Unit No(s): 17
Description: Flare
*This calculation assumes only isobutane/butane unloading is taking place at the facilit

Emission Unit ID No.		Maxi
17	63.6 Mscf/hr	
	25 MMscf/yr	

Flow Rate:

	25.0	MMscf/yr	Annual Flowrate
	0.0029	MMscf/hr	
	9745.3	lb/hr	hourly max
	63627.0	scf/hr	hourly max
	0.064	MMscf/hr	hourly max
	3001.0	MMBtu/MMScf	Heat Value
	8.56	MMBtu/hr	scfh * Maximum heating value / 1(
Pilot	500.0	scf/hr	flare pilot
	0.0120	MMscf/d	scf/hr * 24 (hr/day) / $1*10^6$ SCF/M
	1000.0	BTU/scf	Nominal, sweet natural gas
	0.500	MMBtu/hr	
Flared Gas + Pilot	9.1	MMBtu/hr	Annual Limit
Flared Gas	190.9	MMBtu/hr	Hourly Limit

Emission Calculations

Pilot Emissions	NO_x	CO	SO_2	H_2S	VOC
	0.068	0.31			
					0.0%
					23.70
				3.6E-04	
				1.8E-04	
			7.1E-03		
			3.6E-03		
	0.034	**0.155**			0.00
			0.0036	**3.6E-06**	**-**
	0.15	**0.68**	**0.016**	**1.6E-05**	**0.00**
Vent Gas Flaring	**NO_x**	**CO**	**SO_2**	**H_2S**	**VOC**

Emission Calculation
Potential to Emit From Unit# 17 Flare
Western Refining Southwest, Inc. - Wingate Facility

Section 16, Township 15N, Range 17W, 6 miles East of Gallup, NM.

y.

mum Capacity
Hourly Maximum
Yearly Maximum

Hourly Maximum Capacity including safety factor

000

/Mscf

PM_{10}	Units	
	lb/MMBtu	AP-42 Table 13.5-1 and AP-42 Table 13.5-2
40.00	ug/L	AP-42 Table 13.5-1
	mol %	Assume no VOC content in purchased fuel (methane)
	ft^3/lb	Specific volume
	lb H_2S/Mscf	Purchased sweet natural gas fuel, 0.25 gr H_2S/100scf
	lb H_2S/hr	H_2S rate * fuel usage
	lb S/Mscf	Purchased sweet natural gas fuel, 5 gr S/100scf
	lb SO_2/hr*	SO_2 rate * fuel usage
	lb/hr	lb/MMBtu * MMBtu/hr
-	lb/hr	98% combustion H_2S; 100% conversion to SO_2
-	tpy	8760 hrs/yr

PM_{10}

	0.068	0.31			
			-	0.00%	100.0%
			-	23.65	6.53
			-	0.00	9,745.3
				98%	98%
			100%		
	13.0	59.2	0.00	0.000	194.9
	2.55	11.63	0.00	0.000	38.3
Total Pilot + Flaring	**NO_X**	**CO**	**SO_2**	**H_2S**	**VOC**
	13.0	**59.3**	**3.6E-03**	**3.6E-06**	**194.9**
	2.7	**12.3**	**1.6E-02**	**1.6E-05**	**38.3**

Unit ID No.	**Potential to Emit (tons/y**				
	NO_X	**CO**	**SO_2**	**H_2S**	**VOC**
Unit 17	**2.7**	**12.3**	**1.6E-02**	**1.6E-05**	**38.3**

lb/MMBtu	AP-42 Table 13.5-1 and AP-42 Table 13.5-2	
40.00	ug/L	AP-42 Table 13.5-1
mol %	Flare Gas	
ft^3/lb	Specific volume	
lb/hr	vol. Gas * mole fraction / specific volume	
0.16	lb/hr	ug/L * 1 g/10^6 ug * 1 lb/453.6 g * 1 L/0.0353 scf * scf/hr
98%		Estimated control efficiency for H_2S and VOC
		Estimated H_2S conversion to SO_2 (1-1 molar ratio)
0.16	lb/hr	Based on pilot plus flared gas
0.031	tpy	

PM_{10}	
0.16	**lb/hr**
0.031	**tpy**

ear)
PM_{10}
0.031

Emission Calculation
Gas Analysis
Western Refining Southwest, Inc. - Winga
Section 16, Township 15N, Range 17W, 6 miles Ea

Component	MW	Wet vol/mol%	Dry vol/mol%	MW * dry vol %	LHV Btu/scf	Btu/scf * dry vol %	Mass Fraction (dry)	Spec. Volume ft^3/lb
Water	18.02	0.000%						21.06
Nitrogen	28.01	0.000%	0.00%	0.000	0	0.00	0.00%	13.547
CO_2	44.01	0.000%	0.00%	0.000	0	0.00	0.00%	8.623
H_2S	34.08	0.000%	0.00%	0.000	586.71	0.00	0.00%	11.136
Methane	16.04	0.000%	0.00%	0.000	909.1	0.00	0.00%	23.65
Ethane	30.07	0.000%	0.00%	0.000	1617.8	0.00	0.00%	12.62
Propane	44.10	0.000%	0.00%	0.000	2315.9	0.00	0.00%	8.606
Isobutane	58.12	100.000%	100.00%	58.123	3001	3001.00	100.00%	6.529
n-Butane	58.12	0.000%	0.00%	0.000	3010.5	0.00	0.00%	6.529
Neopentane	72.15	0.000%	0.00%	0.000	3682.3	0.00	0.00%	5.26
Isopentane	72.15	0.000%	0.00%	0.000	3697.9	0.00	0.00%	5.26
n-Pentane	72.15	0.000%	0.00%	0.000	3706.8	0.00	0.00%	5.26
2,2-Dimethylbutane	86.15	0.000%	0.00%	0.000	4393.8	0.00	0.00%	4.404
2,3-Dimethylbutane	86.15	0.000%	0.00%	0.000	4393.8	0.00	0.00%	4.404
2-Methylpentane	86.15	0.000%	0.00%	0.000	5092.3	0.00	0.00%	3.787
3-Methylpentane	86.15	0.000%	0.00%	0.000	5098.4	0.00	0.00%	3.787
n-Hexane	86.15	0.000%	0.00%	0.000	4403.9	0.00	0.00%	4.404
Heptanes	100.20	0.000%	0.00%	0.000	5100	0.00	0.00%	3.787
Octanes	114.20	0.000%	0.00%	0.000	5796	0.00	0.00%	3.322
Nonanes	128.30	0.000%	0.00%	0.000	6493	0.00	0.00%	2.959
Decanes plus	142.00	0.000%	0.00%	0.000	7189	0.00	0.00%	2.667
Benzene	78.11	0.000%	0.00%	0.000	3591	0.00	0.00%	4.858
Toluene	92.14	0.000%	0.00%	0.000	4273.5	0.00	0.00%	4.119
Ethylbenzene	106.17	0.000%	0.00%	0.000	4970.6	0.00	0.00%	3.574
M&P Xylene	106.17	0.000%	0.00%	0.000	4957	0.00	0.00%	3.574
O-Xylene	106.17	0.000%	0.00%	0.000	4958	0.00	0.00%	3.574
2,2,4-Trimethylpentane *	114.20	0.000%	0.00%	0.000	5779	0.00	0.00%	3.322
Total		100.0%	1.00	58.12		3001.00	100%	
Dry total		100.0%		*(mixture mol. wt)*		*(mixture heating value)*		
	NMHC	*100.00%*						
	NMEHC (VOC)	*100.00%*					*100.00%*	
	HAP	*0.00%*					*0.0%*	

te Facility
ıst of Gallup, NM.

Spec. Volume VOC ft^3/lb	Spec. Volume HAP ft^3/lb	HAP lb/hr	HAP ton/yr
0.000			
6.529			
0.000			
0.000			
0.000			
0.000			
0.000			
0.000			
0.000			
0.000			
0.000	#DIV/0!	0.00	0.00
0.000			
0.000			
0.000			
0.000			
0.000	#DIV/0!	0.00	0.00
0.000	#DIV/0!	0.00	0.00
0.000	#DIV/0!	0.00	0.00
0.000	#DIV/0!	0.00	0.00
0.000	#DIV/0!	0.00	0.00
0.000	#DIV/0!	0.00	0.00
6.529			

#DIV/0!