Code (SCC): 3-10-001-99

Release points(s) directly associated with this process

VER007

DEQ Ex. 2 - 47

Emission Unit : SEP001

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: SEP001

Emission Unit Type: Separator/Treater

Type Of Vessel: Gun Barrel

is Vessel Heated: No

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: SEP-1

Company Equipment Description: Gunbarrel

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: SEP-1

Company Process Description: Gunbarrel

Source Classification Code (SCC): 3-10-001-07

Control equipment(s) directly associated with this process

FLA001

FLA002

DEQ Ex. 2 - 48

Emission Unit : TNK001

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: TNK001

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Capacity: 1000 Units: barrels

Maximum Throughput: 191.0000 Units: barrels/day

Tank Location:

Initial Operation Commencement Date: 08/22/2011

AQD Description: TNK0001

Company Equipment ID: TK-1

Company Equipment Description: 1000-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 08/22/2011

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC001

Process Name:

Company Process Description: 1000-bbl Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 49

Emission Unit : TNK002

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Capacity: 500 Units: barrels

Maximum Throughput: 191.0000 Units: barrels/day

Tank Location:

Initial Operation Commencement Date: 08/22/2011

AQD Description: TNK0002

Company Equipment ID: TK-2

Company Equipment Description: 500-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 08/22/2011

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name:

Company Process Description: 500-bbl Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 50

Emission Unit : TNK003

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID: TNK003

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Capacity: 400 Units: barrels

Maximum Throughput: 191.0000 Units: barrels/day

Tank Location:

Initial Operation Commencement Date: 08/22/2011

AQD Description: TNK0003

Company Equipment ID: TK-3

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 08/22/2011

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC003

Process Name:

Company Process Description: 400-bbl Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 51

Emission Unit : TNK004

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID:	TNK004		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Capacity:	400	Units:	barrels
Maximum Throughput:	191.0000	Units:	barrels/day
Tank Location:			
Initial Operation Commencement Date:	08/22/2011		
AQD Description:	TNK0004		
Company Equipment ID:	TK-4		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Permanently Shutdown	Shutdown Date:	08/22/2011
Initial Construction Commencement Date:	08/22/2011		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

DEQ Ex. 2 - 52

Emission Unit : TNK005

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID:	TNK005		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Capacity:	400	Units:	barrels
Maximum Throughput:	191.0000	Units:	barrels/day
Tank Location:			
Initial Operation Commencement Date:	08/22/2011		
AQD Description:	TNK0005		
Company Equipment ID:	TK-5		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Permanently Shutdown	Shutdown Date:	08/22/2011
Initial Construction Commencement Date:	08/22/2011		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

DEQ Ex. 2 - 53

Emission Unit : TNK006

Apr 9 2020, 10:55:39

- Emission Unit Information

AQD Emissions Unit ID:	TNK006		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Capacity:	1000	Units:	barrels
Maximum Throughput:	2.7400	Units:	barrels/day
Tank Location:			
Initial Operation Commencement Date:	08/22/2011		
AQD Description:	TNK0006		
Company Equipment ID:	TK-6		
Company Equipment Description:	1000-bbl Oil Slop Tank		
Operating Status:	Permanently Shutdown	Shutdown Date:	08/22/2011
Initial Construction Commencement Date:	08/22/2011		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

DEQ Ex. 2 - 54

Control Equipment : FLA001

Apr 9 2020, 10:55:39

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-1

Company Control Equipment Description: Combined Gunbarrel and Oil Tanks Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER009

DEQ Ex. 2 - 55

Control Equipment : FLA002

Apr 9 2020, 10:55:39

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA002

AQD Description:

Company Control Equipment ID: FLR-2

Company Control Equipment Description: Dedicated Gunbarrel Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER010

DEQ Ex. 2 - 56

Release Point : VER009

Apr 9 2020, 10:55:39

- Release Point Information

Release Point ID:	VER009
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Combined Gunbarrel and Oil Tanks Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	42.7438	Longitude:	-108.6169

DEQ Ex. 2 - 57

Release Point : VER010

Apr 9 2020, 10:55:39

- Release Point Information

Release Point ID:	VER010
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-2
Company Release Point Description:	Dedicated Gunbarrel Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	42.7438	Longitude:	-108.6169

DEQ Ex. 2 - 58

Release Point : VER008

Apr 9 2020, 10:55:39

- Release Point Information

Release Point ID:	VER008
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitive Emissions
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	42.7438	Longitude:	-106.6169

DEQ Ex. 2 - 59

Release Point : VER007

Apr 9 2020, 10:55:39

- Release Point Information

Release Point ID:	VER007
Release Type:	Vertical
AQD Description:	Oil Loading
Company Release Point ID:	LUD
Company Release Point Description:	Oil Loading
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.25
Exit Gas Velocity (ft/s):	2.0	Exit Gas Flow Rate (acfm):	5.9
Exit Gas Temp (F):	70.0		

- Release Latitude and Longitude

Latitude:	42.7438	Longitude:	-108.6169

DEQ Ex. 2 - 60

EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

January 22, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
Embar 1 Tank Battery
Park County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the Embar 1 Tank Battery in Park County, Wyoming. EDGE is submitting this waiver request for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

HOUSTON | BATON ROUGE | ASHEVILLE | DENVER

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

General Notes

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil and Gas Corp.
Facility/Well Name	LBB Embar 1
Field Name	Little Buffalo Basin
Nearest City/Town	Meeteetse
API Number/SIC Code	
Latitude/Longitude	44.06275, -108.80671
County	Park
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	135
Produced Water Site Throughput (bbl/day):	15135
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

*****Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.*****

Equipment/Process Types	How many for this project?	How many for this site?
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers	4	4
Oil / Condensate Tanks	3	3
Produced Water Tanks	2	2
Miscellaneous Tanks	1	1
Loading Jobs		
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors	1	1
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil and Gas Corp.
LBB Embar 1

Gas and Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** fill out this table.

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	0.0000
VOC weight fraction =	0.0000

VOC content of hydrocarbon fraction only

VOC weight% =	#DIV/0!
VOC weight fraction =	#DIV/0!

Hydrogen Sulfide

H2S weight% =	0.0000
H2S weight fraction =	0.00E+00
H2S ppm_V =	
H2S ppm_{WT}=	0.00

Benzene

Benzene content of total sample

Benzene weight% =	0.0000
Benzene weight fraction =	0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% =	#DIV/0!
Benzene weight fraction =	#DIV/0!

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	Atmospheric Tank Liquid
What site is the sample from?	LBB Embar 3
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	A representative oil analysis was taken at LBB Embar 3. Both LBB Embar 1 and LBB Embar 3 extract well emulsion from the same formation. Petroleum liquids have a similar API gravity, within 3 degrees. Both sites have similar operations where a sample could be taken at the tanks (post flash).
Where in the process was the sample taken?	Oil Storage Tank
What is the temperature and pressure of the sample (include units)?	Ambient
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	20-Dec-17

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.0000	34.08188	0	0.0000
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.0322	30.06904	1	0.0024
propane (C3)	0.1656	44.09562	7	0.0178
butanes (C4)	0.6340	58.12220	37	0.0900
pentanes (C5)	1.6580	72.14878	120	0.2922
benzene	0.0117	78.110000	1	0.0022
other hexanes (C6)	3.5785	86.18000	308	0.7533
toluene	0.0970	92.140000	9	0.0218
other heptanes (C7)	3.0426	100.20000	305	0.7447
ethylbenzene	0.1870	106.170000	20	0.0485
xylenes (o, m, p)	0.5775	106.170000	61	0.1498
other octanes (C8)	2.9614	114.23000	338	0.8263
nonanes (C9)	3.0514	128.26000	391	0.9560
decanes plus (C10+)	84.0031	468.30000	39339	96.0948
Totals:	100.0000	409.37	40937.32425	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	99.9976
VOC weight fraction =	1.0000

VOC content of hydrocarbon fraction only

VOC weight% =	99.9976
VOC weight fraction =	1.0000

Hydrogen Sulfide

H2S weight% =	0.0000
H2S weight fraction =	0.00E+00
H2S ppm_V =	0.00
H2S ppm_{WT}=	0.00

Benzene

Benzene content of total sample

Benzene weight% =	0.0022
Benzene weight fraction =	0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% =	0.0022
Benzene weight fraction =	0.0000

Enter any notes here:

The representative liquid analysis was taken from LBB Embar 3. The exteneded report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benezene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n-hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	11		
Separators		Separator	2		
Meters/piping [2]		Heater-treater	4		
Compressors		Header	1		
In-Line Heaters		Tanks	3	Tanks	3
Dehydrators		Pumps	2	Pumps	1
Scrubbers [3]		Sample Ports	6	Sample Ports	1

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	141	Valves	27
Pump Seals	0	Pump Seals	4	Pump Seals	2
Connectors	0	Connectors	186	Connectors	34
Flange	0	Flange	254	Flange	52
Open-Ended Lines	0	Open-Ended Lines	6	Open-Ended Lines	1
Other	0	Other	11	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(i)(A) dictates counting one meters/piping per well-pad for production operations.

[3] Scrubbers assumed to have the same fugitive components as separators.

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil and Gas Corp.
LBB Embar 1

Fugitives Emissions

EPN	FUG
Name	Fugitive Emission

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.9976
Benzene wt %	0.0022
H_2S wt %	0.0000

(3)

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
141	Valve	0.005500	0.7755	3.39669
4	Pump Seal	0.028660	0.11464	0.5021232
186	Connector	0.000463	0.086118	0.37719684
254	Flange	0.000243	0.061722	0.27034236
6	Open-ended Line	0.003090	0.01854	0.0812052
11	Other	0.016500	0.1815	0.79497
		Total:	1.23802	5.4225276

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0000	
Pump Seal	99.9976	0.0022	0.0000	
Connector	99.9976	0.0022	0.0000	
Flange	99.9976	0.0022	0.0000	
Open-ended Line	99.9976	0.0022	0.0000	
Other	99.9976	0.0022	0.0000	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.78	3.40	0.00	0.00	0.00	0.00
Pump Seal	0.11	0.50	0.00	0.00	0.00	0.00
Connector	0.09	0.38	0.00	0.00	0.00	0.00
Flange	0.06	0.27	0.00	0.00	0.00	0.00
Open-ended Line	0.02	0.08	0.00	0.00	0.00	0.00
Other	0.18	0.79	0.00	0.00	0.00	0.00
Total:	1.24	5.42	0.00	0.00	0.00	0.00

(4)

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
27	Valve	0.000216	0.005832	0.02554416
2	Pump Seal	0.000052	0.000104	0.00045552
34	Connector	0.000243	0.008262	0.03618756
52	Flange	0.000006	0.000312	0.00136656
1	Open-ended Line	0.000550	0.00055	0.002409
0	Other	0.030900	0	0
		Total:	0.01506	0.0659628

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0000	
Pump Seal	99.9976	0.0022	0.0000	
Connector	99.9976	0.0022	0.0000	
Flange	99.9976	0.0022	0.0000	
Open-ended Line	99.9976	0.0022	0.0000	
Other	99.9976	0.0022	0.0000	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.01	0.03	0.00	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00	0.00
Connector	0.01	0.04	0.00	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.02	0.07	0.00	0.00	0.00	0.00

(5)

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	1.25	5.49
benzene	0.00	0.00
H_2S	0.00	0.00

Notes:

Reference to Emission factors used:

1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4.

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

Citation Oil and Gas Corp.
LBB Embar 1

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-1	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit has a heating value of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
LBB Embar 1

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-2	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit has a heating value of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
LBB Embar 1

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-3	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit has a heating value of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
LBB Embar 1

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-4	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.0040	0.0177
NOx	100	0.0735	0.3221
CO	84	0.0618	0.2705
PM_{10}	7.6	0.0056	0.0245
$PM_{2.5}$	5.7	0.0042	0.0184
SO_2	0.6	0.0029	0.0125

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	This unit has a heating value of 0.75 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
Embar 1 Tank Battery
Oil Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from the oil tanks at Embar 1 Tank Battery was measured from 12/26/18 until 1/15/19 with a Fox Thermal Instruments Model FT4A meter. Total flow to the combustor was measured for a total of 479 hours. Flow totaled 37.267 mscf during that time for an average of 1.867 mscfd.

Site	**Embar 1**
Flow Test Date	12/26/18-1/15/19
Duration	479 hrs
Vent Temperature	100.0
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	1.867
Avg Gas Measured (mscf/day)	1.439
MW (lb/lb-mol)	39.198
Sample Site	Embar 3 Vent Gas
Sample Location and Date	Flare Gas 8/7/18
days/yr	365
lb/ton	2000
Total Gas Emitted (tpy)	27.1610
wt % VOC	11.1410
wt % Benzene	0.0000
wt % H2S	1.9746
Total Emissions	
VOC Emissions (tpy)	3.0260
VOC Emissions (lb/hr)	0.6909
Benzene Emissions (tpy)	0.0000
Benzene Emissions (lb/hr)	0.0000
H2S Emissions (tpy)	0.5363
H2S Emissions (lb/hr)	0.1224

Standard Conditions

scf/lb-mol	379
Deg F	60
psia	14.7
Deg R	520

Ambient temperature was taken from the NWS daily average for 8/1/18.

Citation Oil and Gas Corp.
LBB Embar 1

Flare / Vapor Combustor

General Information	
Unit Name:	Oil Tank Vapor Combustor
Unit EPN:	FLR-1
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Oil Tanks Vent										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		59.957944										74.957944
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		525231.59										656631.59
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		478										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Oil Tanks Vent										-
H2S	-	-	0.12244701										0.12244701
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.69086991										0.69086991
benzene	-	-	0										0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.53631792										0.53631792
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	3.0260102										3.0260102
benzene	-	-	0										0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Oil Tanks Vent**										**-**
NOx	0.002	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0055**
CO	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0023**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0006**
H2S	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0025**
SO2	0.000	0.000	0.230	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.2302**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
Total VOC	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0139**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Oil Tanks Vent**										**-**
NOx	0.007	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0241**
CO	0.006	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0099**
PM2.5	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0019**
PM10	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0025**
H2S	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0107**
SO2	0.000	0.000	1.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.0082**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
Total VOC	0.000	0.000	0.061	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0609**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.01	0.06
NOx	0.01	0.02
CO	0.00	0.01
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.01
SO2	0.23	1.01
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	586
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	586
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft^2)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.42

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

The Embar 1 flare used a continuous pilot and maintains a minimum destruction efficiency of 98%. Gas from the process vessels and equipment is all piped to the flare. Volumes and heating values for each tank was taken from the respective E&P Tanks reports. NOx and CO emission factors are from Wyoming's guidance on Oil and Gas Production Facilities Chapter 2, Section 6 (May 2016).

Citation Oil & Gas Corp.
Embar 1 Tank Battery
Water Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from the water tanks at Embar 1 Tank Battery was measured from 11/12/18 until 11/13/18 with a Fox Thermal Instruments Model FT4A meter. Total flow to the combustor was measured for a total of 19.87 hours. Flow totaled 52.207 mscf during that time for an average of 63.058 mscfd.

	Embar 1
Flow Test Date	11/12/18-11/13/18
Duration	19.87 hrs
Vent Temperature	100.0
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	63.058
Avg Gas Measured (mscf/day)	48.596
Water Vapor Flow (mscf/day)	3.359
Dry Flow (mscf/day)	45.237
MW (lb/lb-mol)	25.911
Sample Site	Embar 1 Vent Gas
Sample Location and Date	Pop Tank 8/7/18
days/yr	365
lb/ton	2000
Total Gas Emitted (tpy)	564.4131
wt % VOC	15.8976
wt % Benzene	0.0000
wt % H2S	1.1693
Total Emissions	
VOC Emissions (tpy)	89.7283
VOC Emissions (lb/hr)	20.4859
Benzene Emissions (tpy)	0.0000
Benzene Emissions (lb/hr)	0.0000
H2S Emissions (tpy)	6.5999
H2S Emissions (lb/hr)	1.5068

Vent Stream Water Concetration

Moisture Content (lb H2O/lb Air)	0.043
MW H2O	18.02
MW Air	28.97
mol % Water	6.91

From Perry's Table 12-3; Assuming tank vapors are saturated (100% RH) at 100 F = 0.043 lb water per lb of dry air.

Standard Conditions

scf/lb-mol	379
Deg F	60
psia	14.7
Deg R	520

Ambient temperature was taken from the NWS daily average for 8/1/18.

Citation Oil and Gas Corp.
LBB Embar 1

Flare / Vapor Combustor

General Information	
Unit Name:	Water Tank Flare
Unit EPN:	FLR-2
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Water Tanks Vent										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		1884.85542										1899.85542
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		16511333.5										16642733.5
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		975.207										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Water Tanks Vent										-
H2S	-	-	1.50682958										1.50682958
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	20.4859202										20.4859202
benzene	-	-	0										0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	6.59991357										6.59991357
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	89.7283307										89.7283307
benzene	-	-	0										0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Water Tanks Vent**										**-**
NOx	0.002	0.000	0.257	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.2588**
CO	0.001	0.000	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0656**
PM2.5	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0108**
PM10	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0144**
H2S	0.000	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0301**
SO2	0.000	0.000	2.832	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.8324**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
Total VOC	0.000	0.000	0.410	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.4098**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Water Tanks Vent**										**-**
NOx	0.007	0.000	1.127	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.1337**
CO	0.006	0.000	0.282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.2873**
PM2.5	0.000	0.000	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0474**
PM10	0.000	0.000	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0632**
H2S	0.000	0.000	0.132	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.1320**
SO2	0.000	0.000	12.406	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**12.4059**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
Total VOC	0.000	0.000	1.795	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.7949**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.41	1.79
NOx	0.26	1.13
CO	0.07	0.29
PM2.5	0.01	0.05
PM10	0.01	0.06
H2S	0.03	0.13
SO2	2.83	12.41
benzene	0.00	0.00

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	976
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	976
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft^2)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	10.76

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

The Embar 1 flare uses a continuous pilot and maintains a minimum destruction efficiency of 98%. Gas from the process vessels and water tanks is all piped to the flare. NOx and CO emission factors are from Wyoming's guidance on Oil and Gas Production Facilities Chapter 2, Section 6 (May 2016). Vapor flowrate and compostion based on measured values.

Citation Oil and Gas Corp.
LBB Embar 1

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions*.

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates*.

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emission	Total VOC	1.2531	5.4884
		Benzene	0.0000	0.0001
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0000	0.0000
		NO_X	0.0000	0.0000
		CO	0.0000	0.0000
		PM_{10}	0.0000	0.0000
		$PM_{2.5}$	0.0000	0.0000
HTR-1	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-2	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-3	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306

HTR-4	0.75 MMBtu/hr Heater Treater	**Total VOC**	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184
FLR-1	Oil Tank Vapor Combustor	**Total VOC**	0.0139	0.0609
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0025	0.0107
		SO_2	0.2302	1.0082
		NO_X	0.0055	0.0241
		CO	0.0023	0.0099
		PM_{10}	0.0006	0.0025
		$PM_{2.5}$	0.0004	0.0019
FLR-2	Water Tank Flare	**Total VOC**	0.4098	1.7949
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0301	0.1320
		SO_2	2.8324	12.4059
		NO_X	0.2588	1.1337
		CO	0.0656	0.2873
		PM_{10}	0.0144	0.0632
		$PM_{2.5}$	0.0108	0.0474

Uncollected Emission Rates (emission rates are represented as the sum of all uncontrolled sources, excluding the flare)			
	Air Contaminant Name (3)	**Emission Rates**	
		lbs/hr	**TPY (4)**
	Total VOC	22.45	98.35
	Benzene	2.789E-05	1.222E-04
	Formaldehyde	0.00	0.00
	H_2S	1.63	7.14
	SO_2	0.02	0.08
	NO_X	0.44	1.93
	CO	0.37	1.62
	PM_{10}	0.03	0.15
	$PM_{2.5}$	0.03	0.11

Project Total Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)			
	Air Contaminant Name (3)	**Emission Rates**	
		lbs/hr	**TPY (4)**
	Total VOC	1.70	7.45
	Benzene	2.795E-05	1.224E-04
	Formaldehyde	0.00	0.00
	H_2S	0.03	0.14
	SO_2	3.08	13.49
	NO_X	0.71	3.09
	CO	0.44	1.92
	PM_{10}	0.05	0.21
	$PM_{2.5}$	0.04	0.16

If the automated formulas for the project emission totals (which assume that it is possible for all steady state and periodic emissions in the project to occur in the same hour) have been overwritten, explain any changes made and list the project emission points that occur in the realistic worst case hour. (Leave this blank or put NA if none of the formulas have been overwritten.)	All uncollected and uncombusted vapors from the tanks is captured in the fugitive and flare emissions. Project total emissions are the sum of heater treater emissions and controlled tank emissions.

January 22, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74198.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Heptanes Plus	94.725	98.538	99.011
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.9481	(Water=1)
°API Gravity ----------	17.74	@ 60°F
Molecular Weight ----------	427.7	
Vapor Volume ----------	6.86	CF/Gal
Weight ----------	7.90	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.543	0.127	0.079
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
Other C-6's	1.788	0.538	0.376
Heptanes	3.193	0.989	0.750
Octanes	3.604	1.179	0.960
Nonanes	3.051	1.130	0.945
Decanes Plus	84.003	95.000	96.134
Benzene	0.012	0.002	0.002
Toluene	0.097	0.024	0.022
E-Benzene	0.187	0.053	0.049
Xylenes	0.577	0.161	0.150
n-Hexane	0.998	0.299	0.210
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.9548	(Water=1)
Molecular Weight----------	468.3	

Characteristics of Atmospheric Sample:

°API Gravity ----------	18.46	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)----------	1.74	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74198.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Methylcyclopentane	0.441	0.114	0.091
Benzene	0.012	0.002	0.002
Cyclohexane	0.352	0.087	0.072
2-Methylhexane	0.493	0.167	0.121
3-Methylhexane	0.536	0.179	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.464	0.138	0.113
n-Heptane	0.907	0.304	0.222
Methylcyclohexane	0.643	0.188	0.154
Toluene	0.097	0.024	0.022
Other C-8's	2.160	0.692	0.582
n-Octane	0.802	0.299	0.224
E-Benzene	0.187	0.053	0.049
M & P Xylenes	0.130	0.037	0.034
O-Xylene	0.447	0.124	0.116
Other C-9's	2.312	0.827	0.713
n-Nonane	0.740	0.303	0.232
Other C-10's	2.945	1.158	1.017
n-decane	0.580	0.259	0.202
Undecanes(11)	3.492	1.409	1.254
Dodecanes(12)	3.173	1.383	1.248
Tridecanes(13)	3.492	1.632	1.493
Tetradecanes(14)	3.255	1.630	1.511
Pentadecanes(15)	3.127	1.677	1.574
Hexadecanes(16)	2.866	1.643	1.555
Heptadecanes(17)	2.872	1.741	1.663
Octadecanes(18)	2.547	1.625	1.562
Nonadecanes(19)	2.576	1.713	1.656
Eicosanes(20)	2.259	1.561	1.518
Heneicosanes(21)	2.114	1.537	1.503
Docosanes(22)	2.014	1.526	1.501
Tricosanes(23)	1.828	1.436	1.420
Tetracosanes(24)	1.788	1.455	1.446
Pentacosanes(25)	1.726	1.457	1.455
Hexacosanes(26)	1.152	1.008	1.010
Heptacosanes(27)	1.426	1.294	1.304
Octacosanes(28)	1.487	1.394	1.409
Nonacosanes(29)	1.453	1.407	1.427
Triacontanes(30)	1.481	1.480	1.506
Hentriacontanes Plus(31+)	34.353	63.574	65.900
Total	100.000	100.000	100.000

Citation Oil & Gas Corp.
Embar 1 Tank Battery
Embar 1 Oil Tanks Vent Gas Composition
Sample Date: 8/7/2018
The oil tanks sample from Embar 3 was considered representative and used for this analysis.

	Mol %	MW	Wt%
Nitrogen	5.368	28.0134	3.8363
Methane	17.308	16.04246	7.0836
CO2	66.077	44.0095	74.1879
Ethane	2.316	30.06904	1.7766
H2S	2.271	34.08188	1.9746
Propane	1.683	44.09562	1.8933
i-C4	0.547	58.1222	0.8111
n-C4	1.428	58.1222	2.1174
i-C5	0.786	72.14878	1.4467
n-C5	0.739	72.14878	1.3602
C6+	1.477		3.5123
Total	100		100.0000
VOC %	6.6600		11.1410

Total Stream MW 39.198

AMERICAN MOBILE RESEARCH, INC.

1955 CBS COURT
CASPER, WYOMING 82604

(307) 235-4590 OFFICE PHONE
(307) 265-4489 OFFICE FAX

CERTIFICATE OF ANALYSIS
ROUTINE HYDROCARBON GAS ANALYSIS

COMPANY..... CITATION OIL AND GAS

LAB NUMBER..... CR-18681
DATE SAMPLED..... 8-7-2018

STUDY NUMBER CR-2
DATE TESTED 8-9-2018

SAMPLE IDENTIFICATION.... EMBAR #3 FLARE GAS
SAMPLE #2 SAMPLE TAKEN AT 10:15 AM

LOCATION..... EMBAR #3 TANK BATTERY, WYOMING.
PRESSURE..... 5 Ounces
TYPE SAMPLE..... SPOT
CYLINDER ID..... TEDLAR BAG
SAMPLE METHOD. GPA-2166

TEMPERATURE ..... N/A
SAMPLED BY ..... CITATION - B. YACH
COUNTY ..... PARK
TEST METHOD ..... GPA 2261

COMPONENTS	MOLE%		GPM
NITROGEN.....	5.368		
METHANE.....	17.308		
CARBON DIOXIDE....	66.077		
ETHANE.....	2.316	.....	0.618
H2S.....	2.271	.....	0.306
PROPANE.....	1.683	.....	0.462
iso-BUTANE.....	0.547	.....	0.179
n-BUTANE.....	1.428	.....	0.449
iso-PENTANE.....	0.786	.....	0.287
n-PENTANE.....	0.739	.....	0.267
HEXANES+.....	1.477	.....	0.643
TOTALS.....	100.000	.....	3.211

SPECIFIC GRAVITY AT 60/60 F, calculated.....	1.35337
TOTAL GPM (ETHANE INCLUSIVE).....	3.211
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis.....	477.690
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis.....	469.635
AVERAGE MOLECULAR WEIGHT.....	39.198
MOLAR MASS RATIO.....	1.35337
RELATIVE DENSITY, (G X Z (AIR) / Z).....	1.36131
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA.....	473.815
COMPRESSIBILITY FACTOR (Z).....	0.99417

NOTE: ABOVE CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09. THE HEXANES+ (C6+) FACTORS ARE CALCULATED AS A RATIO AMOUNT OF HEXANES (60%), HEPTANES (30%), AND OCTANES (10%).

James A. Kane, President
American Mobile Research, Inc.

Citation Oil & Gas Corp.
Embar 1 Tank Battery
Embar 1 Pop Tanks Vent Gas Composition
Sample Date: 8/7/2018

	Mol %	MW	Wt%
Nitrogen	4.163	28.0134	4.5008
Methane	63.037	16.04246	39.0285
CO2	19.257	44.0095	32.7078
Ethane	5.77	30.06904	6.6959
H2S	0.889	34.08188	1.1693
Propane	2.657	44.09562	4.5217
i-C4	0.724	58.1222	1.6240
n-C4	1.378	58.1222	3.0911
i-C5	0.688	72.14878	1.9157
n-C5	0.52	72.14878	1.4479
C6+	0.917		3.2972
Total	100		100.0000
VOC %	6.8840		15.8976

Stream Total MW 25.911

AMERICAN MOBILE RESEARCH, INC.

1955 CBS COURT
CASPER, WYOMING 82604

(307) 235-4590 OFFICE PHONE
(307) 265-4489 OFFICE FAX

CERTIFICATE OF ANALYSIS
ROUTINE HYDROCARBON GAS ANALYSIS

COMPANY..... CITATION OIL AND GAS

LAB NUMBER..... CR-18681
DATE SAMPLED..... 8-7-2018

STUDY NUMBER CR-5
DATE TESTED 8-9-2018

SAMPLE IDENTIFICATION.... EMBAR #1 VENT GAS POP TANK VAPORS
SAMPLE #1 SAMPLE TAKEN AT 10:00 AM

LOCATION..... EMBAR #1 TANK BATTERY, WYOMING.
PRESSURE..... 2 Ounces
TYPE SAMPLE..... SPOT
CYLINDER ID..... TEDLAR BAG
SAMPLE METHOD. GPA-2166

TEMPERATURE ..... N/A
SAMPLED BY ..... CITATION - B. YACH
COUNTY ..... PARK
TEST METHOD ..... GPA 2261

COMPONENTS	MOLE%		GPM
NITROGEN.....	4.163		
METHANE.....	63.037		
CARBON DIOXIDE....	19.257		
ETHANE.....	5.770	.....	1.539
H2S.....	0.889	.....	0.120
PROPANE.....	2.657	.....	0.730
iso-BUTANE.....	0.724	.....	0.236
n-BUTANE.....	1.378	.....	0.433
iso-PENTANE.....	0.688	.....	0.251
n-PENTANE.....	0.520	.....	0.188
HEXANES+.....	0.917	.....	0.399
TOTALS.....	100.000	.....	3.897

SPECIFIC GRAVITY AT 60/60 F, calculated.....	0.89464
TOTAL GPM (ETHANE INCLUSIVE).....	3.897
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis.....	981.257
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis.....	964.439
AVERAGE MOLECULAR WEIGHT.....	25.911
MOLAR MASS RATIO.....	0.89464
RELATIVE DENSITY, (G X Z (AIR) / Z).....	0.89812
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA.....	975.207
COMPRESSIBILITY FACTOR (Z).....	0.99612

NOTE: ABOVE CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09. THE HEXANES+ (C6+) FACTORS ARE CALCULATED AS A RATIO AMOUNT OF HEXANES (60%), HEPTANES (30%), AND OCTANES (10%).

James A. Kane, President
American Mobile Research, Inc.

Facility : F004573

Apr 7 2020, 14:19:28

- Facility Information

Facility ID: F004573

FacilityName: Embar 1 Tank Battery

Facility Description:

Company Name: Citation Oil & Gas Corp.

Operating Status: Operating

AFS:

Facility Class: Minor

Facility Type: Storage Tank Battery

CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
Section 12, 47N, 100W	Park County	Park	44.06275/-108.80671	S12-T47N-R100W	05/08/2012

Location Detail For : Section 12, 47N, 100W

Latitude: 44.06275

Longitude: -108.80671

Quarter Quarter:

Quarter:

Section: 12

Township: 47N

Range: 100W

County: Park

State: Wyoming

District: District 4

Physical Address 1: Section 12, 47N, 100W

Physical Address 2:

City: Park County

Zip: 82414

Effective Date: 05/08/2012

- API

API
1720603
1720651
2920192
2920337
2920543
2920652
2920653
2920654
2920655
2920831
2920868
2920885
2921108
2921111
2921112
2921118

DEQ Ex. 2 - 90

2921119
2921184
2931213

- **Notes**

User Name	Date	Note

- **NAICS Codes**

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- **Contacts**

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix: Ms.
First Name: Lee Ann
Middle Name:
Last Name: Elsom
Suffix:
Company Title: Manager Regulatory Compliance
Contact's Company Name: Citation Oil & Gas Corp.

Address 1: 14077 Cutten Road
Address 2:
City: Houston
Zip Code: 77069
State: Texas

Work Phone No: (281)891-1577
Secondary Phone No.:
Address 2: (281)517-7196
Secondary Ext. No.:
Mobile Phone No.:
Pager No.:
Fax No:
Pager PIN No.:

Email: lelsom@cogc.com
Email Pager Address:

- **Rules & Regs**

Subject to Part 60 NSPS:
Subject to 112(r) Accidental Release Prevention:
Subject to Part 61 NESHAP:
Subject to non-attainment NSR:
Subject Part 63 NESHAP:
Subject to PSD:
Subject to Title IV Acid Rain:

DEQ Ex. 2 - 91

- **Attachments**

Description	Type	Modified By	Modified Date

- **Version**

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	04/07/2020		
58812	01/30/2020	04/07/2020	X
55957	08/20/2019	01/30/2020	X
53447	03/22/2019	08/20/2019	X
4573	05/08/2012	03/22/2019	X

DEQ Ex. 2 - 92

Emission Unit : FLR001

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 10.43 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: Flare

Company Equipment Description: Flare/Vapor Combustor

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC014

Process Name: Vapor Combustion Unit

Company Process Description: VCU-1

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER001

DEQ Ex. 2 - 93

Emission Unit : FLR002

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: FLR002

Emission Unit Type: Flare

Maximum Design Capacity: 10.43 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-2

Company Equipment Description: Flare/Vapor Combustor

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC015

Process Name: FLR-1

Company Process Description: Water Tank Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER008

DEQ Ex. 2 - 94

Emission Unit : FUG001

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	186	34
Flanges	0	0	254	52
Open Ended Lines	0	0	6	1
Pump Seals	0	0	4	2
Valves	0	0	141	27
Other	0	0	11	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitives

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC013

Process Name: FUG

Company Process Description: Fugitives

Source Classification Code (SCC): 3-10-888-11

Release points(s) directly associated with this process

DEQ Ex. 2 - 95

AVL001

Emission Unit : HET001

Apr 7 2020, 14:19:28

- **Emission Unit Information**

AQD Emissions Unit ID: HET001

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-1

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- **Permitted Emissions**

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- **Processes**
  - **Emission Process Information**

Process ID: PRC007

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER002

DEQ Ex. 2 - 97

Emission Unit : HET002

Apr 7 2020, 14:19:28

- **Emission Unit Information**

AQD Emissions Unit ID: HET002

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-2

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- **Permitted Emissions**

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- **Processes**
  - **Emission Process Information**

Process ID: PRC008

Process Name: HTR-2

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER003

DEQ Ex. 2 - 98

Emission Unit : HET003

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: HET003

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-3

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: HTR-3

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER004

DEQ Ex. 2 - 99

Emission Unit : HET004

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: HET004

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.75

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-4

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC010

Process Name: HTR-4

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER005

DEQ Ex. 2 - 100

Emission Unit : TNK001

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID:	TNK001		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	400	Units:	barrels
Maximum Throughput:	135.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-1		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC001
Process Name:	Tank 1
Company Process Description:	Oil Storage Tank
Source Classification Code (SCC):	4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 101

Emission Unit : TNK002

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-2

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name: Tank 2

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 102

Emission Unit : TNK003

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID:	TNK003		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	400	Units:	barrels
Maximum Throughput:	1.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-3		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC003
Process Name:	Tank 3
Company Process Description:	Oil Storage Tank
Source Classification Code (SCC):	4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 103

Emission Unit : TNK006

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID:	TNK006		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Produced Water		
Submerged Fill Pipe?:	No		
Capacity:	400	Units:	barrels
Maximum Throughput:	2.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	POPTK		
Company Equipment Description:	400-bbl Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC006
Process Name:	POPTK
Company Process Description:	Pop Tank
Source Classification Code (SCC):	4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 104

Emission Unit : TNK007

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: TNK007

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 3000 Units: barrels

Maximum Throughput: 15135.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-1

Company Equipment Description: 3000-bbl Water Tank

Operating Status: Not Yet Installed

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: Water Tank 1

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 4-04-003-15

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 105

Emission Unit : TNK004

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: TNK004

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-4

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Permanently Shutdown Shutdown Date: 12/31/1969

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC004

Process Name: PW-1

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 106

Emission Unit : TNK005

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: TNK005

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-5

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Permanently Shutdown Shutdown Date: 12/31/1969

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC005

Process Name: PW-2

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 107

Emission Unit : TNK008

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: TNK008

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-2

Company Equipment Description: This tank was inadvertently included during the development of the facility in IMPACT but is not in operation at the site. Please remove from the inventory.

Operating Status: Permanently Shutdown Shutdown Date: 12/31/1969

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC012

Process Name: Water Tank 2

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 4-04-003-15

Release points(s) directly associated with this process

VER007

DEQ Ex. 2 - 108

Emission Unit : TNK009

Apr 7 2020, 14:19:28

- Emission Unit Information

AQD Emissions Unit ID: TNK009

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-2

Company Equipment Description: This tank was inadvertently included during the development of the facility in IMPACT but is not in operation at the site. Please remove from the inventory.

Operating Status: Permanently Shutdown Shutdown Date: 12/31/1969

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

DEQ Ex. 2 - 109

Control Equipment : FLA001

Apr 7 2020, 14:19:28

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-1

Company Control Equipment Description: Flare 1

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER001

DEQ Ex. 2 - 110

Control Equipment : FLA002

Apr 7 2020, 14:19:28

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA002

AQD Description:

Company Control Equipment ID: FLR-2

Company Control Equipment Description: Water Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER008

DEQ Ex. 2 - 111

Release Point : VER001

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER001
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.06194	Longitude:	-108.80389

DEQ Ex. 2 - 112

Release Point : VER008

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER008
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-2
Company Release Point Description:	Water Tank Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.06275	Longitude:	-108.80671

DEQ Ex. 2 - 113

Release Point : AVL001

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	AVL001
Release Type:	Fugitive (Area, Volume, Line)
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitives
Operating Status:	Operating
Release Height (ft):	3.0

- Release Latitude and Longitude

Latitude:	44.06275	Longitude:	-108.80671

DEQ Ex. 2 - 114

Release Point : VER002

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER002
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	246.93
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.06194	Longitude:	-108.80389

DEQ Ex. 2 - 115

Release Point : VER003

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER003
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-2
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.06194	Longitude:	-108.80389

DEQ Ex. 2 - 116

Release Point : VER004

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER004
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-3
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.06194	Longitude:	-108.80389

DEQ Ex. 2 - 117

Release Point : VER005

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER005
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-4
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.06194	Longitude:	-108.80389

DEQ Ex. 2 - 118

Release Point : VER006

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER006
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	PW-1
Company Release Point Description:	3000-bbl Produced Water Tank
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	0.0	Exit Gas Flow Rate (acfm):	0.0
Exit Gas Temp (F):	60.0		

- Release Latitude and Longitude

Latitude:	44.06275	Longitude:	-108.80671

DEQ Ex. 2 - 119

Release Point : VER007

Apr 7 2020, 14:19:28

- Release Point Information

Release Point ID:	VER007
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	PW-2
Company Release Point Description:	400-bbl Water Overflow Tank
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	0.0	Exit Gas Flow Rate (acfm):	0.0
Exit Gas Temp (F):	60.0		

- Release Latitude and Longitude

Latitude:	44.06275	Longitude:	-108.80671

DEQ Ex. 2 - 120

EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

January 22, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
Embar 3 Tank Battery
Park County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the Embar 3 Tank Battery in Park County, Wyoming. EDGE is submitting this waiver request for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

HOUSTON | BATON ROUGE | ASHEVILLE | DENVER

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

General Notes

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil & Gas Corp.
Facility/Well Name	LBB Embar 3
Field Name	Little Buffalo Basin
Nearest City/Town	Meeteese
API Number/SIC Code	
Latitude/Longitude	44.06890, -108.81306
County	Park
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	175
Produced Water Site Throughput (bbl/day):	30000
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

*****Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.*****

Equipment/Process Types	How many for this project?	How many for this site?
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers	4	4
Oil / Condensate Tanks	4	4
Produced Water Tanks	1	1
Miscellaneous Tanks	1	1
Loading Jobs		
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors	1	1
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil & Gas Corp.
LBB Embar 3

Gas and Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** fill out this table.

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 0.0000
VOC weight fraction = 0.0000

VOC content of hydrocarbon fraction only

VOC weight% = #DIV/0!
VOC weight fraction = #DIV/0!

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V =
H2S ppm_{WT} = 0.00

Benzene

Benzene content of total sample

Benzene weight% = 0.0000
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = #DIV/0!
Benzene weight fraction = #DIV/0!

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	Atmospheric Tank Liquid
What site is the sample from?	LBB Embar 3
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	Oil Storage Tank
What is the temperature and pressure of the sample (include units)?	Ambient
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	20-Dec-17

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.0000	34.08188	0	0.0000
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.0322	30.06904	1	0.0024
propane (C3)	0.1656	44.09562	7	0.0178
butanes (C4)	0.6340	58.12220	37	0.0900
pentanes (C5)	1.6580	72.14878	120	0.2922
benzene	0.0117	78.110000	1	0.0022
other hexanes (C6)	3.5785	86.18000	308	0.7533
toluene	0.0970	92.140000	9	0.0218
other heptanes (C7)	3.0426	100.20000	305	0.7447
ethylbenzene	0.1870	106.170000	20	0.0485
xylenes (o, m, p)	0.5775	106.170000	61	0.1498
other octanes (C8)	2.9614	114.23000	338	0.8263
nonanes (C9)	3.0514	128.26000	391	0.9560
decanes plus (C10+)	84.0031	468.30000	39339	96.0948
Totals:	100.0000	409.37	40937.3243	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 99.9976
VOC weight fraction = 1.0000

VOC content of hydrocarbon fraction only

VOC weight% = 99.9976
VOC weight fraction = 1.0000

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V = 0.00
H2S ppm_{WT} = 0.00

Benzene

Benzene content of total sample

Benzene weight% = 0.0022
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = 0.0022
Benzene weight fraction = 0.0000

Enter any notes here:

The representative liquid analysis was taken from LBB Embar 3. The extended report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benezene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n-hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	13		
Separators		Separator	5		
Meters/piping [2]		Heater-treater	4		
Compressors		Header	1		
In-Line Heaters		Tanks	4	Tanks	1
Dehydrators		Pumps	3	Pumps	1
Scrubbers [3]		Sample Ports	7	Sample Ports	1

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	182	Valves	13
Pump Seals	0	Pump Seals	6	Pump Seals	2
Connectors	0	Connectors	238	Connectors	14
Flange	0	Flange	334	Flange	24
Open-Ended Lines	0	Open-Ended Lines	7	Open-Ended Lines	1
Other	0	Other	13	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(i)(A) dictates counting one meters/piping per well-pad for production operations.

[3] Scrubbers assumed to have the same fugitive components as separators.

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil & Gas Corp.
LBB Embar 3

Fugitives Emissions

EPN	FUG
Name	Fugitive Emissions

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.9976
Benzene wt %	0.0022
H_2S wt %	0.0000

(3)

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
182	Valve	0.005500	1.001	4.38438
6	Pump Seal	0.028660	0.17196	0.7531848
238	Connector	0.000463	0.110194	0.48264972
334	Flange	0.000243	0.081162	0.35548956
7	Open-ended Line	0.003090	0.02163	0.0947394
13	Other	0.016500	0.2145	0.93951
		Total:	1.600446	7.00995348

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0000	
Pump Seal	99.9976	0.0022	0.0000	
Connector	99.9976	0.0022	0.0000	
Flange	99.9976	0.0022	0.0000	
Open-ended Line	99.9976	0.0022	0.0000	
Other	99.9976	0.0022	0.0000	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	1.00	4.38	0.00	0.00	0.00	0.00
Pump Seal	0.17	0.75	0.00	0.00	0.00	0.00
Connector	0.11	0.48	0.00	0.00	0.00	0.00
Flange	0.08	0.36	0.00	0.00	0.00	0.00
Open-ended Line	0.02	0.09	0.00	0.00	0.00	0.00
Other	0.21	0.94	0.00	0.00	0.00	0.00
Total:	1.60	7.01	0.00	0.00	0.00	0.00

(4)

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
13	Valve	0.000216	0.002808	0.01229904
2	Pump Seal	0.000052	0.000104	0.00045552
14	Connector	0.000243	0.003402	0.01490076
24	Flange	0.000006	0.000144	0.00063072
1	Open-ended Line	0.000550	0.00055	0.002409
0	Other	0.030900	0	0
		Total:	0.007008	0.03069504

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0000	
Pump Seal	99.9976	0.0022	0.0000	
Connector	99.9976	0.0022	0.0000	
Flange	99.9976	0.0022	0.0000	
Open-ended Line	99.9976	0.0022	0.0000	
Other	99.9976	0.0022	0.0000	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.00	0.01	0.00	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00	0.00
Connector	0.00	0.01	0.00	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.01	0.03	0.00	0.00	0.00	0.00

(5)

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	1.61	7.04
benzene	0.00	0.00
H_2S	0.00	0.00

Notes:

Reference to Emission factors used:

1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4.

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

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LBB Embar 3

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-1	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit has a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
LBB Embar 3

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-2	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit has a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
LBB Embar 3

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-3	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.004	0.018
NOx	100	0.074	0.322
CO	84	0.062	0.271
PM_{10}	7.6	0.006	0.024
$PM_{2.5}$	5.7	0.004	0.018
SO_2	0.6	0.003	0.013

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	A heaThis unit has a heating duty of 0.75 MMBtu/hr.. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
LBB Embar 3

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-4	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.004	0.018
NOx	100	0.074	0.322
CO	84	0.062	0.271
PM_{10}	7.6	0.006	0.024
$PM_{2.5}$	5.7	0.004	0.018
SO_2	0.6	0.003	0.013

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit has a heating duty of 0.75 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
LBB Embar 3

Flare / Vapor Combustor

General Information	
Unit Name:	Pop Tank Flare
Unit EPN:	FLR-1
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Pop Tank										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15												15
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760												-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400												131400
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020												-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Pop Tank										-
H2S	-	-											0
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-											0
benzene	-	-											0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-											0
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-											0
benzene	-	-											0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Pop Tank**										**-**
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0015**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0013**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
SO2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
Total VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Pop Tank**										**-**
NOx	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0066**
CO	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0055**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0005**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
SO2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
Total VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.0000	0.0000
Total Natural Gas VOC	0.0001	0.0004
Total VOC	0.0001	0.0004
NOx	0.0015	0.0066
CO	0.0013	0.0055
PM2.5	0.0001	0.0004
PM10	0.0001	0.0005
H2S	0.0000	0.0000
SO2	0.0000	0.0000
benzene	0.0000	0.0000

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1020
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1020
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft^2)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.08

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

The Pop Tank receives emergency releases only but is included here to capture pilot emissions from the flare.

Citation Oil & Gas Corp.
Embar 3 Tank Battery
Oil Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from the oil tanks at Embar 3 Tank Battery was measured from 4/9/18 to 4/11/19 with a Fox Thermal Instruments Model FT4A meter. Total flow to the combustor was measured for a total of 96.7 hours and averaged 0.622 mcfd. A contingency of 1.5 was added to provide a conservative estimate of PTE.

Site	**Embar 3**
Flow Test Date	4/9/18-4/11/19
Duration	96.7 hrs
Ambient Temp (F)	43.8
Vent Temperature	100.0
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	0.622
Avg Gas Measured (mscf/day)	0.479
MW (lb/lb-mol)	39.198
Sample Site	Embar #3 Flare Gas
Sample Location and Date	Flare Line 8/7/18
days/yr	365
lb/ton	2000
Contingency	1
Total Gas Emitted (tpy)	9.0437
wt % VOC	11.1410
wt % Benzene	0.0000
wt % H2S	1.9746
Total Emissions	
VOC Emissions (tpy)	1.0076
VOC Emissions (lb/hr)	0.2300
Benzene Emissions (tpy)	0.0000
Benzene Emissions (lb/hr)	0.0000
H2S Emissions (tpy)	0.1786
H2S Emissions (lb/hr)	0.0408

Standard Conditions

Molar Volume (scf/lb-mol)	379
Deg F	60
psia	14.7
Deg R	520

Citation Oil & Gas Corp.
LBB Embar 3

Flare / Vapor Combustor

General Information	
Unit Name:	Oil Tank Vapor Combustion Unit
Unit EPN:	FLR-2
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Oil Tanks										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		19.9638844										34.9638844
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		174883.627										306283.627
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		478										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	#REF!	#REF!	Oil Tanks								-
H2S	-	-			0.04077054								0.04077054
Crude or Condensate VOC	-	-			0.23003536								0.23003536
Natural Gas VOC	-	-											0
Total VOC	-	-			0.23003536								0.23003536
benzene	-	-			0								0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-			0.17857499								0.17857499
Crude or Condensate VOC	-	-			1.00755486								1.00755486
Natural Gas VOC	-	-											0
Total VOC	-	-			1.00755486								1.00755486
benzene	-	-			0								0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Oil Tanks**										**-**
NOx	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.08**
Crude or Condensate VOC	-	-	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Oil Tanks**										**-**
NOx	0.007	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.336	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.34**
Crude or Condensate VOC	-	-	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.0046	0.0202
Total Natural Gas VOC	0.0001	0.0004
Total VOC	0.0047	0.0205
NOx	0.0028	0.0124
CO	0.0016	0.0070
PM2.5	0.0002	0.0009
PM10	0.0003	0.0012
H2S	0.0008	0.0036
SO2	0.0766	0.3357
benzene	0.0000	0.0000

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	711
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	711
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft^2)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.20

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions are based on speciation and volume from the E&P Tanks reports for each tank. Flash emissions are included in the flaring calculations. Using the speciated flash gas, the heating value is estimated based on each component's individual heat of combustion. Uncontrolled values from the stable oil, GOR, and GWR are used calculate emissions from flaring. Emission factors for NOx and CO were taken from the Wyoming oil and gas production guidance on flares (May 2016).

Citation Oil & Gas Corp.
Embar 3 Tank Battery
Water Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from the water tanks at Embar 3 Tank Battery was measured on multiple occaisons with a Fox Thermal Instruments Model FT4A meter as shown below.

Measured Flow Data

Flow Test 1 Date	4/12/18-4/16/18
Duration (hours)	96.71
Avg Gas Measured (macf/day)	107.62
Flow Test 2 Date	4/17/18-4/19/18
Duration (hours)	45.97
Avg Gas Measured (macf/day)	81.93
Flow Test 3 Date	4/19/18-4/21/18
Duration (hours)	47.59
Avg Gas Measured (macf/day)	83.45
Flow Test 4 Date	4/21/18-4/24/18
Duration (hours)	71.59
Avg Gas Measured (macf/day)	100.45
Flow Test 5 Date	4/24/18-4/25/18
Duration (hours)	24.59
Avg Gas Measured (macf/day)	110.92
Flow Test 6 Date	4/25/18-4/26/18
Duration (hours)	23.71
Avg Gas Measured (macf/day)	92.91
Flow Test 7 Date	9/5/18-9/6/18
Duration (hours)	19.88
Avg Gas Measured (macf/day)	122.61

Conversion Factors

days/yr	365
lb/ton	2000
Contingency	1

Standard Conditions

Molar Volume (scf/lb-mol)	379
Deg F	60
psia	14.7
Deg R	520

Water Tank Vent Stream Properties

Tank Vent Temperature (F)	100.00
Ambient Pressure (psia)	12.2
Measured Vent Pressure (oz/si)	1
Total Pressure (psia)	12.26
Sample Site	Embar #3
Sample Location and Date	Water Tank 8/7/18
Vent Stream Dry MW (lb/lb-mol)	43.0172
wt % VOC	1.0442
wt % Benzene	0.0000
wt % H2S	1.4752

Vent Stream Water Concetration

Moisture Content (lb H2O/lb Air)	0.043
MW H2O	18.02
MW Air	28.97
mol % Water	6.91

From Perry's Table 12-3; Assuming tank vapors are saturated (100% RH) at 100 F = 0.043 lb water per lb of dry air.

Total Average Flow

Total Duration (hours)	330.04
Avg Gas Measured (macf/day)	99.09
Avg Gas Measured (mscf/day)	76.76
Water Vapor Flow (mscf/day)	5.31
Dry Flow (mscf/day)	71.5
Total Dry Gas Emitted (tpy)	1,480.05

Total Emissions

VOC Emissions (tpy)	15.4548
VOC Emissions (lb/hr)	3.5285
Benzene Emissions (tpy)	0.0000
Benzene Emissions (lb/hr)	0.0000
H2S Emissions (tpy)	21.8343
H2S Emissions (lb/hr)	4.9850

Citation Oil & Gas Corp.
LBB Embar 3

Flare / Vapor Combustor

General Information	
Unit Name:	Water Tank Flare
Unit EPN:	FLR-3
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.		
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Water Tanks										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		2977.14882										2992.14882
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		26079823.6										26211223.6
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		84										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Water Tanks										-
H2S	-	-	4.98499301										4.98499301
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	3.53										3.52848448
benzene	-	-	0.00										0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	21.8342694										21.8342694
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	15.454762										15.454762
benzene	-	-	0										0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Water Tanks**										**-**
NOx	0.002	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.04**
CO	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
PM10	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
H2S	0.000	0.000	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.10**
SO2	0.000	0.000	9.370	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**9.37**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.071	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.07**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Water Tanks**										**-**
NOx	0.007	0.000	0.153	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.16**
CO	0.006	0.000	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.04**
PM2.5	0.000	0.000	0.074	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.07**
PM10	0.000	0.000	0.099	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.10**
H2S	0.000	0.000	0.437	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.44**
SO2	0.000	0.000	41.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**41.04**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.309	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.31**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.0000	0.0000
Total Natural Gas VOC	0.0001	0.0004
Total VOC	0.0707	0.3095
NOx	0.0365	0.1599
CO	0.0100	0.0439
PM2.5	0.0171	0.0747
PM10	0.0227	0.0996
H2S	0.0997	0.4367
SO2	9.3703	41.0418
benzene	0.0000	0.0000

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	89
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	89
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft^2)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	16.94

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions are based on speciation and volume from the E&P Tanks reports for each tank. Flash emissions are included in the flaring calculations. Using the speciated flash gas, the heating value is estimated based on each component's individual heat of combustion. Uncontrolled values from the stable oil, GOR, and GWR are used calculate emissions from flaring. Emission factors for NOx and CO were taken from the Wyoming oil and gas production guidance on flares (May 2016).

Citation Oil & Gas Corp.
LBB Embar 3

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions*.

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates*.

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emissions	Total VOC	1.6074	7.0405
		Benzene	0.0000	0.0002
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0000	0.0000
		NO_X	0.0000	0.0000
		CO	0.0000	0.0000
		PM_{10}	0.0000	0.0000
		$PM_{2.5}$	0.0000	0.0000
HTR-1	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-2	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306

HTR-3	0.75 MMBtu/hr Heater Treater	**Total VOC**	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184
HTR-4	0.75 MMBtu/hr Heater Treater	**Total VOC**	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184
FLR-1	Pop Tank Flare	**Total VOC**	0.0001	0.0004
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0000	0.0000
		NO_X	0.0015	0.0066
		CO	0.0013	0.0055
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004
FLR-2	Oil Tank Vapor Combustion Unit	**Total VOC**	0.0047	0.0205
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0008	0.0036
		SO_2	0.0766	0.3357
		NO_X	0.0028	0.0124
		CO	0.0016	0.0070
		PM_{10}	0.0003	0.0012
		$PM_{2.5}$	0.0002	0.0009
FLR-3	Water Tank Flare	**Total VOC**	0.0707	0.3095
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0997	0.4367
		SO_2	9.3703	41.0418
		NO_X	0.0365	0.1599
		CO	0.0100	0.0439
		PM_{10}	0.0227	0.0996
		$PM_{2.5}$	0.0171	0.0747

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Uncontrolled Emission Rates	**Total VOC**	5.39	23.60
	Benzene	3.578E-05	1.567E-04
	Formaldehyde	0.00	0.00
	H_2S	5.03	22.01
	SO_2	0.02	0.07
	NO_X	0.39	1.72
	CO	0.33	1.44
	PM_{10}	0.03	0.13
	$PM_{2.5}$	0.02	0.10

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Project Total Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)	**Total VOC**	1.70	7.47
	Benzene	3.587E-05	1.571E-04
	Formaldehyde	0.00	0.00
	H_2S	0.10	0.44
	SO_2	9.46	41.44
	NO_X	0.43	1.90
	CO	0.34	1.50
	PM_{10}	0.05	0.23
	$PM_{2.5}$	0.04	0.17

If the automated formulas for the project emission totals (which assume that it is possible for all steady state and periodic emissions in the project to occur in the same hour) have been overwritten, explain any changes made and list the project emission points that occur in the realistic worst case hour. (Leave this blank or put NA if none of the formulas have been overwritten.)	Uncontrolled emissions are all emissions souces summed, excluding the flare: fugitives, heater treaters, and tanks. Project total emission rates take into account the control efficiency of the tanks and includes flare emissions.

January 22, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74198.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Heptanes Plus	94.725	98.538	99.011
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.9481	(Water=1)
°API Gravity ----------	17.74	@ 60°F
Molecular Weight ----------	427.7	
Vapor Volume ----------	6.86	CF/Gal
Weight ----------	7.90	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.543	0.127	0.079
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
Other C-6's	1.788	0.538	0.376
Heptanes	3.193	0.989	0.750
Octanes	3.604	1.179	0.960
Nonanes	3.051	1.130	0.945
Decanes Plus	84.003	95.000	96.134
Benzene	0.012	0.002	0.002
Toluene	0.097	0.024	0.022
E-Benzene	0.187	0.053	0.049
Xylenes	0.577	0.161	0.150
n-Hexane	0.998	0.299	0.210
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.9548	(Water=1)
Molecular Weight----------	468.3	

Characteristics of Atmospheric Sample:

°API Gravity ----------	18.46	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)----------	1.74	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74198.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Methylcyclopentane	0.441	0.114	0.091
Benzene	0.012	0.002	0.002
Cyclohexane	0.352	0.087	0.072
2-Methylhexane	0.493	0.167	0.121
3-Methylhexane	0.536	0.179	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.464	0.138	0.113
n-Heptane	0.907	0.304	0.222
Methylcyclohexane	0.643	0.188	0.154
Toluene	0.097	0.024	0.022
Other C-8's	2.160	0.692	0.582
n-Octane	0.802	0.299	0.224
E-Benzene	0.187	0.053	0.049
M & P Xylenes	0.130	0.037	0.034
O-Xylene	0.447	0.124	0.116
Other C-9's	2.312	0.827	0.713
n-Nonane	0.740	0.303	0.232
Other C-10's	2.945	1.158	1.017
n-decane	0.580	0.259	0.202
Undecanes(11)	3.492	1.409	1.254
Dodecanes(12)	3.173	1.383	1.248
Tridecanes(13)	3.492	1.632	1.493
Tetradecanes(14)	3.255	1.630	1.511
Pentadecanes(15)	3.127	1.677	1.574
Hexadecanes(16)	2.866	1.643	1.555
Heptadecanes(17)	2.872	1.741	1.663
Octadecanes(18)	2.547	1.625	1.562
Nonadecanes(19)	2.576	1.713	1.656
Eicosanes(20)	2.259	1.561	1.518
Heneicosanes(21)	2.114	1.537	1.503
Docosanes(22)	2.014	1.526	1.501
Tricosanes(23)	1.828	1.436	1.420
Tetracosanes(24)	1.788	1.455	1.446
Pentacosanes(25)	1.726	1.457	1.455
Hexacosanes(26)	1.152	1.008	1.010
Heptacosanes(27)	1.426	1.294	1.304
Octacosanes(28)	1.487	1.394	1.409
Nonacosanes(29)	1.453	1.407	1.427
Triacontanes(30)	1.481	1.480	1.506
Hentriacontanes Plus(31+)	34.353	63.574	65.900
Total	100.000	100.000	100.000

Citation Oil & Gas Corp.
Embar 3 Tank Battery
Embar 3 Oil Tanks Vent Gas Composition
Sample Date: 8/7/2018

	Mol %	MW	Wt%
Nitrogen	5.368	28.0134	3.8363
Methane	17.308	16.04246	7.0836
CO2	66.077	44.0095	74.1879
Ethane	2.316	30.06904	1.7766
H2S	2.271	34.08188	1.9746
Propane	1.683	44.09562	1.8933
i-C4	0.547	58.1222	0.8111
n-C4	1.428	58.1222	2.1174
i-C5	0.786	72.14878	1.4467
n-C5	0.739	72.14878	1.3602
C6+	1.477		3.5123
Total	100		100.0000
VOC %	6.6600		11.1410

Total Stream MW 39.198

AMERICAN MOBILE RESEARCH, INC.

1955 CBS COURT
CASPER, WYOMING 82604

(307) 235-4590 OFFICE PHONE
(307) 265-4489 OFFICE FAX

CERTIFICATE OF ANALYSIS
ROUTINE HYDROCARBON GAS ANALYSIS

COMPANY..... CITATION OIL AND GAS

LAB NUMBER..... CR-18681
DATE SAMPLED..... 8-7-2018

STUDY NUMBER CR-2
DATE TESTED 8-9-2018

SAMPLE IDENTIFICATION.... EMBAR #3 FLARE GAS
SAMPLE #2 SAMPLE TAKEN AT 10:15 AM

LOCATION..... EMBAR #3 TANK BATTERY, WYOMING.
PRESSURE..... 5 Ounces
TYPE SAMPLE..... SPOT
CYLINDER ID..... TEDLAR BAG
SAMPLE METHOD. GPA-2166

TEMPERATURE ..... N/A
SAMPLED BY ..... CITATION - B. YACH
COUNTY ..... PARK
TEST METHOD ..... GPA 2261

COMPONENTS	MOLE%		GPM
NITROGEN.....	5.368		
METHANE.....	17.308		
CARBON DIOXIDE....	66.077		
ETHANE.....	2.316	.....	0.618
H2S.....	2.271	.....	0.306
PROPANE.....	1.683	.....	0.462
iso-BUTANE.....	0.547	.....	0.179
n-BUTANE.....	1.428	.....	0.449
iso-PENTANE.....	0.786	.....	0.287
n-PENTANE.....	0.739	.....	0.267
HEXANES+.....	1.477	.....	0.643
TOTALS.....	100.000	.....	3.211

SPECIFIC GRAVITY AT 60/60 F, calculated.....	1.35337
TOTAL GPM (ETHANE INCLUSIVE).....	3.211
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis.....	477.690
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis.....	469.635
AVERAGE MOLECULAR WEIGHT.....	39.198
MOLAR MASS RATIO.....	1.35337
RELATIVE DENSITY, (G X Z (AIR) / Z).....	1.36131
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA.....	473.815
COMPRESSIBILITY FACTOR (Z).....	0.99417

NOTE: ABOVE CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09. THE HEXANES+ (C6+) FACTORS ARE CALCULATED AS A RATIO AMOUNT OF HEXANES (60%), HEPTANES (30%), AND OCTANES (10%).

James A. Kane, President
American Mobile Research, Inc.

Citation Oil & Gas Corp.
Embar 3 Tank Battery
Embar 3 Water Tanks Vent Gas Composition
Sample Date: 8/7/2018

	Mol %	MW	Wt%
Nitrogen	0.812	28.0134	0.5288
Methane	1.466	16.04246	0.5467
CO2	91.076	44.0095	96.0689
Ethane	0.481	30.06904	0.3362
H2S	1.862	34.08188	1.4752
Propane	0.198	44.09562	0.2030
i-C4	0.027	58.1222	0.0365
n-C4	0.096	58.1222	0.1297
i-C5	0.042	72.14878	0.0704
n-C5	0.048	72.14878	0.0805
C6+	0.242	93.16246	0.5241
Total	96.350		100.0000
VOC %	0.6530		1.0442

Total Stream MW 43.0172

H2S concentrations in the water tank vapors during this sampling event were measured at approximately 5 mol % H2S. This value is more than double the H2S concentration measured at other locations at this site and at other sites in this same formation. The decision was made to use a value more in line with typical H2S concentrations from this formation of approximately 2 mol %. The next highest (most conservative) H2S sample at Embar 3 was 1.862 mol % measured at the Embart 3 vent line on 6/5/18. The difference in concentration was chosen to be CO2.

AMERICAN MOBILE RESEARCH, INC.

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CASPER, WYOMING 82604

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CERTIFICATE OF ANALYSIS
ROUTINE HYDROCARBON GAS ANALYSIS

COMPANY..... CITATION OIL AND GAS

LAB NUMBER..... CR-18681
DATE SAMPLED..... 8-7-2018

STUDY NUMBER CR-3
DATE TESTED 8-9-2018

SAMPLE IDENTIFICATION.... EMBAR #3 WATER TANK VAPORS
SAMPLE #1 SAMPLE TAKEN AT 9:00 AM

LOCATION..... EMBAR #3 TANK BATTERY, WYOMING.
PRESSURE..... 2 Ounces
TYPE SAMPLE..... SPOT
CYLINDER ID..... TEDLAR BAG
SAMPLE METHOD. GPA-2166

TEMPERATURE ..... N/A
SAMPLED BY ..... CITATION - B. YACH
COUNTY ..... PARK
TEST METHOD ..... GPA 2261

COMPONENTS	MOLE%		GPM
NITROGEN.....	0.812		
METHANE.....	1.466		
CARBON DIOXIDE....	91.076		
ETHANE.....	0.481	.....	0.128
H2S.....	5.512	.....	0.743
PROPANE.....	0.198	.....	0.054
iso-BUTANE.....	0.027	.....	0.009
n-BUTANE.....	0.096	.....	0.030
iso-PENTANE.....	0.042	.....	0.015
n-PENTANE.....	0.048	.....	0.017
HEXANES+.....	0.242	.....	0.105
TOTALS.....	100.000	.....	1.103

SPECIFIC GRAVITY AT 60/60 F, calculated.....	1.48524
TOTAL GPM (ETHANE INCLUSIVE).....	1.103
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis.....	84.122
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis.....	82.914
AVERAGE MOLECULAR WEIGHT.....	43.017
MOLAR MASS RATIO.....	1.48524
RELATIVE DENSITY, (G X Z (AIR) / Z).....	1.49385
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA.....	83.445
COMPRESSIBILITY FACTOR (Z).....	0.99423

NOTE: ABOVE CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09. THE HEXANES+ (C6+) FACTORS ARE CALCULATED AS A RATIO AMOUNT OF HEXANES (60%), HEPTANES (30%), AND OCTANES (10%).

James A. Kane, President
American Mobile Research, Inc.

Max	1.22	Max	1.06	Max	3.88
Avg	0.622	Avg	-0.14467	Avg	3.48

Citation.Battery.EM3 Battery.Combuster Flow	MCFD rate	Citation.Battery.EM3 Battery.Gas Combustor PSI	Oz	Citation.Battery.EM3 Battery.Gas OZ at Oil Tank	Oz
Time/Date	Value	Time/Date	Value	Time/Date	Value
4/9/2018 14:31	0.76	4/9/2018 14:31	-3.46	4/9/2018 14:31	2.93
4/9/2018 14:34	0.57	4/9/2018 14:34	-2.69	4/9/2018 14:34	2.89
4/9/2018 14:37	0.46	4/9/2018 14:37	-2.22	4/9/2018 14:37	2.84
4/9/2018 14:40	0.42	4/9/2018 14:40	-3.11	4/9/2018 14:40	2.69
4/9/2018 14:42	0.46	4/9/2018 14:42	0.7	4/9/2018 14:42	2.89
4/9/2018 14:45	0.57	4/9/2018 14:45	0.82	4/9/2018 14:45	2.94
4/9/2018 14:48	0.42	4/9/2018 14:48	0.51	4/9/2018 14:48	2.92
4/9/2018 14:50	0.46	4/9/2018 14:50	1.06	4/9/2018 14:50	3.02
4/9/2018 14:53	0.72	4/9/2018 14:53	-0.4	4/9/2018 14:53	3.03
4/9/2018 14:56	0.46	4/9/2018 14:56	-0.35	4/9/2018 14:56	2.98
4/9/2018 14:58	0.57	4/9/2018 14:58	-0.15	4/9/2018 14:58	2.88
4/9/2018 15:01	0.46	4/9/2018 15:01	-0.55	4/9/2018 15:01	2.93
4/9/2018 15:04	0.46	4/9/2018 15:04	-0.04	4/9/2018 15:04	2.95
4/9/2018 15:06	0.72	4/9/2018 15:06	-0.37	4/9/2018 15:06	2.83
4/9/2018 15:09	0.72	4/9/2018 15:09	-0.37	4/9/2018 15:09	2.97
4/9/2018 15:12	0.57	4/9/2018 15:12	-0.53	4/9/2018 15:12	3.33
4/9/2018 15:14	0.57	4/9/2018 15:14	-0.57	4/9/2018 15:14	3.32
4/9/2018 15:17	0.42	4/9/2018 15:17	-0.26	4/9/2018 15:17	3.41
4/9/2018 15:20	0.72	4/9/2018 15:20	-0.31	4/9/2018 15:20	3.38
4/9/2018 15:22	0.42	4/9/2018 15:22	-0.64	4/9/2018 15:23	3.16
4/9/2018 15:25	0.88	4/9/2018 15:25	0.71	4/9/2018 15:25	3.57
4/9/2018 15:28	0.72	4/9/2018 15:28	-0.16	4/9/2018 15:28	3.55
4/9/2018 15:31	0.72	4/9/2018 15:31	0.4	4/9/2018 15:31	3.62
4/9/2018 15:33	0.72	4/9/2018 15:33	0	4/9/2018 15:33	3.44
4/9/2018 15:36	0.57	4/9/2018 15:36	-0.33	4/9/2018 15:36	3.57
4/9/2018 15:39	0.42	4/9/2018 15:39	-0.11	4/9/2018 15:39	3.33
4/9/2018 15:42	0.42	4/9/2018 15:42	0.75	4/9/2018 15:42	3.45
4/9/2018 15:44	0.42	4/9/2018 15:44	-0.09	4/9/2018 15:44	3.48
4/9/2018 15:47	1.14	4/9/2018 15:47	0.26	4/9/2018 15:47	3.24
4/9/2018 15:50	0.69	4/9/2018 15:50	0.27	4/9/2018 15:50	3.18
4/9/2018 15:52	0.57	4/9/2018 15:52	0.07	4/9/2018 15:52	3.33
4/9/2018 15:58	0.72	4/9/2018 15:58	0.48	4/9/2018 15:58	3.33
4/9/2018 16:00	0.88	4/9/2018 16:00	0.18	4/9/2018 16:00	3.27
4/9/2018 16:03	0.88	4/9/2018 16:03	0	4/9/2018 16:03	3.23
4/9/2018 16:06	0.88	4/9/2018 16:06	-0.31	4/9/2018 16:06	3.29
4/9/2018 16:08	0.72	4/9/2018 16:08	0.24	4/9/2018 16:09	3.33
4/9/2018 16:11	0.88	4/9/2018 16:11	0.35	4/9/2018 16:11	3.38
4/9/2018 16:14	0.72	4/9/2018 16:14	-0.09	4/9/2018 16:14	3.35
4/9/2018 16:17	0.72	4/9/2018 16:17	-0.27	4/9/2018 16:17	3.34
4/9/2018 16:20	0.88	4/9/2018 16:19	0.13	4/9/2018 16:20	3.34
4/9/2018 16:22	0.72	4/9/2018 16:22	-0.09	4/9/2018 16:22	3.3
4/9/2018 16:25	0.61	4/9/2018 16:25	-0.13	4/9/2018 16:25	3.39
4/9/2018 16:28	0.61	4/9/2018 16:28	0.02	4/9/2018 16:28	3.37
4/9/2018 16:31	0.61	4/9/2018 16:31	-0.16	4/9/2018 16:31	3.31
4/9/2018 16:34	0.61	4/9/2018 16:34	-0.15	4/9/2018 16:34	3.36
4/9/2018 16:36	0.61	4/9/2018 16:36	-0.29	4/9/2018 16:36	3.43
4/9/2018 16:39	0.61	4/9/2018 16:39	0.02	4/9/2018 16:39	3.37
4/9/2018 16:42	0.61	4/9/2018 16:42	-0.07	4/9/2018 16:42	3.4
4/9/2018 16:45	0.61	4/9/2018 16:45	-0.13	4/9/2018 16:45	3.37
4/9/2018 16:47	0.61	4/9/2018 16:47	0.07	4/9/2018 16:47	3.49
4/9/2018 16:50	0.61	4/9/2018 16:50	-0.07	4/9/2018 16:50	3.44
4/9/2018 16:53	0.61	4/9/2018 16:53	-0.04	4/9/2018 16:53	3.41

Summary and initial data provided. Complete data set available but not included due to length.

EM3 Water Tank Vent Gas; Vent line open to atmosphere. Vent Line 6" poly necked down to 3" swedge to atmosphere (Water vapor/water present on the ground at the end of the line)

Water Vent PSI on Water Tank	OZ	Water Vent PSI by Fox Meter	OZ	Water Vent PSI on Combustor	OZ	Combustor Flow Rate	MSCF/D	
Max	3.69	Max	2.86	Max	0.00	Max	240.00	
Ave	1.03	Ave	0.71	Ave	0.00	Ave	122.61	
Min	0.00	Min	0.00	Min	0.00	Min	6.18	
Time/Date	Value	Time/Date	Value	Time/Date	Value	Time/Date	Value	
9/5/2018 13:26	0.02	9/5/2018 13:26	0.00	9/5/2018 13:26	0.00	9/5/2018 13:26	48.75	0.828241
9/5/2018 13:29	0.10	9/5/2018 13:29	0.01	9/5/2018 13:29	0.00	9/5/2018 13:29	47.15	19.87778
9/5/2018 13:32	0.53	9/5/2018 13:32	0.00	9/5/2018 13:32	0.00	9/5/2018 13:32	53.83	
9/5/2018 13:35	0.75	9/5/2018 13:35	0.18	9/5/2018 13:35	0.00	9/5/2018 13:35	62.35	
9/5/2018 13:38	0.84	9/5/2018 13:37	0.00	9/5/2018 13:38	0.00	9/5/2018 13:38	66.84	
9/5/2018 13:40	0.94	9/5/2018 13:40	0.00	9/5/2018 13:40	0.00	9/5/2018 13:40	65.14	
9/5/2018 13:43	0.62	9/5/2018 13:43	0.00	9/5/2018 13:43	0.00	9/5/2018 13:43	80.66	
9/5/2018 13:46	0.39	9/5/2018 13:46	0.00	9/5/2018 13:46	0.00	9/5/2018 13:46	85.45	
9/5/2018 13:49	0.10	9/5/2018 13:49	0.01	9/5/2018 13:49	0.00	9/5/2018 13:49	67.09	
9/5/2018 13:51	0.69	9/5/2018 13:51	0.29	9/5/2018 13:51	0.00	9/5/2018 13:51	109.50	
9/5/2018 13:54	0.59	9/5/2018 13:54	0.02	9/5/2018 13:54	0.00	9/5/2018 13:54	93.02	
9/5/2018 13:57	0.40	9/5/2018 13:57	0.39	9/5/2018 13:57	0.00	9/5/2018 13:57	100.45	
9/5/2018 14:00	0.79	9/5/2018 14:00	0.44	9/5/2018 14:00	0.00	9/5/2018 14:00	114.41	
9/5/2018 14:03	0.51	9/5/2018 14:03	0.37	9/5/2018 14:03	0.00	9/5/2018 14:03	108.10	
9/5/2018 14:05	0.69	9/5/2018 14:05	0.42	9/5/2018 14:05	0.00	9/5/2018 14:05	116.32	
9/5/2018 14:08	1.37	9/5/2018 14:08	0.77	9/5/2018 14:08	0.00	9/5/2018 14:08	139.84	
9/5/2018 14:11	1.49	9/5/2018 14:11	0.75	9/5/2018 14:11	0.00	9/5/2018 14:11	139.58	
9/5/2018 14:14	1.61	9/5/2018 14:14	1.00	9/5/2018 14:14	0.00	9/5/2018 14:14	151.81	
9/5/2018 14:17	1.53	9/5/2018 14:17	0.88	9/5/2018 14:17	0.00	9/5/2018 14:17	149.66	
9/5/2018 14:19	1.61	9/5/2018 14:19	0.77	9/5/2018 14:20	0.00	9/5/2018 14:19	144.02	
9/5/2018 14:23	1.58	9/5/2018 14:23	0.94	9/5/2018 14:23	0.00	9/5/2018 14:23	146.40	
9/5/2018 14:25	1.29	9/5/2018 14:25	0.58	9/5/2018 14:25	0.00	9/5/2018 14:25	130.07	
9/5/2018 14:28	0.92	9/5/2018 14:28	0.45	9/5/2018 14:28	0.00	9/5/2018 14:28	115.97	
9/5/2018 14:31	0.67	9/5/2018 14:31	0.37	9/5/2018 14:31	0.00	9/5/2018 14:31	112.55	
9/5/2018 14:34	0.71	9/5/2018 14:34	0.26	9/5/2018 14:34	0.00	9/5/2018 14:34	106.45	
9/5/2018 14:37	0.67	9/5/2018 14:37	0.37	9/5/2018 14:37	0.00	9/5/2018 14:37	108.86	
9/5/2018 14:39	0.49	9/5/2018 14:39	0.43	9/5/2018 14:39	0.00	9/5/2018 14:39	108.10	
9/5/2018 14:42	0.78	9/5/2018 14:42	0.66	9/5/2018 14:42	0.00	9/5/2018 14:42	120.58	
9/5/2018 14:45	0.86	9/5/2018 14:45	0.46	9/5/2018 14:45	0.00	9/5/2018 14:45	116.52	
9/5/2018 14:48	1.50	9/5/2018 14:48	0.75	9/5/2018 14:48	0.00	9/5/2018 14:48	142.81	
9/5/2018 14:50	1.32	9/5/2018 14:50	0.78	9/5/2018 14:50	0.00	9/5/2018 14:50	138.95	
9/5/2018 14:53	1.09	9/5/2018 14:53	0.80	9/5/2018 14:53	0.00	9/5/2018 14:53	131.57	
9/5/2018 14:56	1.08	9/5/2018 14:56	0.73	9/5/2018 14:56	0.00	9/5/2018 14:56	129.41	
9/5/2018 14:59	0.59	9/5/2018 14:59	0.39	9/5/2018 14:59	0.00	9/5/2018 14:59	110.39	
9/5/2018 15:02	0.71	9/5/2018 15:02	0.34	9/5/2018 15:02	0.00	9/5/2018 15:02	108.48	
9/5/2018 15:05	0.81	9/5/2018 15:05	0.28	9/5/2018 15:05	0.00	9/5/2018 15:05	105.27	
9/5/2018 15:07	0.53	9/5/2018 15:07	0.38	9/5/2018 15:07	0.00	9/5/2018 15:07	108.63	
9/5/2018 15:10	0.83	9/5/2018 15:10	0.66	9/5/2018 15:10	0.00	9/5/2018 15:10	126.42	
9/5/2018 15:13	0.85	9/5/2018 15:13	0.55	9/5/2018 15:13	0.00	9/5/2018 15:13	128.41	
9/5/2018 15:16	1.45	9/5/2018 15:16	1.14	9/5/2018 15:16	0.00	9/5/2018 15:16	149.91	
9/5/2018 15:19	1.57	9/5/2018 15:18	0.89	9/5/2018 15:19	0.00	9/5/2018 15:18	146.76	
9/5/2018 15:21	1.21	9/5/2018 15:21	0.62	9/5/2018 15:21	0.00	9/5/2018 15:21	130.76	
9/5/2018 15:24	0.96	9/5/2018 15:24	0.00	9/5/2018 15:24	0.00	9/5/2018 15:24	105.27	
9/5/2018 15:27	0.75	9/5/2018 15:27	0.27	9/5/2018 15:27	0.00	9/5/2018 15:27	110.31	
9/5/2018 15:30	0.69	9/5/2018 15:30	0.29	9/5/2018 15:30	0.00	9/5/2018 15:30	105.21	
9/5/2018 15:33	0.58	9/5/2018 15:33	0.34	9/5/2018 15:33	0.00	9/5/2018 15:33	108.84	
9/5/2018 15:35	0.89	9/5/2018 15:35	0.40	9/5/2018 15:35	0.00	9/5/2018 15:35	117.05	
9/5/2018 15:38	1.30	9/5/2018 15:38	0.71	9/5/2018 15:38	0.00	9/5/2018 15:38	135.35	
9/5/2018 15:41	1.26	9/5/2018 15:41	0.81	9/5/2018 15:41	0.00	9/5/2018 15:41	139.21	
9/5/2018 15:44	1.49	9/5/2018 15:44	1.05	9/5/2018 15:44	0.00	9/5/2018 15:44	148.58	
9/5/2018 15:47	1.30	9/5/2018 15:47	1.27	9/5/2018 15:47	0.00	9/5/2018 15:47	149.27	
9/5/2018 15:50	1.36	9/5/2018 15:50	0.88	9/5/2018 15:50	0.00	9/5/2018 15:50	138.37	
9/5/2018 15:53	1.27	9/5/2018 15:53	0.74	9/5/2018 15:53	0.00	9/5/2018 15:53	132.97	
9/5/2018 15:56	0.84	9/5/2018 15:56	0.22	9/5/2018 15:56	0.00	9/5/2018 15:56	108.51	
9/5/2018 15:58	0.84	9/5/2018 15:58	0.48	9/5/2018 15:58	0.00	9/5/2018 15:58	115.19	
9/5/2018 16:01	0.70	9/5/2018 16:01	0.26	9/5/2018 16:01	0.00	9/5/2018 16:01	105.95	
9/5/2018 16:04	0.63	9/5/2018 16:04	0.37	9/5/2018 16:04	0.00	9/5/2018 16:04	110.13	
9/5/2018 16:07	0.94	9/5/2018 16:07	0.72	9/5/2018 16:07	0.00	9/5/2018 16:07	124.23	
9/5/2018 16:10	1.55	9/5/2018 16:10	1.14	9/5/2018 16:10	0.00	9/5/2018 16:10	154.84	
9/5/2018 16:12	1.74	9/5/2018 16:12	0.94	9/5/2018 16:12	0.00	9/5/2018 16:12	151.40	
9/5/2018 16:15	1.44	9/5/2018 16:15	0.70	9/5/2018 16:15	0.00	9/5/2018 16:15	136.62	
9/5/2018 16:18	1.19	9/5/2018 16:18	0.67	9/5/2018 16:18	0.00	9/5/2018 16:18	133.82	
9/5/2018 16:21	0.90	9/5/2018 16:21	0.29	9/5/2018 16:21	0.00	9/5/2018 16:21	114.92	
9/5/2018 16:23	0.87	9/5/2018 16:23	0.21	9/5/2018 16:23	0.00	9/5/2018 16:23	105.52	
9/5/2018 16:26	0.83	9/5/2018 16:26	0.34	9/5/2018 16:26	0.00	9/5/2018 16:26	113.91	
9/5/2018 16:29	0.84	9/5/2018 16:29	0.31	9/5/2018 16:29	0.00	9/5/2018 16:29	111.47	
9/5/2018 16:32	0.97	9/5/2018 16:32	0.31	9/5/2018 16:32	0.00	9/5/2018 16:32	114.63	
9/5/2018 16:35	0.69	9/5/2018 16:35	0.12	9/5/2018 16:35	0.00	9/5/2018 16:35	103.85	
9/5/2018 16:38	0.86	9/5/2018 16:38	0.23	9/5/2018 16:38	0.00	9/5/2018 16:38	112.63	
9/5/2018 16:41	0.91	9/5/2018 16:41	0.40	9/5/2018 16:41	0.00	9/5/2018 16:41	121.43	
9/5/2018 16:44	1.30	9/5/2018 16:44	0.71	9/5/2018 16:44	0.00	9/5/2018 16:44	138.84	
9/5/2018 16:46	1.55	9/5/2018 16:46	1.01	9/5/2018 16:46	0.00	9/5/2018 16:46	147.77	
9/5/2018 16:49	1.21	9/5/2018 16:49	0.67	9/5/2018 16:49	0.00	9/5/2018 16:49	133.05	
9/5/2018 16:52	1.23	9/5/2018 16:52	0.75	9/5/2018 16:52	0.00	9/5/2018 16:52	135.00	
9/5/2018 16:55	0.51	9/5/2018 16:55	0.48	9/5/2018 16:55	0.00	9/5/2018 16:55	108.08	
9/5/2018 16:58	0.59	9/5/2018 16:58	0.31	9/5/2018 16:58	0.00	9/5/2018 16:58	104.92	
9/5/2018 17:01	0.62	9/5/2018 17:01	0.27	9/5/2018 17:01	0.00	9/5/2018 17:01	109.53	
9/5/2018 17:03	0.81	9/5/2018 17:03	0.39	9/5/2018 17:03	0.00	9/5/2018 17:03	117.25	
9/5/2018 17:06	0.58	9/5/2018 17:06	0.31	9/5/2018 17:06	0.00	9/5/2018 17:06	105.32	
9/5/2018 17:09	0.78	9/5/2018 17:09	0.78	9/5/2018 17:09	0.00	9/5/2018 17:09	126.50	
9/5/2018 17:12	0.86	9/5/2018 17:12	0.60	9/5/2018 17:12	0.00	9/5/2018 17:12	129.17	
9/5/2018 17:14	1.63	9/5/2018 17:14	1.03	9/5/2018 17:14	0.00	9/5/2018 17:14	156.35	
9/5/2018 17:17	1.29	9/5/2018 17:17	0.98	9/5/2018 17:17	0.00	9/5/2018 17:17	147.07	
9/5/2018 17:20	1.19	9/5/2018 17:20	0.93	9/5/2018 17:20	0.00	9/5/2018 17:20	137.03	
9/5/2018 17:23	0.70	9/5/2018 17:23	0.53	9/5/2018 17:23	0.00	9/5/2018 17:23	116.02	
9/5/2018 17:26	0.57	9/5/2018 17:26	0.55	9/5/2018 17:26	0.00	9/5/2018 17:26	112.45	
9/5/2018 17:29	0.59	9/5/2018 17:29	0.54	9/5/2018 17:29	0.00	9/5/2018 17:29	118.20	
9/5/2018 17:31	0.49	9/5/2018 17:31	0.50	9/5/2018 17:31	0.00	9/5/2018 17:31	110.81	
9/5/2018 17:34	0.63	9/5/2018 17:34	0.37	9/5/2018 17:34	0.00	9/5/2018 17:34	111.55	
9/5/2018 17:37	0.63	9/5/2018 17:37	0.34	9/5/2018 17:37	0.00	9/5/2018 17:37	110.34	
9/5/2018 17:40	0.62	9/5/2018 17:40	0.51	9/5/2018 17:40	0.00	9/5/2018 17:40	123.31	
9/5/2018 17:43	1.17	9/5/2018 17:43	1.03	9/5/2018 17:43	0.00	9/5/2018 17:43	149.56	
9/5/2018 17:46	1.16	9/5/2018 17:46	1.11	9/5/2018 17:46	0.00	9/5/2018 17:46	151.52	

Summary and initial data provided. Full data set available but not included due to length.

Facility : F006413

Apr 8 2020, 10:08:09

- Facility Information

Facility ID: F006413

FacilityName: Embar 3 Tank Battery

Facility Description:

Company Name: Citation Oil & Gas Corp.

Operating Status: Operating

AFS: 5602900033

Facility Class: Minor

Facility Type: Storage Tank Battery

CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
Section 1, 47N, 100W	Park County	Park	44.06890/-108.81306	S1-T47N-R100W	05/08/2012

Location Detail For : Section 1, 47N, 100W

Latitude: 44.06890

Longitude: -108.81306

Quarter Quarter:

Quarter:

Section: 1

Township: 47N

Range: 100W

County: Park

State: Wyoming

District: District 4

Physical Address 1: Section 1, 47N, 100W

Physical Address 2:

City: Park County

Zip: 82414

Effective Date: 05/08/2012

- API

API
1720250
1720667
2920093
2920201
2920219
2920236
2920259
2920265
2920381
2920830
2920860
2920911
2920912
2920931
2920943
2921174

DEQ Ex. 2 - 157

2921175
2921176
2921177
2921179
2921183
2921187
2921228
2921230
2921240
2921242

- **Notes**

User Name	Date	Note

- **NAICS Codes**

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- **Contacts**

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix:	Ms.	First Name:	Lee Ann
Middle Name:		Last Name:	Elsom
Suffix:			
Company Title:	Manager Regulatory Compliance	Contact's Company Name:	Citation Oil & Gas Corp.
Address 1:	14077 Cutten Road		
Address 2:			
City:	Houston	Zip Code:	77069
State:	Texas		
Work Phone No:	(281)891-1577	Secondary Phone No.:	
Address 2:	(281)517-7196	Secondary Ext. No.:	
Mobile Phone No.:		Pager No.:	
Fax No:		Pager PIN No.:	
Email:	lelsom@cogc.com		
Email Pager Address:			

DEQ Ex. 2 - 158

- Rules & Regs

Subject to Part 60 NSPS:

Subject to 112(r) Accidental Release Prevention:

Subject to Part 61 NESHAP:

Subject to non-attainment NSR:

Subject Part 63 NESHAP:

Subject to PSD:

Subject to Title IV Acid Rain:

- Attachments

Description	Type	Modified By	Modified Date
Permit History as of 4/13/2015	Other	Coffman, Ella(inactive)	04/13/2015

- Version

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	04/08/2020		
58807	01/30/2020	04/08/2020	X
53448	03/22/2019	01/30/2020	X
6413	05/08/2012	03/22/2019	X

DEQ Ex. 2 - 159

Emission Unit : FLR001

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 1.41 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-1

Company Equipment Description: Pop Tank Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC012

Process Name: Vapor Combustion Unit

Company Process Description: VCU-1

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER001

DEQ Ex. 2 - 160

Emission Unit : FLR002

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: FLR002

Emission Unit Type: Flare

Maximum Design Capacity: 20.43 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: VCU-2

Company Equipment Description: Vapor Combustion Unit

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC013

Process Name: Vapor Combustion Unit

Company Process Description: VCU-2

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER005

DEQ Ex. 2 - 161

Emission Unit : FLR003

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: FLR003

Emission Unit Type: Flare

Maximum Design Capacity: 1.41 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-3

Company Equipment Description: Water Tank Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC014

Process Name: FLR-3

Company Process Description: Water Tank Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER007

DEQ Ex. 2 - 162

Emission Unit : FUG001

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	238	14
Flanges	0	0	334	24
Open Ended Lines	0	0	7	1
Pump Seals	0	0	6	2
Valves	0	0	182	13
Other	0	0	13	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitives

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: FUG

Company Process Description: Fugitives

Source Classification Code (SCC): 3-10-888-11

Release points(s) directly associated with this process

DEQ Ex. 2 - 163

AVL001

Emission Unit : HET001

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: HET001

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-1

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC006

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER002

DEQ Ex. 2 - 165

Emission Unit : HET002

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: HET002

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-2

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC007

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER003

DEQ Ex. 2 - 166

Emission Unit : HET003

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID:	HET003		
Emission Unit Type:	Heater/Chiller		
Firing Type:	Indirect		
Heat Input Rating:	0.75	Units:	MMBtu/hr
Primary Fuel Type:	Pipeline Grade Natural Gas	Secondary Fuel Type:	Propane
Heat Content of Fuel (BTU/scf):	1020		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	HTR-3		
Company Equipment Description:	Heater Treater		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC008
Process Name:	HTR-3
Company Process Description:	Heater Treater
Source Classification Code (SCC):	3-10-004-03

Release points(s) directly associated with this process

VER004

DEQ Ex. 2 - 167

Emission Unit : HET004

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: HET004

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.75 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-4

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC010

Process Name: HTR-4

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER006

DEQ Ex. 2 - 168

Emission Unit : TNK001

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID:	TNK001		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	1000	Units:	barrels
Maximum Throughput:	250.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-1		
Company Equipment Description:	400-bbl Oil Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC001
Process Name:	Tank 1
Company Process Description:	Oil Storage Tank
Source Classification Code (SCC):	4-04-003-12

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 169

Emission Unit : TNK002

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-2

Company Equipment Description: 400-bbl Oil Overflow Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name: Tank 2

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 170

Emission Unit : TNK003

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: TNK003

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-3

Company Equipment Description: 400-bbl Oil Overflow Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC003

Process Name: Tank 3

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 171

Emission Unit : TNK004

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: TNK004

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-4

Company Equipment Description: 400-bbl Oil Overflow Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC004

Process Name: TK-4

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 172

Emission Unit : TNK005

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID:	TNK005		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Produced Water		
Submerged Fill Pipe?:	No		
Capacity:	2000	Units:	barrels
Maximum Throughput:	32000.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	PW-1		
Company Equipment Description:	2000-bbl Water Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC005
Process Name:	PW-1
Company Process Description:	Produced Water Tank
Source Classification Code (SCC):	4-04-003-15

Control equipment(s) directly associated with this process

FLA003

DEQ Ex. 2 - 173

Emission Unit : TNK006

Apr 8 2020, 10:08:09

- Emission Unit Information

AQD Emissions Unit ID: TNK006

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Capacity: 400 Units: barrels

Maximum Throughput: 2.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: POPTK

Company Equipment Description: 400-bbl Pop Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: POPTK

Company Process Description: Pop Tank

Source Classification Code (SCC): 4-04-003-12

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 174

Control Equipment : FLA001

Apr 8 2020, 10:08:09

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-1

Company Control Equipment Description: Pop Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER001

DEQ Ex. 2 - 175

Control Equipment : FLA002

Apr 8 2020, 10:08:09

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA002

AQD Description:

Company Control Equipment ID: FLR-2

Company Control Equipment Description: Vapor Combustion Unit

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER005

DEQ Ex. 2 - 176

Control Equipment : FLA003

Apr 8 2020, 10:08:09

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA003

AQD Description:

Company Control Equipment ID: FLR-3

Company Control Equipment Description: Water Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER007

DEQ Ex. 2 - 177

Release Point : VER001

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER001
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Flare 1
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05806	Longitude:	-108.80861

DEQ Ex. 2 - 178

Release Point : VER007

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER007
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-3
Company Release Point Description:	Water Tank Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.0689	Longitude:	-108.81306

DEQ Ex. 2 - 179

Release Point : AVL001

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	AVL001
Release Type:	Fugitive (Area, Volume, Line)
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitives
Operating Status:	Operating
Release Height (ft):	3.0

- Release Latitude and Longitude

Latitude:	44.0689	Longitude:	-108.81306

DEQ Ex. 2 - 180

Release Point : VER002

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER002
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05806	Longitude:	-108.80861

DEQ Ex. 2 - 181

Release Point : VER003

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER003
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05806	Longitude:	-108.80861

DEQ Ex. 2 - 182

Release Point : VER004

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER004
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-3
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05806	Longitude:	-108.80861

DEQ Ex. 2 - 183

Release Point : VER006

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER006
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-4
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.0689	Longitude:	-108.81306

DEQ Ex. 2 - 184

Release Point : VER005

Apr 8 2020, 10:08:09

- Release Point Information

Release Point ID:	VER005
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	VCU-2
Company Release Point Description:	Vapor Combustion Unit 2
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	246.93
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.0689	Longitude:	-108.81306

DEQ Ex. 2 - 185

EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

April 7, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
NWD 1 Tank Battery
Park County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the NWD 1 Tank Battery in Park County, Wyoming. EDGE is submitting this waiver request for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

HOUSTON | BATON ROUGE | ASHEVILLE | DENVER

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

General Notes

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil and Gas Corp.
Facility/Well Name	NWD 1 Tank Battery
Field Name	Pitchfork Oil Field
Nearest City/Town	Meeteetse
API Number/SIC Code	
Latitude/Longitude	44.08010, -108.84625
County	Park
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	211
Produced Water Site Throughput (bbl/day):	5200
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

*****Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.*****

Equipment/Process Types	How many for this project?	How many for this site?
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers	5	5
Oil / Condensate Tanks	4	4
Produced Water Tanks	1	1
Miscellaneous Tanks	1	1
Loading Jobs		
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors		
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Gas and Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** fill out this table.

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 0.0000
VOC weight fraction = 0.0000

VOC content of hydrocarbon fraction only

VOC weight% = #DIV/0!
VOC weight fraction = #DIV/0!

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V =
H2S ppm_{WT} = 0.00

Benzene

Benzene content of total sample

Benzene weight% = 0.0000
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = #DIV/0!
Benzene weight fraction = #DIV/0!

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	Little Sand Draw Oil
What site is the sample from?	Little Sand Draw Oil
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	The Little Sand Draw liquid analysis is used as a representative sample for LBB NWD 1 since the sites are in close proximiity in the same basin, have similar site operations, and similar separator operating parameters.
Where in the process was the sample taken?	Atmospheric Oil Tank
What is the temperature and pressure of the sample (include units)?	30 psig, 95°F
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	21-Dec-17

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.1200	34.08188	4	0.0321
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.3119	30.06904	9	0.0736
propane (C3)	0.8229	44.09562	36	0.2846
butanes (C4)	1.8181	58.12220	106	0.8289
pentanes (C5)	3.2147	72.14878	232	1.8194
benzene	0.0644	78.110000	5	0.0395
other hexanes (C6)	5.9800	86.18000	515	4.0427
toluene	0.3651	92.140000	34	0.2639
other heptanes (C7)	6.3734	100.20000	639	5.0096
ethylbenzene	0.3874	106.170000	41	0.3226
xylenes (o, m, p)	1.5801	106.170000	168	1.3159
other octanes (C8)	6.6785	114.23000	763	5.9844
nonanes (C9)	6.3478	128.26000	814	6.3867
decanes plus (C10+)	65.9357	142.29000	9382	73.5962
Totals:	100.0000	127.48	12747.9407	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 99.8944
VOC weight fraction = 0.9989

VOC content of hydrocarbon fraction only

VOC weight% = 99.9264
VOC weight fraction = 0.9993

Hydrogen Sulfide

H2S weight% = 0.0321
H2S weight fraction = 3.21E-04
H2S ppm_V = 1200.00
H2S ppm_{WT} = 320.82

Benzene

Benzene content of total sample

Benzene weight% = 0.0395
Benzene weight fraction = 0.0004

Benzene content of hydrocarbon fraction only

Benzene weight% = 0.0395
Benzene weight fraction = 0.0004

Enter any notes here:

The representative liquid analysis was taken from Little Sand Draw. The extended report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benezene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n-hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	13		
Separators		Separator	1		
Meters/piping [2]		Heater-treater	5		
Compressors		Header	1		
In-Line Heaters		Tanks	4	Tanks	1
Dehydrators		Pumps	3	Pumps	1
Scrubbers [3]		Sample Ports	5	Sample Ports	1

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	164	Valves	13
Pump Seals	0	Pump Seals	6	Pump Seals	2
Connectors	0	Connectors	218	Connectors	14
Flange	0	Flange	298	Flange	24
Open-Ended Lines	0	Open-Ended Lines	5	Open-Ended Lines	1
Other	0	Other	13	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(i)(A) dictates counting one meters/piping per well-pad for production operations.

[3] Scrubbers assumed to have the same fugitive components as separators.

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Fugitives Emissions

EPN	FUG
Name	Fugitive Emissions

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.8944
Benzene wt %	0.0395
H_2S wt %	0.0321

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
164	Valve	0.005500	0.902	3.95076
6	Pump Seal	0.028660	0.17196	0.7531848
218	Connector	0.000463	0.100934	0.44209092
298	Flange	0.000243	0.072414	0.31717332
5	Open-ended Line	0.003090	0.01545	0.067671
13	Other	0.016500	0.2145	0.93951
		Total:	1.477258	6.47039004

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.8944	0.0395	0.0321	
Pump Seal	99.8944	0.0395	0.0321	
Connector	99.8944	0.0395	0.0321	
Flange	99.8944	0.0395	0.0321	
Open-ended Line	99.8944	0.0395	0.0321	
Other	99.8944	0.0395	0.0321	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.90	3.95	0.00	0.00	0.00	0.00
Pump Seal	0.17	0.75	0.00	0.00	0.00	0.00
Connector	0.10	0.44	0.00	0.00	0.00	0.00
Flange	0.07	0.32	0.00	0.00	0.00	0.00
Open-ended Line	0.02	0.07	0.00	0.00	0.00	0.00
Other	0.21	0.94	0.00	0.00	0.00	0.00
Total:	1.48	6.46	0.00	0.00	0.00	0.00

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
13	Valve	0.000216	0.002808	0.01229904
2	Pump Seal	0.000052	0.000104	0.00045552
14	Connector	0.000243	0.003402	0.01490076
24	Flange	0.000006	0.000144	0.00063072
1	Open-ended Line	0.000550	0.00055	0.002409
0	Other	0.030900	0	0
		Total:	0.007008	0.03069504

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.8944	0.0395	0.0321	
Pump Seal	99.8944	0.0395	0.0321	
Connector	99.8944	0.0395	0.0321	
Flange	99.8944	0.0395	0.0321	
Open-ended Line	99.8944	0.0395	0.0321	
Other	99.8944	0.0395	0.0321	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.00	0.01	0.00	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00	0.00
Connector	0.00	0.01	0.00	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.01	0.03	0.00	0.00	0.00	0.00

Reference to Emission factors used:

1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4.

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	1.48	6.49
benzene	0.00	0.00
H_2S	0.00	0.00

Notes:

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-1	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.004	0.018
NOx	100	0.074	0.322
CO	84	0.062	0.271
PM_{10}	7.6	0.006	0.024
$PM_{2.5}$	5.7	0.004	0.018
SO_2	0.6	0.003	0.013

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	This unit is one of two 0.75 MMBtu/hr tester heater treaters at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-2	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.004	0.018
NOx	100	0.074	0.322
CO	84	0.062	0.271
PM_{10}	7.6	0.006	0.024
$PM_{2.5}$	5.7	0.004	0.018
SO_2	0.6	0.003	0.013

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit is one of two 0.75 MMBtu/hr tester heater treaters at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-3	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	This unit is the main 1.25 MMBtu/hr vertical heater treater at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-4	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	This unit is the main 1.25 MMBtu/hr horizontal heater treater at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-5	
Name	0.5 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.5	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.003	0.012
NOx	100	0.049	0.215
CO	84	0.041	0.180
PM_{10}	7.6	0.004	0.016
$PM_{2.5}$	5.7	0.003	0.012
SO_2	0.6	0.002	0.008

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0019**
SO_2 produced (tpy) =	**0.0084**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	This unit is the heater for TK-1

Citation Oil & Gas Corp.
NWD 1 Tank Battery
Oil Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from the oil tanks at NWD 1 Tank Battery was measured from 5/17/19 to 5/19/19 with a Fox Thermal Instruments Model FT4A meter. Total flow to the combustor was measured for a total of 46.85 hours and averaged 2.56 mcfd.

Site	**NWD 1 Tank Battery**
Flow Test Date	5/17/18-5/19/19
Duration	46.85 hrs
Vent Temperature	100.0
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	2.56
Avg Gas Measured (mscf/day)	1.97
MW (lb/lb-mol)	29.656
Sample Site	NWD 1
Sample Location and Date	Vent Line 6/5/18
days/yr	365
lb/ton	2000
Total Gas Emitted (tpy)	28.1234
wt % VOC	11.4839
wt % Benzene	0.0632
wt % H2S	0.7447
Total Emissions	
VOC Emissions (tpy)	3.2297
VOC Emissions (lb/hr)	0.7374
Benzene Emissions (tpy)	0.0178
Benzene Emissions (lb/hr)	0.0041
H2S Emissions (tpy)	0.2094
H2S Emissions (lb/hr)	0.0478

Standard Conditions

scf/lb-mol	379
Deg F	60
psia	14.7
Deg R	520

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Vapor Combustion Unit
Unit EPN:	VCU-1
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Oil Tanks										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		82.058										97.0584106
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		718831.676										850231.676
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		717										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Oil Tanks										-
H2S	-	-	0.05										0.04781564
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.74										0.7373651
benzene	-	-	0.00										0.00405905

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.21										0.20943249
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	3.23										3.22965913
benzene	-	-	0.02										0.01777862

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Oil Tanks**										**-**
NOx	0.002	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0097**
CO	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0033**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0006**
PM10	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0007**
H2S	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0010**
SO2	0.000	0.000	0.090	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0899**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
Total VOC	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0148**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Oil Tanks**										**-**
NOx	0.007	0.000	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0426**
CO	0.006	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0145**
PM2.5	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0024**
PM10	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0032**
H2S	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0042**
SO2	0.000	0.000	0.394	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.3937**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
Total VOC	0.000	0.000	0.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0650**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.01	0.06
NOx	0.01	0.04
CO	0.00	0.01
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.09	0.39
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	764
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	764
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	1.5
Total Flare/Burner Tip Surface Area (ft^2)?	0.01226563
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.01226563
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	2.20

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Citation Oil & Gas Corp.
NWD 1 Tank Battery
Water Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from the water tanks and pop tank at NWD 1 was measured in May of 2018 with a Fox Thermal Instruments Model FT4A meter. Flow averaged 52 mcfd.

	NWD 1
Flow Test Date	May 2018
Vent Temperature	100
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	52
Avg Gas Measured (mscf/day)	40.1
MW (lb/lb-mol)	29.7
Sample Site	NWD 1
Sample Location and Date	Vent Line 6/5/18
days/yr	365
lb/ton	2000
Total Gas Emitted (tpy)	572.26
wt % VOC	11.4839
wt % Benzene	0.0632
wt % H2S	0.7447
Total Emissions	
VOC Emissions (tpy)	65.7179
VOC Emissions (lb/hr)	15.0041
Benzene Emissions (tpy)	0.3618
Benzene Emissions (lb/hr)	0.0826
H2S Emissions (tpy)	4.2616
H2S Emissions (lb/hr)	0.9730

Standard Conditions

scf/lb-mol	379
Deg F	60
psia	14.7
Deg R	520

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Vapor Combustion Unit
Unit EPN:	VCU-2
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	Water Tanks										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		1669.744										1684.74409
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		14626958.2										14758358.2
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		717.000										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	Water Tanks										-
H2S	-	-	0.97										0.97296399
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	15.00										15.0040807
benzene	-	-	0.08										0.08259444

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	4.26										4.26158226
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	65.72										65.7178733
benzene	-	-	0.36										0.36176366

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Water Tanks**										**-**
NOx	0.002	0.000	0.168	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.1691**
CO	0.001	0.000	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0432**
PM2.5	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0096**
PM10	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0128**
H2S	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0195**
SO2	0.000	0.000	1.829	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.8289**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0001**
Total VOC	0.000	0.000	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.3002**
benzene	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0017**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**Water Tanks**										**-**
NOx	0.007	0.000	0.734	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.7407**
CO	0.006	0.000	0.184	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.1891**
PM2.5	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0421**
PM10	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0561**
H2S	0.000	0.000	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0853**
SO2	0.000	0.000	8.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**8.0105**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0004**
Total VOC	0.000	0.000	1.314	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.3147**
benzene	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0072**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.30	1.31
NOx	0.17	0.74
CO	0.04	0.19
PM2.5	0.01	0.04
PM10	0.01	0.06
H2S	0.02	0.09
SO2	1.83	8.01
benzene	0.00	0.01

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	720
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	720
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	1.5
Total Flare/Burner Tip Surface Area (ft^2)?	0.01226563
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.01226563
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	38.15

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Citation Oil and Gas Corp.
NWD 1 Tank Battery

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions*.

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates*.

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emissions	Total VOC	1.4827	6.4942
		Benzene	0.0006	0.0026
		Formaldehyde	0.0000	0.0000
		H_2S	0.0005	0.0021
		SO_2	0.0000	0.0000
		NO_X	0.0000	0.0000
		CO	0.0000	0.0000
		PM_{10}	0.0000	0.0000
		$PM_{2.5}$	0.0000	0.0000
HTR-1	0.75 MMBtu/hr Heater Treater	Total VOC	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184
HTR-2	0.75 MMBtu/hr Heater Treater	Total VOC	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184

HTR-3	1.25 MMBtu/hr Heater Treater	**Total VOC**	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-4	1.25 MMBtu/hr Heater Treater	**Total VOC**	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-5	0.5 MMBtu/hr Heater Treater	**Total VOC**	0.0027	0.0118
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0019	0.0084
		NO_X	0.0490	0.2147
		CO	0.0412	0.1804
		PM_{10}	0.0037	0.0163
		$PM_{2.5}$	0.0028	0.0122
VCU-1	Vapor Combustion Unit	**Total VOC**	0.0148	0.0650
		Benzene	0.0001	0.0004
		Formaldehyde	0.0000	0.0000
		H_2S	0.0010	0.0042
		SO_2	0.0899	0.3937
		NO_X	0.0097	0.0426
		CO	0.0033	0.0145
		PM_{10}	0.0007	0.0032
		$PM_{2.5}$	0.0006	0.0024
VCU-2	Vapor Combustion Unit	**Total VOC**	0.3002	1.3147
		Benzene	0.0017	0.0072
		Formaldehyde	0.0000	0.0000
		H2S	0.0195	0.0853
		SO2	1.8289	8.0105
		NOX	0.1691	0.7407
		CO	0.0432	0.1891
		PM10	0.0128	0.0561
		PM2.5	0.0096	0.0421

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Uncontrolled Emission Rates (excluded flare emissions)	**Total VOC**	17.25	75.55
	Benzene	0.09	0.38
	Formaldehyde	0.00	0.00
	H_2S	1.02	4.47
	SO_2	1.94	8.48
	NO_X	0.62	2.72
	CO	0.42	1.83
	PM_{10}	0.05	0.21
	$PM_{2.5}$	0.04	0.15

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Project Total Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)	**Total VOC**	1.82	7.98
	Benzene	2.319E-03	0.01
	Formaldehyde	0.00	0.00
	H_2S	0.02	0.09
	SO_2	1.94	8.48
	NO_X	0.62	2.72
	CO	0.42	1.83
	PM_{10}	0.05	0.21
	$PM_{2.5}$	0.04	0.15

If the automated formulas for the project emission totals (which assume that it is possible for all steady state and periodic emissions in the project to occur in the same hour) have been overwritten, explain any changes made and list the project emission points that occur in the realistic worst case hour. (Leave this blank or put NA if none of the formulas have been overwritten.)	Uncontrolled emissions are based on tanks venting to atmosphere (0% VOC and H2S control) and no flare present to control emissions. Controlled emissions were calculated by applying 100% control to tank emissions and including flaring emissions.

January 23, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - Little Sand Draw
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74197.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.312	0.107	0.045
Propane	0.823	0.290	0.174
Isobutane	0.444	0.186	0.124
n-Butane	1.374	0.554	0.383
2,2 Dimethylpropane	0.006	0.003	0.002
Isopentane	1.511	0.707	0.523
n-Pentane	1.698	0.787	0.588
2,2 Dimethylbutane	0.028	0.015	0.012
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.153	0.121
2 Methylpentane	1.376	0.731	0.569
3 Methylpentane	1.063	0.555	0.440
n-Hexane	1.928	1.014	0.798
Heptanes Plus	89.144	94.898	96.220
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.8560	(Water=1)
°API Gravity ----------	33.81	@ 60°F
Molecular Weight ----------	224.8	
Vapor Volume ----------	12.08	CF/Gal
Weight ----------	7.13	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.8442	(Water=1)
°API Gravity ----------	36.11	@ 60°F
Molecular Weight----------	208.3	
Vapor Volume ----------	12.86	CF/Gal
Weight ----------	7.03	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74197.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.312	0.107	0.045
Propane	0.823	0.290	0.174
Isobutane	0.444	0.186	0.124
n-Butane	1.380	0.557	0.385
Isopentane	1.511	0.707	0.523
n-Pentane	1.698	0.787	0.588
Other C-6's	2.760	1.454	1.142
Heptanes	6.563	3.646	3.053
Octanes	7.780	4.617	4.086
Nonanes	6.348	4.273	3.861
Decanes Plus	66.056	81.218	84.032
Benzene	0.064	0.023	0.024
Toluene	0.365	0.156	0.162
E-Benzene	0.387	0.191	0.197
Xylenes	1.580	0.774	0.805
n-Hexane	1.928	1.014	0.798
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.8442	(Water=1)
°API Gravity ----------	36.11	@ 60°F
Molecular Weight----------	208.3	
Vapor Volume ----------	12.86	CF/Gal
Weight ----------	7.03	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.8735	(Water=1)
Molecular Weight----------	265.0	

Characteristics of Atmospheric Sample:

°API Gravity ----------	36.11	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)--------	5.25	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74197.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.312	0.107	0.045
Propane	0.823	0.290	0.174
Isobutane	0.444	0.186	0.124
n-Butane	1.374	0.554	0.383
2,2 Dimethylpropane	0.006	0.003	0.002
Isopentane	1.511	0.707	0.523
n-Pentane	1.698	0.787	0.588
2,2 Dimethylbutane	0.028	0.015	0.012
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.153	0.121
2 Methylpentane	1.376	0.731	0.569
3 Methylpentane	1.063	0.555	0.440
n-Hexane	1.928	1.014	0.798
Methylcyclopentane	0.749	0.339	0.303
Benzene	0.064	0.023	0.024
Cyclohexane	0.542	0.236	0.219
2-Methylhexane	1.092	0.649	0.525
3-Methylhexane	1.202	0.706	0.578
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.989	0.542	0.471
n-Heptane	1.990	1.174	0.957
Methylcyclohexane	1.102	0.566	0.519
Toluene	0.365	0.156	0.162
Other C-8's	4.984	2.941	2.637
n-Octane	1.695	1.110	0.929
E-Benzene	0.387	0.191	0.197
M & P Xylenes	0.542	0.269	0.276
O-Xylene	1.038	0.505	0.529
Other C-9's	4.867	3.208	2.950
n-Nonane	1.480	1.065	0.911
Other C-10's	6.138	4.446	4.163
n-decane	1.200	0.942	0.820
Undecanes(11)	6.523	4.847	4.603
Dodecanes(12)	5.617	4.508	4.341
Tridecanes(13)	5.615	4.832	4.717
Tetradecanes(14)	4.512	4.159	4.115
Pentadecanes(15)	4.140	4.088	4.094
Hexadecanes(16)	3.407	3.595	3.631
Heptadecanes(17)	2.959	3.302	3.367
Octadecanes(18)	2.383	2.800	2.872
Nonadecanes(19)	2.532	3.099	3.197
Eicosanes(20)	2.191	2.788	2.893
Heneicosanes(21)	1.813	2.428	2.533
Docosanes(22)	1.590	2.218	2.328
Tricosanes(23)	1.369	1.980	2.091
Tetracosanes(24)	1.068	1.601	1.698
Pentacosanes(25)	0.958	1.489	1.586
Hexacosanes(26)	0.737	1.187	1.270
Heptacosanes(27)	0.792	1.322	1.421
Octacosanes(28)	0.703	1.215	1.310
Nonacosanes(29)	0.585	1.044	1.129
Triacontanes(30)	0.617	1.134	1.232
Hentriacontanes Plus(31+)	8.605	22.193	24.621
Total	100.000	100.000	100.000

AMERICAN MOBILE RESEARCH, INC.

P.O. BOX 2909 (307) 235-4590 PHONE
CASPER, WYOMING 82602 (307) 265-4489 FAX

EXTENDED HYDROCARBON GAS (GLYCALC) STUDY

CERTIFICATE OF ANALYSIS

Company ..... **CITATION OIL AND GAS**
Lab Number CR-18493
Date Sampled 6-5-2018
Time Sampled..... N/A
Method of Analysis..... Dual TCD-FID Chromatography

Study Number..... CR-1
Date Tested..... 6-7-2018
Time Tested..... 1:39 PM
Ambient Temp at Sampling..... N/A

Sample Identification ..... **GAS FROM NORTH WEST DOME #1 WATER & OIL VESSEL - Vent line**
STATION NO..... N/A

Sample Location ..... LITTLE BUFFALO BASIN FIELD, WYOMING.
Type Sample..... SPOT
Effective Date..... N/A
Sample Pressure ..... 4 Ounces
Cylinder ID ..... AMR 240
Instrument Used..... Shimadzu GC-2014
Sample Method..... Trap & Purge
Test Method GPA-2286

County ..... PARK
Composite From..... N/A
Sample Temperature ..... 94 F
Cylinder Heated To..... 130 F
Calibration Date..... 6-7-2018
Un-Normalized Total..... 99.16 %
Sampled By..... TCRI - Jack Fabion

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide.....	30.551	45.338	30.041
Hydrogen Sulfide.....	0.648	0.745	0.505
Nitrogen.....	15.274	14.428	9.682
Methane.....	43.752	23.668	42.736
Ethane.....	4.278	4.338	6.592
Propane.....	2.041	3.035	3.240
iso-Butane.....	0.511	1.002	0.963
n-Butane.....	1.019	1.997	1.851
iso-Pentane.....	0.479	1.165	1.009
n-Pentane.....	0.397	0.966	0.829
Cyclopentane.....	0.018	0.043	0.031
n-Hexane.....	0.154	0.448	0.365
Cyclohexane.....	0.086	0.244	0.169
Other Hexanes	0.302	0.878	0.716
Heptanes.....	0.239	0.808	0.635
Methylcyclohexane.....	0.037	0.123	0.086
2,2,4-Trimethylpentane..	0.011	0.042	0.033
Benzene.....	0.024	0.063	0.039
Toluene.....	0.041	0.127	0.079
Ethylbenzene.....	0.006	0.021	0.013
Xylenes.....	0.021	0.075	0.047
Octanes	0.084	0.324	0.248
Nonanes	0.011	0.048	0.036
Decanes + ...	0.016	0.077	0.057
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.018	0.043	0.031
Cyclohexane	0.086	0.244	0.169
2-Methylpentane	0.216	0.627	0.512
3-Methylpentane	0.086	0.250	0.204
n-Hexane	0.154	0.448	0.365
Methylcyclohexane	0.037	0.123	0.086
2,2,4-Trimethylpentane	0.011	0.042	0.033
Benzene	0.024	0.063	0.039
Toluene	0.041	0.127	0.079
Ethylbenzene	0.006	0.021	0.013
m-Xylene	0.003	0.011	0.007
p-Xylene	0.013	0.045	0.028
o-Xylene	0.005	0.019	0.012
Hexanes, Total	0.560	1.612	1.280
Heptanes, Total	0.311	1.036	0.793
Octanes, Total	0.152	0.548	0.387
Nonanes, Total	0.011	0.048	0.036
Decanes+, Total	0.016	0.077	0.057

SPECIFIC GRAVITY AT 60/60 F, calculated	1.02392
TOTAL GPM (ETHANE INCLUSIVE)	2.948
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis	717.903
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis	705.667
AVERAGE MOLECULAR WEIGHT	29.656
MOLAR MASS RATIO	1.02392
RELATIVE DENSITY (G x Z (Air) / Z), calculated	1.02768
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA, calculated	713.636
COMPRESSIBILITY FACTOR (Z)	0.99634

ETHANE GPM	1.1412
PROPANE GPM	0.5609
iso-BUTANE GPM	0.1668
n-BUTANE GPM	0.3204
iso-PENTANE GPM	0.1747
n-PENTANE GPM	0.1435
GASOLINE RANGE (HEXANES+) GPM	0.4408
FIELD H2S AT TIME OF SAMPLING, PPM	**N/A PPM**

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

James A. Kane, President
American Mobile Research, Inc.

Facility Detail Report
Facility Name: NWD 1 Tank Battery
ID: F004577

Facility : F004577

Apr 7 2020, 09:42:43

- Facility Information

Facility ID: F004577

FacilityName: NWD 1 Tank Battery

Facility Description:

Company Name: Citation Oil & Gas Corp.

Operating Status: Operating

AFS:

Facility Class: Minor

Facility Type: Storage Tank Battery

CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
Section 34, 48N, 100W	Park County	Park	44.08010/-108.84625	S34-T48N-R100W	05/08/2012

Location Detail For : Section 34, 48N, 100W

Latitude: 44.08010

Longitude: -108.84625

Quarter Quarter:

Quarter:

Section: 34

Township: 48N

Range: 100W

County: Park

State: Wyoming

District: District 4

Physical Address 1: Section 34, 48N, 100W

Physical Address 2:

City: Park County

Zip: 82414

Effective Date: 05/08/2012

- API

API
2906901
2920032
2920064
2920081
2920167
2920207
2920208
2920245
2921372
2921394
2921492
2921669
2921774
2931366

- Notes

DEQ Ex. 2 - 216

User Name	Date	Note

- **NAICS Codes**

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- **Contacts**

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix: Ms.
First Name: Lee Ann
Middle Name:
Last Name: Elsom
Suffix:
Company Title: Manager Regulatory Compliance
Contact's Company Name: Citation Oil & Gas Corp.

Address 1: 14077 Cutten Road
Address 2:
City: Houston
Zip Code: 77069
State: Texas

Work Phone No: (281)891-1577
Secondary Phone No.:
Address 2: (281)517-7196
Secondary Ext. No.:
Mobile Phone No.:
Pager No.:
Fax No:
Pager PIN No.:

Email: lelsom@cogc.com
Email Pager Address:

- **Rules & Regs**

Subject to Part 60 NSPS:
Subject to 112(r) Accidental Release Prevention:
Subject to Part 61 NESHAP:
Subject to non-attainment NSR:
Subject Part 63 NESHAP:
Subject to PSD:
Subject to Title IV Acid Rain:

- **Attachments**

Description	Type	Modified By	Modified Date

DEQ Ex. 2 - 217

- **Version**

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	03/09/2020		
58808	01/30/2020	03/09/2020	X
53449	03/22/2019	01/30/2020	X
44922	04/16/2018	03/22/2019	X
4577	05/08/2012	04/16/2018	X

DEQ Ex. 2 - 218

Emission Unit : FLR001

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 0.06 Units : Mscf/hr

Minimum Design Capacity: 0.01 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-1

Company Equipment Description: Vapor Combustor Unit

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC013

Process Name: VCU-1

Company Process Description: Vapor Combustion Unit

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER001

DEQ Ex. 2 - 219

Emission Unit : FLR002

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: FLR002

Emission Unit Type: Flare

Maximum Design Capacity: 0.11 Units : Mscf/hr

Minimum Design Capacity: 0.01 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: VCU-2

Company Equipment Description: Vapor Combustion Unit

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC014

Process Name: Vapor Combustion Unit

Company Process Description: VCU-2

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER007

DEQ Ex. 2 - 220

Emission Unit : FUG001

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	218	14
Flanges	0	0	298	24
Open Ended Lines	0	0	5	1
Pump Seals	0	0	6	2
Valves	0	0	164	13
Other	0	0	13	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitives

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC012

Process Name: FUG

Company Process Description: Fugitives

Source Classification Code (SCC): 3-10-888-11

Release points(s) directly associated with this process

DEQ Ex. 2 - 221

AVL001

Emission Unit : HET001

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: HET001

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.75

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-1

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC007

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER002

DEQ Ex. 2 - 223

Emission Unit : HET002

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: HET002

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.75

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-2

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC008

Process Name: HTR-2

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER003

DEQ Ex. 2 - 224

Emission Unit : HET003

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: HET003

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-3

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: HTR-3

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER004

DEQ Ex. 2 - 225

Emission Unit : HET004

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: HET004

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-4

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC010

Process Name: HTR-4

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER005

DEQ Ex. 2 - 226

Emission Unit : HET005

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: HET005

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.5

Units: MMBtu/hr

Primary Fuel Type: Field Gas

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-5

Company Equipment Description: Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: HTR-5

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER006

DEQ Ex. 2 - 227

Emission Unit : TNK001

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID:	TNK001		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	400	Units:	barrels
Maximum Throughput:	211.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-1		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC001
Process Name:	Tank 1
Company Process Description:	Oil Storage Tank
Source Classification Code (SCC):	3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 228

Emission Unit : TNK002

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 211.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-2

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name: Tank 2

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 229

Emission Unit : TNK003

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID:	TNK003		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	400	Units:	barrels
Maximum Throughput:	211.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-3		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC003
Process Name:	Tank 3
Company Process Description:	Oil Storage Tank
Source Classification Code (SCC):	3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 230

Emission Unit : TNK004

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID:	TNK004		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	400	Units:	barrels
Maximum Throughput:	211.0000	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-4		
Company Equipment Description:	400-bbl Oil Storage Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC004
Process Name:	Tank 4
Company Process Description:	Oil Storage Tank
Source Classification Code (SCC):	3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 231

Emission Unit : TNK005

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: TNK005

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: Yes

Capacity: 1000 Units: barrels

Maximum Throughput: 7000.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-1

Company Equipment Description: 1000-bbl Water Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC005

Process Name: PW-1

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 232

Emission Unit : TNK006

Apr 7 2020, 09:42:43

- Emission Unit Information

AQD Emissions Unit ID: TNK006

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: Yes

Capacity: 400 Units: barrels

Maximum Throughput: 5.5000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: POPTK

Company Equipment Description: 400-bbl Water Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC006

Process Name: POPTK

Company Process Description: Pop Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 233

Control Equipment : FLA001

Apr 7 2020, 09:42:43

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-1

Company Control Equipment Description: Vapor Combustion Unit 1

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER001

DEQ Ex. 2 - 234

Control Equipment : FLA002

Apr 7 2020, 09:42:43

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA002

AQD Description:

Company Control Equipment ID: VCU-2

Company Control Equipment Description: Vapor Combustion Unit 2

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Enclosed

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER007

DEQ Ex. 2 - 235

Release Point : VER001

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER001
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 236

Release Point : AVL001

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	AVL001
Release Type:	Fugitive (Area, Volume, Line)
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitives
Operating Status:	Operating
Release Height (ft):	3.0

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 237

Release Point : VER002

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER002
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 238

Release Point : VER003

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER003
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-2
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 239

Release Point : VER004

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER004
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-3
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 240

Release Point : VER005

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER005
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-4
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 241

Release Point : VER006

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER006
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-5
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.07972	Longitude:	-108.85139

DEQ Ex. 2 - 242

Release Point : VER007

Apr 7 2020, 09:42:43

- Release Point Information

Release Point ID:	VER007
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	VCU-2
Company Release Point Description:	Vapor Combustion Unit
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	246.93
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.0801	Longitude:	-108.84625

DEQ Ex. 2 - 243

EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

January 23, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
NWD 2 Tank Battery
Park County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the NWD 2 Tank Battery in Park County, Wyoming. EDGE is submitting this waiver request for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

HOUSTON | BATON ROUGE | ASHEVILLE | DENVER

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

General Notes

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil and Gas Corp.
Facility/Well Name	LBB NWD #2
Field Name	Pitchfork Oil Field
Nearest City/Town	Meeteetse
API Number/SIC Code	
Latitude/Longitude	44.06503, -108.83998
County	Park
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	112
Produced Water Site Throughput (bbl/day):	2130
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

*****Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.*****

Equipment/Process Types	How many for this project?	0.061764706
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers	4	4
Oil / Condensate Tanks	3	3
Produced Water Tanks	2	2
Miscellaneous Tanks	1	1
Loading Jobs		
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors	1	1
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil and Gas Corp.
LBB NWD #2

Gas and Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** fill out this table.

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	6503, -108.83998
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = #VALUE!
VOC weight fraction = #VALUE!

VOC content of hydrocarbon fraction only

VOC weight% = #VALUE!
VOC weight fraction = #VALUE!

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V = #VALUE!
H2S ppm_{WT} = 0.00 0.061764706

Benzene

Benzene content of total sample

Benzene weight% = 0.0000
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = #VALUE!
Benzene weight fraction = #VALUE!

0.06176

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	Little Sand Draw Oil
What site is the sample from?	Little Sand Draw Oil
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	The Little Sand Draw liquid analysis is used as a representative sample for LBB NWD 1 since the sites are in close proximiity in the same basin, have similar site operations, and similar separator operating parameters.
Where in the process was the sample taken?	Atmospheric Oil Tank
What is the temperature and pressure of the sample (include units)?	30 psig, 95°F
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	21-Dec-17

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.0000	34.08188	0	0.0000
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.3119	30.06904	9	0.0735
propane (C3)	0.8229	44.09562	36	0.2844
butanes (C4)	1.8181	58.12220	106	0.8281
pentanes (C5)	3.2147	72.14878	232	1.8175
benzene	0.0644	78.110000	5	0.0394
other hexanes (C6)	5.9800	86.18000	515	4.0385
toluene	0.3651	92.140000	34	0.2636
other heptanes (C7)	6.3734	100.20000	639	5.0045
ethylbenzene	0.3874	106.170000	41	0.3223
xylenes (o, m, p)	1.5801	106.170000	168	1.3146
other octanes (C8)	6.6785	114.23000	763	5.9783
nonanes (C9)	6.3478	128.26000	814	6.3802
decanes plus (C10+)	66.0557	142.29000	9399	73.6551
Totals:	100.0000	127.61	12760.9256	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 99.9265
VOC weight fraction = 0.9993

VOC content of hydrocarbon fraction only

VOC weight% = 99.9265
VOC weight fraction = 0.9993

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V = 0.00
H2S ppm_{WT} = 0.00

Benzene

Benzene content of total sample

Benzene weight% = 0.0394
Benzene weight fraction = 0.0004

Benzene content of hydrocarbon fraction only

Benzene weight% = 0.0394
Benzene weight fraction = 0.0004

Enter any notes here:

The representative liquid analysis was taken from Little Sand Draw. The extended report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benezene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n-hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	13		
Separators		Separator	1		
Meters/piping [2]		Heater-treater	5		
Compressors		Header	1		
In-Line Heaters		Tanks	4	Tanks	1
Dehydrators		Pumps	3	Pumps	1
Scrubbers [3]		Sample Ports	5	Sample Ports	1

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	164	Valves	13
Pump Seals	0	Pump Seals	6	Pump Seals	2
Connectors	0	Connectors	218	Connectors	14
Flange	0	Flange	298	Flange	24
Open-Ended Lines	0	Open-Ended Lines	5	Open-Ended Lines	1
Other	0	Other	13	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

44.06503, -108.83998

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

0.061764706

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(0

[3] Scrubbers assumed 0.061765

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil and Gas Corp.
LBB NWD #2

Fugitives Emissions

EPN	FUG
Name	Fugitive Emissions

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.9265
Benzene wt %	0.0394
H_2S wt %	0.0000

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
164	Valve	0.005500	0.902	3.95076
6	Pump Seal	0.028660	0.17196	0.7531848
218	Connector	0.000463	0.100934	0.44209092
298	Flange	0.000243	0.072414	0.31717332
5	Open-ended Line	0.003090	0.01545	0.067671
13	Other	0.016500	0.2145	0.93951
		Total:	1.477258	6.47039004

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9265	0.0394	0.0000	
Pump Seal	99.9265	0.0394	0.0000	
Connector	99.9265	0.0394	0.0000	
Flange	99.9265	0.0394	0.0000	
Open-ended Line	99.9265	0.0394	0.0000	
Other	99.9265	0.0394	0.0000	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	4.06503, -108.8399	lb/hr	tpy	lb/hr	tpy
Valves	0.90	3.95	0.00	0.00	0.00	0.00
Pump Seal	0.17	0.75	0.00	0.00	0.00	0.00
Connector	0.10	0.44	0.00	0.00	0.00	0.00
Flange	0.07	0.32	0.00	0.00	0.00	0.00
Open-ended Line	0.02	0.07	0.00	0.00	0.00	0.00
Other	0.21	0.94	0.00	0.00	0.00	0.00
Total:	1.48	6.47	0.00	0.00	0.00	0.06

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
13	Valve	0.000216	0.002808	0.01229904
2	Pump Seal	0.000052	0.000104	0.00045552
14	Connector	0.000243	0.003402	0.01490076
24	Flange	0.000006	0.000144	0.00063072
1	Open-ended Line	0.000550	0.00055	0.002409
0	Other	0.030900	0	0
		Total:	0.007008	0.03069504

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9265	0.0394	0.0000	
Pump Seal	99.9265	0.0394	0.0000	
Connector	99.9265	0.0394	0.0000	
Flange	99.9265	0.0394	0.0000	
Open-ended Line	99.9265	0.0394	0.0000	
Other	99.9265	0.0394	0.0000	

	VOC Emissions		H_2S Emissions		Benzene Emissions
	lb/hr	tpy	lb/hr	tpy	lb/hr
Valves	0.00	0.01	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00
Connector	0.00	0.01	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00
Total:	0.01	0.03	0.00	0.00	0.00

IMPACT Data	
BTU Content (Btu/Scf)	
0.0122	
#VALUE!	Mscf/hr

Reference to Emission factors used:
for oil and gas

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

Notes:

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	1.48	6.50
benzene	0.00	0.06
H_2S	0.00	0.00

Citation Oil and Gas Corp.
LBB NWD #2

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-1	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.004	0.018
NOx	100	0.074	0.322
CO	84	0.062	0.271
PM_{10}	7.6	0.006	0.024
$PM_{2.5}$	5.7	0.004	0.018
SO_2	0.6	0.003	0.013

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)
Steady State (continuous)

44.06503, -108.83998

Enter any notes here:	This unit is one of two 0.75 MMBtu/hr tester heater treaters at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
LBB NWD #2

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-2	
Name	0.75 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.75	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.004	0.018
NOx	100	0.074	0.322
CO	84	0.062	0.271
PM_{10}	7.6	0.006	0.024
$PM_{2.5}$	5.7	0.004	0.018
SO_2	0.6	0.003	0.013

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0029**
SO_2 produced (tpy) =	**0.0125**

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

Emission Type: (pick from list)

Steady State (continuous)

44.06503, -108.83998

Enter any notes here:	This unit is one of two 0.75 MMBtu/hr tester heater treaters at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
LBB NWD #2

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-3	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

44.06503, -108.83998

Enter any notes here:	This unit is the main 1.25 MMBtu/hr vertical heater treater at LBB NWD 1. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
LBB NWD #2

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-4	
Name	0.5 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	0.5	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.003	0.012
NOx	100	0.049	0.215
CO	84	0.041	0.180
PM_{10}	7.6	0.004	0.016
$PM_{2.5}$	5.7	0.003	0.012
SO_2	0.6	0.002	0.008

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0019**
SO_2 produced (tpy) =	**0.0084**

assumptions:

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

Emission Type: (pick from list)

Steady State (continuous)

44.06503, -108.83998

Enter any notes here:	This unit is a 0.500 MMBtu/hr heater for Oil Storage Tank 1.

Citation Oil & Gas Corp.
LBB NWD #2
All Tanks
Emissions from Flash and Standing, Working, and Breathing Losses

Total vent flow from all tanks at NWD 2 Tank Battery was measured from 5/3/18 to 5/7/18 with a Fox Thermal Instruments Model FT4A meter. Total flow to the combustor was measured for a total of 89.82 hours and averaged 42.35 mcfd.

Site	**NWD 2 Tank Battery**
Flow Test Date	5/3/18-5/19/19
Duration (hours)	89.82
Vent Temperature	100.0
Ambient Pressure (psia)	12.2
Avg Gas Measured (mcf/day)	42.35
Avg Gas Measured (mscf/day)	32.64
MW (lb/lb-mol)	24.199
Sample Site	NWD 2
Sample Location and Date	Vent Line 6/5/18
days/yr	365
lb/ton	2000
Total Gas Emitted (tpy)	380.3052
wt % VOC	15.8562
wt % Benzene	0.0613
wt % H2S	1.3971
Total Emissions	
VOC Emissions (tpy)	60.3020
VOC Emissions (lb/hr)	13.7676
Benzene Emissions (tpy)	0.2331
Benzene Emissions (lb/hr)	0.0532
H2S Emissions (tpy)	5.3132
H2S Emissions (lb/hr)	1.2131

Standard Conditions

scf/lb-mol	379
Deg F	60
psia	14.7
Deg R	520

Citation Oil and Gas Corp.
LBB NWD #2

Flare / Vapor Combustor

General Information	
Unit Name:	Vapor Combustion Unit
Unit EPN:	VCU
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.14	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	All Tanks										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)			1359.878										1359.87812
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)			8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)			11912532										11912532.3
Heat Value of Stream - from program results or gas analysis (Btu/scf)			1032.689										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

0

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	All Tanks										-
H2S	-	-	1.21										1.21306951
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	13.77										13.7675705
benzene	-	-	0.05										0.05322537

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	5.31										5.31324446
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	60.30										60.3019589
benzene	-	-	0.23										0.23312711

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**All Tanks**										**-**
NOx	0.000	0.000	0.197	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.1966**
CO	0.000	0.000	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0492**
PM2.5	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0078**
PM10	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0103**
H2S	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0243**
SO2	0.000	0.000	2.280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.2802**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Total VOC	0.000	0.000	0.275	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.2754**
benzene	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0011**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**All Tanks**										**-**
NOx	0.000	0.000	0.861	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.8611**
CO	0.000	0.000	0.215	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.2153**
PM2.5	0.000	0.000	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0340**
PM10	0.000	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0453**
H2S	0.000	0.000	0.106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.1063**
SO2	0.000	0.000	9.987	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**9.9873**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0000**
Total VOC	0.000	0.000	1.206	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**1.2060**
benzene	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.0047**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.28	1.21
NOx	0.20	0.86
CO	0.05	0.22
PM2.5	0.01	0.03
PM10	0.01	0.05
H2S	0.02	0.11
SO2	2.28	9.99
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1033
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1033
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	1.5
Total Flare/Burner Tip Surface Area (ft^2)?	0.01226563
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft^2)?	0.01226563
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	30.80

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions are based on speciation and volume from the E&P Tanks reports for each tank. The heating value is based on the proportinal amounts of gas from working and breathing (E&P Tanks) and flash gas (GOR). The heating value from flash gas was determined using molar percentages from flash gas and individual heating values from https://www.enggcyclopedia.com/2011/09/heating-values-natural-gas/. Flash emissions are included in the flaring calculations. Uncontrolled values from the stable oil, GOR, and GWR are used calculate emissions from flaring. NOx and CO emission factors are used from an example calcualtion from the WY Oil and Gas Production Facilities Chapter 6 Section 3 Permitting Guidance. Flare burner parameters were supplied by Citation.

Citation Oil and Gas Corp.
LBB NWD #2

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions*.

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates*.

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emissions	Total VOC	1.4832	6.4963
		Benzene	0.0006	0.0618
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0000	0.0000
		NO_X	0.0000	0.0000
		CO	0.0000	0.0000
		PM_{10}	0.0000	0.0000
		$PM_{2.5}$	0.0000	0.0000
HTR-1	0.75 MMBtu/hr Heater Treater	Total VOC	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184
HTR-2	0.75 MMBtu/hr Heater Treater	Total VOC	0.0040	0.0177
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0029	0.0125
		NO_X	0.0735	0.3221
		CO	0.0618	0.2705
		PM_{10}	0.0056	0.0245
		$PM_{2.5}$	0.0042	0.0184

HTR-3	1.25 MMBtu/hr Heater Treater	**Total VOC**	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-4	0.5 MMBtu/hr Heater Treater	**Total VOC**	0.0027	0.0118
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0019	0.0084
		NO_X	0.0490	0.2147
		CO	0.0412	0.1804
		PM_{10}	0.0037	0.0163
		$PM_{2.5}$	0.0028	0.0122
VCU	Vapor Combustion Unit	**Total VOC**	0.2754	1.2060
		Benzene	0.0011	0.0047
		Formaldehyde	0.0000	0.0000
		H_2S	0.0243	0.1063
		SO_2	2.2802	9.9873
		NO_X	0.1966	0.8611
		CO	0.0492	0.2153
		PM_{10}	0.0103	0.0453
		$PM_{2.5}$	0.0078	0.0340

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Uncontrolled Emission Rates (excluded flare emissions)	**Total VOC**	15.27	66.88
	Benzene	0.05	0.29
	Formaldehyde	0.00	0.00
	H_2S	1.21	5.31
	SO_2	2.29	10.04
	NO_X	0.52	2.26
	CO	0.32	1.39
	PM_{10}	0.03	0.15
	$PM_{2.5}$	0.03	0.11

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Project Total Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)	**Total VOC**	1.78	7.78
	Benzene	1.650E-03	0.07
	Formaldehyde	0.00	0.00
	H_2S	0.02	0.11
	SO_2	2.29	10.04
	NO_X	0.52	2.26
	CO	0.32	1.39
	PM_{10}	0.03	0.15
	$PM_{2.5}$	0.03	0.11

If the automated formulas for the project emission totals (which assume that it is possible for all steady state and periodic emissions in the project to occur in the same hour) have been overwritten, explain any changes made and list the project emission points that occur in the realistic worst case hour. (Leave this blank or put NA if none of the formulas have been overwritten.)	Uncontrolled emissions are based on tanks venting to atmosphere (0% VOC and H2S control) and no flare present to control emissions. Controlled emissions were calculated by applying 100% control to tank emissions and including flaring emissions.

January 23, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - Little Sand Draw
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74197.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.312	0.107	0.045
Propane	0.823	0.290	0.174
Isobutane	0.444	0.186	0.124
n-Butane	1.374	0.554	0.383
2,2 Dimethylpropane	0.006	0.003	0.002
Isopentane	1.511	0.707	0.523
n-Pentane	1.698	0.787	0.588
2,2 Dimethylbutane	0.028	0.015	0.012
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.153	0.121
2 Methylpentane	1.376	0.731	0.569
3 Methylpentane	1.063	0.555	0.440
n-Hexane	1.928	1.014	0.798
Heptanes Plus	89.144	94.898	96.220
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.8560	(Water=1)
°API Gravity ----------	33.81	@ 60°F
Molecular Weight ----------	224.8	
Vapor Volume ----------	12.08	CF/Gal
Weight ----------	7.13	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.8442	(Water=1)
°API Gravity ----------	36.11	@ 60°F
Molecular Weight----------	208.3	
Vapor Volume ----------	12.86	CF/Gal
Weight ----------	7.03	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74197.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.312	0.107	0.045
Propane	0.823	0.290	0.174
Isobutane	0.444	0.186	0.124
n-Butane	1.380	0.557	0.385
Isopentane	1.511	0.707	0.523
n-Pentane	1.698	0.787	0.588
Other C-6's	2.760	1.454	1.142
Heptanes	6.563	3.646	3.053
Octanes	7.780	4.617	4.086
Nonanes	6.348	4.273	3.861
Decanes Plus	66.056	81.218	84.032
Benzene	0.064	0.023	0.024
Toluene	0.365	0.156	0.162
E-Benzene	0.387	0.191	0.197
Xylenes	1.580	0.774	0.805
n-Hexane	1.928	1.014	0.798
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.8442	(Water=1)
°API Gravity ----------	36.11	@ 60°F
Molecular Weight----------	208.3	
Vapor Volume ----------	12.86	CF/Gal
Weight ----------	7.03	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.8735	(Water=1)
Molecular Weight----------	265.0	

Characteristics of Atmospheric Sample:

°API Gravity ----------	36.11	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)--------	5.25	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74197.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.312	0.107	0.045
Propane	0.823	0.290	0.174
Isobutane	0.444	0.186	0.124
n-Butane	1.374	0.554	0.383
2,2 Dimethylpropane	0.006	0.003	0.002
Isopentane	1.511	0.707	0.523
n-Pentane	1.698	0.787	0.588
2,2 Dimethylbutane	0.028	0.015	0.012
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.153	0.121
2 Methylpentane	1.376	0.731	0.569
3 Methylpentane	1.063	0.555	0.440
n-Hexane	1.928	1.014	0.798
Methylcyclopentane	0.749	0.339	0.303
Benzene	0.064	0.023	0.024
Cyclohexane	0.542	0.236	0.219
2-Methylhexane	1.092	0.649	0.525
3-Methylhexane	1.202	0.706	0.578
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.989	0.542	0.471
n-Heptane	1.990	1.174	0.957
Methylcyclohexane	1.102	0.566	0.519
Toluene	0.365	0.156	0.162
Other C-8's	4.984	2.941	2.637
n-Octane	1.695	1.110	0.929
E-Benzene	0.387	0.191	0.197
M & P Xylenes	0.542	0.269	0.276
O-Xylene	1.038	0.505	0.529
Other C-9's	4.867	3.208	2.950
n-Nonane	1.480	1.065	0.911
Other C-10's	6.138	4.446	4.163
n-decane	1.200	0.942	0.820
Undecanes(11)	6.523	4.847	4.603
Dodecanes(12)	5.617	4.508	4.341
Tridecanes(13)	5.615	4.832	4.717
Tetradecanes(14)	4.512	4.159	4.115
Pentadecanes(15)	4.140	4.088	4.094
Hexadecanes(16)	3.407	3.595	3.631
Heptadecanes(17)	2.959	3.302	3.367
Octadecanes(18)	2.383	2.800	2.872
Nonadecanes(19)	2.532	3.099	3.197
Eicosanes(20)	2.191	2.788	2.893
Heneicosanes(21)	1.813	2.428	2.533
Docosanes(22)	1.590	2.218	2.328
Tricosanes(23)	1.369	1.980	2.091
Tetracosanes(24)	1.068	1.601	1.698
Pentacosanes(25)	0.958	1.489	1.586
Hexacosanes(26)	0.737	1.187	1.270
Heptacosanes(27)	0.792	1.322	1.421
Octacosanes(28)	0.703	1.215	1.310
Nonacosanes(29)	0.585	1.044	1.129
Triacontanes(30)	0.617	1.134	1.232
Hentriacontanes Plus(31+)	8.605	22.193	24.621
Total	100.000	100.000	100.000

Combustor line flowing to atmosphere

1 ft fill cycle

Min	0.00	Min	0.00	Min	0.00	Min	0.00
Ave	42.35	Ave	0.23	Ave	0.39	Ave	0.91
Max	75.17	Max	1.12	Max	1.66	Max	2.04
Fox Meter 163.869 MCF 92.22 HR	42.64						
NWD2 Battery. Vent Gas Flow Rate		NWD2 Battery. Combustor Line PSI		NWD2 Battery. Oil Tank Vent OZ		NWD2 Battery. Water Tank OZ	
Time/Date	Value	Time/Date	Value	Time/Date	Value	Time/Date	Value
5/3/2018 14:33	15.15	5/3/2018 14:33	0	5/3/2018 14:33	0	5/3/2018 14:33	0.42
5/3/2018 14:36	6.19	5/3/2018 14:36	0	5/3/2018 14:36	0.29	5/3/2018 14:36	0.78
5/3/2018 14:39	26.65	5/3/2018 14:39	0	5/3/2018 14:39	0.45	5/3/2018 14:39	0.9
5/3/2018 14:42	67.94	5/3/2018 14:42	0.56	5/3/2018 14:42	1.66	5/3/2018 14:42	1.96
5/3/2018 14:45	68.42	5/3/2018 14:45	0.48	5/3/2018 14:45	1.52	5/3/2018 14:45	1.91
5/3/2018 14:48	48.1	5/3/2018 14:48	0	5/3/2018 14:48	0.83	5/3/2018 14:48	1.27
5/3/2018 14:50	39.9	5/3/2018 14:50	0	5/3/2018 14:50	0.41	5/3/2018 14:50	0.96
5/3/2018 14:53	40.25	5/3/2018 14:53	0	5/3/2018 14:53	0.37	5/3/2018 14:53	1
5/3/2018 14:56	60	5/3/2018 14:56	0.52	5/3/2018 14:56	1.01	5/3/2018 14:56	1.45
5/3/2018 14:59	59.56	5/3/2018 14:59	0.39	5/3/2018 14:59	0.99	5/3/2018 14:59	1.55
5/3/2018 15:01	35.63	5/3/2018 15:01	0	5/3/2018 15:01	0.33	5/3/2018 15:01	0.95
5/3/2018 15:04	18.77	5/3/2018 15:04	0	5/3/2018 15:04	0.06	5/3/2018 15:04	0.77
5/3/2018 15:07	26.08	5/3/2018 15:07	0	5/3/2018 15:07	0.11	5/3/2018 15:07	0.86
5/3/2018 15:10	11.52	5/3/2018 15:10	0	5/3/2018 15:10	0.02	5/3/2018 15:10	0.44
5/3/2018 15:12	47.85	5/3/2018 15:12	0.01	5/3/2018 15:12	0.83	5/3/2018 15:12	1.44
5/3/2018 15:15	62.19	5/3/2018 15:15	0.04	5/3/2018 15:15	0.96	5/3/2018 15:15	1.6
5/3/2018 15:18	59.46	5/3/2018 15:18	0.17	5/3/2018 15:18	1.03	5/3/2018 15:18	1.74
5/3/2018 15:21	54.85	5/3/2018 15:21	0.18	5/3/2018 15:21	0.98	5/3/2018 15:21	1.59
5/3/2018 15:24	50.73	5/3/2018 15:24	0	5/3/2018 15:24	0.92	5/3/2018 15:24	1.55
5/3/2018 15:26	60.08	5/3/2018 15:26	0.12	5/3/2018 15:26	0.81	5/3/2018 15:26	1.44
5/3/2018 15:29	67.02	5/3/2018 15:29	0.63	5/3/2018 15:29	0.86	5/3/2018 15:29	1.29
5/3/2018 15:32	51.9	5/3/2018 15:32	0	5/3/2018 15:32	0.56	5/3/2018 15:32	1.04
5/3/2018 15:35	19.17	5/3/2018 15:35	0	5/3/2018 15:35	0	5/3/2018 15:35	0.55
5/3/2018 15:38	12.63	5/3/2018 15:38	0	5/3/2018 15:38	0.03	5/3/2018 15:38	0.83
5/3/2018 15:41	24.9	5/3/2018 15:41	0	5/3/2018 15:41	0.28	5/3/2018 15:41	0.82
5/3/2018 15:44	34.19	5/3/2018 15:44	0	5/3/2018 15:44	0.29	5/3/2018 15:44	0.85
5/3/2018 15:47	56.83	5/3/2018 15:47	0.19	5/3/2018 15:47	1.05	5/3/2018 15:47	1.52
5/3/2018 15:50	50.02	5/3/2018 15:50	0.05	5/3/2018 15:50	1.06	5/3/2018 15:50	1.63
5/3/2018 15:53	51.75	5/3/2018 15:53	0.45	5/3/2018 15:53	1.01	5/3/2018 15:53	1.33
5/3/2018 15:56	58.48	5/3/2018 15:56	0.29	5/3/2018 15:56	1.25	5/3/2018 15:56	1.81
5/3/2018 16:00	48	5/3/2018 16:00	0.02	5/3/2018 16:00	0.72	5/3/2018 16:00	1.27
5/3/2018 16:03	40.29	5/3/2018 16:03	0	5/3/2018 16:03	0.12	5/3/2018 16:03	0.69
5/3/2018 16:06	49.13	5/3/2018 16:06	0.22	5/3/2018 16:06	0.63	5/3/2018 16:06	1.08
5/3/2018 16:08	58.88	5/3/2018 16:08	0.53	5/3/2018 16:08	1	5/3/2018 16:08	1.47
5/3/2018 16:12	26.9	5/3/2018 16:12	0	5/3/2018 16:12	0.2	5/3/2018 16:12	0.78
5/3/2018 16:14	14.79	5/3/2018 16:14	0	5/3/2018 16:14	0.45	5/3/2018 16:14	0.92
5/3/2018 16:18	5.06	5/3/2018 16:18	0	5/3/2018 16:18	0.26	5/3/2018 16:18	0.59
5/3/2018 16:21	13.1	5/3/2018 16:21	0	5/3/2018 16:21	0.1	5/3/2018 16:21	0.59
5/3/2018 16:24	2.31	5/3/2018 16:24	0	5/3/2018 16:24	0.02	5/3/2018 16:24	0.44
5/3/2018 16:27	51.13	5/3/2018 16:27	0.18	5/3/2018 16:27	0.61	5/3/2018 16:27	1.08
5/3/2018 16:30	55.58	5/3/2018 16:30	0	5/3/2018 16:30	0.61	5/3/2018 16:30	1.07
5/3/2018 16:33	59.23	5/3/2018 16:32	0.27	5/3/2018 16:33	0.73	5/3/2018 16:33	1.27
5/3/2018 16:35	61.5	5/3/2018 16:35	0.41	5/3/2018 16:35	0.66	5/3/2018 16:35	1.11
5/3/2018 16:39	59.25	5/3/2018 16:39	0.12	5/3/2018 16:39	0.54	5/3/2018 16:39	1.07
5/3/2018 16:41	60.08	5/3/2018 16:41	0.31	5/3/2018 16:41	0.59	5/3/2018 16:41	1.29
5/3/2018 16:44	67.19	5/3/2018 16:44	0.83	5/3/2018 16:44	0.89	5/3/2018 16:44	1.52
5/3/2018 16:47	42.98	5/3/2018 16:47	0.32	5/3/2018 16:47	0.44	5/3/2018 16:47	1
5/3/2018 16:50	35.6	5/3/2018 16:50	0	5/3/2018 16:50	0.42	5/3/2018 16:50	1.11
5/3/2018 16:53	26.75	5/3/2018 16:53	0	5/3/2018 16:53	0.18	5/3/2018 16:53	0.73
5/3/2018 16:56	14.48	5/3/2018 16:56	0.21	5/3/2018 16:56	0	5/3/2018 16:56	0.37
5/3/2018 16:59	44.63	5/3/2018 16:59	0.56	5/3/2018 16:59	0.21	5/3/2018 16:59	0.73
5/3/2018 17:02	63.67	5/3/2018 17:02	0.7	5/3/2018 17:02	0.94	5/3/2018 17:02	1.22
5/3/2018 17:05	65.83	5/3/2018 17:05	0.88	5/3/2018 17:05	1.04	5/3/2018 17:05	1.52
5/3/2018 17:08	68.29	5/3/2018 17:08	0.88	5/3/2018 17:08	1.09	5/3/2018 17:08	1.6
5/3/2018 17:11	61.98	5/3/2018 17:11	0.48	5/3/2018 17:11	1	5/3/2018 17:11	1.59
5/3/2018 17:14	52.52	5/3/2018 17:13	0.75	5/3/2018 17:14	0.7	5/3/2018 17:14	1.44
5/3/2018 17:16	54.83	5/3/2018 17:16	0.62	5/3/2018 17:16	0.74	5/3/2018 17:16	1.37
5/3/2018 17:19	67.88	5/3/2018 17:19	0.92	5/3/2018 17:19	1.14	5/3/2018 17:19	1.83
5/3/2018 17:22	63.17	5/3/2018 17:22	0.56	5/3/2018 17:22	1.41	5/3/2018 17:22	2.04
5/3/2018 17:25	41.52	5/3/2018 17:25	0	5/3/2018 17:25	0.65	5/3/2018 17:25	1.49
5/3/2018 17:28	10.48	5/3/2018 17:28	0	5/3/2018 17:28	0.19	5/3/2018 17:28	0.92
5/3/2018 17:31	0	5/3/2018 17:31	0	5/3/2018 17:31	0.18	5/3/2018 17:31	0.89
5/3/2018 17:34	21.13	5/3/2018 17:34	0	5/3/2018 17:34	0.32	5/3/2018 17:34	1.07
5/3/2018 17:37	38.79	5/3/2018 17:37	0	5/3/2018 17:37	0.28	5/3/2018 17:37	1.14
5/3/2018 17:40	58.54	5/3/2018 17:40	0.37	5/3/2018 17:40	1	5/3/2018 17:40	1.74
5/3/2018 17:43	58.15	5/3/2018 17:43	0.28	5/3/2018 17:43	0.68	5/3/2018 17:43	1.29
5/3/2018 17:46	49	5/3/2018 17:46	0	5/3/2018 17:46	0.37	5/3/2018 17:46	0.97
5/3/2018 17:48	49.88	5/3/2018 17:48	0.23	5/3/2018 17:48	0.35	5/3/2018 17:48	0.77
5/3/2018 17:51	64.35	5/3/2018 17:51	0.63	5/3/2018 17:51	1.18	5/3/2018 17:51	1.89
5/3/2018 17:54	62.73	5/3/2018 17:54	0.21	5/3/2018 17:54	1.2	5/3/2018 17:54	1.87
5/3/2018 17:57	58.94	5/3/2018 17:57	0.08	5/3/2018 17:57	0.92	5/3/2018 17:57	1.83
5/3/2018 17:59	48.33	5/3/2018 17:59	0	5/3/2018 17:59	0.49	5/3/2018 17:59	1.27
5/3/2018 18:02	28.21	5/3/2018 18:02	0	5/3/2018 18:02	0.06	5/3/2018 18:02	0.59
5/3/2018 18:05	18.04	5/3/2018 18:05	0	5/3/2018 18:05	0.26	5/3/2018 18:05	1.01
5/3/2018 18:08	29.44	5/3/2018 18:08	0.29	5/3/2018 18:08	0	5/3/2018 18:08	0.46
5/3/2018 18:10	13.54	5/3/2018 18:10	0	5/3/2018 18:10	0	5/3/2018 18:10	0.28
5/3/2018 18:13	6.65	5/3/2018 18:13	0	5/3/2018 18:13	0	5/3/2018 18:13	0
5/3/2018 18:16	41.65	5/3/2018 18:16	0.49	5/3/2018 18:16	0.24	5/3/2018 18:16	0.8
5/3/2018 18:19	62.46	5/3/2018 18:19	0.85	5/3/2018 18:19	1.07	5/3/2018 18:19	1.51
5/3/2018 18:25	62.54	5/3/2018 18:25	0.48	5/3/2018 18:25	1.13	5/3/2018 18:25	1.77
5/3/2018 18:27	49.06	5/3/2018 18:27	0.26	5/3/2018 18:27	0.92	5/3/2018 18:27	1.55
5/3/2018 18:30	47.08	5/3/2018 18:30	0.56	5/3/2018 18:30	0.74	5/3/2018 18:30	1.24
5/3/2018 18:33	57	5/3/2018 18:33	0.4	5/3/2018 18:33	0.57	5/3/2018 18:33	1.16
5/3/2018 18:36	62.77	5/3/2018 18:36	0.67	5/3/2018 18:36	1.17	5/3/2018 18:36	1.71
5/3/2018 18:39	62.77	5/3/2018 18:39	0.34	5/3/2018 18:39	1.05	5/3/2018 18:39	1.69
5/3/2018 18:42	42.48	5/3/2018 18:42	0.25	5/3/2018 18:42	0.75	5/3/2018 18:42	1.23
5/3/2018 18:44	12.38	5/3/2018 18:44	0	5/3/2018 18:44	0.16	5/3/2018 18:44	0.83
5/3/2018 18:47	10.21	5/3/2018 18:47	0	5/3/2018 18:47	0.34	5/3/2018 18:47	0.85
5/3/2018 18:50	30.88	5/3/2018 18:50	0.28	5/3/2018 18:50	0.46	5/3/2018 18:50	0.99
5/3/2018 18:53	18.23	5/3/2018 18:53	0.41	5/3/2018 18:53	0.2	5/3/2018 18:53	0.63
5/3/2018 18:56	2.65	5/3/2018 18:56	0.34	5/3/2018 18:56	0.09	5/3/2018 18:56	0.52
5/3/2018 18:59	38.29	5/3/2018 18:59	0.56	5/3/2018 18:59	0.43	5/3/2018 18:59	0.92
5/3/2018 19:02	64.83	5/3/2018 19:02	0.99	5/3/2018 19:02	1	5/3/2018 19:02	1.47
5/3/2018 19:05	61.06	5/3/2018 19:05	0.9	5/3/2018 19:05	0.92	5/3/2018 19:05	1.39

This data included as an example of the type of flow readings recorded and includes the average value over the entire testing period. The entire data set is available but was not included due to space issues.

AMERICAN MOBILE RESEARCH, INC.

P.O. BOX 2909 (307) 235-4590 PHONE
CASPER, WYOMING 82602 (307) 265-4489 FAX

EXTENDED HYDROCARBON GAS (GLYCALC) STUDY

CERTIFICATE OF ANALYSIS

Company ..... **CITATION OIL AND GAS**
Lab Number CR-18493
Date Sampled 6-5-2018
Time Sampled..... N/A
Method of Analysis..... Dual TCD-FID Chromatography

Study Number..... CR-2
Date Tested..... 6-7-2018
Time Tested..... 9:26 AM
Ambient Temp at Sampling..... N/A

Sample Identification ..... **GAS FROM NORTH WEST DOME #2 WATER & OIL VESSEL - vent line**
STATION NO..... N/A

Sample Location ..... LITTLE BUFFALO BASIN FIELD, WYOMING.
Type Sample..... SPOT
Effective Date..... N/A
Sample Pressure ..... 16 Ounces
Cylinder ID ..... AMR 243
Instrument Used..... Shimadzu GC-2014
Sample Method..... Trap & Purge
Test Method GPA-2286

County ..... PARK
Composite From..... N/A
Sample Temperature ..... 96 F
Cylinder Heated To..... 130 F
Calibration Date..... 6-7-2018
Un-Normalized Total..... 100.34 %
Sampled By..... TCRI - Jack Fabion

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide.....	14.790	26.898	13.778
Hydrogen Sulfide.....	0.992	1.397	0.732
Nitrogen.....	2.290	2.651	1.375
Methane.....	70.109	46.478	64.878
Ethane.....	5.408	6.720	7.895
Propane.....	2.465	4.492	3.707
iso-Butane.....	0.695	1.669	1.241
n-Butane.....	1.268	3.046	2.182
iso-Pentane.....	0.640	1.908	1.278
n-Pentane.....	0.475	1.416	0.940
Cyclopentane.....	0.015	0.043	0.024
n-Hexane.....	0.144	0.513	0.323
Cyclohexane.....	0.062	0.216	0.115
Other Hexanes	0.270	0.962	0.606
Heptanes.....	0.220	0.911	0.554
Methylcyclohexane.....	0.018	0.073	0.039
2,2,4-Trimethylpentane..	0.009	0.042	0.026
Benzene.....	0.019	0.061	0.029
Toluene.....	0.028	0.107	0.051
Ethylbenzene.....	0.003	0.013	0.006
Xylenes.....	0.013	0.057	0.027
Octanes	0.055	0.260	0.154
Nonanes	0.005	0.027	0.015
Decanes + ...	0.007	0.041	0.023
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.015	0.043	0.024
Cyclohexane	0.062	0.216	0.115
2-Methylpentane	0.193	0.687	0.433
3-Methylpentane	0.077	0.274	0.173
n-Hexane	0.144	0.513	0.323
Methylcyclohexane	0.018	0.073	0.039
2,2,4-Trimethylpentane	0.009	0.042	0.026
Benzene	0.019	0.061	0.029
Toluene	0.028	0.107	0.051
Ethylbenzene	0.003	0.013	0.006
m-Xylene	0.002	0.009	0.004
p-Xylene	0.008	0.034	0.016
o-Xylene	0.003	0.014	0.007
Hexanes, Total	0.491	1.733	1.069
Heptanes, Total	0.266	1.088	0.648
Octanes, Total	0.099	0.436	0.239
Nonanes, Total	0.005	0.027	0.015
Decanes+, Total	0.007	0.041	0.023

SPECIFIC GRAVITY AT 60/60 F, calculated	0.83552
TOTAL GPM (ETHANE INCLUSIVE)	3.514
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis	1032.689
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis	1014.977
AVERAGE MOLECULAR WEIGHT	24.199
MOLAR MASS RATIO	0.83552
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.83861
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA, calculated	1026.520
COMPRESSIBILITY FACTOR (Z)	0.99631

ETHANE GPM	1.4426
PROPANE GPM	0.6774
iso-BUTANE GPM	0.2268
n-BUTANE GPM	0.3987
iso-PENTANE GPM	0.2335
n-PENTANE GPM	0.1717
GASOLINE RANGE (HEXANES+) GPM	0.3635
FIELD H2S AT TIME OF SAMPLING, PPM	**N/A PPM**

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

James A. Kane, President
American Mobile Research, Inc.

Facility : F004576

Apr 7 2020, 12:01:22

- Facility Information

Facility ID: F004576
FacilityName: NWD 2 Tank Battery
Facility Description:
Company Name: Citation Oil & Gas Corp.
Operating Status: Operating
AFS:
Facility Class: Minor
Facility Type: Storage Tank Battery
CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
Section 3, 47N, 100W	Park County	Park	44.06503/-108.83998	S3-T47N-R100W	05/08/2012

Location Detail For : Section 3, 47N, 100W

Latitude: 44.06503
Longitude: -108.83998
Quarter Quarter:
Quarter:
Section: 3
Township: 47N
Range: 100W
County: Park
State: Wyoming
District: District 4
Physical Address 1: Section 3, 47N, 100W
Physical Address 2:
City: Park County
Zip: 82414
Effective Date: 05/08/2012

- API

API
2920246
2920251
2920274
2920356
2920757
2920892
2920894
2931365

- Notes

User Name	Date	Note

- NAICS Codes

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- Contacts

DEQ Ex. 2 - 268

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix:	Ms.	First Name:	Lee Ann
Middle Name:		Last Name:	Elsom
Suffix:			
Company Title:	Manager Regulatory Compliance	Contact's Company Name:	Citation Oil & Gas Corp.
Address 1:	14077 Cutten Road		
Address 2:			
City:	Houston	Zip Code:	77069
State:	Texas		
Work Phone No:	(281)891-1577	Secondary Phone No.:	
Address 2:	(281)517-7196	Secondary Ext. No.:	
Mobile Phone No.:		Pager No.:	
Fax No:		Pager PIN No.:	
Email:	lelsom@cogc.com		
Email Pager Address:			

- **Rules & Regs**

Subject to Part 60 NSPS:	X	Subject to 112(r) Accidental Release Prevention:	
Subject to Part 61 NESHAP:		Subject to non-attainment NSR:	
Subject Part 63 NESHAP:		Subject to PSD:	
Subject to Title IV Acid Rain:			

Part 60 NSPS Subparts

OOOO - Crude Oil and Natural Gas Production, Transmission and Distribution

- **Attachments**

Description	Type	Modified By	Modified Date

- **Version**

DEQ Ex. 2 - 269

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	01/30/2020		X
55958	08/20/2019	01/30/2020	X
53450	03/22/2019	08/20/2019	X
4576	05/08/2012	03/22/2019	X

Emission Unit : FLR001

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 0.06 Units : Mscf/hr

Minimum Design Capacity: 0.01 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: VCU-1

Company Equipment Description: Vapor Combustion Unit

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: Vapor Combustion Unit

Company Process Description: VCU-1

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER001

DEQ Ex. 2 - 271

Emission Unit : FUG001

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	218	14
Flanges	0	0	298	24
Open Ended Lines	0	0	5	1
Pump Seals	0	0	6	2
Valves	0	0	164	13
Other	0	0	13	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitives

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC010

Process Name: FUG

Company Process Description: Fugitives

Source Classification Code (SCC): 3-10-888-11

Release points(s) directly associated with this process

DEQ Ex. 2 - 272

AVL001

Emission Unit : HET001

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: HET001

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.75 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-1

Company Equipment Description: 0.75 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC006

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER002

DEQ Ex. 2 - 274

Emission Unit : HET002

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: HET002

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.75 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-2

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC007

Process Name: HTR-2

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER003

DEQ Ex. 2 - 275

Emission Unit : HET003

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: HET003

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-3

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC008

Process Name: HTR-3

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER004

DEQ Ex. 2 - 276

Emission Unit : HET004

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: HET004

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 0.5 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-3

Company Equipment Description: 0.50 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: HTR-4

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER005

DEQ Ex. 2 - 277

Emission Unit : TNK001

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: TNK001

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 112.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-1

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC001

Process Name: Tank 1

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 278

Emission Unit : TNK002

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 112.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-2

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name: Tank 2

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 279

Emission Unit : TNK003

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: TNK003

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 112.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-3

Company Equipment Description: 400-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC003

Process Name: Tank 3

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 280

Emission Unit : TNK004

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: TNK004

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 112.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-1

Company Equipment Description: 400-bbl Produced Water Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC004

Process Name: PW-1

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 281

Emission Unit : TNK005

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: TNK005

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 112.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-2

Company Equipment Description: 400-bbl Produced Water Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC005

Process Name: PW-2

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 282

Emission Unit : TNK006

Apr 7 2020, 12:01:23

- Emission Unit Information

AQD Emissions Unit ID: TNK006

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/yr

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: POPTK

Company Equipment Description: 400-bbl Water Knockout Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC012

Process Name: POPTK

Company Process Description: Pop Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 283

Control Equipment : FLA001

Apr 7 2020, 12:01:23

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-1

Company Control Equipment Description: Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER001

DEQ Ex. 2 - 284

Release Point : VER001

Apr 7 2020, 12:01:23

- Release Point Information

Release Point ID:	VER001
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.065	Longitude:	-108.84028

DEQ Ex. 2 - 285

Release Point : AVL001

Apr 7 2020, 12:01:23

- Release Point Information

Release Point ID:	AVL001
Release Type:	Fugitive (Area, Volume, Line)
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitives
Operating Status:	Operating
Release Height (ft):	3.0

- Release Latitude and Longitude

Latitude:	44.065	Longitude:	-108.84028

DEQ Ex. 2 - 286

Release Point : VER002

Apr 7 2020, 12:01:23

- Release Point Information

Release Point ID:	VER002
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.065	Longitude:	-108.84028

DEQ Ex. 2 - 287

Release Point : VER003

Apr 7 2020, 12:01:23

- Release Point Information

Release Point ID:	VER003
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-2
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.065	Longitude:	-108.84028

DEQ Ex. 2 - 288

Release Point : VER004

Apr 7 2020, 12:01:23

- Release Point Information

Release Point ID:	VER004
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-3
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.065	Longitude:	-108.84028

DEQ Ex. 2 - 289

Release Point : VER005

Apr 7 2020, 12:01:23

- Release Point Information

Release Point ID:	VER005
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-4
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.065	Longitude:	-108.84028

DEQ Ex. 2 - 290

EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

January 24, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
Tensleep 1 Tank Battery
Park County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the Tensleep 1 Tank Battery in Park County, Wyoming. EDGE is submitting this waiver request for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

HOUSTON | BATON ROUGE | ASHEVILLE | DENVER

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

General Notes

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil & Gas Corp.
Facility/Well Name	Tensleep 1 Tank Battery
Field Name	Pitchfork Oil Field
Nearest City/Town	Meeteetse
API Number/SIC Code	
Latitude/Longitude	44.06246, -108.79512
County	Park
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	135
Produced Water Site Throughput (bbl/day):	15000
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

*****Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.*****

Equipment/Process Types	How many for this project?	How many for this site?
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers	2	2
Oil / Condensate Tanks	4	4
Produced Water Tanks	1	1
Miscellaneous Tanks	1	1
Loading Jobs		
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors	1	1
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Gas and Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** fill out this table.

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 0.0000
VOC weight fraction = 0.0000

VOC content of hydrocarbon fraction only

VOC weight% = #DIV/0!
VOC weight fraction = #DIV/0!

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V =
H2S ppm_{WT} = 0.00

Benzene

Benzene content of total sample

Benzene weight% = 0.0000
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = #DIV/0!
Benzene weight fraction = #DIV/0!

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	Stock Tank
What site is the sample from?	LBB Embar 3
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	LBB Embar 3 liquid analysis is being used as a representative sample for LBB Tensleep 1. Both sites extract well emulsion from the same formation, have similar API gravities (within 3 degrees), and have similar site operations where sampling could occur at the same point in the process for each site.
Where in the process was the sample taken?	Oil Tank
What is the temperature and pressure of the sample (include units)?	17psig, 154°F
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	20-Dec-17

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.0400	34.08188	1	0.0033
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.0322	30.06904	1	0.0024
propane (C3)	0.1656	44.09562	7	0.0178
butanes (C4)	0.6340	58.12220	37	0.0901
pentanes (C5)	1.6580	72.14878	120	0.2923
benzene	0.0117	78.110000	1	0.0022
other hexanes (C6)	3.5785	86.18000	308	0.7537
toluene	0.0970	92.140000	9	0.0218
other heptanes (C7)	3.0426	100.20000	305	0.7450
ethylbenzene	0.1870	106.170000	20	0.0485
xylenes (o, m, p)	0.5775	106.170000	61	0.1498
other octanes (C8)	2.9614	114.23000	338	0.8267
nonanes (C9)	3.0514	128.26000	391	0.9564
decanes plus (C10+)	83.9631	468.30000	39320	96.0898
Totals:	100.0000	409.20	40919.9555	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 99.9943
VOC weight fraction = 0.9999

VOC content of hydrocarbon fraction only

VOC weight% = 99.9976
VOC weight fraction = 1.0000

Hydrogen Sulfide

H2S weight% = 0.0033
H2S weight fraction = 3.33E-05
H2S ppm_V = 400.00
H2S ppm_{WT} = 33.32

Benzene

Benzene content of total sample

Benzene weight% = 0.0022
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = 0.0022
Benzene weight fraction = 0.0000

Enter any notes here:

The representative liquid analysis was taken from LBB Embar 3. The extended report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benezene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n-hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

The liquid analysis was not analyzed for H2S so the concentration in the flash gas from the oil was used and the difference was subracted from C10+.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	10		
Separators		Separator	3		
Meters/piping [2]		Heater-treater	2		
Compressors		Header	1		
In-Line Heaters		Tanks	4	Tanks	1
Dehydrators		Pumps	2	Pumps	1
Scrubbers [3]		Sample Ports	5	Sample Ports	1

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	132	Valves	13
Pump Seals	0	Pump Seals	4	Pump Seals	2
Connectors	0	Connectors	162	Connectors	14
Flange	0	Flange	246	Flange	24
Open-Ended Lines	0	Open-Ended Lines	5	Open-Ended Lines	1
Other	0	Other	10	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(i)(A) dictates counting one meters/piping per well-pad for production operations.

[3] Scrubbers assumed to have the same fugitive components as separators.

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Fugitives Emissions

EPN	FUG
Name	Fugitive Emissions

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.9976
Benzene wt %	0.0022
H_2S wt %	0.0033

(3)

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
132	Valve	0.005500	0.726	3.17988
4	Pump Seal	0.028660	0.11464	0.5021232
162	Connector	0.000463	0.075006	0.32852628
246	Flange	0.000243	0.059778	0.26182764
5	Open-ended Line	0.003090	0.01545	0.067671
10	Other	0.016500	0.165	0.7227
		Total:	1.155874	5.06272812

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0033	
Pump Seal	99.9976	0.0022	0.0033	
Connector	99.9976	0.0022	0.0033	
Flange	99.9976	0.0022	0.0033	
Open-ended Line	99.9976	0.0022	0.0033	
Other	99.9976	0.0022	0.0033	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.73	3.18	0.00	0.00	0.00	0.00
Pump Seal	0.11	0.50	0.00	0.00	0.00	0.00
Connector	0.08	0.33	0.00	0.00	0.00	0.00
Flange	0.06	0.26	0.00	0.00	0.00	0.00
Open-ended Line	0.02	0.07	0.00	0.00	0.00	0.00
Other	0.16	0.72	0.00	0.00	0.00	0.00
Total:	1.16	5.06	0.00	0.00	0.00	0.00

(4)

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
13	Valve	0.000216	0.002808	0.01229904
2	Pump Seal	0.000052	0.000104	0.00045552
14	Connector	0.000243	0.003402	0.01490076
24	Flange	0.000006	0.000144	0.00063072
1	Open-ended Line	0.000550	0.00055	0.002409
0	Other	0.030900	0	0
		Total:	0.007008	0.03069504

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0033	
Pump Seal	99.9976	0.0022	0.0033	
Connector	99.9976	0.0022	0.0033	
Flange	99.9976	0.0022	0.0033	
Open-ended Line	99.9976	0.0022	0.0033	
Other	99.9976	0.0022	0.0033	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.00	0.01	0.00	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00	0.00
Connector	0.00	0.01	0.00	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.01	0.03	0.00	0.00	0.00	0.00

(5)

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	1.16	5.09
benzene	0.00	0.00
H_2S	0.00	0.00

Notes:

Reference to Emission factors used:

1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4.

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-1	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	LBB Tensleep 1 has two heater treaters with a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-2	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)

Steady State (continuous)

Enter any notes here:	LBB Tensleep 1 has two heater treaters with a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Tank Emissions - Lab Gas Oil Ratio (GOR) Method

GOR [FOR ESTIMATING FLASH LOSSES FROM STORAGE TANKS]

EPN	Tank Identifier	Flash Initial Press. (psig)	Flash Initial Temp. (°F)	Flash Final Press. (psig)	Flash Final Temp. (°F)	GOR (scf of flash gas/bbl of oil/cond. produced)	Barrels of Oil or Condensate per day (bbl/day)	Flash Gas Molecular Weight	Flash Gas VOC wt%	Flash Gas Benzene wt%	Flash Gas H_2S wt%	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H_2S Control Efficiency (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H_2S Results (lb/hr)	H_2S Results (tpy)
TK-1	1000-bbl Oil Tank	17	154	-2.2	70	3.75	135	64.84	85.5357	1.0954	0.0210	0	(B) cont. by flare/ VC/TO/VRU	100	100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
															Totals:	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

VOC Type: (pick from list)
Crude Oil or Condensate VOC

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here: Tank flash emissions are based on a flash gas analysis from the LBB Tensleep 1 flash gas analysis.

GOR Calculator

This table can be used to calculate the flash gas molecular weight and the component weight percents if needed, if the flash gas mole percents are entered. It can also calculate the overall VOC, benzene, and H2S flash emissions if the GOR and the oil/condensate throughput are entered.

Gas Oil Ratio:	3.75	in standard cubic feet of flash gas per barrel (SCF/bbl) of oil/condensate produced
Barrels of Oil or Condensate per day:	135	

Flash Gas Speciation:

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.5670	28.01340	16	0.2445
CO2	18.2170	44.00950	802	12.3415
H2S	0.0400	34.08188	1	0.0210
methane (C1)	2.4210	16.04246	39	0.5979
ethane (C2)	2.7210	30.06904	82	1.2595
propane (C3)	6.8080	44.09562	300	4.6212
butanes (C4)	17.6610	58.12220	1026	15.8016
pentanes (C5)	23.3110	72.14878	1682	25.8901
benzene	0.9110	78.110000	71	1.0954
other hexanes (C6)	19.5870	86.18000	1688	25.9847
toluene	0.9800	92.140000	90	1.3900
other heptanes (C7)	5.3240	100.20000	533	8.2120
ethylbenzene	0.0000	106.170000	0	0.0000
xylenes (o, m, p)	0.3360	106.170000	36	0.5491
other octanes (C8)	0.9810	114.23000	112	1.7250
nonanes (C9)	0.1350	128.26000	17	0.2665
decanes plus (C10+)	0.0000	142.28000	0	0.0000
Totals:	100.0000	64.96	6496	100.00

Flash Gas MW =	64.9615967
Total gas emitted:	
lb/hr:	3.61092054
tpy:	15.815832
VOC wt% =	85.5357
VOC, lb/hr:	3.08862585
VOC, tpy:	13.5281812
Benzene wt% =	1.0954
Benzene, lb/hr:	0.03955362
Benzene, tpy:	0.17324486
H_2S wt% =	0.0210
H_2S, lb/hr:	0.00075778
H_2S, tpy:	0.00331909

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Tank Emissions - Lab Gas Water Ratio (GWR) Method

GWR [FOR ESTIMATING FLASH LOSSES FROM STORAGE TANKS]

EPN	Tank Identifier	Flash Initial Press. (psig)	Flash Initial Temp. (°F)	Flash Final Press. (psig)	Flash Final Temp. (°F)	GWR (scf of flash gas/bbl of water produced)	Barrels of Water per day (bbl/day)	Flash Gas Molecular Weight	Flash Gas VOC wt%	Flash Gas Benzene wt%	Flash Gas H_2S wt%	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H_2S Control Efficiency (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H_2S Results (lb/hr)	H_2S Results (tpy)
WTK-1	1000-bbl Water Tank	17	154	-2.2	70	0.43	15000	43.41	1.1347	0.0072	1.5704	(B) cont. by flare/ VC/TO/VRU	100	100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
														Totals:	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

VOC Type: (pick from list)
Crude Oil or Condensate VOC

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here: Tank flash emissions are based on a flash gas analysis from the LBB Tensleep 1 flash gas analysis. The GOR for the oil is 0.51 CF/bbl applied to 26500 bbl/day. Overflow tanks do not experience any flash emissions. Flash gas speciation was summed similarly to the liquid analysis used for fugitive emissions.

GWR Calculator

This table can be used to calculate the flash gas molecular weight and the component weight percents if needed, if the flash gas mole percents are entered. It can also calculate the overall VOC, benzene, and H2S flash emissions if the GWR and the oil/condensate throughput are entered.

Gas Water Ratio:	0.43	in standard cubic feet of flash gas per barrel (SCF/bbl) of water produced
Barrels of Oil or Condensate per day:	15000	

Flash Gas Speciation:

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.6750	28.01340	19	0.4356
CO2	94.6410	44.00950	4165	95.9556
H2S	2.0000	34.08188	68	1.5704
methane (C1)	1.1050	16.04246	18	0.4084
ethane (C2)	0.7150	30.06904	21	0.4953
propane (C3)	0.3310	44.09562	15	0.3363
butanes (C4)	0.3250	58.12220	19	0.4352
pentanes (C5)	0.1670	72.14878	12	0.2776
benzene	0.0040	78.110000	0	0.0072
other hexanes (C6)	0.0200	86.18000	2	0.0397
toluene	0.0070	92.140000	1	0.0149
other heptanes (C7)	0.0040	100.20000	0	0.0092
ethylbenzene	0.0020	106.170000	0	0.0049
xylenes (o, m, p)	0.0040	106.170000	0	0.0098
other octanes (C8)	0.0000	114.23000	0	0.0000
nonanes (C9)	0.0000	128.26000	0	0.0000
decanes plus (C10+)	0.0000	142.28000	0	0.0000
	100.0000		4340.655	100.0000

Flash Gas MW =	43.406552
Total gas emitted:	
lb/hr:	30.74052
tpy:	134.64348
VOC wt% =	1.1347
VOC, lb/hr:	0.3488101
VOC, tpy:	1.5277883
Benzene wt% =	0.0072
Benzene, lb/hr:	0.0022127
Benzene, tpy:	0.0096916
H_2S wt% =	1.5704
H_2S, lb/hr:	0.4827357
H_2S, tpy:	2.1143826

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Tank Emissions - E&P Tanks Stable Oil Option

E&P TANKS STABLE OIL OPTION [FOR ESTIMATING WORKING AND BREATHING LOSSES FROM STORAGE TANKS]

EPN	Tank Identifier	C10+ MW	C10+ SG	Production Rate (bbl/day)	API Gravity	RVP (psia)	Bulk Temperature (°F)	Emissions Uncontrolled VOC (lb/hr)	Emissions Uncontrolled VOC (ton/yr)	Emissions Uncontrolled Benzene (lb/hr)	Emissions Uncontrolled Benzene (ton/yr)	Emissions Uncontrolled H_2S (lb/hr)	Emissions Uncontrolled H_2S (ton/yr)	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H_2S Control Efficiency (%)	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H_2S Results (lb/hr)	H_2S Results (tpy)
TK-1	1000-bbl Oil Tank	468.3	0.9548	135	18.46	1.74	60	0.097	0.427	0	0	0.005	0.023	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-2	1000-bbl Oil Overflow Tank	468.3	0.9548	1	18.46	1.74	60	0.097	0.046	0	0	0.005	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-3	300-bbl Oil Overflow Tank	468.3	0.9548	1	18.46	1.74	60	0.04	0.034	0	0	0.002	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-4	300-bbl Oil Overflow Tank	468.3	0.9548	1	18.46	1.74	60	0.04	0.034	0	0	0.002	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-5	90-bbl Pop Tank	468.3	0.9548	1	18.46	1.74	60	0.002	0.009	0	0	0	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
PW-1	1000-bbl Water Tank	468.3	0.9548	15000	18.46	1.74	60	1.654	7.244	0.001	0.003	0.09	0.396	(B) cont. by flare/ VC/TO/VRU	100	100	99	0.00	0.00	0.00	0.00	0.00	0.00
																	Totals:	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
				625.0000																			

VOC Type: (pick from list)
Crude Oil or Condensate VOC

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:

The main tank, TK-1, receives the bulk of all incoming oil from the heater treaters. LBB Tensleep 1 has 3 tanks, TK-2, TK-3, and TK-4, for overflow only. Hourly emissions for overflow tanks are based on the total site throughput, annual emissions are based on 1 barrel of oil per day. Oil characteristics were taken from the LBB Embar 3 atmospheric hydrocarbon liquid analysis. Emissions were calculated for the tanks near Cheyenne, WY using the stable oil method in E&P Tanks Version 2. Water generated at the site is sent through the main water tank, WTK-1. Oil entrained in within the water is based on the atmospheric hydrocarbon liquid analysis. Emissions were estimated similarly to the oil tanks and uses a 99% reduction factor for the amount of oil within the water. Both annual and hourly emissions for the Pop Tank were based on 1 bbl/day.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Pop Tank Flare
Unit EPN:	FLR-1
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	steam assisted flare with high Btu stream flared	
NOx	0.0485	lb/MMBtu
CO	0.3503	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	GOR	GWR	Pop Tank Stable Oil								-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		21.09375	268.75	0.01375								304.8575
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760	8760	8760								-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		184781.25	2354250	120.45								2670551.7
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		3275	66	3201.85								-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	GOR	GWR	Pop Tank Stable Oil								-
H2S	-	-	0.0008	0.4828	0								0.48353045
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	3.0828	0.3488	0.002								3.43368229
benzene	-	-	0.0395	0.0022	0								0.04169246

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.0033	2.1146	0								2.11786338
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	13.5029	1.5279	0.009								15.0397684
benzene	-	-	0.1729	0.0097	0								0.18261297

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**GOR**	**GWR**	**Pop Tank Stable Oil**								**-**
NOx	0.002	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.001	0.000	0.024	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.03**
PM2.5	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
SO2	0.000	0.000	0.001	0.907	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.91**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.062	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.07**
benzene	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**GOR**	**GWR**	**Pop Tank Stable Oil**								**-**
NOx	0.007	0.000	0.015	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.03**
CO	0.006	0.000	0.106	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.14**
PM2.5	0.000	0.000	0.001	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM10	0.000	0.000	0.001	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
H2S	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.04**
SO2	0.000	0.000	0.006	3.975	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**3.98**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.270	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.30**
benzene	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.07	0.30
NOx	0.01	0.03
CO	0.03	0.14
PM2.5	0.00	0.01
PM10	0.00	0.01
H2S	0.01	0.04
SO2	0.91	3.98
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	335
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	335
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft²)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	1.73

Enter any notes here as needed. You must address the following:

(1) How is this control efficiency justified? Please be specific.

(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions are based on speciation and volume from the E&P Tanks reports for each tank. Flash emissions are included in the flaring calculations. Using the speciated flash gas, the heating value is estimated based on each component's individual heat of combustion. Uncontrolled values from the stable oil, GOR, and GWR are used calculate emissions from flaring. An updated CO emission factors was used based on example calculations provided in the WY Oil and Gas Production Facilities Ch 6 Sec 2 Permitting Guidance (May 2016). Gas volumes for each tank is based on the E&P Tanks report for the hourly and annual vapor amounts, GOR gas volumes were estimated from the GOR calculation.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Oil Tanks Flare
Unit EPN:	FLR-2
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	steam assisted flare with high Btu stream flared	
NOx	0.0485	lb/MMBtu
CO	0.3503	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.14	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	TK-1	TK-2	TK-3	TK-4							-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		0.67583333	0.67583333	0.27625	0.27625							16.9041667
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		5920.3	412.45	354.05	354.05							138440.85
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		3057.29	3057.29	3057.29	3057.29							-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	TK-1	TK-2	TK-3	TK-4							-
H2S	-	-	0.005	0.005	0.002	0.002							0.014
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.097	0.097	0.04	0.04							0.274
benzene	-	-	0	0	0	0							0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.023	0	0	0							0.023
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.427	0.046	0.034	0.034							0.541
benzene	-	-	0	0	0	0							0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**TK-1**	**TK-2**	**TK-3**	**TK-4**							**-**
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.009	0.009	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000	**0.03**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**TK-1**	**TK-2**	**TK-3**	**TK-4**							**-**
NOx	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.04**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.009	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.01	0.01
NOx	0.00	0.01
CO	0.00	0.01
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.03	0.04
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1200
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1116
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	3
Total Flare/Burner Tip Surface Area (ft²)?	0.0490625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	0.0490625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.10

Enter any notes here as needed. You must address the following:

(1) How is this control efficiency justified? Please be specific.

(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions are based on speciation and volume from the E&P Tanks reports for each tank. Flash emissions are included in the flaring calculations. Using the speciated flash gas, the heating value is estimated based on each component's individual heat of combustion. Uncontrolled values from the stable oil, GOR, and GWR are used calculate emissions from flaring. An updated CO emission factors was used based on example calculations provided in the WY Oil and Gas Production Facilities Ch 6 Sec 2 Permitting Guidance (May 2016).

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Water Tank Flare
Unit EPN:	FLR-3
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	steam assisted flare with high Btu stream flared	
NOx	0.0485	lb/MMBtu
CO	0.3503	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	PW-1										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		0.11462083										15.1146208
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		1004.0785										132404.079
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		40.1948										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	PW-1										-
H2S	-	-	0.00										0.0009
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.02										0.01654
benzene	-	-	0.00										0.00001

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.00										0.00396
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.07										0.07244
benzene	-	-	0.00										0.00003

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**PW-1**										**-**
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**PW-1**										**-**
NOx	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.00	0.00
Total Natural Gas VOC	0.00	0.00
Total VOC	0.00	0.00
NOx	0.00	0.01
CO	0.00	0.01
PM2.5	0.00	0.00
PM10	0.00	0.00
H2S	0.00	0.00
SO2	0.00	0.01
benzene	0.00	0.00

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1013
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1013
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	6
Total Flare/Burner Tip Surface Area (ft²)?	0.19625
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	0.19625
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.02

Enter any notes here as needed. You must address the following:

(1) How is this control efficiency justified? Please be specific.

(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions are based on speciation and volume from the E&P Tanks reports for each tank. Flash emissions are included in the flaring calculations. Using the speciated flash gas, the heating value is estimated based on each component's individual heat of combustion. Uncontrolled values from the stable oil, GOR, and GWR are used calculate emissions from flaring. An updated CO emission factors was used based on example calculations provided in the WY Oil and Gas Production Facilities Ch 6 Sec 2 Permitting Guidance (May 2016). Gas volumes for each tank is based on the E&P Tanks report for the hourly and annual vapor amounts, GOR gas volumes were estimated from the GOR calculation.

Citation Oil & Gas Corp.
Tensleep 1 Tank Battery

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions* .

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates* .

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emissions	Total VOC	1.1629	5.0933
		Benzene	0.0000	0.0001
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0002
		SO_2	0.0000	0.0000
		NO_X	0.0000	0.0000
		CO	0.0000	0.0000
		PM_{10}	0.0000	0.0000
		$PM_{2.5}$	0.0000	0.0000
HTR-1	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-2	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306

FLR-1	Pop Tank Flare	**Total VOC**	0.0688	0.3012
		Benzene	0.0008	0.0037
		Formaldehyde	0.0000	0.0000
		H_2S	0.0097	0.0424
		SO_2	0.9089	3.9810
		NO_X	0.0057	0.0250
		CO	0.0317	0.1388
		PM_{10}	0.0023	0.0101
		$PM_{2.5}$	0.0017	0.0076
FLR-2	Oil Tanks Flare	**Total VOC**	0.0056	0.0112
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0003	0.0005
		SO_2	0.0263	0.0433
		NO_X	0.0018	0.0071
		CO	0.0033	0.0093
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004
FLR-3	Water Tank Flare	**Total VOC**	0.0004	0.0018
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0001
		SO_2	0.0017	0.0075
		NO_X	0.0015	0.0066
		CO	0.0013	0.0055
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Uncontrolled Emission Rates (excluded flare emissions)	**Total VOC**	6.54	27.98
	Benzene	0.04	0.19
	Formaldehyde	0.00	0.00
	H_2S	0.59	2.54
	SO_2	0.95	4.07
	NO_X	0.25	1.11
	CO	0.24	1.06
	PM_{10}	0.02	0.09
	$PM_{2.5}$	0.02	0.07

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Controlled Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)	**Total VOC**	1.25	5.47
	Benzene	8.600E-04	3.767E-03
	Formaldehyde	0.00	0.00
	H_2S	0.01	0.04
	SO_2	0.95	4.07
	NO_X	0.25	1.11
	CO	0.24	1.06
	PM_{10}	0.02	0.09
	$PM_{2.5}$	0.02	0.07

If the automated formulas for the project emission totals (which assume that it is possible for all steady state and periodic emissions in the project to occur in the same hour) have been overwritten, explain any changes made and list the project emission points that occur in the realistic worst case hour. (Leave this blank or put NA if none of the formulas have been overwritten.)	Uncontrolled emissions are based on tanks venting to atmosphere (0% VOC and H2S control) and no flare present to control emissions. Controlled emissions were calculated by applying 100% control to tank emissions and including flaring emissions.

December 20, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Heater Treater Gas
Spot Sample @ 17 psig & 154 °F

Date Sampled: 12/06/17 Job Number: 74198.021

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	8.000	
Nitrogen	0.935	
Carbon Dioxide	58.670	
Methane	8.291	
Ethane	2.618	0.723
Propane	3.336	0.949
Isobutane	1.339	0.452
n-Butane	3.628	1.181
2-2 Dimethylpropane	0.015	0.006
Isopentane	2.573	0.971
n-Pentane	2.852	1.067
Hexanes	4.289	1.823
Heptanes Plus	3.454	1.545
Totals	100.000	8.717

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.507	(Air=1)
Molecular Weight	100.33	
Gross Heating Value	5424	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.621	(Air=1)
Compressibility (Z)	0.9878	
Molecular Weight	46.37	
Gross Heating Value		
Dry Basis	1068	BTU/CF
Saturated Basis	1050	BTU/CF

*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377)
Results: 5031.4 Gr/100 CF, 80000 PPMV or 8.000 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) RG
Analyst: MR
Processor: ANB
Cylinder ID: T-5967

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.021

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	8.000		5.880
Nitrogen	0.935		0.565
Carbon Dioxide	58.670		55.683
Methane	8.291		2.870
Ethane	2.618	0.723	1.698
Propane	3.336	0.949	3.172
Isobutane	1.339	0.452	1.678
n-Butane	3.628	1.181	4.547
2,2 Dimethylpropane	0.015	0.006	0.023
Isopentane	2.573	0.971	4.003
n-Pentane	2.852	1.067	4.438
2,2 Dimethylbutane	0.032	0.014	0.059
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.329	0.139	0.611
2 Methylpentane	1.347	0.577	2.503
3 Methylpentane	0.964	0.406	1.792
n-Hexane	1.617	0.686	3.005
Methylcyclopentane	0.442	0.157	0.802
Benzene	0.008	0.002	0.013
Cyclohexane	0.292	0.103	0.530
2-Methylhexane	0.241	0.116	0.521
3-Methylhexane	0.388	0.182	0.838
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.487	0.219	1.042
n-Heptane	0.501	0.239	1.083
Methylcyclohexane	0.231	0.096	0.489
Toluene	0.021	0.007	0.042
Other C8's	0.479	0.230	1.139
n-Octane	0.109	0.058	0.269
Ethylbenzene	0.015	0.006	0.034
M & P Xylenes	0.013	0.005	0.030
O-Xylene	0.003	0.001	0.007
Other C9's	0.148	0.078	0.403
n-Nonane	0.015	0.009	0.041
Other C10's	0.027	0.016	0.082
n-Decane	0.006	0.004	0.018
Undecanes (11)	0.028	0.018	0.090
Totals	100.000	8.717	100.000

Computed Real Characteristics of Total Sample

Specific Gravity	1.621	(Air=1)
Compressibility (Z)	0.9878	
Molecular Weight	46.37	

Gross Heating Value

Dry Basis	1068	BTU/CF
Saturated Basis	1050	BTU/CF

December 20, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

Sample: Citation Oil & Gas - LBB Embar 3
Heater Treater Gas
Spot Sample @ 17 psig & 154 °F

Date Sampled: 12/06/17 Job Number: 74198.021

GLYCALC FORMAT

COMPONENT	MOL%	GPM	Wt %
Carbon Dioxide	58.670		55.683
Hydrogen Sulfide	8.000		5.880
Nitrogen	0.935		0.565
Methane	8.291		2.870
Ethane	2.618	0.723	1.698
Propane	3.336	0.949	3.172
Isobutane	1.339	0.452	1.678
n-Butane	3.643	1.187	4.570
Isopentane	2.573	0.971	4.003
n-Pentane	2.852	1.067	4.438
Cyclopentane	0.000	0.000	0.000
n-Hexane	1.617	0.686	3.005
Cyclohexane	0.292	0.103	0.530
Other C6's	2.672	1.136	4.965
Heptanes	2.059	0.913	4.286
Methylcyclohexane	0.231	0.096	0.489
2,2,4 Trimethylpentane	0.000	0.000	0.000
Benzene	0.008	0.002	0.013
Toluene	0.021	0.007	0.042
Ethylbenzene	0.015	0.006	0.034
Xylenes	0.016	0.006	0.037
Octanes Plus	0.812	0.412	2.042
Totals	100.000	8.717	100.000

Real Characteristics Of Octanes Plus:

Specific Gravity ----------	4.077	(Air=1)
Molecular Weight ----------	116.63	
Gross Heating Value ----------	6120	BTU/CF

Real Characteristics Of Total Sample:

Specific Gravity ----------	1.621	(Air=1)
Compressibility (Z) ----------	0.9878	
Molecular Weight ----------	46.37	
Gross Heating Value		
Dry Basis ----------	1068	BTU/CF
Saturated Basis ----------	1050	BTU/CF

January 22, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74198.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Heptanes Plus	94.725	98.538	99.011
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.9481	(Water=1)
°API Gravity ----------	17.74	@ 60°F
Molecular Weight ----------	427.7	
Vapor Volume ----------	6.86	CF/Gal
Weight ----------	7.90	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.543	0.127	0.079
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
Other C-6's	1.788	0.538	0.376
Heptanes	3.193	0.989	0.750
Octanes	3.604	1.179	0.960
Nonanes	3.051	1.130	0.945
Decanes Plus	84.003	95.000	96.134
Benzene	0.012	0.002	0.002
Toluene	0.097	0.024	0.022
E-Benzene	0.187	0.053	0.049
Xylenes	0.577	0.161	0.150
n-Hexane	0.998	0.299	0.210
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.9548	(Water=1)
Molecular Weight----------	468.3	

Characteristics of Atmospheric Sample:

°API Gravity ----------	18.46	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)----------	1.74	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74198.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Methylcyclopentane	0.441	0.114	0.091
Benzene	0.012	0.002	0.002
Cyclohexane	0.352	0.087	0.072
2-Methylhexane	0.493	0.167	0.121
3-Methylhexane	0.536	0.179	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.464	0.138	0.113
n-Heptane	0.907	0.304	0.222
Methylcyclohexane	0.643	0.188	0.154
Toluene	0.097	0.024	0.022
Other C-8's	2.160	0.692	0.582
n-Octane	0.802	0.299	0.224
E-Benzene	0.187	0.053	0.049
M & P Xylenes	0.130	0.037	0.034
O-Xylene	0.447	0.124	0.116
Other C-9's	2.312	0.827	0.713
n-Nonane	0.740	0.303	0.232
Other C-10's	2.945	1.158	1.017
n-decane	0.580	0.259	0.202
Undecanes(11)	3.492	1.409	1.254
Dodecanes(12)	3.173	1.383	1.248
Tridecanes(13)	3.492	1.632	1.493
Tetradecanes(14)	3.255	1.630	1.511
Pentadecanes(15)	3.127	1.677	1.574
Hexadecanes(16)	2.866	1.643	1.555
Heptadecanes(17)	2.872	1.741	1.663
Octadecanes(18)	2.547	1.625	1.562
Nonadecanes(19)	2.576	1.713	1.656
Eicosanes(20)	2.259	1.561	1.518
Heneicosanes(21)	2.114	1.537	1.503
Docosanes(22)	2.014	1.526	1.501
Tricosanes(23)	1.828	1.436	1.420
Tetracosanes(24)	1.788	1.455	1.446
Pentacosanes(25)	1.726	1.457	1.455
Hexacosanes(26)	1.152	1.008	1.010
Heptacosanes(27)	1.426	1.294	1.304
Octacosanes(28)	1.487	1.394	1.409
Nonacosanes(29)	1.453	1.407	1.427
Triacontanes(30)	1.481	1.480	1.506
Hentriacontanes Plus(31+)	34.353	63.574	65.900
Total	100.000	100.000	100.000

January 22, 2018

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W Mayberry Trail
Peoria, Arizona 85383

Date Sampled: 12/06/17

Date Analyzed: 01/16/18

Job Number: J74198

Sample: Citation Oil & Gas - LBB Embar 3

FLASH LIBERATION OF HYDROCARBON LIQUID			
	Separator	**Stock Tank @ 12.5 psia & 70°F**	**Stock Tank @ 14.7 psia & 68°F**
Pressure	17 psig	12.5 psia	14.7 psia
Temperature	154 °F	70 °F	68 °F
Gas Oil Ratio (1)	------	4.41 CF/Bbl	3.75 CF/STBbl
Gas Specific Gravity	------	2.350 Air = 1.000	2.350 Air = 1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (2)	0.9764
Oil API Gravity at 60 °F	18.46
Reid Vapor Pressure Equivalent (D-6377), psi (3)	1.74

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1311	-----
Pressure, psig	17	19	------
Temperature, °F	154	154	------

Note: Study Conducted @ 12.5 psia & 70 °F

(1) - CF of flashed vapor per barrel of stock tank oil
(2) - Fraction of first stage separator liquid
(3) - Absolute pressure at 100 deg F
Analyst: E.J.

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Gas Liberated from Hydrocarbon Liquid
From 17 psig & 154 °F to 0 psig & 70 °F

Date Sampled: 12/06/17 Job Number: 74198.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	0.040	
Nitrogen	0.567	
Carbon Dioxide	18.217	
Methane	2.421	
Ethane	2.721	0.775
Propane	6.808	1.999
Isobutane	3.927	1.369
n-Butane	13.734	4.614
2-2 Dimethylpropane	1.825	0.743
Isopentane	8.855	3.451
n-Pentane	12.631	4.879
Hexanes	16.706	7.329
Heptanes Plus	11.548	4.914
Totals	100.000	30.072

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.425	(Air=1)
Molecular Weight	94.93	
Gross Heating Value	5065	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.339	(Air=1)
Compressibility (Z)	0.9570	
Molecular Weight	64.84	
Gross Heating Value		
Dry Basis	3332	BTU/CF
Saturated Basis	3275	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
Results: 25.16 Gr/100 CF, 400.0 PPMV or 0.040 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) ET
Analyst: RR
Processor: ANB
Cylinder ID: FL-5s

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	0.040		0.021
Nitrogen	0.567		0.245
Carbon Dioxide	18.217		12.365
Methane	2.421		0.597
Ethane	2.721	0.775	1.262
Propane	6.808	1.999	4.630
Isobutane	3.927	1.369	3.520
n-Butane	13.734	4.614	12.311
2,2 Dimethylpropane	1.825	0.743	2.031
Isopentane	8.855	3.451	9.853
n-Pentane	12.631	4.879	14.055
2,2 Dimethylbutane	0.173	0.077	0.230
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	1.405	0.613	1.867
2 Methylpentane	5.210	2.304	6.924
3 Methylpentane	3.632	1.580	4.827
n-Hexane	6.286	2.754	8.354
Methylcyclopentane	1.804	0.663	2.342
Benzene	0.911	0.272	1.097
Cyclohexane	1.077	0.391	1.397
2-Methylhexane	0.726	0.360	1.122
3-Methylhexane	1.089	0.529	1.683
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	1.617	0.750	2.474
n-Heptane	1.252	0.616	1.935
Methylcyclohexane	0.640	0.274	0.969
Toluene	0.980	0.350	1.393
Other C8's	0.803	0.398	1.365
n-Octane	0.178	0.097	0.314
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.219	0.090	0.359
O-Xylene	0.117	0.048	0.192
Other C9's	0.039	0.021	0.076
n-Nonane	0.096	0.058	0.190
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	30.072	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.339	(Air=1)
Compressibility (Z)	0.9570	
Molecular Weight	64.84	
Gross Heating Value		
Dry Basis	3332	BTU/CF
Saturated Basis	3275	BTU/CF

January 22, 2018

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W Mayberry Trail
Peoria, Arizona 85383

Date Sampled: 12/06/17

Date Analyzed: 12/14/17

Job Number: J74198

Sample: Citation Oil & Gas - LBB Embar 3

GAS LIBERATION OF PRESSURIZED WATER			
	Separator	**Stock Tank @12.5 psia & 70°F**	**Stock Tank @14.7 psia & 68°F**
Pressure	17 psig	12.5 psia	14.7 psia
Temperature	154 °F	70 °F	68 °F
Gas Water Ratio	------	0.51 CF/Bbl	0.43 CF/STBbl
Gas Specific Gravity	------	1.507 Air = 1.000	1.507 Air = 1.000

Note: Study Conducted @ 12.5 psia & 70 °F

Analyst : E.J.

Piston No. : PW-37699

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: LBB Embar 3
Gas Liberated from Separator Water
From 17 psig & 154 °F to 0 psig & 70 °F

Date Sampled: 12/06/17 Job Number: 74198.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	2.000	
Nitrogen	0.675	
Carbon Dioxide	94.641	
Methane	1.105	
Ethane	0.715	0.196
Propane	0.331	0.094
Isobutane	0.145	0.049
n-Butane	0.180	0.058
2-2 Dimethylpropane	0.028	0.011
Isopentane	0.056	0.021
n-Pentane	0.083	0.031
Hexanes	0.011	0.005
Heptanes Plus	0.030	0.011
Totals	100.000	0.475

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.182	(Air=1)
Molecular Weight	91.62	
Gross Heating Value	4629	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.507	(Air=1)
Compressibility (Z)	0.9942	
Molecular Weight	43.41	
Gross Heating Value		
Dry Basis	66	BTU/CF
Saturated Basis	66	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
Results: 1257.9 Gr/100 CF, 20000 PPMV or 2.000 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) ET
Analyst: RR
Processor: ANB
Cylinder ID: WF-11S

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	2.000		1.570
Nitrogen	0.675		0.436
Carbon Dioxide	94.641		95.957
Methane	1.105		0.408
Ethane	0.715	0.196	0.495
Propane	0.331	0.094	0.336
Isobutane	0.145	0.049	0.194
n-Butane	0.180	0.058	0.241
2,2 Dimethylpropane	0.028	0.011	0.047
Isopentane	0.056	0.021	0.093
n-Pentane	0.083	0.031	0.138
2,2 Dimethylbutane	0.000	0.000	0.000
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.003	0.001	0.006
2 Methylpentane	0.003	0.001	0.006
3 Methylpentane	0.003	0.001	0.006
n-Hexane	0.002	0.001	0.004
Methylcyclopentane	0.004	0.001	0.008
Benzene	0.004	0.001	0.007
Cyclohexane	0.005	0.002	0.010
2-Methylhexane	0.000	0.000	0.000
3-Methylhexane	0.001	0.000	0.002
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.000	0.000	0.000
n-Heptane	0.001	0.000	0.002
Methylcyclohexane	0.002	0.001	0.005
Toluene	0.007	0.002	0.015
Other C8's	0.000	0.000	0.000
n-Octane	0.000	0.000	0.000
Ethylbenzene	0.002	0.001	0.005
M & P Xylenes	0.003	0.001	0.007
O-Xylene	0.001	0.000	0.002
Other C9's	0.000	0.000	0.000
n-Nonane	0.000	0.000	0.000
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	0.475	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.507	(Air=1)
Compressibility (Z)	0.9942	
Molecular Weight	43.41	
Gross Heating Value		
Dry Basis	66	BTU/CF
Saturated Basis	66	BTU/CF

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 1
Well ID                   : TK-1 Annual and Hourly; TK-2 Hourly
Date                      : 2020.01.24


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 135[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 21.50[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

```
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
Min Ambient Temperature   : 33.10[F]
Max Ambient Temperature   : 58.30[F]
Total Solar Insolation    : 1491.00[Btu/ft^2*day]
```

****
* Calculation Results *
****

-- Emission Summary --

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.020	0.005
Total HC	0.457	0.104
VOCs, C2+	0.457	0.104
VOCs, C3+	0.427	0.097

Uncontrolled Recovery Info.

Vapor	17.6400 x1E-3	[MSCFD]
HC Vapor	16.2200 x1E-3	[MSCFD]
GOR	0.13	[SCF/bbl]

-- Emission Composition --

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.023	0.005
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.029	0.007
7	C3	0.083	0.019
8	i-C4	0.036	0.008
9	n-C4	0.094	0.021
10	i-C5	0.058	0.013
11	n-C5	0.062	0.014
12	C6	0.048	0.011
13	C7	0.021	0.005
14	C8	0.007	0.002
15	C9	0.003	0.001
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.001	0.000
21	n-C6	0.015	0.003
22	224Trimethylp	0.000	0.000
	Total	0.480	0.110

-- Stream Data --

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0366	8.0732
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0273	11.5449
7	C3	44.10	2.1827	0.1563	22.0942
8	i-C4	58.12	1.1269	0.1316	7.2429
9	n-C4	58.12	4.6091	0.4915	19.0866
10	i-C5	72.15	3.1066	0.6724	9.4253
11	n-C5	72.15	5.0558	0.9779	10.1125
12	C6	86.16	4.1726	2.5790	6.7247
13	C7	100.20	10.3655	3.0428	2.5175
14	C8	114.23	10.8426	2.9623	0.7352

15	C9	128.28	5.5127	3.0526	0.2496
16	C10+	468.30	45.9695	83.9989	0.0000
17	Benzene	78.11	0.5685	0.0117	0.0230
18	Toluene	92.13	0.2132	0.0970	0.0509
19	E-Benzene	106.17	0.0711	0.1871	0.0308
20	Xylenes	106.17	0.6802	0.5777	0.0820
21	n-C6	86.18	3.5939	0.9974	2.0066
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	408.54	56.49
	Stream Mole Ratio		1.0000	0.9996	0.0004
	Heating Value	[BTU/SCF]			3057.29
	Gas Gravity	[Gas/Air]			1.95
	Bubble Pt. @ 100F	[psia]	1.95	1.87	
	RVP @ 100F	[psia]	8.45	8.58	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 1
Well ID                   : TK-2 Annual
Date                      : 2020.01.24


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 1[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 21.50[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.010	0.002
Total HC	0.046	0.011
VOCs, C2+	0.046	0.011
VOCs, C3+	0.046	0.011

Uncontrolled Recovery Info.

Vapor	1.1300 x1E-3	[MSCFD]
HC Vapor	1.1300 x1E-3	[MSCFD]
GOR	1.13	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.000	0.000
7	C3	0.000	0.000
8	i-C4	0.000	0.000
9	n-C4	0.000	0.000
10	i-C5	0.005	0.001
11	n-C5	0.008	0.002
12	C6	0.015	0.003
13	C7	0.008	0.002
14	C8	0.003	0.001
15	C9	0.001	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.005	0.001
22	224Trimethylp	0.000	0.000
	Total	0.045	0.010

-- Stream Data ----------

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0000	0.0003
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0000	0.0003
7	C3	44.10	2.1827	0.0000	0.0002
8	i-C4	58.12	1.1269	0.0000	0.0052
9	n-C4	58.12	4.6091	0.0036	1.0256
10	i-C5	72.15	3.1066	0.1400	12.8758
11	n-C5	72.15	5.0558	0.3120	20.8799
12	C6	86.16	4.1726	1.9926	32.6083
13	C7	100.20	10.3655	2.8793	14.8498
14	C8	114.23	10.8426	2.9944	4.6208

15	C9	128.28	5.5127	3.1447	1.5969
16	C10+	468.30	45.9695	87.3434	0.0000
17	Benzene	78.11	0.5685	0.0097	0.1198
18	Toluene	92.13	0.2132	0.0950	0.3103
19	E-Benzene	106.17	0.0711	0.1909	0.1955
20	Xylenes	106.17	0.6802	0.5911	0.5215
21	n-C6	86.18	3.5939	0.8246	10.3897
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	418.94	83.94
	Stream Mole Ratio		1.0000	0.9962	0.0038
	Heating Value	[BTU/SCF]			4596.16
	Gas Gravity	[Gas/Air]			2.90
	Bubble Pt. @ 100F	[psia]	1.95	0.37	
	RVP @ 100F	[psia]	8.45	2.43	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 1
Well ID                   : TK-3 -4 Hourly
Date                      : 2020.01.24


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 135[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 12.00[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

```
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
Min Ambient Temperature   : 33.10[F]
Max Ambient Temperature   : 58.30[F]
Total Solar Insolation    : 1491.00[Btu/ft^2*day]
```

****
* Calculation Results *
****

-- Emission Summary --

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.010	0.002
Total HC	0.187	0.043
VOCs, C2+	0.187	0.043
VOCs, C3+	0.175	0.040

Uncontrolled Recovery Info.

Vapor	7.2100 x1E-3	[MSCFD]
HC Vapor	6.6300 x1E-3	[MSCFD]
GOR	0.05	[SCF/bbl]

-- Emission Composition --

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.010	0.002
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.012	0.003
7	C3	0.034	0.008
8	i-C4	0.015	0.003
9	n-C4	0.039	0.009
10	i-C5	0.024	0.005
11	n-C5	0.025	0.006
12	C6	0.020	0.005
13	C7	0.008	0.002
14	C8	0.003	0.001
15	C9	0.001	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.006	0.001
22	224Trimethylp	0.000	0.000
	Total	0.197	0.045

-- Stream Data --

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0386	8.0732
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0302	11.5449
7	C3	44.10	2.1827	0.1618	22.0942
8	i-C4	58.12	1.1269	0.1334	7.2429
9	n-C4	58.12	4.6091	0.4962	19.0866
10	i-C5	72.15	3.1066	0.6746	9.4253
11	n-C5	72.15	5.0558	0.9802	10.1125
12	C6	86.16	4.1726	2.5801	6.7247
13	C7	100.20	10.3655	3.0427	2.5175
14	C8	114.23	10.8426	2.9618	0.7352

15	C9	128.28	5.5127	3.0519	0.2496
16	C10+	468.30	45.9695	83.9777	0.0000
17	Benzene	78.11	0.5685	0.0117	0.0230
18	Toluene	92.13	0.2132	0.0970	0.0509
19	E-Benzene	106.17	0.0711	0.1870	0.0308
20	Xylenes	106.17	0.6802	0.5776	0.0820
21	n-C6	86.18	3.5939	0.9976	2.0066
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	408.54	56.49
	Stream Mole Ratio		1.0000	0.9998	0.0002
	Heating Value	[BTU/SCF]			3057.29
	Gas Gravity	[Gas/Air]			1.95
	Bubble Pt. @ 100F	[psia]	1.95	1.92	
	RVP @ 100F	[psia]	8.45	8.47	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 1
Well ID                   : TK-3 -4 Annual
Date                      : 2020.01.24


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 1[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 12.00[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary --

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.000	0.000
Total HC	0.034	0.008
VOCs, C2+	0.034	0.008
VOCs, C3+	0.034	0.008

Uncontrolled Recovery Info.

Vapor	0.9700 x1E-3	[MSCFD]
HC Vapor	0.9700 x1E-3	[MSCFD]
GOR	0.97	[SCF/bbl]

-- Emission Composition --

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.000	0.000
7	C3	0.000	0.000
8	i-C4	0.002	0.000
9	n-C4	0.006	0.001
10	i-C5	0.006	0.001
11	n-C5	0.007	0.002
12	C6	0.006	0.001
13	C7	0.003	0.001
14	C8	0.001	0.000
15	C9	0.000	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.002	0.000
22	224Trimethylp	0.000	0.000
	Total	0.033	0.008

-- Stream Data --

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0000	0.0003
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0000	0.0003
7	C3	44.10	2.1827	0.0031	1.7966
8	i-C4	58.12	1.1269	0.0390	6.2804
9	n-C4	58.12	4.6091	0.2130	22.9330
10	i-C5	72.15	3.1066	0.5048	18.1791
11	n-C5	72.15	5.0558	0.7946	20.8835
12	C6	86.16	4.1726	2.4715	16.0026
13	C7	100.20	10.3655	3.0281	6.1879
14	C8	114.23	10.8426	2.9843	1.8257

15	C9	128.28	5.5127	3.0861	0.6214
16	C10+	468.30	45.9695	85.0668	0.0000
17	Benzene	78.11	0.5685	0.0114	0.0555
18	Toluene	92.13	0.2132	0.0972	0.1257
19	E-Benzene	106.17	0.0711	0.1888	0.0767
20	Xylenes	106.17	0.6802	0.5833	0.2040
21	n-C6	86.18	3.5939	0.9679	4.8274
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	411.83	72.81
	Stream Mole Ratio		1.0000	0.9968	0.0032
	Heating Value	[BTU/SCF]			4019.48
	Gas Gravity	[Gas/Air]			2.51
	Bubble Pt. @ 100F	[psia]	1.95	0.81	
	RVP @ 100F	[psia]	8.45	4.90	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 1
Well ID                   : TK-5
Date                      : 2020.01.24


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 1[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 8.00[ft]
Shell Height              : 10.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.000	0.000
Total HC	0.010	0.002
VOCs, C2+	0.010	0.002
VOCs, C3+	0.009	0.002

Uncontrolled Recovery Info.

Vapor	0.3500 x1E-3	[MSCFD]
HC Vapor	0.3300 x1E-3	[MSCFD]
GOR	0.35	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.000	0.000
7	C3	0.002	0.000
8	i-C4	0.001	0.000
9	n-C4	0.002	0.000
10	i-C5	0.001	0.000
11	n-C5	0.001	0.000
12	C6	0.001	0.000
13	C7	0.000	0.000
14	C8	0.000	0.000
15	C9	0.000	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.000	0.000
22	224Trimethylp	0.000	0.000
	Total	0.008	0.002

-- Stream Data ----------

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0234	6.9148
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0111	7.5016
7	C3	44.10	2.1827	0.1179	21.0097
8	i-C4	58.12	1.1269	0.1182	7.7065
9	n-C4	58.12	4.6091	0.4560	20.7394
10	i-C5	72.15	3.1066	0.6553	10.5751
11	n-C5	72.15	5.0558	0.9600	11.4001
12	C6	86.16	4.1726	2.5705	7.6561
13	C7	100.20	10.3655	3.0434	2.8727
14	C8	114.23	10.8426	2.9662	0.8395

15	C9	128.28	5.5127	3.0576	0.2850
16	C10+	468.30	45.9695	84.1504	0.0000
17	Benzene	78.11	0.5685	0.0117	0.0262
18	Toluene	92.13	0.2132	0.0971	0.0581
19	E-Benzene	106.17	0.0711	0.1873	0.0352
20	Xylenes	106.17	0.6802	0.5786	0.0936
21	n-C6	86.18	3.5939	0.9952	2.2863
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	408.92	58.95
	Stream Mole Ratio		1.0000	0.9989	0.0011
	Heating Value	[BTU/SCF]			3201.85
	Gas Gravity	[Gas/Air]			2.03
	Bubble Pt. @ 100F	[psia]	1.95	1.57	
	RVP @ 100F	[psia]	8.45	8.68	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 1
Well ID                   : PW-1
Date                      : 2020.01.24


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 15000[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 21.50[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

```
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
Min Ambient Temperature   : 33.10[F]
Max Ambient Temperature   : 58.30[F]
Total Solar Insolation    : 1491.00[Btu/ft^2*day]
```

****
* Calculation Results *
****

-- Emission Summary --

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.280	0.064
Total HC	7.744	1.768
VOCs, C2+	7.744	1.768
VOCs, C3+	7.244	1.654

Uncontrolled Recovery Info.

Vapor	299.2500 x1E-3	[MSCFD]
HC Vapor	275.0900 x1E-3	[MSCFD]
GOR	0.02	[SCF/bbl]

-- Emission Composition --

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.396	0.090
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.500	0.114
7	C3	1.404	0.321
8	i-C4	0.607	0.139
9	n-C4	1.599	0.365
10	i-C5	0.980	0.224
11	n-C5	1.051	0.240
12	C6	0.814	0.186
13	C7	0.352	0.080
14	C8	0.118	0.027
15	C9	0.044	0.010
16	C10+	0.000	0.000
17	Benzene	0.003	0.001
18	Toluene	0.007	0.002
19	E-Benzene	0.005	0.001
20	Xylenes	0.013	0.003
21	n-C6	0.249	0.057
22	224Trimethylp	0.000	0.000
	Total	8.142	1.859

-- Stream Data --

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0395	8.0732
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0315	11.5449
7	C3	44.10	2.1827	0.1642	22.0942
8	i-C4	58.12	1.1269	0.1341	7.2429
9	n-C4	58.12	4.6091	0.4982	19.0866
10	i-C5	72.15	3.1066	0.6755	9.4253
11	n-C5	72.15	5.0558	0.9812	10.1125
12	C6	86.16	4.1726	2.5805	6.7247
13	C7	100.20	10.3655	3.0426	2.5175
14	C8	114.23	10.8426	2.9615	0.7352

15	C9	128.28	5.5127	3.0516	0.2496
16	C10+	468.30	45.9695	83.9686	0.0000
17	Benzene	78.11	0.5685	0.0117	0.0230
18	Toluene	92.13	0.2132	0.0970	0.0509
19	E-Benzene	106.17	0.0711	0.1870	0.0308
20	Xylenes	106.17	0.6802	0.5775	0.0820
21	n-C6	86.18	3.5939	0.9977	2.0066
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	408.54	56.49
	Stream Mole Ratio		1.0000	0.9999	0.0001
	Heating Value	[BTU/SCF]			3057.29
	Gas Gravity	[Gas/Air]			1.95
	Bubble Pt. @ 100F	[psia]	1.95	1.94	
	RVP @ 100F	[psia]	8.45	8.43	
	SG @ 100F		0.695	0.695	

Facility : F004571

Apr 8 2020, 13:08:27

- Facility Information

Facility ID: F004571

FacilityName: Tensleep 1 Tank Battery

Facility Description:

Company Name: Citation Oil & Gas Corp.

Operating Status: Operating

AFS:

Facility Class: Minor

Facility Type: Storage Tank Battery

CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
Section 12, 47N, 100W	Park County	Park	44.06246/-108.79512	S12-T47N-R100W	05/08/2012

Location Detail For : Section 12, 47N, 100W

Latitude: 44.06246

Longitude: -108.79512

Quarter Quarter:

Quarter:

Section: 12

Township: 47N

Range: 100W

County: Park

State: Wyoming

District: District 4

Physical Address 1: Section 12, 47N, 100W

Physical Address 2:

City: Park County

Zip: 82414

Effective Date: 05/08/2012

- API

API
1720211
1720212
1720307
1720308
1720332
1720333
1720375
1720410
1720821
2920079
2920358
2920552
2920553
2920554
2920555
2920558

DEQ Ex. 2 - 347

2920680
2920681
2920954
2921290
2921504
2921505
2921506

- **Notes**

User Name	Date	Note

- **NAICS Codes**

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- **Contacts**

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix: Ms.
First Name: Lee Ann
Middle Name:
Last Name: Elsom
Suffix:
Company Title: Manager Regulatory Compliance
Contact's Company Name: Citation Oil & Gas Corp.

Address 1: 14077 Cutten Road
Address 2:
City: Houston
Zip Code: 77069
State: Texas

Work Phone No: (281)891-1577
Secondary Phone No.:
Address 2: (281)517-7196
Secondary Ext. No.:
Mobile Phone No.:
Pager No.:
Fax No:
Pager PIN No.:

Email: lelsom@cogc.com
Email Pager Address:

- **Rules & Regs**

Subject to Part 60 NSPS:
Subject to 112(r) Accidental Release

DEQ Ex. 2 - 348

Prevention:

Subject to Part 61 NESHAP:

Subject to non-attainment NSR:

Subject Part 63 NESHAP:

Subject to PSD:

Subject to Title IV Acid Rain:

- Attachments

Description	Type	Modified By	Modified Date
Permit History as of 2/11/2015	Other	Coffman, Ella(inactive)	02/11/2015

- Version

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	01/30/2020		X
55955	08/20/2019	01/30/2020	X
53451	03/22/2019	08/20/2019	X
4571	05/08/2012	03/22/2019	X

DEQ Ex. 2 - 349

Emission Unit : FLR001

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 0.08 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min): 0.2500

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-1

Company Equipment Description: Pop Tank Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: FLR-1

Company Process Description: Pop Tank Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER001

DEQ Ex. 2 - 350

Emission Unit : FLR002

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: FLR002

Emission Unit Type: Flare

Maximum Design Capacity: 0.72 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min): 0.2500

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-2

Company Equipment Description: Oil Tanks Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: FLR-2

Company Process Description: Oil Tanks Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER005

DEQ Ex. 2 - 351

Emission Unit : FLR003

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: FLR003

Emission Unit Type: Flare

Maximum Design Capacity: 0.72 Units : Mscf/hr

Minimum Design Capacity: 0.02 Units : Mscf/hr

Pilot Gas Volume (scf/min): 0.2500

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-3

Company Equipment Description: Water Tanks Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC012

Process Name: FLR-3

Company Process Description: Water Tank Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER008

DEQ Ex. 2 - 352

Emission Unit : FUG001

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	162	14
Flanges	0	0	246	24
Open Ended Lines	0	0	5	1
Pump Seals	0	0	4	2
Valves	0	0	132	13
Other	0	0	10	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitives

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC008

Process Name: FUG

Company Process Description: Fugitives

Source Classification Code (SCC): 3-10-002-07

Release points(s) directly associated with this process

DEQ Ex. 2 - 353

AVL001

Emission Unit : HET001

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: HET001

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-1

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC006

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER006

DEQ Ex. 2 - 355

Emission Unit : HET002

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: HET002

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Pipeline Grade Natural Gas Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-2

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC007

Process Name: HTR-2

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER007

DEQ Ex. 2 - 356

Emission Unit : TNK001

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: TNK001

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 210.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-1

Company Equipment Description: 1000-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC001

Process Name: Tank 1

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 357

Emission Unit : TNK002

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 210.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-2

Company Equipment Description: 1000-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name: Tank 2

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 358

Emission Unit : TNK003

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: TNK003

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 300 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-3

Company Equipment Description: 300-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC003

Process Name: Tank 3

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 359

Emission Unit : TNK004

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: TNK004

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 300 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-4

Company Equipment Description: 300-bbl Oil Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC004

Process Name: Tank 4

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 360

Emission Unit : TNK005

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID: TNK005

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 26500.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-1

Company Equipment Description: 1000-bbl Water Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC005

Process Name: PW-1

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 361

Emission Unit : TNK006

Apr 8 2020, 13:08:27

- Emission Unit Information

AQD Emissions Unit ID:	TNK006		
Emission Unit Type:	Storage Tank/Silo		
Material Type:	Liquid		
Type of Liquid:	Oil		
Submerged Fill Pipe?:	No		
Capacity:	90	Units:	barrels
Maximum Throughput:	3.7500	Units:	barrels/day
Tank Location:	Aboveground		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	TK-5		
Company Equipment Description:	90-bbl Pop Tank		
Operating Status:	Operating		
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID:	PRC010
Process Name:	Tank 5
Company Process Description:	Pop Tank
Source Classification Code (SCC):	3-10-001-33

Control equipment(s) directly associated with this process

FLA003

DEQ Ex. 2 - 362

Control Equipment : FLA001

Apr 8 2020, 13:08:27

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-2

Company Control Equipment Description: Oil Tanks Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Non-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
Hydrogen Sulfide	98	98	100	98
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER001

DEQ Ex. 2 - 363

Control Equipment : FLA002

Apr 8 2020, 13:08:27

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA002

AQD Description:

Company Control Equipment ID: FLR-3

Company Control Equipment Description: Water Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Non-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER005

DEQ Ex. 2 - 364

Control Equipment : FLA003

Apr 8 2020, 13:08:27

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA003

AQD Description:

Company Control Equipment ID: FLR-2

Company Control Equipment Description: Pop Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Non-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER008

DEQ Ex. 2 - 365

Release Point : VER001

Apr 8 2020, 13:08:27

- Release Point Information

Release Point ID:	VER001
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Pop Tank Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	1.73	Exit Gas Flow Rate (acfm):	20.38
Exit Gas Temp (F):	1200.0		

- Release Latitude and Longitude

Latitude:	44.06055	Longitude:	-108.7975

DEQ Ex. 2 - 366

Release Point : VER005

Apr 8 2020, 13:08:27

- Release Point Information

Release Point ID:	VER005
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-2
Company Release Point Description:	Oil Tanks Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	0.1	Exit Gas Flow Rate (acfm):	4.71
Exit Gas Temp (F):	1200.0		

- Release Latitude and Longitude

Latitude:	44.06055	Longitude:	-108.7975

DEQ Ex. 2 - 367

Release Point : VER008

Apr 8 2020, 13:08:27

- Release Point Information

Release Point ID:	VER008
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-3
Company Release Point Description:	Water Tank Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	0.02	Exit Gas Flow Rate (acfm):	0.24
Exit Gas Temp (F):	1200.0		

- Release Latitude and Longitude

Latitude:	44.06246	Longitude:	-108.79512

DEQ Ex. 2 - 368

Release Point : AVL001

Apr 8 2020, 13:08:27

- Release Point Information

Release Point ID:	AVL001
Release Type:	Fugitive (Area, Volume, Line)
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitives
Operating Status:	Operating
Release Height (ft):	3.0

- Release Latitude and Longitude

Latitude:	44.06055	Longitude:	-108.7975

DEQ Ex. 2 - 369

Release Point : VER006

Apr 8 2020, 13:08:27

- Release Point Information

Release Point ID:	VER006
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	246.93
Exit Gas Temp (F):	60.0		

- Release Latitude and Longitude

Latitude:	44.06055	Longitude:	-108.7975

DEQ Ex. 2 - 370

Release Point : VER007

Apr 8 2020, 13:08:27

- Release Point Information

Release Point ID:	VER007
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-2
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	1.0
Exit Gas Velocity (ft/s):	0.0	Exit Gas Flow Rate (acfm):	0.0
Exit Gas Temp (F):	60.0		

- Release Latitude and Longitude

Latitude:	44.06055	Longitude:	-108.7975

DEQ Ex. 2 - 371

EDGE ENGINEERING & SCIENCE
16285 Park Ten Place, Suite 400 | Houston, Texas 77084 | 832.772.3000 edge-es.com

January 28, 2020

Wyoming Permitting Program (Application)
Wyoming Dept. of Environmental Quality
Air Quality Division
200 West 17th Street, 3rd Floor
Cheyenne, WY 82002

RE: Oil and Gas Facility Air Permit Application
Citation Oil & Gas Corp.
Tensleep 2 Tank Battery
Park County, Wyoming

Dear Sir or Madam:

Pursuant to the audit discourses of Citation Oil & Gas Corp. (Citation), including without limitation the initial audit disclosure of March 21, 2018 and subsequent correspondence and meetings, Edge Engineering and Science, LLC (EDGE) is pleased to provide this request for a minor source air permit for the Tensleep 2 Tank Battery in Park County, Wyoming. EDGE is submitting this waiver request for the approval of an existing site. As a result of Citation's audit and the State of Wyoming's approval, this application authorizes the site based on operations as they exist today; no construction applications or modifications to existing permits are being proposed. Existing equipment that is on site but out of service is not included in this application and will remain out of service unless and until authorized.

We look forward to assisting the DEQ during review of this package. Please do not hesitate to contact me by phone at (225) 367-4021 or by email at gfholder@edge-es.com, or Lee Ann Elsom at (281) 891-1577 or by email at lelsom@cogc.com if you should have questions or comments.

Sincerely,
Edge Engineering and Science, LLC

George F. Holder II, P.E.
Senior Engineer

cc: Lee Ann Elsom, Citation Oil & Gas Corp.

Oil and Gas Emissions Spreadsheet

Revised 10/2/2014

Oil and Gas Site General Information	
Administrative Information	
Company Name	Citation Oil and Gas Corp.
Facility/Well Name	Tensleep 2 Tank Battery
Field Name	Pitchfork Oil Field
Nearest City/Town	Meeteetse
API Number/SIC Code	
Latitude/Longitude	44.05493, -108.79750
County	Park
Technical Information	
Natural Gas Site Throughput (MMSCF/day):	
Oil/Condensate Site Throughput (bbl/day):	92
Produced Water Site Throughput (bbl/day):	8200
Are there any sour gas streams at this site?	Yes
Is this site currently operational/producing?	Yes
What is the date of the site start of construction or the date that the project changes were implemented (whichever is applicable to this project, anticipated date if in the future)?	
Has this site been registered before?	Yes

Equipment/Processes at Site

Before entering any numbers into the Equipment/Processes section of the table below, please make sure to review all of the comments in the cells of the table. These should make it clear what numbers need to be entered and where they need to be entered.

Equipment/Process Types	How many for this project?	How many for this site?
Fugitives	1	1
IC Engines		
Turbines		
Diesel Engines		
Heaters-Boilers	3	3
Oil / Condensate Tanks	3	3
Produced Water Tanks	1	1
Miscellaneous Tanks	1	1
Loading Jobs		
Glycol Units		
Amine Units		
Vapor Recovery Units		
Flares-Vapor Combustors	3	3
Thermal Oxidizers		
MSS Blowdowns		
MSS FLR Tank Landing Loss		
MSS Tank Non Forced Vent		
MSS Tank Forced Vent Degas		
MSS Defaults		
MSS Paint Blast		
MSS Other		
Other		

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Liquid Analyses

For the liquid sample, I am inputting (pick from list):	mole percents

Select whether weight percents or mole percents are being entered for this liquid sample.

Then fill out this table **OR** fill out this table.

Liquid Analysis - Use if the Inputs are Weight Percents

Analysis Identifier/Name	
What site is the sample from?	
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	
Where in the process was the sample taken?	
What is the temperature and pressure of the sample (include units)?	
Who analyzed the sample?	
Date of sample:	

Component	weight %
hydrogen	
helium	
nitrogen	
CO2	
H2S	
methane (C1)	
ethane (C2)	
propane (C3)	
butanes (C4)	
pentanes (C5)	
benzene	
other hexanes (C6)	
toluene	
other heptanes (C7)	
ethylbenzene	
xylenes (o, m, p)	
other octanes (C8)	
nonanes (C9)	
decanes plus (C10+)	
Totals:	0.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 0.0000
VOC weight fraction = 0.0000

VOC content of hydrocarbon fraction only

VOC weight% = #DIV/0!
VOC weight fraction = #DIV/0!

Hydrogen Sulfide

H2S weight% = 0.0000
H2S weight fraction = 0.00E+00
H2S ppm_V =
H2S ppm_{WT} = 0.00

Benzene

Benzene content of total sample

Benzene weight% = 0.0000
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = #DIV/0!
Benzene weight fraction = #DIV/0!

Liquid Analysis - Use if the Inputs are Mole Percents

Analysis Identifier/Name	Stock Tank
What site is the sample from?	LBB Embar 3
If the sample is from a representaive site, explain how this sampled stream is representative of the similar stream at this site (use the notes box provided below if more space is needed).	LBB Embar 3 liquid analysis is being used as a representative sample for LBB Tensleep 2. Both sites extract well emulsion from the same formation, have similar API gravities (within 3 degrees), and have similar site operations where sampling could occur at the same point in the process for each site.
Where in the process was the sample taken?	Oil Tank
What is the temperature and pressure of the sample (include units)?	17psig, 154°F
Who analyzed the sample?	FESCO, Ltd.
Date of sample:	20-Dec-17

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.0000	28.01340	0	0.0000
CO2	0.0000	44.00950	0	0.0000
H2S	0.0400	34.08188	1	0.0033
methane (C1)	0.0000	16.04246	0	0.0000
ethane (C2)	0.0322	30.06904	1	0.0024
propane (C3)	0.1656	44.09562	7	0.0178
butanes (C4)	0.6340	58.12220	37	0.0901
pentanes (C5)	1.6580	72.14878	120	0.2923
benzene	0.0117	78.110000	1	0.0022
other hexanes (C6)	3.5785	86.18000	308	0.7537
toluene	0.0970	92.140000	9	0.0218
other heptanes (C7)	3.0426	100.20000	305	0.7450
ethylbenzene	0.1870	106.170000	20	0.0485
xylenes (o, m, p)	0.5775	106.170000	61	0.1498
other octanes (C8)	2.9614	114.23000	338	0.8267
nonanes (C9)	3.0514	128.26000	391	0.9564
decanes plus (C10+)	83.9631	468.30000	39320	96.0898
Totals:	100.0000	409.20	40919.9555	100.00

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% = 99.9943
VOC weight fraction = 0.9999

VOC content of hydrocarbon fraction only

VOC weight% = 99.9976
VOC weight fraction = 1.0000

Hydrogen Sulfide

H2S weight% = 0.0033
H2S weight fraction = 3.33E-05
H2S ppm_V = 400.00
H2S ppm_{WT} = 33.32

Benzene

Benzene content of total sample

Benzene weight% = 0.0022
Benzene weight fraction = 0.0000

Benzene content of hydrocarbon fraction only

Benzene weight% = 0.0022
Benzene weight fraction = 0.0000

Enter any notes here:

The representative liquid analysis was taken from LBB Embar 3. The extended report from test GPA 21868-M, like constituents were summed together: ntitrogen = nitrogen; CO2 = CO2; methane = methane; ethane = ethane; propane = propane; butanes = isobutnae, n-butane; pentanes = 2,2-dimethylpropane, isopentane, n-pentane, and cyclopentane; benzene = benzene; other hexanes = 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, n hexane, methylcyclopentane, cyclohexane; toluene = toluene; other heptanes = 2-methylhexane, 3-methylhexane, other c-7s, n-heptane, methylcycloheane, ethylbenzene = ethylbenzene; xylenes (o,m,p) = M & P xylenes, O-xylene; other octanes = 2,2,4-trimethylpentane, other c-8s, n-octane, nonanes = other c-9s, n-nonane, decanes plus = other c-10s through hentriacontanes plus (C31+). The molecular weight for decanes plus was taken from the same analyses in the 'Characteristics of Decanes (C10) Plus' section.

The liquid analysis was not analyzed for H2S so the concentration in the flash gas from the oil was used and the difference was subracted from C10+.

Fugitive Component Count Tables

= User inputs

Site Equipment Count					
Gas		Crude Oil		Water	
Wellheads [1]		Wellhead	16		
Separators		Separator	3		
Meters/piping [2]		Heater-treater	3		
Compressors		Header	1		
In-Line Heaters		Tanks	3	Tanks	2
Dehydrators		Pumps	2	Pumps	1
Scrubbers [3]		Sample Ports	5	Sample Ports	2

Component Count for Gas		Component Count for Crude Oil		Component Count for Water	
Valves	0	Valves	163	Valves	21
Pump Seals	0	Pump Seals	4	Pump Seals	2
Connectors	0	Connectors	196	Connectors	24
Flange	0	Flange	304	Flange	38
Open-Ended Lines	0	Open-Ended Lines	5	Open-Ended Lines	2
Other	0	Other	16	Other	0

Component Counts for Natural Gas Production Equipment (adapted from Table W-1B [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-Ended Lines	Other Components [5]
Wellheads	11	0	36	0	1	0
Separators	34	0	106	0	6	2
Meters/piping	14	0	51	0	1	1
Compressors	73	0	179	0	3	4
In-Line Heaters	14	0	65	0	2	1
Dehydrators	24	0	90	0	2	2

Component Counts for Crude Oil Production Equipment (adapted from Table W-1C [4])

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Wellhead	5	0	4	10	0	1
Separator	6	0	10	12	0	0
Heater-treater	8	0	20	12	0	0
Header	5	0	4	10	0	0

Estimated Component Counts for Crude Oil Production Equipment and Water [6]

Equipment	Valves	Pump Seals	Connectors	Flanges	Open-ended Lines	Other Components
Tanks	7	0	10	14	0	0
Pumps	5	2	4	10	0	0
Sample Ports	1	0	0	0	1	0

Notes:

[1] Assumed to be equal to the number of wells onsite.

[2] 40 CFR 98.233(r)(2)(i)(A) dictates counting one meters/piping per well-pad for production operations.

[3] Scrubbers assumed to have the same fugitive components as separators.

[4] Tables W-1B and W-1C are found in Title 40 Code of Federal Regulations Part 98 Subpart W. Values are for Western U.S.

[5] The Pressure Relief Valves from Table W-1B are being grouped with Other Components for the purposes of these calculations.

[6] Component counts for crude oil production equipment used here are based on conservative estimates.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Fugitives Emissions

EPN	FUG
Name	Fugitive Emissions

Liquid Weight Percents From Analyses Tab:	
VOC wt %	99.9976
Benzene wt %	0.0022
H_2S wt %	0.0033

(3)

Light Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
163	Valve	0.005500	0.8965	3.92667
4	Pump Seal	0.028660	0.11464	0.5021232
196	Connector	0.000463	0.090748	0.39747624
304	Flange	0.000243	0.073872	0.32355936
5	Open-ended Line	0.003090	0.01545	0.067671
16	Other	0.016500	0.264	1.15632
		Total:	1.45521	6.3738198

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0033	
Pump Seal	99.9976	0.0022	0.0033	
Connector	99.9976	0.0022	0.0033	
Flange	99.9976	0.0022	0.0033	
Open-ended Line	99.9976	0.0022	0.0033	
Other	99.9976	0.0022	0.0033	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.90	3.93	0.00	0.00	0.00	0.00
Pump Seal	0.11	0.50	0.00	0.00	0.00	0.00
Connector	0.09	0.40	0.00	0.00	0.00	0.00
Flange	0.07	0.32	0.00	0.00	0.00	0.00
Open-ended Line	0.02	0.07	0.00	0.00	0.00	0.00
Other	0.26	1.16	0.00	0.00	0.00	0.00
Total:	1.46	6.37	0.00	0.00	0.00	0.00

(4)

Water/Oil

number	component	emission factor (lb/hr of TOC per component)	lb/hr	tpy
21	Valve	0.000216	0.004536	0.01986768
2	Pump Seal	0.000052	0.000104	0.00045552
24	Connector	0.000243	0.005832	0.02554416
38	Flange	0.000006	0.000228	0.00099864
2	Open-ended Line	0.000550	0.0011	0.004818
0	Other	0.030900	0	0
		Total:	0.0118	0.051684

	VOC content (wt%)	Benzene content (wt%)	H_2S content (wt%)	Control Efficiency (%)
Valves	99.9976	0.0022	0.0033	
Pump Seal	99.9976	0.0022	0.0033	
Connector	99.9976	0.0022	0.0033	
Flange	99.9976	0.0022	0.0033	
Open-ended Line	99.9976	0.0022	0.0033	
Other	99.9976	0.0022	0.0033	

	VOC Emissions		H_2S Emissions		Benzene Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.00	0.02	0.00	0.00	0.00	0.00
Pump Seal	0.00	0.00	0.00	0.00	0.00	0.00
Connector	0.01	0.03	0.00	0.00	0.00	0.00
Flange	0.00	0.00	0.00	0.00	0.00	0.00
Open-ended Line	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.01	0.05	0.00	0.00	0.00	0.00

(5)

Fugitive Total Emissions

	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC	1.47	6.43
benzene	0.00	0.00
H_2S	0.00	0.00

Notes:

Reference to Emission factors used:

1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4.

2. Emission factors that are not based on the EPA document are from the TCEQ "Air Permit Technical Guidance for Chemical Source Equipment Leak Fugitives (Draft October 2000)

3. For fugitive calculations, VOC content should be VOC content of total hydrocarbons, not of total sample.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-1	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	LBB Tensleep 2 has three heater treaters each with a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-2
Name	1.25 MMBtu/hr Heater Treater
Heater/Boiler rating (MMBtu/hr):	1.25
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled (assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760
Fuel Heat Value (Btu/SCF):	1020

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	LBB Tensleep 2 has three heater treaters each with a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Heaters-Boilers Emissions

Heater and Boiler Emission Calculations (fueled by natural gas)

EPN	HTR-3	
Name	1.25 MMBtu/hr Heater Treater	
Heater/Boiler rating (MMBtu/hr):	1.25	
Rating above is **(select from list)**:	below 100 MMBtu/hr, uncontrolled	(assume uncontrolled, unless specifically stated otherwise)
Operating hours/year:	8760	
Fuel Heat Value (Btu/SCF):	1020	

Pollutant	Emission Factor (lb/MMCF)	lb/hr	tpy
VOC	5.5	0.007	0.030
NOx	100	0.123	0.537
CO	84	0.103	0.451
PM_{10}	7.6	0.009	0.041
$PM_{2.5}$	5.7	0.007	0.031
SO_2	0.6	0.005	0.021

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

SO_2 Mass Balance calculation:	
Fuel H_2S content (mol %) =	**0.0023**
SO_2 produced (lb/hr) =	**0.0048**
SO_2 produced (tpy) =	**0.0209**

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

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:	LBB Tensleep 2 has three heater treaters each with a heating duty of 1.25 MMBtu/hr. Fuel gas is sweet gas and will be represented to contain a theoretical upper limit of 23ppm of H2S.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Tank Emissions - Lab Gas Oil Ratio (GOR) Method

GOR [FOR ESTIMATING FLASH LOSSES FROM STORAGE TANKS]

EPN	Tank Identifier	Flash Initial Press. (psig)	Flash Initial Temp. (°F)	Flash Final Press. (psig)	Flash Final Temp. (°F)	GOR (scf of flash gas/bbl of oil/cond. produced)	Barrels of Oil or Condensate per day (bbl/day)	Flash Gas Molecular Weight	Flash Gas VOC wt%	Flash Gas Benzene wt%	Flash Gas H_2S wt%	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H_2S Control Efficiency (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H_2S Results (lb/hr)	H_2S Results (tpy)
TK-1	1,000-bbl Oil Tank	17	154	12.5	70	3.75	92	64.84	85.536	1.095	0.0210	0	(B) cont. by flare/ VC/TO/VRU	100	100	0.000	0.000	0.000	0.000	0.000	0.000
															Totals:	0.00	0.00	0.00	0.00	0.00	0.00

VOC Type: (pick from list)
Crude Oil or Condensate VOC

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here: Flash emissions are based on a flash gas analysis from LBB Embar 3.

GOR Calculator

This table can be used to calculate the flash gas molecular weight and the component weight percents if needed, if the flash gas mole percents are entered. It can also calculate the overall VOC, benzene, and H2S flash emissions if the GOR and the oil/condensate throughput are entered.

Gas Oil Ratio:	3.75	in standard cubic feet of flash gas per barrel (SCF/bbl) of oil/condensate produced
Barrels of Oil or Condensate per day:	92	

Flash Gas Speciation:

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.5670	28.01340	16	0.2445
CO2	18.2170	44.00950	802	12.3415
H2S	0.0400	34.08188	1	0.0210
methane (C1)	2.4210	16.04246	39	0.5979
ethane (C2)	2.7210	30.06904	82	1.2595
propane (C3)	6.8080	44.09562	300	4.6212
butanes (C4)	17.6610	58.12220	1026	15.8016
pentanes (C5)	23.3110	72.14878	1682	25.8901
benzene	0.9110	78.110000	71	1.0954
other hexanes (C6)	19.5870	86.18000	1688	25.9847
toluene	0.9800	92.140000	90	1.3900
other heptanes (C7)	5.3240	100.20000	533	8.2120
ethylbenzene	0.0000	106.170000	0	0.0000
xylenes (o, m, p)	0.3360	106.170000	36	0.5491
other octanes (C8)	0.9810	114.23000	112	1.7250
nonanes (C9)	0.1350	128.26000	17	0.2665
decanes plus (C10+)	0.0000	142.28000	0	0.0000
Totals:	100.0000	64.96	6496	100.00

Flash Gas MW =	64.9615967
Total gas emitted:	
lb/hr:	2.46077548
tpy:	10.7781966
VOC wt% =	85.5357
VOC, lb/hr:	2.10484132
VOC, tpy:	9.21920497
Benzene wt% =	1.0954
Benzene, lb/hr:	0.02695506
Benzene, tpy:	0.11806317
H_2S wt% =	0.0210
H_2S, lb/hr:	0.00051641
H_2S, tpy:	0.0022619

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Tank Emissions - Lab Gas Water Ratio (GWR) Method

GWR [FOR ESTIMATING FLASH LOSSES FROM STORAGE TANKS]

EPN	Tank Identifier	Flash Initial Press. (psig)	Flash Initial Temp. (°F)	Flash Final Press. (psig)	Flash Final Temp. (°F)	GWR (scf of flash gas/bbl of water produced)	Barrels of Water per day (bbl/day)	Flash Gas Molecular Weight	Flash Gas VOC wt%	Flash Gas Benzene wt%	Flash Gas H_2S wt%	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H_2S Control Efficiency (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H_2S Results (lb/hr)	H_2S Results (tpy)
PW-1	5,000-bbl Water Tank	17	154	14.7	68	0.43	8200	43.41	1.1347	0.0072	1.5704	(B) cont. by flare/ VC/TO/VRU	100	100	0.000	0.000	0.000	0.000	0.000	0.000
														Totals:	0.00	0.00	0.00	0.00	0.00	0.00

VOC Type: (pick from list)
Crude Oil or Condensate VOC

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here: Flash emissions are based on a flash gas analysis from LBB Embar 3.

GWR Calculator

This table can be used to calculate the flash gas molecular weight and the component weight percents if needed, if the flash gas mole percents are entered. It can also calculate the overall VOC, benzene, and H2S flash emissions if the GWR and the oil/condensate throughput are entered.

Gas Water Ratio:	0.43	in standard cubic feet of flash gas per barrel (SCF/bbl) of water produced
Barrels of Oil or Condensate per day:	8200	

Flash Gas Speciation:

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %
hydrogen	0.0000	2.01588	0	0.0000
helium	0.0000	4.0026	0	0.0000
nitrogen	0.6750	28.01340	19	0.4356
CO2	94.6410	44.00950	4165	95.9556
H2S	2.0000	34.08188	68	1.5704
methane (C1)	1.1050	16.04246	18	0.4084
ethane (C2)	0.7150	30.06904	21	0.4953
propane (C3)	0.3310	44.09562	15	0.3363
butanes (C4)	0.3250	58.12220	19	0.4352
pentanes (C5)	0.1670	72.14878	12	0.2776
benzene	0.0040	78.110000	0	0.0072
other hexanes (C6)	0.0200	86.18000	2	0.0397
toluene	0.0070	92.140000	1	0.0149
other heptanes (C7)	0.0040	100.20000	0	0.0092
ethylbenzene	0.0020	106.170000	0	0.0049
xylenes (o, m, p)	0.0040	106.170000	0	0.0098
other octanes (C8)	0.0000	114.23000	0	0.0000
nonanes (C9)	0.0000	128.26000	0	0.0000
decanes plus (C10+)	0.0000	142.28000	0	0.0000
	100.0000		4340.655	100.0000

Flash Gas MW =	43.406552
Total gas emitted:	
lb/hr:	16.804818
tpy:	73.605101
VOC wt% =	1.1347
VOC, lb/hr:	0.1906829
VOC, tpy:	0.8351909
Benzene wt% =	0.0072
Benzene, lb/hr:	0.0012096
Benzene, tpy:	0.0052981
H_2S wt% =	1.5704
H_2S, lb/hr:	0.2638955
H_2S, tpy:	1.1558625

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Tank Emissions - E&P Tanks Stable Oil Option

E&P TANKS STABLE OIL OPTION [FOR ESTIMATING WORKING AND BREATHING LOSSES FROM STORAGE TANKS]

EPN	Tank Identifier	C10+ MW	C10+ SG	Production Rate (bbl/day)	API Gravity	RVP (psia)	Bulk Temperature (°F)	Emissions Uncontrolled VOC (lb/hr)	Emissions Uncontrolled VOC (ton/yr)	Emissions Uncontrolled Benzene (lb/hr)	Emissions Uncontrolled Benzene (ton/yr)	Emissions Uncontrolled H_2S (lb/hr)	Emissions Uncontrolled H_2S (ton/yr)	Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	VOC Control Efficiency (%)	H_2S Control Efficiency (%)	Percent Reduction for Produced Water Tank Calc. as Oil/Cond. (%)	VOC Results (lb/hr)	VOC Results (tpy)	Benzene Results (lb/hr)	Benzene Results (tpy)	H_2S Results (lb/hr)	H_2S Results (tpy)
TK-1	1,000-bbl Oil Tank	468.3	0.9548	92	18.46	1.74	70	0.088	0.384	0	0	0.005	0.021	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-2	1,000-bbl Oil Overflow Tank	468.3	0.9548	1	18.46	1.74	70	0.088	0.046	0	0	0.005	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-3	1,000-bbl Oil Overflow Tank	468.3	0.9548	1	18.46	1.74	70	0.088	0.046	0	0	0.005	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
TK-4	400-bbl Pop Tank	468.3	0.9548	1	18.46	1.74	70	0.008	0.034	0	0	0	0	(B) cont. by flare/ VC/TO/VRU	100	100	0	0.00	0.00	0.00	0.00	0.00	0.00
PW-1	5,000-bbl Water Tank	468.3	0.9548	8200	18.46	1.74	70	1.252	5.484	0	0.002	0.068	0.3	(B) cont. by flare/ VC/TO/VRU	100	100	99	0.00	0.00	0.00	0.00	0.00	0.00
																	Totals:	0.00	0.00	0.00	0.00	0.00	0.00

0.0417

VOC Type: (pick from list)
Crude Oil or Condensate VOC

Emission Type: (pick from list)
Steady State (continuous)

Enter any notes here:

The main tank, TK-1, receives the bulk of all incoming oil from the heater treaters. LBB Tensleep 2 has 2 tanks, TK-2 and TK-3, for overflow only. Hourly emissions for overflow tanks were determined based on the total site throughput of 92 bbl/day. Annual emissions for overflow tanks was based on the average 1 bbl/day. Oil characteristics were taken from the LBB Embar 3 atmospheric hydrocarbon liquid analysis. Emissions were calculated for the tanks near Cheyenne, WY using the stable oil method in E&P Tanks Version 2. Water generated at the site is sent through the water tank, WTK-1. The pop tank has liquid and gas piping to the inlet freewater knockout and heater treaters and a gas connection to the water tank. During maintenance periods, a vessel will dump liquids to the pop tank. Hourly emissions are based on 100bbl/day and annual emissions are based on 100bbl for each vessel connected (1 FWKO and 4 total heaters/separators), 500bbl/yr. Emissions were estimated similarly to the oil tanks and uses a 99% reduction factor for the amount of oil within the water.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Pop Tank Flare
Unit EPN:	FLR-1
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.138	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	GOR	GWR	Pop Tank Stable Oil								-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		14.375	146.917	0.044								176.335833
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760	8760	8760								-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		125925	1286990	386.9								1544701.9
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		3275	66	3652								-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	GOR	GWR	Pop Tank Stable Oil								-
H2S	-	-	0.001	0.264	0.000								0.26443195
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	2.101	0.191	0.008								2.29959943
benzene	-	-	0.027	0.001	0.000								0.02811431

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.002	1.156	0.000								1.15821194
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	9.202	0.835	0.034								10.0712055
benzene	-	-	0.118	0.005	0.000								0.12314068

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**GOR**	**GWR**	**Pop Tank Stable Oil**								**-**
NOx	0.002	0.000	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
SO2	0.000	0.000	0.001	0.496	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.50**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.042	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.05**
benzene	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**GOR**	**GWR**	**Pop Tank Stable Oil**								**-**
NOx	0.007	0.000	0.028	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.04**
CO	0.006	0.000	0.007	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
H2S	0.000	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.02**
SO2	0.000	0.000	0.004	2.173	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**2.18**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.184	0.017	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.20**
benzene	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.0000	0.0000
Total Natural Gas VOC	0.0001	0.0004
Total VOC	0.0461	0.2018
NOx	0.0094	0.0410
CO	0.0033	0.0142
PM2.5	0.0010	0.0044
PM10	0.0013	0.0059
H2S	0.0053	0.0232
SO2	0.4971	2.1771
benzene	0.0006	0.0025

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	410
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	410
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	4
Total Flare/Burner Tip Surface Area (ft²)?	0.08722222
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	0.08722222
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.56

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions for the Pop Tank assume that the GOR, GWR, and S/W/B Pop Tank Emissions are all routed to this flare.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Oil Tanks Flare
Unit EPN:	FLR-2
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.138	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	TK-1	TK-2	TK-3								-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		0.608	0.608	0.608								16.82375
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760	8760	8760								-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		5325.35	412.45	412.45								137550.25
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		3057	4596	4596								-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	TK-1	TK-2	TK-3								-
H2S	-	-	0.005	0.005	0.005								0.015
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.088	0.088	0.088								0.264
benzene	-	-	0	0	0								0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.021	0	0								0.021
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.384	0.046	0.046								0.476
benzene	-	-	0	0	0								0

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**TK-1**	**TK-2**	**TK-3**								**-**
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.009	0.009	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.03**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**TK-1**	**TK-2**	**TK-3**								**-**
NOx	0.007	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.04**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.008	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.0000	0.0000
Total Natural Gas VOC	0.0001	0.0004
Total VOC	0.0054	0.0099
NOx	0.0025	0.0080
CO	0.0015	0.0059
PM2.5	0.0001	0.0004
PM10	0.0001	0.0005
H2S	0.0003	0.0004
SO2	0.0282	0.0395
benzene	0.0000	0.0000

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1352
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1120
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	4
Total Flare/Burner Tip Surface Area (ft²)?	0.08722222
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	0.08722222
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.05

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions based on the Stable Oil calculations for each tank.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Flare / Vapor Combustor

General Information	
Unit Name:	Water Tank Flare
Unit EPN:	FLR-3
Which is utilized for this device?	continuous pilot

NOx and CO Emission Factors		
For Waste Gas:		
What kind of device is this? Pick from list.	non-steam assisted flare with high Btu stream flared	
NOx	0.138	lb/MMBtu
CO	0.035	lb/MMBtu
For Pilot Stream(s):		
If there is one or more pilot streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	pipeline quality natural gas	
NOx	100	lb/MMscf
CO	84	lb/MMscf
Enter pilot stream information into the column for Stream No. 1 below. If there is more than one pilot stream, please enter it as one combined stream.		
For Added Fuel Stream(s):		
If there is one or more added fuel streams, are they made up of pipeline quality natural gas, propane, or field gas? Pick from drop down list to the right and follow instructions below.	no added fuel	
NOx	0	
CO	0	
Since there is no added fuel stream, you do not need to enter anything in the column for Stream No. 2 below.		

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
propane percent destruction efficiency (%) *OPTIONAL*	98
H_2S percent destruction efficiency (%)	98

Emission Factors

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

NOx	100	
CO	84	
PM10, PM2.5	7.6	5.7

Emission Factors from TCEQ Guidance (lb/MMBtu)

Non-steam assisted, high Btu		Steam assisted, high Btu	
NOx	0.138	NOx	0.0485
CO	0.035	CO	0.3503
Non-steam assisted, low Btu		**Steam assisted, low Btu**	
NOx	0.0641	NOx	0.068
CO	0.5496	CO	0.3465

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

SO_2	0.6
VOC	5.5
benzene	2.10E-03

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Stream Information

Each numbered column represents a stream. The first two columns are always for pilot and added fuel streams. The next ten columns, Columns 3-12, are for any streams sent to the control device, such as "tank 1", "amine regenerator vent", etc. Under the column numbers, these columns should be labeled with the stream name. Information only needs to be entered for the number of streams sent to the flare. If for example, there are only two process/waste streams routed to the flare, only colums 3 and 4 need to be filled out, and potentially 1 and 2 if there are also any pilot or added fuel streams.

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name (Enter Names of Each Stream Here)	pilot(s)	added fuel stream(s)	PW-1										-
Maximum Expected Hourly Volumtric Flow Rate of Stream (scf/hr)	15		0.087										15.08677083
Amount of Time Stream Routed to Flare/Vapor Combustor (hrs/yr)	8760		8760										-
Maximum Expected Annual Volumtric Flow Rate of Stream (scf/yr)	131400		760.1125										132160.1125
Heat Value of Stream - from program results or gas analysis (Btu/scf)	1020		30.57										-
propane weight percent of total stream (%) *OPTIONAL*													-
VOC weight percent of total stream (%) *OPTIONAL*													-

It is suggested that you link these cells below to the cells in the other tabs of this spreadsheet which contain the calculated uncontrolled emissions for the stream.

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)

Stream Sent to Flare/Vapor Combustor No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
Stream Sent to Flare/Vapor Combustor Name	pilot(s)	added fuel stream(s)	PW-1										-
H2S	-	-	0.068										0.068
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.01252										0.01252
benzene	-	-	0										0

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)

H2S	-	-	0.3										0.3
Crude or Condensate VOC	-	-											0
Natural Gas VOC	-	-											0
Total VOC	-	-	0.05484										0.05484
benzene	-	-	0.00002										0.00002

Controlled Emissions													
Hourly (lb/hr)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**PW-1**										**-**
NOx	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
CO	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
SO2	0.000	0.000	0.128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.13**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Annual (tpy)													
Stream Sent to Flare/Vapor Combustor No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Stream Sent to Flare/Vapor Combustor Name	**pilot(s)**	**added fuel stream(s)**	**PW-1**										**-**
NOx	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
CO	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
PM2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
PM10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
H2S	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.01**
SO2	0.000	0.000	0.564	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.56**
Crude or Condensate VOC	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Natural Gas VOC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
Total VOC	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**
benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.00**

Flare/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total Crude Oil or Condensate VOC	0.0000	0.0000
Total Natural Gas VOC	0.0001	0.0004
Total VOC	0.0003	0.0015
NOx	0.0015	0.0066
CO	0.0013	0.0055
PM2.5	0.0001	0.0004
PM10	0.0001	0.0005
H2S	0.0014	0.0060
SO2	0.1278	0.5639
benzene	0.0000	0.0000

Calculations

Scf/hr = (Uncontrolled (lb/hr) / Molecular Weight (lb/lb-mole)) * 379 (ft3/lb-mole)

VOC = Uncontrooled (lb/hr) * ((100-DRE%)/100)
NOx = (Flow rate = scf/hr) * (Heat content = Btu/scf) * (Emission factor = lb/MM Btu)*(1MM Btu / 1,000,000 Btu)
CO = (Flow rate = scf/hr)*(Heat content = Btu/scf) * (Emission factor = lb/MM Btu) * (1MM Btu/1,000,000 Btu)

Emission Type: (pick from list)
Steady State (continuous)

PBR/Standard Permit Compliance	
Minimum Heat Value Requirement	
Total Stream Heat Value (weighted with hourly volumetric flow rates, Btu/scf)	1014
Total Stream Heat Value (weighted with annual volumetric flow rates, Btu/scf)	1014
Maximum Flare/Burner Tip Velocity Requirement	
How many flare/burner tips does the unit have?	1
What is the diameter of the flare/burner tip(s) (in)?	4
Total Flare/Burner Tip Surface Area (ft²)?	0.087222222
What is the flare/burner tip surface area that the hourly worst case (highest flow) stream passes through (ft²)?	0.087222222
Stream Velocity Through Burner Tip (based on hourly worst case, ft/sec)	0.05

Enter any notes here as needed. You must address the following:
(1) How is this control efficiency justified? Please be specific.
(2) Explain what happens when this unit is down. Include how long the unit could be down for.

Flaring emissions based on the Stable Oil calculations for each tank.

Citation Oil and Gas Corp.
Tensleep 2 Tank Battery

Emissions Summary

The table below is a summary of all emission points for this registration. It is separated into *Project Emissions* and *Other Site Wide Emissions*.

The table has separate totals for *Project Total Emission Rates* and *Site Wide Total Emission Rates*.

Any formaldehyde emissions must be included as part of VOC emissions.

Emissions Summary

Project Emissions (This needs to include all emission points being added for the first time to the registration or emission points with emissions that are changing from previously registered emissions. It does NOT include emission points for which the emissions have not changed and have previously been registered (unless the emission point emissions are chosen to be re-calculated as part of this project); those emissions will be entered below in the Other Registration Emissions section of this table.)

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hr	TPY (4)
FUG	Fugitive Emissions	Total VOC	1.4670	6.4254
		Benzene	0.0000	0.0001
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0002
		SO_2	0.0000	0.0000
		NO_X	0.0000	0.0000
		CO	0.0000	0.0000
		PM_{10}	0.0000	0.0000
		$PM_{2.5}$	0.0000	0.0000
HTR-1	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
HTR-2	1.25 MMBtu/hr Heater Treater	Total VOC	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306

HTR-3	1.25 MMBtu/hr Heater Treater	**Total VOC**	0.0067	0.0295
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0000	0.0000
		SO_2	0.0048	0.0209
		NO_X	0.1225	0.5368
		CO	0.1029	0.4509
		PM_{10}	0.0093	0.0408
		$PM_{2.5}$	0.0070	0.0306
FLR-1	Pop Tank Flare	**Total VOC**	0.0461	0.2018
		Benzene	0.0006	0.0025
		Formaldehyde	0.0000	0.0000
		H_2S	0.0053	0.0232
		SO_2	0.4971	2.1771
		NO_X	0.0094	0.0410
		CO	0.0033	0.0142
		PM_{10}	0.0013	0.0059
		$PM_{2.5}$	0.0010	0.0044
FLR-2	Oil Tanks Flare	**Total VOC**	0.0054	0.0099
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0003	0.0004
		SO_2	0.0282	0.0395
		NO_X	0.0025	0.0080
		CO	0.0015	0.0059
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004
FLR-3	Water Tank Flare	**Total VOC**	0.0003	0.0015
		Benzene	0.0000	0.0000
		Formaldehyde	0.0000	0.0000
		H_2S	0.0014	0.0060
		SO_2	0.1278	0.5639
		NO_X	0.0015	0.0066
		CO	0.0013	0.0055
		PM_{10}	0.0001	0.0005
		$PM_{2.5}$	0.0001	0.0004

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Uncontrolled Emission Rates (excluded flare emisssions)	**Total VOC**	4.06	17.12
	Benzene	0.03	0.12
	Formaldehyde	0.00	0.00
	H_2S	0.35	1.48
	SO_2	0.67	2.84
	NO_X	0.38	1.67
	CO	0.31	1.38
	PM_{10}	0.03	0.13
	$PM_{2.5}$	0.02	0.10

	Air Contaminant Name (3)	Emission Rates	
		lbs/hr	TPY (4)
Project Total Emission Rates (Note that these totals are simply the sum of the emission rates from each emission point. For the hourly rates, if the worst case combination of continuously and periodically emitting sources is less than this, then please input the values in this table to the right. Please explain below which emission points are included in this worst case combination.)	**Total VOC**	1.54	6.73
	Benzene	0.00	0.00
	Formaldehyde	0.00	0.00
	H_2S	0.01	0.03
	SO_2	0.67	2.84
	NO_X	0.38	1.67
	CO	0.31	1.38
	PM_{10}	0.03	0.13
	$PM_{2.5}$	0.02	0.10

If the automated formulas for the project emission totals (which assume that it is possible for all steady state and periodic emissions in the project to occur in the same hour) have been overwritten, explain any changes made and list the project emission points that occur in the realistic worst case hour. (Leave this blank or put NA if none of the formulas have been overwritten.)	Uncontrolled emissions are based on tanks venting to atmosphere (0% VOC and H2S control) and no flare present to control emissions. Controlled emissions were calculated by applying 100% control to tank emissions and including flaring emissions.

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 2
Well ID                   : TK-1 Annual and Hourly; TK-2 & TK-3 Hourly
Date                      : 2020.01.27


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 92[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 21.50[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary --

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.010	0.002
Total HC	0.411	0.094
VOCs, C2+	0.411	0.094
VOCs, C3+	0.384	0.088

Uncontrolled Recovery Info.

Vapor	15.8800 x1E-3	[MSCFD]
HC Vapor	14.5900 x1E-3	[MSCFD]
GOR	0.17	[SCF/bbl]

-- Emission Composition --

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.021	0.005
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.027	0.006
7	C3	0.074	0.017
8	i-C4	0.032	0.007
9	n-C4	0.085	0.019
10	i-C5	0.052	0.012
11	n-C5	0.056	0.013
12	C6	0.043	0.010
13	C7	0.019	0.004
14	C8	0.006	0.001
15	C9	0.002	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.001	0.000
21	n-C6	0.013	0.003
22	224Trimethylp	0.000	0.000
	Total	0.431	0.098

-- Stream Data --

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0355	8.0732
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0257	11.5449
7	C3	44.10	2.1827	0.1533	22.0942
8	i-C4	58.12	1.1269	0.1306	7.2429
9	n-C4	58.12	4.6091	0.4889	19.0866
10	i-C5	72.15	3.1066	0.6712	9.4253
11	n-C5	72.15	5.0558	0.9767	10.1125
12	C6	86.16	4.1726	2.5785	6.7247
13	C7	100.20	10.3655	3.0429	2.5175
14	C8	114.23	10.8426	2.9627	0.7352

15	C9	128.28	5.5127	3.0530	0.2496
16	C10+	468.30	45.9695	84.0103	0.0000
17	Benzene	78.11	0.5685	0.0117	0.0230
18	Toluene	92.13	0.2132	0.0970	0.0509
19	E-Benzene	106.17	0.0711	0.1871	0.0308
20	Xylenes	106.17	0.6802	0.5778	0.0820
21	n-C6	86.18	3.5939	0.9972	2.0066
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	408.54	56.49
	Stream Mole Ratio		1.0000	0.9994	0.0006
	Heating Value	[BTU/SCF]			3057.29
	Gas Gravity	[Gas/Air]			1.95
	Bubble Pt. @ 100F	[psia]	1.95	1.85	
	RVP @ 100F	[psia]	8.45	8.62	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 2
Well ID                   : TK-2 TK-3 Annual
Date                      : 2020.01.27


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 1[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 21.50[ft]
Shell Height              : 16.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 8.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.010	0.002
Total HC	0.046	0.011
VOCs, C2+	0.046	0.011
VOCs, C3+	0.046	0.011

Uncontrolled Recovery Info.

Vapor	1.1300 x1E-3	[MSCFD]
HC Vapor	1.1300 x1E-3	[MSCFD]
GOR	1.13	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.000	0.000
7	C3	0.000	0.000
8	i-C4	0.000	0.000
9	n-C4	0.000	0.000
10	i-C5	0.005	0.001
11	n-C5	0.008	0.002
12	C6	0.015	0.003
13	C7	0.008	0.002
14	C8	0.003	0.001
15	C9	0.001	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.005	0.001
22	224Trimethylp	0.000	0.000
	Total	0.045	0.010

-- Stream Data ----------

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0000	0.0003
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0000	0.0003
7	C3	44.10	2.1827	0.0000	0.0002
8	i-C4	58.12	1.1269	0.0000	0.0052
9	n-C4	58.12	4.6091	0.0036	1.0256
10	i-C5	72.15	3.1066	0.1400	12.8758
11	n-C5	72.15	5.0558	0.3120	20.8799
12	C6	86.16	4.1726	1.9926	32.6083
13	C7	100.20	10.3655	2.8793	14.8498
14	C8	114.23	10.8426	2.9944	4.6208

15	C9	128.28	5.5127	3.1447	1.5969
16	C10+	468.30	45.9695	87.3434	0.0000
17	Benzene	78.11	0.5685	0.0097	0.1198
18	Toluene	92.13	0.2132	0.0950	0.3103
19	E-Benzene	106.17	0.0711	0.1909	0.1955
20	Xylenes	106.17	0.6802	0.5911	0.5215
21	n-C6	86.18	3.5939	0.8246	10.3897
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	418.94	83.94
	Stream Mole Ratio		1.0000	0.9962	0.0038
	Heating Value	[BTU/SCF]			4596.16
	Gas Gravity	[Gas/Air]			2.90
	Bubble Pt. @ 100F	[psia]	1.95	0.37	
	RVP @ 100F	[psia]	8.45	2.43	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 2
Well ID                   : TK-4 Pop Tank
Date                      : 2020.01.28


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 1[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 12.00[ft]
Shell Height              : 20.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 15.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.000	0.000
Total HC	0.034	0.008
VOCs, C2+	0.034	0.008
VOCs, C3+	0.034	0.008

Uncontrolled Recovery Info.

Vapor	1.0800 x1E-3	[MSCFD]
HC Vapor	1.0600 x1E-3	[MSCFD]
GOR	1.08	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.000	0.000
7	C3	0.003	0.001
8	i-C4	0.003	0.001
9	n-C4	0.008	0.002
10	i-C5	0.005	0.001
11	n-C5	0.006	0.001
12	C6	0.005	0.001
13	C7	0.002	0.000
14	C8	0.001	0.000
15	C9	0.000	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.001	0.000
22	224Trimethylp	0.000	0.000
	Total	0.034	0.008

-- Stream Data ----------

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0010	1.9677
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0000	0.0004
7	C3	44.10	2.1827	0.0288	14.0178
8	i-C4	58.12	1.1269	0.0762	8.6212
9	n-C4	58.12	4.6091	0.3381	25.1015
10	i-C5	72.15	3.1066	0.5928	14.3422
11	n-C5	72.15	5.0558	0.8932	15.7151
12	C6	86.16	4.1726	2.5348	10.9143
13	C7	100.20	10.3655	3.0409	4.1263
14	C8	114.23	10.8426	2.9765	1.2086

15	C9	128.28	5.5127	3.0720	0.4106
16	C10+	468.30	45.9695	84.5960	0.0000
17	Benzene	78.11	0.5685	0.0116	0.0375
18	Toluene	92.13	0.2132	0.0972	0.0835
19	E-Benzene	106.17	0.0711	0.1881	0.0507
20	Xylenes	106.17	0.6802	0.5810	0.1349
21	n-C6	86.18	3.5939	0.9857	3.2676
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	409.89	66.28
	Stream Mole Ratio		1.0000	0.9965	0.0035
	Heating Value	[BTU/SCF]			3652.93
	Gas Gravity	[Gas/Air]			2.29
	Bubble Pt. @ 100F	[psia]	1.95	1.05	
	RVP @ 100F	[psia]	8.45	6.18	
	SG @ 100F		0.695	0.695	

```
*****************************************************************************************
*     Project Setup Information                                                         *
*****************************************************************************************
Project File              : Z:\PROJECTS\Citation Oil and Gas\COG2018-0009 WY Audit Support\Site Folders\Tensleep
Model                     : Stable Oil Tank
Calculation Method        : AP42
Control Efficiency        : 100.0%

Well Name                 : LBB Tensleep 2
Well ID                   : PW-1
Date                      : 1/27/2020


*****************************************************************************************
*     Data Input                                                                        *
*****************************************************************************************

Separator Pressure        : 23.00[psig]
Separator Temperature     : 85.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.9548
C10+ MW                   : 468.30

-- Stable Oil ---------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                   0.0400
   2      O2                    0.0000
   3      CO2                   0.0000
   4      N2                    0.0000
   5      C1                    0.0000
   6      C2                    0.0322
   7      C3                    0.1656
   8      i-C4                  0.1346
   9      n-C4                  0.4994
   10     i-C5                  0.6761
   11     n-C5                  0.9818
   12     C6                    2.5808
   13     C7                    3.0426
   14     C8                    2.9614
   15     C9                    3.0514
   16     C10+                 83.9631
   17     Benzene               0.0117
   18     Toluene               0.0970
   19     E-Benzene             0.1870
   20     Xylenes               0.5775
   21     n-C6                  0.9978
   22     224Trimethylp         0.0000

-- Sales Oil ----------------------------------------------------------------------------
Production Rate           : 8200[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 18.46
Reid Vapor Pressure       : 1.74[psia]
Bulk Temperature          : 60.00[F]

-- Tank and Shell Data ------------------------------------------------------------------
Diameter                  : 30.00[ft]
Shell Height              : 40.00[ft]
Cone Roof Slope           : 0.06
Average Liquid Height     : 15.00[ft]
Vent Pressure Range       : 0.06[psi]
Solar Absorbance          : 0.39

-- Meteorological Data ------------------------------------------------------------------
City                      : Cheyenne, WY
```

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 33.10[F]
Max Ambient Temperature : 58.30[F]
Total Solar Insolation : 1491.00[Btu/ft^2*day]

****
* Calculation Results *
****

-- Emission Summary --

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.210	0.048
Total HC	5.863	1.339
VOCs, C2+	5.863	1.339
VOCs, C3+	5.484	1.252

Uncontrolled Recovery Info.

Vapor	226.5400 x1E-3	[MSCFD]
HC Vapor	208.2500 x1E-3	[MSCFD]
GOR	0.03	[SCF/bbl]

-- Emission Composition --

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.300	0.068
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.379	0.087
7	C3	1.063	0.243
8	i-C4	0.459	0.105
9	n-C4	1.210	0.276
10	i-C5	0.742	0.169
11	n-C5	0.796	0.182
12	C6	0.616	0.141
13	C7	0.266	0.061
14	C8	0.089	0.020
15	C9	0.033	0.008
16	C10+	0.000	0.000
17	Benzene	0.002	0.000
18	Toluene	0.005	0.001
19	E-Benzene	0.004	0.001
20	Xylenes	0.009	0.002
21	n-C6	0.189	0.043
22	224Trimethylp	0.000	0.000
	Total	6.162	1.407

-- Stream Data --

No.	Component	MW	Stable Oil mol %	Sales Oil mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0393	8.0732
2	O2	32.00	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0000	0.0000
4	N2	28.01	0.0102	0.0000	0.0000
5	C1	16.04	0.9543	0.0000	0.0000
6	C2	30.07	0.6701	0.0312	11.5449
7	C3	44.10	2.1827	0.1636	22.0942
8	i-C4	58.12	1.1269	0.1340	7.2429
9	n-C4	58.12	4.6091	0.4977	19.0866
10	i-C5	72.15	3.1066	0.6753	9.4253
11	n-C5	72.15	5.0558	0.9810	10.1125
12	C6	86.16	4.1726	2.5804	6.7247
13	C7	100.20	10.3655	3.0426	2.5175
14	C8	114.23	10.8426	2.9616	0.7352

15	C9	128.28	5.5127	3.0517	0.2496
16	C10+	468.30	45.9695	83.9707	0.0000
17	Benzene	78.11	0.5685	0.0117	0.0230
18	Toluene	92.13	0.2132	0.0970	0.0509
19	E-Benzene	106.17	0.0711	0.1870	0.0308
20	Xylenes	106.17	0.6802	0.5775	0.0820
21	n-C6	86.18	3.5939	0.9977	2.0066
22	224Trimethylp	114.24	0.0000	0.0000	0.0000
	MW		408.54	408.54	56.49
	Stream Mole Ratio		1.0000	0.9999	0.0001
	Heating Value	[BTU/SCF]			3057.29
	Gas Gravity	[Gas/Air]			1.95
	Bubble Pt. @ 100F	[psia]	1.95	1.94	
	RVP @ 100F	[psia]	8.45	8.43	
	SG @ 100F		0.695	0.695	

December 20, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Heater Treater Gas
Spot Sample @ 17 psig & 154 °F

Date Sampled: 12/06/17 Job Number: 74198.021

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	8.000	
Nitrogen	0.935	
Carbon Dioxide	58.670	
Methane	8.291	
Ethane	2.618	0.723
Propane	3.336	0.949
Isobutane	1.339	0.452
n-Butane	3.628	1.181
2-2 Dimethylpropane	0.015	0.006
Isopentane	2.573	0.971
n-Pentane	2.852	1.067
Hexanes	4.289	1.823
Heptanes Plus	3.454	1.545
Totals	100.000	8.717

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.507	(Air=1)
Molecular Weight	100.33	
Gross Heating Value	5424	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.621	(Air=1)
Compressibility (Z)	0.9878	
Molecular Weight	46.37	
Gross Heating Value		
Dry Basis	1068	BTU/CF
Saturated Basis	1050	BTU/CF

*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377)
Results: 5031.4 Gr/100 CF, 80000 PPMV or 8.000 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) RG
Analyst: MR
Processor: ANB
Cylinder ID: T-5967

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.021

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	8.000		5.880
Nitrogen	0.935		0.565
Carbon Dioxide	58.670		55.683
Methane	8.291		2.870
Ethane	2.618	0.723	1.698
Propane	3.336	0.949	3.172
Isobutane	1.339	0.452	1.678
n-Butane	3.628	1.181	4.547
2,2 Dimethylpropane	0.015	0.006	0.023
Isopentane	2.573	0.971	4.003
n-Pentane	2.852	1.067	4.438
2,2 Dimethylbutane	0.032	0.014	0.059
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.329	0.139	0.611
2 Methylpentane	1.347	0.577	2.503
3 Methylpentane	0.964	0.406	1.792
n-Hexane	1.617	0.686	3.005
Methylcyclopentane	0.442	0.157	0.802
Benzene	0.008	0.002	0.013
Cyclohexane	0.292	0.103	0.530
2-Methylhexane	0.241	0.116	0.521
3-Methylhexane	0.388	0.182	0.838
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.487	0.219	1.042
n-Heptane	0.501	0.239	1.083
Methylcyclohexane	0.231	0.096	0.489
Toluene	0.021	0.007	0.042
Other C8's	0.479	0.230	1.139
n-Octane	0.109	0.058	0.269
Ethylbenzene	0.015	0.006	0.034
M & P Xylenes	0.013	0.005	0.030
O-Xylene	0.003	0.001	0.007
Other C9's	0.148	0.078	0.403
n-Nonane	0.015	0.009	0.041
Other C10's	0.027	0.016	0.082
n-Decane	0.006	0.004	0.018
Undecanes (11)	0.028	0.018	0.090
Totals	100.000	8.717	100.000

Computed Real Characteristics of Total Sample

Specific Gravity	1.621	(Air=1)
Compressibility (Z)	0.9878	
Molecular Weight	46.37	

Gross Heating Value

Dry Basis	1068	BTU/CF
Saturated Basis	1050	BTU/CF

December 20, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

Sample: Citation Oil & Gas - LBB Embar 3
Heater Treater Gas
Spot Sample @ 17 psig & 154 °F

Date Sampled: 12/06/17 Job Number: 74198.021

GLYCALC FORMAT

COMPONENT	MOL%	GPM	Wt %
Carbon Dioxide	58.670		55.683
Hydrogen Sulfide	8.000		5.880
Nitrogen	0.935		0.565
Methane	8.291		2.870
Ethane	2.618	0.723	1.698
Propane	3.336	0.949	3.172
Isobutane	1.339	0.452	1.678
n-Butane	3.643	1.187	4.570
Isopentane	2.573	0.971	4.003
n-Pentane	2.852	1.067	4.438
Cyclopentane	0.000	0.000	0.000
n-Hexane	1.617	0.686	3.005
Cyclohexane	0.292	0.103	0.530
Other C6's	2.672	1.136	4.965
Heptanes	2.059	0.913	4.286
Methylcyclohexane	0.231	0.096	0.489
2,2,4 Trimethylpentane	0.000	0.000	0.000
Benzene	0.008	0.002	0.013
Toluene	0.021	0.007	0.042
Ethylbenzene	0.015	0.006	0.034
Xylenes	0.016	0.006	0.037
Octanes Plus	0.812	0.412	2.042
Totals	100.000	8.717	100.000

Real Characteristics Of Octanes Plus:

Specific Gravity ----------	4.077	(Air=1)
Molecular Weight ----------	116.63	
Gross Heating Value ----------	6120	BTU/CF

Real Characteristics Of Total Sample:

Specific Gravity ----------	1.621	(Air=1)
Compressibility (Z) ----------	0.9878	
Molecular Weight ----------	46.37	
Gross Heating Value		
Dry Basis ----------	1068	BTU/CF
Saturated Basis ----------	1050	BTU/CF

January 22, 2018

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Atmospheric Hydrocarbon Liquid
Sampled from Flash Liberation

Date Sampled: 12/06/17 Job Number: 74198.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Heptanes Plus	94.725	98.538	99.011
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----------	0.9481	(Water=1)
°API Gravity ----------	17.74	@ 60°F
Molecular Weight ----------	427.7	
Vapor Volume ----------	6.86	CF/Gal
Weight ----------	7.90	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: 0
Analyst: XG
Processor: XGdjv
Cylinder ID: Vial

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.543	0.127	0.079
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
Other C-6's	1.788	0.538	0.376
Heptanes	3.193	0.989	0.750
Octanes	3.604	1.179	0.960
Nonanes	3.051	1.130	0.945
Decanes Plus	84.003	95.000	96.134
Benzene	0.012	0.002	0.002
Toluene	0.097	0.024	0.022
E-Benzene	0.187	0.053	0.049
Xylenes	0.577	0.161	0.150
n-Hexane	0.998	0.299	0.210
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity ----------	0.9436	(Water=1)
°API Gravity ----------	18.46	@ 60°F
Molecular Weight----------	409.2	
Vapor Volume ----------	7.14	CF/Gal
Weight ----------	7.86	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ----------	0.9548	(Water=1)
Molecular Weight----------	468.3	

Characteristics of Atmospheric Sample:

°API Gravity ----------	18.46	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)----------	1.74	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	------	------
Pressure, PSIG	------	------	------
Temperature, °F	------	------	------

* Sample used for analysis

FESCO, Ltd. Job Number: 74198.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.032	0.006	0.002
Propane	0.166	0.033	0.018
Isobutane	0.135	0.032	0.019
n-Butane	0.499	0.115	0.071
2,2 Dimethylpropane	0.043	0.012	0.008
Isopentane	0.676	0.180	0.119
n-Pentane	0.938	0.248	0.165
2,2 Dimethylbutane	0.483	0.147	0.102
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.112	0.033	0.024
2 Methylpentane	0.670	0.202	0.141
3 Methylpentane	0.522	0.155	0.110
n-Hexane	0.998	0.299	0.210
Methylcyclopentane	0.441	0.114	0.091
Benzene	0.012	0.002	0.002
Cyclohexane	0.352	0.087	0.072
2-Methylhexane	0.493	0.167	0.121
3-Methylhexane	0.536	0.179	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.464	0.138	0.113
n-Heptane	0.907	0.304	0.222
Methylcyclohexane	0.643	0.188	0.154
Toluene	0.097	0.024	0.022
Other C-8's	2.160	0.692	0.582
n-Octane	0.802	0.299	0.224
E-Benzene	0.187	0.053	0.049
M & P Xylenes	0.130	0.037	0.034
O-Xylene	0.447	0.124	0.116
Other C-9's	2.312	0.827	0.713
n-Nonane	0.740	0.303	0.232
Other C-10's	2.945	1.158	1.017
n-decane	0.580	0.259	0.202
Undecanes(11)	3.492	1.409	1.254
Dodecanes(12)	3.173	1.383	1.248
Tridecanes(13)	3.492	1.632	1.493
Tetradecanes(14)	3.255	1.630	1.511
Pentadecanes(15)	3.127	1.677	1.574
Hexadecanes(16)	2.866	1.643	1.555
Heptadecanes(17)	2.872	1.741	1.663
Octadecanes(18)	2.547	1.625	1.562
Nonadecanes(19)	2.576	1.713	1.656
Eicosanes(20)	2.259	1.561	1.518
Heneicosanes(21)	2.114	1.537	1.503
Docosanes(22)	2.014	1.526	1.501
Tricosanes(23)	1.828	1.436	1.420
Tetracosanes(24)	1.788	1.455	1.446
Pentacosanes(25)	1.726	1.457	1.455
Hexacosanes(26)	1.152	1.008	1.010
Heptacosanes(27)	1.426	1.294	1.304
Octacosanes(28)	1.487	1.394	1.409
Nonacosanes(29)	1.453	1.407	1.427
Triacontanes(30)	1.481	1.480	1.506
Hentriacontanes Plus(31+)	34.353	63.574	65.900
Total	100.000	100.000	100.000

January 22, 2018

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W Mayberry Trail
Peoria, Arizona 85383

Date Sampled: 12/06/17

Date Analyzed: 01/16/18

Job Number: J74198

Sample: Citation Oil & Gas - LBB Embar 3

FLASH LIBERATION OF HYDROCARBON LIQUID			
	Separator	**Stock Tank @ 12.5 psia & 70°F**	**Stock Tank @ 14.7 psia & 68°F**
Pressure	17 psig	12.5 psia	14.7 psia
Temperature	154 °F	70 °F	68 °F
Gas Oil Ratio (1)	------	4.41 CF/Bbl	3.75 CF/STBbl
Gas Specific Gravity	------	2.350 Air = 1.000	2.350 Air = 1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (2)	0.9764
Oil API Gravity at 60 °F	18.46
Reid Vapor Pressure Equivalent (D-6377), psi (3)	1.74

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1311	-----
Pressure, psig	17	19	------
Temperature, °F	154	154	------

Note: Study Conducted @ 12.5 psia & 70 °F

(1) - CF of flashed vapor per barrel of stock tank oil
(2) - Fraction of first stage separator liquid
(3) - Absolute pressure at 100 deg F
Analyst: E.J.

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: Citation Oil & Gas - LBB Embar 3
Gas Liberated from Hydrocarbon Liquid
From 17 psig & 154 °F to 0 psig & 70 °F

Date Sampled: 12/06/17 Job Number: 74198.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	0.040	
Nitrogen	0.567	
Carbon Dioxide	18.217	
Methane	2.421	
Ethane	2.721	0.775
Propane	6.808	1.999
Isobutane	3.927	1.369
n-Butane	13.734	4.614
2-2 Dimethylpropane	1.825	0.743
Isopentane	8.855	3.451
n-Pentane	12.631	4.879
Hexanes	16.706	7.329
Heptanes Plus	11.548	4.914
Totals	100.000	30.072

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.425	(Air=1)
Molecular Weight	94.93	
Gross Heating Value	5065	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.339	(Air=1)
Compressibility (Z)	0.9570	
Molecular Weight	64.84	
Gross Heating Value		
Dry Basis	3332	BTU/CF
Saturated Basis	3275	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
Results: 25.16 Gr/100 CF, 400.0 PPMV or 0.040 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) ET
Analyst: RR
Processor: ANB
Cylinder ID: FL-5s

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	0.040		0.021
Nitrogen	0.567		0.245
Carbon Dioxide	18.217		12.365
Methane	2.421		0.597
Ethane	2.721	0.775	1.262
Propane	6.808	1.999	4.630
Isobutane	3.927	1.369	3.520
n-Butane	13.734	4.614	12.311
2,2 Dimethylpropane	1.825	0.743	2.031
Isopentane	8.855	3.451	9.853
n-Pentane	12.631	4.879	14.055
2,2 Dimethylbutane	0.173	0.077	0.230
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	1.405	0.613	1.867
2 Methylpentane	5.210	2.304	6.924
3 Methylpentane	3.632	1.580	4.827
n-Hexane	6.286	2.754	8.354
Methylcyclopentane	1.804	0.663	2.342
Benzene	0.911	0.272	1.097
Cyclohexane	1.077	0.391	1.397
2-Methylhexane	0.726	0.360	1.122
3-Methylhexane	1.089	0.529	1.683
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	1.617	0.750	2.474
n-Heptane	1.252	0.616	1.935
Methylcyclohexane	0.640	0.274	0.969
Toluene	0.980	0.350	1.393
Other C8's	0.803	0.398	1.365
n-Octane	0.178	0.097	0.314
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.219	0.090	0.359
O-Xylene	0.117	0.048	0.192
Other C9's	0.039	0.021	0.076
n-Nonane	0.096	0.058	0.190
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	30.072	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.339	(Air=1)
Compressibility (Z)	0.9570	
Molecular Weight	64.84	
Gross Heating Value		
Dry Basis	3332	BTU/CF
Saturated Basis	3275	BTU/CF

January 22, 2018

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W Mayberry Trail
Peoria, Arizona 85383

Date Sampled: 12/06/17

Date Analyzed: 12/14/17

Job Number: J74198

Sample: Citation Oil & Gas - LBB Embar 3

GAS LIBERATION OF PRESSURIZED WATER			
	Separator	**Stock Tank @12.5 psia & 70°F**	**Stock Tank @14.7 psia & 68°F**
Pressure	17 psig	12.5 psia	14.7 psia
Temperature	154 °F	70 °F	68 °F
Gas Water Ratio	------	0.51 CF/Bbl	0.43 CF/STBbl
Gas Specific Gravity	------	1.507 Air = 1.000	1.507 Air = 1.000

Note: Study Conducted @ 12.5 psia & 70 °F

Analyst : E.J.

Piston No. : PW-37699

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2017

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Murin Environmental Inc.
7052 W. Mayberry Trail
Peoria, Arizona 85383

Sample: LBB Embar 3
Gas Liberated from Separator Water
From 17 psig & 154 °F to 0 psig & 70 °F

Date Sampled: 12/06/17 Job Number: 74198.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	2.000	
Nitrogen	0.675	
Carbon Dioxide	94.641	
Methane	1.105	
Ethane	0.715	0.196
Propane	0.331	0.094
Isobutane	0.145	0.049
n-Butane	0.180	0.058
2-2 Dimethylpropane	0.028	0.011
Isopentane	0.056	0.021
n-Pentane	0.083	0.031
Hexanes	0.011	0.005
Heptanes Plus	0.030	0.011
Totals	100.000	0.475

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.182	(Air=1)
Molecular Weight	91.62	
Gross Heating Value	4629	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.507	(Air=1)
Compressibility (Z)	0.9942	
Molecular Weight	43.41	
Gross Heating Value		
Dry Basis	66	BTU/CF
Saturated Basis	66	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
Results: 1257.9 Gr/100 CF, 20000 PPMV or 2.000 Mol %

Base Conditions: 15.025 PSI & 60 Deg F

Sampled By: (16) ET
Analyst: RR
Processor: ANB
Cylinder ID: WF-11S

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 74198.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	2.000		1.570
Nitrogen	0.675		0.436
Carbon Dioxide	94.641		95.957
Methane	1.105		0.408
Ethane	0.715	0.196	0.495
Propane	0.331	0.094	0.336
Isobutane	0.145	0.049	0.194
n-Butane	0.180	0.058	0.241
2,2 Dimethylpropane	0.028	0.011	0.047
Isopentane	0.056	0.021	0.093
n-Pentane	0.083	0.031	0.138
2,2 Dimethylbutane	0.000	0.000	0.000
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.003	0.001	0.006
2 Methylpentane	0.003	0.001	0.006
3 Methylpentane	0.003	0.001	0.006
n-Hexane	0.002	0.001	0.004
Methylcyclopentane	0.004	0.001	0.008
Benzene	0.004	0.001	0.007
Cyclohexane	0.005	0.002	0.010
2-Methylhexane	0.000	0.000	0.000
3-Methylhexane	0.001	0.000	0.002
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.000	0.000	0.000
n-Heptane	0.001	0.000	0.002
Methylcyclohexane	0.002	0.001	0.005
Toluene	0.007	0.002	0.015
Other C8's	0.000	0.000	0.000
n-Octane	0.000	0.000	0.000
Ethylbenzene	0.002	0.001	0.005
M & P Xylenes	0.003	0.001	0.007
O-Xylene	0.001	0.000	0.002
Other C9's	0.000	0.000	0.000
n-Nonane	0.000	0.000	0.000
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	0.475	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.507	(Air=1)
Compressibility (Z)	0.9942	
Molecular Weight	43.41	
Gross Heating Value		
Dry Basis	66	BTU/CF
Saturated Basis	66	BTU/CF

Facility Detail Report
Facility Name: Tensleep 2 Tank Battery
ID: F004572

Facility : F004572

Apr 8 2020, 14:13:51

- Facility Information

Facility ID: F004572
FacilityName: Tensleep 2 Tank Battery
Facility Description:
Company Name: Citation Oil & Gas Corp.
Operating Status: Operating
AFS: 5602900028
Facility Class: Minor
Facility Type: Storage Tank Battery
CERR Class: NON

- Location

Physical Address	City	County	Lat/Long	PLSS	Effective Date
Section 12, 47N, 100W	Park County	Park	44.05493/-108.79750	S12-T47N-R100W	05/08/2012

Location Detail For : Section 12, 47N, 100W

Latitude: 44.05493
Longitude: -108.79750
Quarter Quarter:
Quarter:
Section: 12
Township: 47N
Range: 100W
County: Park
State: Wyoming
District: District 4
Physical Address 1: Section 12, 47N, 100W
Physical Address 2:
City: Park County
Zip: 82414
Effective Date: 05/08/2012

- API

API
1720026
1720395
1720601
1720716
1720719
1720742
2905084
2905087
2920078
2920090
2920091
2920544
2920545
2920560
2920561
2920562

DEQ Ex. 2 - 423

2920646
2920648
2920650
2920651
2920760
2920792
2920793
2920794
2920823
2920844
2921249
2921264
2921266
2921281
2921496

- **Notes**

User Name	Date	Note

- **NAICS Codes**

211111 Crude Petroleum and Natural Gas Extraction (SIC 1311)

- **Contacts**

Contact Type	Contact Person	Phone Number	Email	Start Date	End Date
Compliance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
Environmental Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Billing Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	
NSR Permit Issuance Contact	Elsom, Lee Ann	(281)891-1577	lelsom@cogc.com	05/15/2013	

Contact Detail For : Elsom, Lee Ann

Prefix:	Ms.	First Name:	Lee Ann
Middle Name:		Last Name:	Elsom
Suffix:			
Company Title:	Manager Regulatory Compliance	Contact's Company Name:	Citation Oil & Gas Corp.
Address 1:	14077 Cutten Road		
Address 2:			
City:	Houston	Zip Code:	77069
State:	Texas		
Work Phone No:	(281)891-1577	Secondary Phone No.:	
Address 2:	(281)517-7196	Secondary Ext. No.:	

DEQ Ex. 2 - 424

Mobile Phone No.:

Pager No.:

Fax No:

Pager PIN No.:

Email: lelsom@cogc.com

Email Pager Address:

- Rules & Regs

Subject to Part 60 NSPS:

Subject to 112(r) Accidental Release Prevention:

Subject to Part 61 NESHAP:

Subject to non-attainment NSR:

Subject Part 63 NESHAP:

Subject to PSD:

Subject to Title IV Acid Rain:

- Attachments

Description	Type	Modified By	Modified Date
Permit History as of 4/28/2015	Other	Coffman, Ella(inactive)	04/28/2015

- Version

Version ID	Version Start Date	Version End Date	Preserved
CURRENT	04/08/2020		
58811	01/30/2020	04/08/2020	X
55956	08/20/2019	01/30/2020	X
53452	03/22/2019	08/20/2019	X
4572	05/08/2012	03/22/2019	X

DEQ Ex. 2 - 425

Emission Unit : FLR001

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: FLR001

Emission Unit Type: Flare

Maximum Design Capacity: 0.04 Units : Mscf/hr

Minimum Design Capacity: 0.01 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-1

Company Equipment Description: Pop Tank Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC010

Process Name: Vapor Combustion Unit

Company Process Description: FLR

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER001

DEQ Ex. 2 - 426

Emission Unit : FLR002

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: FLR002

Emission Unit Type: Flare

Maximum Design Capacity: 0.24 Units : Mscf/hr

Minimum Design Capacity: 0.01 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-2

Company Equipment Description: Oil Tanks Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC011

Process Name: Vapor Combustion Unit

Company Process Description: FLR2

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER005

DEQ Ex. 2 - 427

Emission Unit : FLR003

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: FLR003

Emission Unit Type: Flare

Maximum Design Capacity: 0.24 Units : Mscf/hr

Minimum Design Capacity: 0.01 Units : Mscf/hr

Pilot Gas Volume (scf/min):

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: FLR-3

Company Equipment Description: Water Tank Flare

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC012

Process Name: FLR-3

Company Process Description: Water Tank Flare

Source Classification Code (SCC): 3-10-001-60

Release points(s) directly associated with this process

VER006

DEQ Ex. 2 - 428

Emission Unit : FUG001

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: FUG001

Emission Unit Type: Fugitive

Fugitive Emission Type - Fugitive Leaks at Oil and Gas Sites: X

Initial Operation Commencement Date: 12/31/1969

Total Count of Component				
Component	Gas	Heavy Oil (<= 20° API)	Light Oil(> 20° API)	Water/Condensate
Connectors	0	0	216	24
Flanges	0	0	326	38
Open Ended Lines	0	0	5	2
Pump Seals	0	0	4	2
Valves	0	0	175	21
Other	0	0	16	0

AQD Description:

Company Equipment ID: FUG

Company Equipment Description: Fugitives

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC009

Process Name: FUG

Company Process Description: Fugitives

Source Classification Code (SCC): 3-10-002-07

Release points(s) directly associated with this process

DEQ Ex. 2 - 429

AVL001

Emission Unit : HET001

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: HET001

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Other Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-1

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC006

Process Name: HTR-1

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER003

DEQ Ex. 2 - 431

Emission Unit : HET002

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: HET002

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25

Units: MMBtu/hr

Primary Fuel Type: Other

Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-2

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC007

Process Name: HTR-2

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER004

DEQ Ex. 2 - 432

Emission Unit : HET004

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: HET004

Emission Unit Type: Heater/Chiller

Firing Type: Indirect

Heat Input Rating: 1.25 Units: MMBtu/hr

Primary Fuel Type: Other Secondary Fuel Type: Propane

Heat Content of Fuel (BTU/scf): 1020

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: HTR-3

Company Equipment Description: 1.25 MMBtu/hr Heater Treater

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC013

Process Name: HTR-3

Company Process Description: Heater Treater

Source Classification Code (SCC): 3-10-004-03

Release points(s) directly associated with this process

VER007

DEQ Ex. 2 - 433

Emission Unit : TNK001

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: TNK001

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 92.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-1

Company Equipment Description: 1,000-bbl Oil Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC001

Process Name: Tank 1

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 434

Emission Unit : TNK002

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: TNK002

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 92.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-2

Company Equipment Description: 1,000-bbl Oil Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC002

Process Name: Tank 2

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 435

Emission Unit : TNK003

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: TNK003

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 1000 Units: barrels

Maximum Throughput: 92.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-3

Company Equipment Description: 1,000-bbl Oil Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date: 12/31/1969

Most Recent Operation Commencement Date: 12/31/1969

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC003

Process Name: Tank 3

Company Process Description: Oil Storage Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA002

DEQ Ex. 2 - 436

Emission Unit : TNK004

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: TNK004

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Oil

Submerged Fill Pipe?: No

Capacity: 400 Units: barrels

Maximum Throughput: 1.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: TK-4

Company Equipment Description: Pop Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC004

Process Name: TK-4

Company Process Description: Pop Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA001

DEQ Ex. 2 - 437

Emission Unit : TNK005

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID: TNK005

Emission Unit Type: Storage Tank/Silo

Material Type: Liquid

Type of Liquid: Produced Water

Submerged Fill Pipe?: No

Capacity: 5000 Units: barrels

Maximum Throughput: 8200.0000 Units: barrels/day

Tank Location: Aboveground

Initial Operation Commencement Date: 12/31/1969

AQD Description:

Company Equipment ID: PW-1

Company Equipment Description: 5,000-bbl Water Storage Tank

Operating Status: Operating

Initial Construction Commencement Date: 12/31/1969

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

- Emission Process Information

Process ID: PRC005

Process Name: PW-2

Company Process Description: Produced Water Tank

Source Classification Code (SCC): 3-10-001-33

Control equipment(s) directly associated with this process

FLA003

DEQ Ex. 2 - 438

Emission Unit : HET003

Apr 8 2020, 14:13:51

- Emission Unit Information

AQD Emissions Unit ID:	HET003		
Emission Unit Type:	Heater/Chiller		
Firing Type:	Indirect		
Heat Input Rating:	1.25	Units:	MMBtu/hr
Primary Fuel Type:	Other	Secondary Fuel Type:	Propane
Heat Content of Fuel (BTU/scf):	1020		
Initial Operation Commencement Date:	12/31/1969		
AQD Description:			
Company Equipment ID:	HTR-3		
Company Equipment Description:	1.25 MMBtu/hr Heater Treater		
Operating Status:	Permanently Shutdown	Shutdown Date:	12/31/1969
Initial Construction Commencement Date:	12/31/1969		
Most Recent Construction/Modification Commencement Date:			
Most Recent Operation Commencement Date:			

- Permitted Emissions

Pollutant	Potential Emissions (Lbs/hour)	Potential Emissions (Tons/Year)	Allowable Emissions (Lbs/Hour)	Allowable Emissions (Tons/Year	Comments

- Processes

DEQ Ex. 2 - 439

Control Equipment : FLA001

Apr 8 2020, 14:13:51

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA001

AQD Description:

Company Control Equipment ID: FLR-1

Company Control Equipment Description: Pop Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER001

DEQ Ex. 2 - 440

Control Equipment : FLA002

Apr 8 2020, 14:13:51

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA002

AQD Description:

Company Control Equipment ID: FLR-2

Company Control Equipment Description: Oil Tanks Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER002

DEQ Ex. 2 - 441

Control Equipment : FLA003

Apr 8 2020, 14:13:51

- Control Equipment Information

Equipment Type: Flare

Control Equipment ID: FLA003

AQD Description:

Company Control Equipment ID: FLR-3

Company Control Equipment Description: Water Tank Flare

Operating Status: Operating

Initial Installation Date:

Manufacturer:

Model:

- Specific Equipment Type information

Flare Type: Elevated - Open

Elevated Flare Type: Air-Assisted

Ignition Device: Yes

Flame Presence Sensor: Yes

Inlet Gas Temp:

Flame Presence Type: Thermocouple

Gas Flow Rate:

Sec. Outlet Gas Temp:

- Pollutants Controlled

Pollutant	Design Control Efficiency(%)	Operating Control Efficiency(%)	Capture Efficiency(%)	Total Capture Control(%)
VOC - Volatile Organic Compounds	98	98	100	98

- Associated Control Equipments And Release Points

Release points(s) directly associated with this control equipment

VER006

DEQ Ex. 2 - 442

Release Point : VER001

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER001
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-1
Company Release Point Description:	Pop Tank Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05361	Longitude:	-108.7975

DEQ Ex. 2 - 443

Release Point : VER002

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER002
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-2
Company Release Point Description:	Oil Tanks Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05361	Longitude:	-108.7975

DEQ Ex. 2 - 444

Release Point : VER006

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER006
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	FLR-3
Company Release Point Description:	Water Tank Flare
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	20.0	Stack Diameter (ft):	0.5
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	61.73
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05493	Longitude:	-108.7975

DEQ Ex. 2 - 445

Release Point : AVL001

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	AVL001
Release Type:	Fugitive (Area, Volume, Line)
AQD Description:	
Company Release Point ID:	FUG
Company Release Point Description:	Fugitives
Operating Status:	Operating
Release Height (ft):	3.0

- Release Latitude and Longitude

Latitude:	44.05361	Longitude:	-108.7975

DEQ Ex. 2 - 446

Release Point : VER003

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER003
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-1
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05361	Longitude:	-108.7975

DEQ Ex. 2 - 447

Release Point : VER004

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER004
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-2
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05361	Longitude:	-108.7975

DEQ Ex. 2 - 448

Release Point : VER007

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER007
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-3
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05493	Longitude:	-108.7975

DEQ Ex. 2 - 449

Release Point : VER005

Apr 8 2020, 14:13:51

- Release Point Information

Release Point ID:	VER005
Release Type:	Vertical
AQD Description:	
Company Release Point ID:	HTR-3
Company Release Point Description:	Heater Treater
Operating Status:	Operating
Base Elevation (ft):	5774.0

- Stack Details

Stack Height (ft):	61.0	Stack Diameter (ft):	2.0
Exit Gas Velocity (ft/s):	5.24	Exit Gas Flow Rate (acfm):	987.72
Exit Gas Temp (F):	343.0		

- Release Latitude and Longitude

Latitude:	44.05361	Longitude:	-108.7975

DEQ Ex. 2 - 450