Division Information

Engineer:	Kirk Bear	
Control Engineer:	Christopher Laplante	
Review Date:	09/29/2014	
Application Date:	12/09/2013	

Facility Identifiers

Permit No.		14WE0183	
AIRs	County #	123	Weld
	Facility #	9C40	
Facility Type:		exploration and production facility	

☐ Located in the 8-hour non-attainment area?

○ True Minor

◉ Synthetic Minor for: ☑ VOC ☐ NOx ☐ CO

Administrative Information

Company Name:		Whiting Oil and Gas Corporation
Source Name:		Horsetail 16-1610B
Source Location:		NWNE, Section 16, T10N, R57W
SIC:		1311
Mailing Address	Address 1:	Whiting Oil and Gas Corporation
	Address 2:	1700 Broadway, Suite 2300
	, State Zip:	Denver, Colorado 80290
Person To Contact	Name:	Jed Smith
	Phone:	303 390 1340
	Fax:	720 644 3636
	Email:	jed.smith@whiting.com

Requested Action

Self Certification Required?	Yes
Issuance Number:	1

Source Description:

Oil and gas exploration and production facility known as the Horsetail 16-1610B, located in the NWNE, Section 16, T10N, R57W, Weld County, Colorado.

Point	Name	Type	Control	Action
004	SEP-1	Separator Venting	Flare	Newly reported source

004	Separator controlled by a 25' flare stack. Flare has a minimum combustion efficiency of 95%. The flare is/is not enclosed.

Equipment Description

This source vents natural gas from: a well head separator
Emissions from this source are: routed to a flare

Natural gas venting from a well head separator. Emissions from this source are routed to a flare.

Calculations

Emission Calculation Method

EPA Emission Inventory Improvement Program Publication: Volume II, Chapter 10 - Displacement Equation (10.4-3)

Ex = Q * MW * Xx / C

Ex = emissions of pollutant x
Q = Volumetric flow rate/volume of gas processed
MW = Molecular weight of gas = SG of gas * MW of air
Xx = mass fraction of x in gas
C = molar volume of ideal gas (379 scf/lb-mol) at 60F and 1 atm

Throughput (Q)	98.55	MMscf/yr	11250	scf/hr
MW	27.455	lb/lb-mol	0.27	MMscf/d

	mole %	MW	lbx/lbmol	mass fraction	lb/hr	lb/yr	tpy
Helium	0.000	4.0026	0.000	0.000	0.00	0.00	0.00
CO2	2.596	44.01	1.142	0.042	33.91	297080.04	148.54
N2	1.955	28.013	0.548	0.020	16.26	142404.53	71.20
methane	64.069	16.041	10.277	0.374	305.07	2672371.32	1336.19
ethane	10.673	30.063	3.209	0.117	95.24	834326.90	417.16
propane	10.344	44.092	4.561	0.166	135.38	1185948.22	592.97
isobutane	1.247	58.118	0.725	0.026	21.51	188449.30	94.22
n-butane	4.637	58.118	2.695	0.098	79.99	700753.34	350.38
isopentane	1.036	72.114	0.747	0.027	22.18	194265.98	97.13
n-pentane	1.454	72.114	1.049	0.038	31.12	272647.43	136.32
cyclopentane	0.166	70.13	0.116	0.004	3.46	30271.18	15.14
n-Hexane	0.382	86.18	0.329	0.012	9.77	85602.66	42.80
cyclohexane	0.049	84.16	0.041	0.002	1.22	10723.07	5.36
Other hexanes	0.625	86.18	0.539	0.020	15.99	140056.71	70.03
heptanes	0.395	100.21	0.396	0.014	11.75	102926.11	51.46
methylcyclohexane	0.085	98.19	0.083	0.003	2.48	21702.19	10.85
224-TMP	0.000	114.23	0.000	0.000	0.00	0.00	0.00
Benzene	0.052	78.12	0.041	0.001	1.21	10562.90	5.28
Toluene	0.043	92.15	0.040	0.001	1.18	10303.42	5.15
Ethylbenzene	0.006	106.17	0.006	0.000	0.19	1656.42	0.83
Xylenes	0.009	106.17	0.010	0.000	0.28	2484.63	1.24
C8+ Heavies	0.177	137.4837288	0.243	0.009	7.22	63276.43	31.64
			VOC mass fract	0.423	Total VOC (Uncontrolled)		1510.82

Notes

Flaring Information

Equipment Description

Flare to combust produced gas until pipeline is available at this wellhead facility.

Manufacturer	Tornado	
Model	25' Flare Stack	
Serial Number	12345678	
Gas Heating Value	1549	Btu/scf
Throughput	152653.95	MMBtu/yr

VRU Information

Equipment Description

Engine to recompress gas to sales line.

Make	
Model	
Requested Control	100.00%
Annual Bypass Tim	50.00%
Backup	Flare

Overall Control	95.00%

Combustion emission factor source:		AP-42: Chapter 13.5	
0.07	lb NOX/MMBtu	0.37	lb CO/MMBtu

Emissions Summary Table

Pollutant	Uncontrolled Emission Factor		Controlled Emission Factor		Uncontrolled Emissions		Controlled Emissions		Source
VOC	30660.88	lb/MMscf	1533.04	lb/MMscf	1510.8	tpy	75.5	tpy	Gas Analysis
Nox	0.07	lb/MMBTU	0.07	lb/MMBTU	5.2	tpy	5.2	tpy	AP-42
CO	0.37	lb/MMBTU	0.37	lb/MMBTU	28.2	tpy	28.2	tpy	AP-42
Benzene	107.18	lb/MMscf	5.36	lb/MMscf	10563	lb/yr	528	lb/yr	Gas Analysis
n-Hexane	868.62	lb/MMscf	43.43	lb/MMscf	85603	lb/yr	4280	lb/yr	Gas Analysis
Toluene	104.55	lb/MMscf	5.23	lb/MMscf	10303	lb/yr	515	lb/yr	Gas Analysis
Xylenes	25.21	lb/MMscf	1.26	lb/MMscf	2485	lb/yr	124	lb/yr	Gas Analysis
Ethylbenzene	16.81	lb/MMscf	0.84	lb/MMscf	1656	lb/yr	83	lb/yr	Gas Analysis

Regulatory Applicability

AQCC Regulation 1

This source is subject to the opacity requirements for flares in Section II.A.5:'No owner or operator of a smokeless flare or other flare for the combustion of waste gases shall allow or cause emissions into the atmosphere of any air pollutant which is in excess of 30% opacity.'

AQCC Regulation 2

Section I.A applies to all emission sources. "No person, wherever located, shall cause or allow the emission of odorous air contaminants from any single source such as to result in detectable odors which are measured in excess of the following limits: For areas used predominantly for residential or commercial purposes it is a violation if odors are detected after the odorous air has been diluted with seven (7) or more volumes of odor free air."

AIRS (County/Plant) 123/9C40
Permit No. 14WE0183
Date 9/29/2014

Point #	SCC	Pollutant or CAS		Uncontrolled Emission Factor
004	31000205	VOC		30660.883 lb/MMscf
004	31000205	NOx		0.068 lb/MMBTU
004	31000205	CO		0.37 lb/MMBTU
004	31000205	Benzene		107.183 lb/MMscf
004	31000205	n-Hexane		868.622 lb/MMscf
004	31000205	Toluene		104.55 lb/MMscf
004	31000205	Ethylbenzene		16.808 lb/MMscf
004	31000205	Xylenes		25.212 lb/MMscf

Emisison Factor Source	Controlled Actual Emissions (tpy)*	Controlled Requested Emissions (tpy)*	PTE (tpy)*	Ctrl. Eff%	NCRP = reportable ?
Gas Analysis		75.5	1510.8	95%	Yes
AP-42		5.2	5.2	0%	Yes
AP-42		28.2	28.2	0%	Yes
Gas Analysis		528.1	10562.9	95%	Yes
Gas Analysis		4280.1	85602.7	95%	Yes
Gas Analysis		515.2	10303.4	95%	Yes
Gas Analysis		82.8	1656.4	95%	Yes
Gas Analysis		124.2	2484.6	95%	Yes