TRAACS ✓
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DK

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Midstream Operations

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January 27, 2020

UPS 1Z E53 32W 02 9282 0444

Mr. David Kauth
Northwest Region, Portland Office
Oregon Department of Environmental Quality
2020 SW Fourth Ave., Suite 400
Portland, Oregon 97201

RE: 2019 Reporting Year
Annual Emissions Report
Portland Products Terminal
Permit 26-2026
Phillips 66

Dear Mr. Kauth:

Phillips 66 (P66) owns and operates the Portland Products Terminal, a bulk storage and loading terminal, for finished gasoline and distillate products, located at 5528 NW Doane Ave., Portland, Oregon. Per the requirement of permit section 7.2, please find two copies of the emissions calculations.

Volatile organic compound (VOC) emissions during 2019 totaled approximately 62.3 tons. Emissions of hazardous air pollutants (HAPs) totaled 1.72 and 0.28 tons, combined and single, respectively. As shown in Table 1, the emissions did not exceed the PSELs values.

Total greenhouse gas (GHG) emissions for 2019 totaled 2,163 tons. This information is only required to enter into the EZ filer system if the emissions are equal to or above 2,500 tons.

The facility emissions were calculated using an in-house system called TankESPd+. This system utilizes AP-42 emission calculation methodologies, equations and emission factors.

The following documents are attached:

Table 1 – PSEL Limits and Emissions Summary
Table 2 – Annual Reporting
Detailed emissions and sample calculations

If you have any questions about this report or require any additional information, please call at (253) 207-5569.

Sincerely,

Kelly W Hayes

Table 1
PSEL Limits and Emissions Summary

Pollutant	PSEL Limit (tons/yr)	2019 Actuals (tons/yr)	Percent of PSEL
VOC	99	49.3	64.86
PM/PM_{10}	14	0.035	0.26
SO_x	75	0.011	0.02
NO_x	39	1.83	5.04
CO	99	1.53	1.67
Single HAP	10	0.31	4.00
Total HAP	25	1.38	6.02

Table 2
Annual Reporting

Permit 26-2026 Section	Parameter/Requirement	Response	
7.2(a)(i)	A letter stating the facility's compliance with permit conditions for the previous year.	See cover letter	
7.2(a)(ii)	Total amount of natural gas combusted in boilers	36.53	MMft3
7.2(a)(iii)	Total amount and type of dual fuel oil combusted in boilers	5,984 gal of diesel in March due to NG Curtailment.	
7.2(a)(iv)	Total amount of gasoline received into storage tanks	10,134,093	Barrels
7.2(a)(v)	Total amount of gasoline loaded into tank trucks	268,318,344	Gallons
7.2(a)(vi)	Total amount of gasoline loaded into marine vessels	0	Gallons
7.2(a)(vii)	The calculated PM/PM_{10}, SO_x, NO_x, CO and VOC, 12-month rolling emission rates for each month of the previous calendar year.	Emissions of each pollutant did not exceed the PSELs during any rolling 12-month period.	
7.2(b)	An evaluation of the permittee's HAP potential to emit (PTE) (as limited by the overall VOC PSEL)	Total and single HAP emissions did not exceed the PSELs during any rolling 12-month period.	
7.2(c)	Records of all planned and unplanned excess emissions events.	No Excess emissions.	
7.2(d)	Summary of complaints relating to air quality by permittee during the year.	No Complaints received	
7.2(e)	List permanent changes made in plant process, production levels and pollution control equipment which affected air contaminant emissions.	Installed new diesel only loading rack with associated additive tanks. Started test loading on Dec 20.	
7.2(f)	List major maintenance performed on pollution control equipment.	None	

Phillips 66 Company Products Terminal

Report Year 2019

First day of current year: 1/1/2019

Site: Portland Terminal a, OR

Number of days in current year: 365

POINT NAME	ANNUAL PROCESS RATE	PROCESS RATE UNITS	EMISSION FACTOR	EMISSION FACTOR UNITS	POUNDS	TONS	Pollutant
BULK TERMINALS- LOADING							
Loading Rack	257,223	1000 gallons	0.0101	lbs/1000 gallons	2,597.0626	1.2985	VOC
Marine Loading	585	1000 gallons	0.7329	lbs/1000 gallons	428.6211	0.2143	VOC
Loading Not Captured (if controlled)	257,223	1000 gallons	0.1330	lbs/1000 gallons	34,206.4985	17.1032	VOC
Fugitive Components	257,808	1000 gallons	0.0041	lbs/1000 gallons	1,054.3162	0.5272	VOC
Miscellaneous Emissions	257,808	1000 gallons	0.0740	lbs/1000 gallons	19,080.7850	9.5404	VOC
Tank 36	0	1000 gallons	0.0000	lbs/1000 gallons	553.1815	0.2766	VOC
Tank 2561	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Tank 2669	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Tank 2783	0	1000 gallons	0.0000	lbs/1000 gallons	239.2030	0.1196	VOC
Tank 2784	803,560	1000 gallons	0.0003	lbs/1000 gallons	239.2030	0.1196	VOC
Tank 2915	123,511	1000 gallons	0.1083	lbs/1000 gallons	13,375.5663	6.6878	VOC
Tank 2916	9,015	1000 gallons	0.0552	lbs/1000 gallons	498.0518	0.2490	VOC
Tank 2982	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Tank 3407	210,761	1000 gallons	0.0607	lbs/1000 gallons	12,785.2657	6.3926	VOC
Tank 3408	38,544	1000 gallons	0.2706	lbs/1000 gallons	10,431.4783	5.2157	VOC
Tank 3409	18,156	1000 gallons	0.3077	lbs/1000 gallons	5,586.1075	2.7931	VOC
Tank 3410	26,535	1000 gallons	0.0279	lbs/1000 gallons	739.6892	0.3698	VOC
Tank 3411	3,093	1000 gallons	1.2985	lbs/1000 gallons	4,016.8092	2.0084	VOC
Tank 3412	26,374	1000 gallons	0.0243	lbs/1000 gallons	640.7261	0.3204	VOC
Tank 3413	308,607	1000 gallons	0.0099	lbs/1000 gallons	3,057.1256	1.5286	VOC
Tank 3579	117,185	1000 gallons	0.0235	lbs/1000 gallons	2,748.2302	1.3741	VOC
Tank 3623	52	1000 gallons	1.0985	lbs/1000 gallons	56.9412	0.0285	VOC
Tank 3761	64,870	1000 gallons	0.0275	lbs/1000 gallons	1,784.5986	0.8923	VOC
Tank 4252	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Tank 4253	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Tank 4254	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Tank 4255	4,532	1000 gallons	0.1800	lbs/1000 gallons	815.6410	0.4078	VOC
Tank 4259	22	1000 gallons	43.8581	lbs/1000 gallons	967.3292	0.4837	VOC
Tank 4260	0	1000 gallons	10.4101	lbs/1000 gallons	2.6234	0.0013	VOC
Tank 4318	10,055	1000 gallons	0.0655	lbs/1000 gallons	658.4745	0.3292	VOC
Tank 4441	17	1000 gallons	1.8011	lbs/1000 gallons	31.0239	0.0155	VOC

Phillips 66 Company Products Terminal

Site: Portland Terminal a, OR

Report Year 2019
First day of current year: 1/1/2019
Number of days in current year: 365

POINT NAME	ANNUAL PROCESS RATE	PROCESS RATE UNITS	EMISSION FACTOR	EMISSION FACTOR UNITS	POUNDS	TONS	Pollutant
Tank 4442	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Dock Red Dye Tank	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
L4 Dodiflow Tote	0	1000 gallons	0.0259	lbs/1000 gallons	0.0065	0.0000	VOC
L4 Red Dye Tote	0	1000 gallons	0	lbs/1000 gallons	0.0000	0.0000	VOC
Rack Red Dye Tank	0.011	1000 gallons	3.5427	lbs/1000 gallons	0.0390	0.0000	VOC
Temporary BioDiesel Tank	0	1000 gallons	0.0000	lbs/1000 gallons	0.0000	0.0000	VOC
Cleaver-Brooks	36.5	MMscf	5.5000	lbs/MMscf	200.9150	0.1005	VOC
Natural Gas Boiler			100.0000	lbs/MMscf	3,653.0000	1.8265	NOx
			84.0000	lbs/MMscf	3,068.5200	1.5343	CO
			0.6001	lbs/MMscf	21.9223	0.0110	SOx
			1.9000	lbs/MMscf	69.4070	0.0347	PM
			120161.8431	lbs/MMscf	4,389,512.1273	2,194.7561	CO2
			2.2663	lbs/MMscf	82.7898	0.0414	CH4
			0.2266	lbs/MMscf	8.2790	0.0041	N2O
			120286.0389	lbs/MMscf	4,394,049.0013	2,197.0245	CO2e

Site Wide Emissions Totals, TPY	58.3978	VOC
	1.8265	NOx
	1.5343	CO
	0.0110	SOx
	0.0347	PM
	2,262.0803	CO2
	0.0441	CH4
	0.0047	N2O
	2,264.5797	CO2e

Phillips 66 Pipe Company - Portland Terminal
Oregon Permit No. 26-2026

for 12-month consecutive period ending
December 2019

SECTION 4, PERMIT CONDITION 4.1 Plant Site Emission Limits

Limit: 198000 Lbs/Yr in any consecutive 12-month period

Emission Unit ID No.	VOC Emissions (tons)												
	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun 19	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19	Calendar YTD
	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	
Storage Tanks													
36	0.0086	0.0116	0.0178	0.0224	0.0290	0.0341	0.0422	0.0401	0.0313	0.0209	0.0108	0.0078	0.0000
2581	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2669	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2783	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2784	0.0324	0.0030	0.0049	0.0065	0.0092	0.0116	0.0151	0.0143	0.0115	0.0063	0.0028	0.0020	0.1196
2915	0.5485	0.5623	0.5794	0.6322	0.4261	0.4077	0.4713	0.4760	0.6807	0.7054	0.6342	0.5640	6.6878
2916	0.0023	0.0097	0.0056	0.0160	0.0105	0.0280	0.0584	0.0457	0.0325	0.0160	0.0148	0.0094	0.2490
2982	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3407	0.5305	0.5332	0.5515	0.6003	0.4064	0.3939	0.4600	0.4556	0.6449	0.6696	0.6077	0.5391	6.3926
3408	0.4330	0.4350	0.4553	0.4928	0.3343	0.3170	0.3682	0.3682	0.5301	0.5472	0.4949	0.4398	5.2157
3409	0.2317	0.2324	0.2440	0.2645	0.1800	0.1692	0.1962	0.1977	0.2818	0.2935	0.2665	0.2356	2.7931
3410	0.0229	0.0229	0.0197	0.0290	0.0262	0.0390	0.0438	0.0446	0.0377	0.0325	0.0265	0.0250	0.3698
3411	0.1664	0.1683	0.1764	0.1899	0.1298	0.1217	0.1414	0.1408	0.2041	0.2107	0.1902	0.1688	2.0084
3412	0.0195	0.0192	0.0230	0.0241	0.0284	0.0320	0.0359	0.0366	0.0309	0.0271	0.0225	0.0212	0.3204
3413	0.1264	0.1275	0.1344	0.1452	0.0989	0.0926	0.1074	0.1080	0.1545	0.1600	0.1445	0.1292	1.5286
3579	0.0395	0.0652	0.0470	0.1138	0.1181	0.1920	0.2058	0.2119	0.1267	0.1127	0.0780	0.0633	1.3741
3623	0.0010	0.0007	0.0018	0.0023	0.0022	0.0040	0.0037	0.0049	0.0037	0.0024	0.0013	0.0004	0.0285
3761	0.0440	0.0562	0.0269		0.0277	0.1123	0.1543	0.1751	0.0971	0.0706	0.0727	0.0555	0.8923
4252	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4254	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4255	0.0201	0.0197	0.0119	0.0315	0.0222	0.0460	0.0639	0.0576	0.0337	0.0332	0.0380	0.0302	0.4078
4259	0.0278	0.0279	0.0342	0.0365	0.0440	0.0497	0.0574	0.0575	0.0486	0.0403	0.0316	0.0282	0.4837
4260	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0000	0.0000	0.0013
4318	0.0221	0.0104	0.0129	0.0190	0.0284	0.0408	0.0530	0.0480	0.0341	0.0309	0.0161	0.0136	0.3292
4441	0.0003	0.0005	0.0008	0.0011	0.0015	0.0020	0.0026	0.0026	0.0020	0.0012	0.0006	0.0003	0.0155
4442	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
Dock Red Dye Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L4 Dodoflow Tote	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L4 Red Dye Tote	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rack Red Dye Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Temporary BioDiesel Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Loading Racks													
Controlled	0.1042	0.1024	0.1085	0.1133	0.0829	0.0830	0.0932	0.0986	0.1213	0.1367	0.1334	0.1210	1.2985
Marine Loading	0.0160	0.0245	0.0089	0.0077	0.0189	0.0365	0.0081	0.0369	0.0145	0.0139	0.0222	0.0063	0.2143
Loading Not Captured (if controlled)	1.3723	1.3491	1.4295	1.4916	1.0913	1.0933	1.2280	1.2992	1.5977	1.8006	1.7571	1.5936	17.1032
Fugitives													
Equipment Leaks	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	0.0916	1.0991
Combustion Units													
Cleaver-Brooks	0.0096	0.0090	0.0075	0.0081	0.0065	0.0053	0.0060	0.0061	0.0062	0.0101	0.0118	0.0143	0.1005
Erie	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Generator	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Oil Water Separators													
OWS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions													
Monthly	3.8709	3.8823	3.9934	4.3395	3.2143	3.4032	3.9076	4.0177	4.8172	5.0334	4.6698	4.1602	-
12-Month Rolling	2018.8665	1839.5674	1660.3795	1481.5375	1301.5704	1121.7922	942.5184	763.3547	584.9905	406.8425	228.3309	49.3098	0.0000
	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance

Phillips 66 Pipe Company - Portland Terminal Report Year 2019

Fired Units
Facility-Wide Combustion Emissions

	Emissions (lbs)			
	NOx	CO	SO2	PM
Combustion Units				
Cleaver-Brooks	3,653.0000	3,068.5200	21.9223	69.4070
Erie	0.0000	0.0000	0.0000	0.0000
Generator	0.0000	0.0000	0.0000	0.0000
Total Emissions				
Annual, lbs	3,653.0000	3,068.5200	21.9223	69.4070
Annual, tons	1.8265	1.5343	0.0110	0.0347

Phillips 66 Pipe Company - Portland Terminal

for 12-month consecutive period ending
December 2019

Largest Single HAP: Toluene

FACILITY-WIDE Single HAP EMISSIONS
Limit: 9 tons Single HAP in any consecutive 12-month period

	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun 19	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19
	Combined HAP Emissions (lbs)											
	31	28	31	30	31	30	31	31	30	31	30	31
Storage Tanks												
36	0.19	0.27	0.43	0.56	0.78	0.97	1.26	1.20	0.89	0.54	0.25	0.17
2561	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2669	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2783	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2784	1.59	0.14	0.24	0.31	0.44	0.54	0.70	0.66	0.54	0.30	0.14	0.10
2915	2.62	3.87	3.35	4.81	4.49	6.20	7.35	7.81	6.94	5.91	4.06	3.49
2916	0.11	0.47	0.27	0.77	0.50	1.31	2.70	2.11	1.52	0.76	0.72	0.46
2982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3407	4.02	4.13	3.86	5.15	4.83	6.95	8.69	8.20	7.05	6.24	5.02	4.21
3408	2.30	2.36	2.66	3.40	3.50	4.55	5.58	5.55	4.99	3.94	2.86	2.41
3409	1.32	1.31	1.56	2.00	2.05	2.44	2.97	3.11	2.58	2.30	1.81	1.42
3410	0.07	0.07	0.03	0.09	0.04	0.12	0.12	0.13	0.11	0.10	0.09	0.09
3411	0.78	0.92	1.06	1.25	1.41	1.66	2.06	1.98	1.84	1.43	0.98	0.80
3412	0.07	0.07	0.08	0.08	0.09	0.10	0.11	0.12	0.10	0.09	0.08	0.08
3413	0.57	0.64	0.82	1.02	1.09	1.26	1.54	1.60	1.31	1.05	0.73	0.69
3579	1.93	3.16	2.26	5.42	5.55	8.90	9.44	9.72	5.90	5.35	3.77	3.09
3623	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3761	2.15	2.73	1.30	4.02	1.31	5.25	7.13	8.10	4.54	3.36	3.52	2.71
4252	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4253	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4254	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4259	0.61	0.64	0.82	0.92	1.18	1.42	1.72	1.72	1.38	1.04	0.74	0.63
4260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4318	1.08	0.50	0.62	0.91	1.34	1.89	2.43	2.20	1.58	1.47	0.78	0.66
4441	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dock Red Dye Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rack Red Dye Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Temporary BioDiesel Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tank Cleaning Operations												
Place Holder	Not calculated in ESPdplus											
Loading Racks												
Controlled	0.47	0.49	0.62	0.68	0.84	1.07	1.26	1.34	1.01	0.86	0.66	0.55
Uncontrolled	0.78	1.19	0.43	0.37	0.90	1.71	0.37	1.71	0.68	0.66	1.07	0.31
Fugitives												
Loading Not Captured (if controlled)	6.20	6.45	8.13	8.91	11.11	14.03	16.56	17.60	13.32	11.26	8.71	7.27
Equipment Leaks	6.27	5.66	6.27	6.07	6.27	6.07	6.27	6.27	6.07	6.27	6.07	6.27
Control Devices												
VCU pilot gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Combustion Units												
Cleaver-Brooks	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Erie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Place Holder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions												
Monthly	33.17	35.10	34.81	46.72	47.73	66.43	78.27	81.14	62.35	52.95	42.06	35.41
12-Month Rolling	33.17	68.28	103.09	149.81	197.55	263.98	342.25	423.39	485.74	538.69	580.75	616.17
12-Month Rolling (tons)	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.24	0.27	0.29	0.31
	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance

Phillips 66 Pipe Company - Portland Terminal

for 12-month consecutive period ending
December 2019

Combined HAP — FACILITY-WIDE Combined HAP EMISSIONS

Limit: **25 tons Combined HAP** in any consecutive 12-month period

	Combined HAP Emissions (lbs)												Calendar
	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun 19	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19	YTD
Storage Tanks													
36	0.8085	1.1307	1.8005	2.3401	3.2034	3.9600	5.0848	4.8284	3.6043	2.2400	1.0698	0.7333	30.8039
2561	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2669	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2783	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2784	5.5717	0.5151	0.8495	1.1364	1.6216	2.0457	2.6767	2.5451	2.0391	1.1018	0.4865	0.3394	20.9287
2915	13.6372	18.1423	17.3183	22.9604	22.5586	29.3321	34.7084	36.3243	32.6282	27.5732	19.4843	16.7268	291.3940
2916	0.4031	1.6846	0.9721	2.7942	1.8406	4.9597	10.3630	8.1095	5.7479	2.8100	2.5632	1.6225	43.8703
2982	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3407	18.2423	18.7506	18.7847	23.7789	23.3239	31.4657	38.8262	37.1125	32.4925	28.3068	22.5093	18.9644	312.5577
3408	11.5630	11.8737	13.7139	16.7179	17.6267	21.9145	26.5916	26.4980	24.0126	19.2257	14.1639	11.9974	215.8988
3409	6.4848	6.5253	7.7879	9.5637	10.0351	11.7569	14.1480	14.6479	12.5413	10.9332	8.5484	6.8460	119.8183
3410	0.2134	0.2116	0.0955	0.2550	0.1336	0.3323	0.3559	0.3721	0.3157	0.2898	0.2508	0.2511	3.0768
3411	4.0978	4.6125	5.4201	6.2290	7.0032	8.1431	9.9298	9.6742	8.9666	7.1140	5.0392	4.1716	80.4009
3412	0.2005	0.1941	0.2246	0.2303	0.2631	0.2931	0.3162	0.3289	0.2788	0.2622	0.2341	0.2312	3.0572
3413	3.0431	3.3168	4.1776	4.9815	5.3838	6.1794	7.4596	7.6706	6.5228	5.2806	3.7709	3.4454	61.2321
3579	6.8074	11.3005	8.1940	19.9561	20.8434	34.0423	36.6016	37.6824	22.4496	19.8000	13.5594	10.9006	242.1373
3623	0.3749	0.2751	0.7148	0.9125	0.8800	1.5950	1.4833	1.9585	1.4698	0.9255	0.5015	0.1684	11.2591
3761	7.5651	9.7185	4.6756	14.6684	4.8816	19.8668	27.3754	31.0648	17.1561	12.3719	12.6043	9.5434	171.4918
4252	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4254	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4255	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4259	2.6140	2.7196	3.4531	3.8251	4.8502	5.7642	6.9143	6.9218	5.6078	4.3123	3.1453	2.6750	52.8027
4260	0.0038	0.0057	0.0102	0.0130	0.0190	0.0249	0.0332	0.0315	0.0224	0.0127	0.0054	0.0035	0.1853
4318	3.8132	1.8005	2.2514	3.3360	5.0191	7.2269	9.4232	8.5269	6.0316	5.4251	2.7953	2.3427	57.9937
4441	0.2392	0.3511	0.5811	0.7796	1.1085	1.4133	1.8507	1.8699	1.4264	0.8779	0.4377	0.2158	11.1511
4442	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0441	0.0441
Dock Red Dye Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L4 Dodiflow Tote	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0007
L4 Red Dye Tote	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0161	0.0161
Rack Red Dye Tank	0.0022	0.0033	0.0054	0.0073	0.0104	0.0133	0.0174	0.0165	0.0120	0.0070	0.0031	0.0020	0.1000
Temporary BioDiesel Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Loading													
Controlled	2.4948	2.5676	3.2048	3.4764	4.2728	5.3111	6.2030	6.5864	5.0453	4.3566	3.4416	2.9200	49.8805
Marine Loading	2.7385	4.2256	1.5455	1.3485	3.3260	6.4468	1.4269	6.5323	2.5631	2.4300	3.8426	1.0851	37.5108
Loading Not Captured (if controlled)	32.8600	33.8190	42.2113	45.7885	56.2785	69.9535	81.7014	86.7509	66.4526	57.3822	45.3300	38.4593	656.9871
Fugitives													
Equipment Leaks	20.7008	18.6975	20.7008	20.0331	20.7008	20.0331	20.7008	20.7008	20.0331	20.7008	20.0331	20.7008	243.7358
Combustion Units													
Cleaver-Brooks	4.1400	3.0616	3.1000	2.8100	2.5900	2.2791	4.1196	4.1573	4.2325	6.8849	8.0512	9.7630	55.1891
Erie	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Generator	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions													
Monthly	148.6193	155.5026	161.7927	207.9418	217.7740	294.3522	348.3111	360.9133	281.6520	240.6242	191.8706	154.4065	-
12-Month Rolling	371.6543	508.4594	649.5513	837.4600	1,034.5332	1,308.8523	1,636.4625	1,976.6750	2,238.2939	2,458.2173	2,630.0549	2,763.7605	2,763.7605
12-Month Rolling (tons)	0.1858	0.2542	0.3248	0.4187	0.5173	0.6544	0.8182	0.9883	1.1191	1.2291	1.3150	1.3819	1.3819
	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	In Compliance	

Phillips 66 Pipe Company - Portland Terminal

First day of current year: 1/1/2019
Number of days in current year: 365

Speciated VOC — FACILITY-WIDE Speciated VOC EMISSIONS

Speciated VOC Emissions (lbs)

	Anthracene	Benzene	Benzo(g,h,i)perylene	Biphenyl	Butane	Cresol	Cumene (isopropylbenzene)	Cyclohexane	Ethanol (ethyl alcohol)	Ethylbenzene	Hexane (n)	Isooctane (2,2,4 trimethylpentane)	Methanol (methyl alcohol)	Naphthalene	PAHs (Chrysene)	Phenanthrene	Propane	Propylene	Styrene	Tetra ethyl lead	Toluene	Trimethylbenzene mixture (1,2,4)	Xylene	Formaldehyde	Phenol
Storage Tanks																									
38	0.0000	6.8062	0.0000	0.0000	0.0000	0.0000	0.0783	0.6387	0.0000	0.4729	6.1675	7.7078	0.0000	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7.5087	0.1678	2.0603	0.0000	0.0000
2561	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2589	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2783	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2784	0.0000	0.5109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7120	0.1053	0.0000	0.0000	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.6876	10.5913	13.8204	0.0000	0.0000
2915	0.0020	46.6641	0.0006	0.0000	0.0000	0.0000	0.5057	8.6848	0.0000	4.6186	77.6822	77.4716	0.0000	0.6251	0.0060	0.0040	0.0000	0.0000	0.0000	0.3030	0.0000	60.6957	5.4700	22.5952	0.0000
2918	0.0000	1.0284	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.5026	0.2094	0.0000	0.0000	0.0260	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11.7056	23.0873	29.2164	0.0000
2982	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3407	0.0040	46.6159	0.0012	0.0000	0.0000	0.0000	0.7929	8.9642	0.0000	6.3021	75.8569	81.2944	0.0000	1.2291	0.0120	0.0080	0.0000	0.0000	0.0000	0.4500	0.0000	68.3643	9.6279	31.6369	0.0000
3408	0.0009	35.7436	0.0002	0.0000	0.0000	0.0000	0.2911	6.8850	0.0000	2.9721	60.0466	58.0022	0.0000	0.2767	0.0026	0.0017	0.0000	0.0000	0.0000	0.1828	0.0000	44.1054	2.7976	14.2709	0.0000
3409	0.0007	19.3870	0.0002	0.0000	0.0000	0.0000	0.1941	3.7322	0.0000	1.8247	32.3643	31.9551	0.0000	0.2262	0.0022	0.0014	0.0000	0.0000	0.0000	0.1177	0.0000	24.8721	2.0416	8.8824	0.0000
3410	0.0000	0.3879	0.0000	0.0000	0.0000	0.0000	0.0792	0.6537	403.7408	0.1699	0.5150	0.1928	0.0000	0.0373	0.0002	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	1.0656	0.1956	0.6183	0.0000
3411	0.0002	13.6036	0.0001	0.0000	0.0000	0.0000	0.0872	2.6218	0.0000	0.9928	22.9938	21.7527	0.0000	0.0558	0.0005	0.0003	0.0000	0.0000	0.0000	0.0575	0.0000	16.1680	0.7237	4.6884	0.0000
3412	0.0000	0.3508	0.0000	0.0000	0.0000	0.0000	0.0910	0.5744	378.2222	0.1884	0.4358	0.1821	0.0000	0.0444	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0725	0.2294	0.6918	0.0000
3413	0.0001	10.3658	0.0000	0.0000	0.0000	0.0000	0.0668	1.9958	0.0000	0.7578	17.5021	16.5642	0.0000	0.0432	0.0004	0.0003	0.0000	0.0000	0.0000	0.0440	0.0000	12.3173	0.5560	3.5802	0.0000
3578	0.0000	5.6535	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.2681	1.1501	0.0000	0.0000	1.1565	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	64.4832	128.0298	161.3929	0.0000
3623	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.9042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	16.7211	7.3549	0.0000
3781	0.0000	4.0930	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.8562	0.8377	0.0000	0.0000	0.7886	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	46.1311	88.7053	113.7852	0.0000
4252	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4254	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4255	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4256	0.0000	11.7006	0.0000	0.0000	0.0000	0.0000	0.1319	1.8166	0.0000	0.6004	10.6495	13.2166	0.0000	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	12.8097	0.2831	3.4651	0.0000
4260	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1834	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6558	0.0000	0.0000
4318	0.0000	1.3669	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.9868	0.2762	0.0000	0.0000	0.2769	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	15.4582	30.6094	38.6387	0.0000
4441	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6378	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0000	9.5099	0.0000
4442	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0065	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0375	0.0000
Dock Red Dye Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L4 Dodflow Tote	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000
L4 Rad Dye Tote	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0026	0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0115	0.0000
Rack Red Dye Tank	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0166	0.0056	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0000	0.0723	0.0000
Temporary BioDiesel Tank	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Loading																									
Controlled	0.0000	8.6200	0.0000	0.0000	0.0000	0.0000	0.0367	1.6633	0.0000	0.5400	14.6938	13.6602	0.0000	0.0046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0264	0.0000	9.8364	0.3132	2.5674	0.0000
Marine Loading	0.0000	0.6173	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.2768	0.1890	0.0000	0.0000	0.1646	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	10.2042	18.9209	24.7599	0.0000
Loading Not Captured (if controlled)	0.0000	113.5368	0.0000	0.0000	0.0000	0.0000	0.6226	21.9075	0.0000	7.1124	193.5267	178.4730	0.0000	0.0603	0.0000	0.0000	0.0000	0.0000	0.0000	0.3740	0.0000	129.6542	4.1256	33.8150	0.0000
Fugitives																									
Equipment Leaks	0.0000	18.9777	0.0032	0.0000	0.0000	0.0000	5.3716	2.5304	0.0000	14.7604	10.5432	42.1727	0.0000	4.3764	0.0274	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	73.8021	26.3579	73.8021	0.0000
Miscellaneous																									
Miscellaneous Emissions	0.0000	113.1109	0.0000	0.0000	0.0000	0.0000	0.0000	14.8280	0.0000	5.2823	129.1300	0.0000	0.0000	0.0442	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	92.0768	2.5019	26.2358	0.0000
Combustion Units																									
Cleaver-Brooks	0.0000	0.0767	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	65.7540	0.0000	0.0000	0.0223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1242	0.0000	0.0000	0.0000
Erie	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Generator	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions																									
Annual, lbs	0.0079	469.5269	0.0055	0.0000	0.0000	0.0000	12.2403	77.8663	781.9630	68.0897	720.6368	542.6374	0.0000	9.7457	0.0514	0.0157	0.0000	0.0000	1.5574	0.0000	708.2455	372.7142	627.5308	0.0000	0.0000
Annual, tons	0.0000	0.2258	0.0000	0.0000	0.0000	0.0000	0.0061	0.0389	0.3910	0.0340	0.3603	0.2713	0.0000	0.0049	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.3541	0.1864	0.3138	0.0000	0.0000

Phillips 66 Pipe Company - Portland Terminal

GHG Emissions for Calendar Year 2019

Emission Unit ID No. Cleaver-Brooks	CO2	CH4	N2O	CO2e
Annual Emission, lbs	4,389,512.1273	82.7898	8.2790	4,394,049.0013
Annual Emission, TPY	2,194.7561	0.0414	0.0041	2,197.0245
Annual Emission, tonnes/yr	1,995.2328	0.0376	0.0038	1,997.2950

Emission Unit ID No. Erie	CO2	CH4	N2O	CO2e
Annual Emission, lbs	134,648.4371	5.4617	1.0923	135,110.4932
Annual Emission, TPY	67.3242	0.0027	0.0005	67.5552
Annual Emission, tonnes/yr	61.2038	0.0025	0.0005	61.4139

Emission Unit ID No. Generator	CO2	CH4	N2O	CO2e
Annual Emission, lbs	0.0000	0.0000	0.0000	0.0000
Annual Emission, TPY	0.0000	0.0000	0.0000	0.0000
Annual Emission, tonnes/yr	0.0000	0.0000	0.0000	0.0000

Phillips 66 Company Products Terminal
Portland, OR **RY2019**

Emissions types:

MISCELLANEOUS EMISSIONS - Other emissions from ordinary facility operations

Miscellaneous Emissions

Component type	Number	Emission Factor (VOC-lbs/comp.-yr)	Emissions (lb VOC/yr)		
Separator Losses			17,088.8		
Aggregated Insignificant Emissions			1,992.0		
Gasoline Tank Roof landing			0.0		
Gasoline Tank Cleaning			0.0		
Place Holder					
Place Holder					
		Misc Emissions, lb/yr	19,081	**9.5**	**ton/yr**
		Misc Emissions, lb VOC/yr	**19,081**	**9.5**	**ton/yr**

Phillips 66
Portland Terminal, WA
Background on TankESPd+

ESPd+ is a software tool that applies EPA's AP-42 methodology to estimate emissions from various types of emission sources that are commonly found at petroleum terminal and pipeline facilities. The current version is used to estimate emissions for:

- Storage Tanks.
- Loading Racks.
- Control Devices.
- Combustion Units.
- Equipment Leaks.

All calculations for these source types are based on AP-42 except as noted in the sample calculations. For evaporative emissions, speciation of the contribution of individual chemicals to the total VOC emissions is determined by applying Raoult's Law at the given temperature to determine vapor-phase concentrations from the given concentrations of the chemicals of interest in the liquid phase. For equipment leak emissions, the liquid-phase concentration is used to determine the speciated emissions. For speciated products of combustion, AP-42 factors are applied.

Information on the presence and configuration of emissions sources is referred to as "source information," whereas routine information on operating parameters for these emissions sources is referred to as "service information." Thus there is a one-time entry of Source Information to describe each emissions source, and on-going entry of Service Information to describe the usage of these emissions sources during a given period of time.

Phillips 66

Portland Terminal, WA

Sample Calculations for Loading Operations

Loading Operations

General notes:

This sample calculation presents the method by which ESPd+ calculates emissions for the loading of a particular stock through a given loading rack. ESPd+ repeats this calculation for each type of stock loaded and for each loading rack. The Source Information identifies whether the loading operations are controlled and, if so, the type of cargo tank that is loaded and the applicable annual leak test. From this information, a capture efficiency is determined from factors published by EPA - or, in the case of marine loading, by TCEQ. The Service Information then gives the throughput for this stock through this loading rack during this time period, and the emissions are then calculated from AP-42 Section 5.2 Equation 1.

Emissions associated with the vapor load to the control device are shown with the control device calculations.

Uncontrolled scenario:

Emissions (lbs) = [12.46*(S*P*M)/T]*[throughput(gal)/1000] AP-42 Section 5.2 Equation 1

where: **S** is the saturation factor (assumed equal to 1.0)

P is the true vapor pressure of the stock being loaded (psia)

M is the vapor molecular weight of the stock being loaded

T is the temperature of the compartment being loaded (degrees R) (assumed equal to average ambient temperature)

Controlled scenario:

Emissions not captured (lbs) = (1-X)*[12.46*(S*P*M)/T]*[throughput(gal)/1000]

Vapor load to control device (lbs) = (X)*[12.46*(S*P*M)/T]*[throughput(gal)/1000]

where: **X** is the capture efficiency, determined by the type of cargo tank and the applicable annual leak test.

Source Information data:

Loading Rack/Berth ID: Portland Terminal a, OR

Loading configuration: controlled (vapors routed to a control device)

Type of cargo tank: tank truck

Annual leak test: XX / GACT (3-inch)

If controlled:

Primary control device: VRU

Secondary control device:

Service Data:

Loading Rack/Berth ID: Portland Terminal a, OR

Time period: Monthly

Time Period (mm/yyyy): 08/01/2019

Stock: Gasoline

Stock RVP: 7.8

Throughput (gallons): 655,211

If controlled:

Control device: primary

Select Primary or Secondary, depending upon which control device was used for this throughput.

For tank trucks and rail cars, the capture efficiency is from AP-42 5.2.2.1.1.

For marine vessels, the capture efficiency is from TCEQ guidance.

Phillips 66

Portland Terminal, WA

Sample Calculations for Loading Operations

Calculated parameter values:

	Annual	
X	98.7%	capture efficiency
S	1.0	assume saturation is 100%
P	4.66	from selected stock and temperature
M	66	from selected stock
T	68.6	assume equal to average ambient (deg F)

Estimated Emissions from the cargo tanks (lb):

= (1-X)*[12.46*(S*P*M)/T]*[throughput(gal)/1000]

60.97 — For a controlled scenario, these are the emissions that are not captured (e.g., tank truck leakage).

Vapor Load to Control Device (lb):

= (X)*[12.46*(S*P*M)/T]*[throughput(gal)/1000]

4,629 — For a controlled scenario, these are the captured emissions, routed to the control device.

Phillips 66
Portland Terminal, WA
Sample Calculations for Loading Operations

Equipment Leaks

Notes: **Time Period: Aug-2019**

If the service is a fluid in the vapor phase, select the 'gas' service.
If the service is crude oil, select whether 'light' or 'heavy'.
If the service is any other fluid in the liquid phase, select 'light liquid'.

Source Information:

Component Type	Service	Subject to M21 LDAR?	Speciation Stock	N1 Component Count	Estimated Emissions (pounds)
Valves	gas	No	Gasoline	15	0.32
Valves	light liquid	No	Gasoline	1,017	71.73
Pumps	gas	No	Gasoline	0	
Pumps	light liquid	No	Gasoline	18	15.94
Fittings	gas	No	Gasoline	68	4.68
Fittings	light liquid	No	Gasoline	2,708	35.53
Others	gas	No	Gasoline	5	0.98
Others	light liquid	No	Gasoline	234	49.90

When not subject to Method 21 LDAR inspections, the equipment leak emissions are simply the component count multiplied by the applicable emission factor, and there is no associated entry of service data.

If not subject to M21 LDAR:
Emissions (lb/hr) = F1*N1

Emission factors:
Gas & Liquid Products
EPA 453/R-95-017 Table 2-3
Crude Oil
API 4653 Table ES-2

Component type	Service	F1
valves	gas	2.87E-05
valves	light liquid	9.48E-05
pump seals	gas	1.43E-04
pump seals	light liquid	1.19E-03
fittings (1)	gas	9.26E-05
fittings (1)	light liquid	1.76E-05
others (2)	gas	2.65E-04
others (2)	light liquid	2.87E-04

(1) connectors and flanges
(2) compressors and any components other than fittings, pumps, or valves

Phillips 66
Portland Terminal, WA
Sample Calculations for Control Devices

Control Devices

General notes:

The vapor load to the control device is summed from the emission sources that are routed to the given control device, and then the control device efficiency is applied. The load of Total VOCs and of the speciated VOC components (Benzene et al) are compiled separately from each of the contributing emissions sources. That is, a speciation calculation is not performed on the Total VOC vapor load to the control device, but rather the speciation calculations are done at each emissions source. This is because speciation is performed differently for different types of emissions sources. Separate emission factors are given for speciation of the products of combustion, as noted below.

Load Factor

The load factor (LF) is a variable multiplied by the total VOC load to the control device from emissions sources (Vapor Load) to calculate emissions. The load factor (LF) is dimensionless; it calculates the (lbs) of a pollutant as a decimal fraction of the Vapor Load.

Calculation of the Total VOC and speciated VOC components from the vapor load are calculated using:

LF = (1 - X) for Total VOCs, where X is the control efficiency of the given control device.

LF = (1 - X) * Zi for speciated VOC components, where Zi is the vapor phase fraction of speciated component (i) in the total load.

Emission factors are given in various sets of units, and thus the calculation of LF needs to convert emission factors to a basis of:

(pounds of pollutant) per (pound of VOC load)

Flares and Vapor Combustion Units (Flares/VCUs)

In addition to emissions of Total VOCs and speciated VOC components that pass through the control device from the vapor load, flares and VCUs emit products of combustion. The vapor load must be characterized as one of the types of combustion fuel for which emission factors are available, and the emission factors for that type of combustion fuel are then applied. When there is vapor load from more than one type of combustion fuel (e.g. some gasoline throughput and some diesel throughput), the emissions associated with each are calculated separately. Separate combustion calculations are required for:

- combustion of vapor load (with a separate calculation for each type of combustion fuel)
- combustion at the pilot flame (assumed to be natural gas)
- combustion of auxiliary fuel (assumed to be natural gas)

Emission factors for products of combustion are from AP-42 for the pilot flame and the auxiliary fuel, and from TCEQ document RG-109 for the vapor load, except for greenhouse gases, for which the emission factors are from EPA's GHG MRR -- 40 CFR Part 98 Subpart C, Tables C-1 & C-2. High heat values (HHV) used to calculate LF are from EPA's GHG MRR Subpart C, Table C-1.

General equation:

Emissions (lbs) = (LF) * [total VOC load to control device from emissions sources]
+ (EF1*S1 + EF2*C2*S2 + EF3) * K * (U*H) for the pilot flame
+ (EF1*S1 + EF2*C2*S2 + EF3) * K * (U*H) for the auxiliary fuel (assist gas)

where:

total VOC load (vapor load) is summed from the emissions sources routed to the given control device, and is compiled in (pounds).

LF is the load factor for a given pollutant.

LF is determined as follows:

	Pollutant	LF	variables for the 'vapor load' LF
	CO2	= (EF3) * K * H	H = X * HHV / density
	N2O	= (EF3) * K * H	H = X * HHV / density
	CH4	= (EF3) * K * H	H = X * HHV / density
	NOx	= (EF3) * K * H	H = X * HHV / density
	CO	= (EF3) * K * H	H = X * HHV / density
Total VOCs:	**VOC**	= (1-X)	X = control device efficiency
	PM	= (EF3) * K * H	H = X *[HHV(fuel) / HHV(ng)] / density
	SOx	= (EF1) * S	S is the sulfur content (%)
Speciated VOCs:	**Benzene**	= (1-X) * Zi	X = control device efficiency
	Ethylbenzene	= (1-X) * Zi	X = control device efficiency
	Toluene	= (1-X) * Zi	X = control device efficiency
	Xylenes	= (1-X) * Zi	X = control device efficiency
	n-Hexane	= (1-X) * Zi	X = control device efficiency
	Naphthalene	= (1-X) * Zi	X = control device efficiency
	Formaldehyde	= (EF3) * K * H	H = X *[HHV(fuel) / HHV(ng)] / density

X is the control efficiency

Zi is the weight fraction of chemical "i" in the total VOC load, as determined from the emissions sources routed to the given control device.

For Vapor Recovery Units (VRUs):

EF1 **EF2** **EF3** are all set to **0** for VRUs (no products of combustion)

The emissions from a VRU are simply the vapor load factored by the control efficiency of the VRU.

For flares and enclosed vapor combustion units (Flares/VCUs):

EF1 is an Emission Factor dependent on sulfur content in the gasoline/diesel
S1 is sulfur content in the liquid generating the vapors (gasoline/diesel) (wt%)
EF2 is a natural gas Emission Factor dependent on the sulfur content
C2 is a conversion from a (2,000 grains/MMscf) basis to a (1wt%) basis; use:
1435 where the Emission Factor is based on (2,000 grains/MMscf)
1 where the Emission Factor is based on (1wt%)
S2 is the sulfur content in natural gas (wt%)
EF3 is an Emission Factor that is not related to sulfur content
K is a factor to convert from kilograms to pounds; use:
2.20462 if the Emission Factor is in units of kilograms
1 if the Emission Factor is in units of pounds
U is the Usage (in units of MMscf, gal, hours, or pounds (of VOC load))

The variable **H** is evaluated specifically for the given scenario:

If usage is given as volume of fuel used and the Emission Factor is per MMBtu, then:
H = HHV (MMBtu/volume)
If usage is given as volume of fuel used and the Emission Factor is per volume of fuel, then:
H = 1
If usage is given in hours (HR) and the Emission Factor is per hp-hr, then:
H = horsepower (hp)
If usage is given in hours (HR) and the Emission Factor is per volume of fuel, then:
H = (HR)*(typical fuel feed rate)
If usage is given in hours (HR) and the Emission Factor is per MMBtu, then:
H = (HR)*(typical fuel feed rate)*HHV
If usage is given in VOC load (pounds) and the emission factor is per MMBtu, then:
H = X * HHV / density
where HHV and density are for the fuel representing the vapor load

Source Information:

Control Device ID:	VRU	
Type of unit:	VRU	
Control efficiency:	0.999	percent reduction of emissions
for Flares/VCUs:		
NOx Load Factor override:		weight fraction of vapor load, from stack test
CO Load Factor override:		weight fraction of vapor load, from stack test
Pilot flame feed rate:	#N/A	MMscf per hour
		Feed rate is required only if the usage is given in hours, rather than in MMscf.
Auxiliary fuel feed rate:	#N/A	MMscf per hour

Sulfur Content (default values):

	ppm
Natural Gas	6.97
LNG	0
Propane Gas	0
LPG	0
Butane Gas	0
Liquified Butane	0
Diesel	15
Gasoline	15
#2 Fuel Oil	15
#6 Fuel Oil	30,000

These are default values that are used in the absence of user entry of sulfur content.

Service Information:

Control Device ID:	VRU	
Time Period (mm/yyyy):	8/1/1/2017	
Combustion fuel type:	Gasoline	the vapor load is characterized as this type of combustion fuel, for purposes of applying combustion emission factors
Vapor load (lbs):	196,990	compiled from the emissions sources routed to this control device
Pilot flame usage **(U)**:	#N/A	default is total hours in period
Pilot flame usage units:		
Auxiliary fuel usage **(U)**:	#N/A	no default usage - requires user entry
Auxiliary fuel usage units:		
Sulfur content S1:		ppm, override for vapor load
Sulfur content S2:		ppm, override for natural gas

Sulfur Content:

Combustion fuel (vapor load):	Gasoline	
Sulfur content S1 (wt%):	1.50E-03	wt%, for given fuel vapor load
Sulfur content S2 (wt%):	6.97E-04	wt%, for natural gas pilot flame & aux fuel

Conversion of Usage Values (application of variable H):

Vapor Load HHV:	0.125	MMBtu/gal
Vapor Load density:	6.2	lb/gal
Pilot flame usage:	#N/A	MMscf
Auxiliary fuel usage:	#N/A	MMscf

Calculated Emissions (pounds):

Emissions (lbs) = (LF) * [total VOC load to control device from emissions sources]
+ (EF1*S1 + EF2*C2*S2 + EF3) * K * (U*H) for the pilot flame
+ (EF1*S1 + EF2*C2*S2 + EF3) * K * (U*H) for the auxiliary fuel (assist gas)

Pounds this period from:

	Vapor Load to Control Device:	Natural Gas:			K factor to convert kilograms to pounds
	Gasoline	**Pilot Flame**	**Auxiliary Fuel**	**TOTAL (lbs)**	K
CO2	0	#N/A	#N/A	#N/A	2.20462
N2O	0	#N/A	#N/A	#N/A	2.20462
CH4	0	#N/A	#N/A	#N/A	2.20462
NOx	0	unit?	unit?	0	1
CO	0	unit?	unit?	0	1
VOC	197	unit?	unit?	197	1
PM	0	unit?	unit?	0	1
SOx	0	unit?	unit?	0	1
Benzene	VOC*Zi	unit?	unit?	*	1
Ethylbenzene	VOC*Zi	unit?	unit?	*	1
Toluene	VOC*Zi	unit?	unit?	*	1
Xylenes	VOC*Zi	unit?	unit?	*	1
n-Hexane	VOC*Zi	unit?	unit?	*	1
Naphthalene	VOC*Zi	unit?	unit?	*	1
Formaldehyde	0.00	unit?	unit?	0.00	1

* need to compute the VOC*Zi values and then sum across the row

Sample Calculation of Estimated Emissions - Fixed-Roof Tanks

Company: **Phillips 66**
Location: **Portland Terminal a, OR**
Calculations for Tank No.: **3761**
Emission estimates per EPA's AP-42 Chapter 7.1 (Nov 2006), for: **August 2019**

Meteorological Data:

Avg Atmos Pressure, Pa:	**14.7465**	psia
Avg Ambient Temp, Taa:	**68.6**	degrees F
Avg Daily Temp Range, ΔTa:	**23.4**	degrees F
Avg Daily Solar Insolation, I:	**1718.334**	Btu / ft^2 day

Tank Data:

Tank Type:	**FixedRoof**		shell color:	**white paint**
Average alpha:	**0.17**		shell condition:	**good**
Tank Diameter:	**120**	ft	shell alpha:	**0.17**
Tank Height:	**40**	ft	roof color:	**white paint**
Maximum Fill Height:	**38.6**	ft	roof condition:	**good**
Minimum Liquid Level:	**1**	ft	roof alpha:	**0.17**
Net Working Height:	**37.6**	ft		
Fixed Roof Type:	**Column-supported (cone)**		effective roof height:	**0** ft
Average outage, H_{VO}:	**20.2**	ft		
Max Vent Setting:	**0.03**	psig		
Min Vent Setting:	**-0.03**	psig		

Service Data:

Service (stored liquid):	**Diesel**			
Product Factor, K_P:	**1**		Vapor Pressure Constants:	
Reid VaporPressure:		psi (if specified)	A:	**12.101**
ASTM Distillation Slope:		(if specified)	B:	**8907**
Molecular Weight, M_V:	**130**	lb/lb-mol	C:	
Liquid Bulk Temp, Tb:	**71**	degrees F		
Constant Temp Tank?	**NO**			
Liquid Bulk Temp Basis?	given by user			
Liquid Surface Temp, T:	**72.2**	degrees F	per AP-42 equation 1-26	
True Vapor Pressure, P:	**0.0092**	psia	per AP-42 equation 1-24	
Stock Vapor Density, W_V:	**0.00021**	lb/ft^3	per AP-42 equation 1-21	

Operational Data:

Throughput:	**274,088**	bbl per month
Days this Period:	**31**	days
Turnover Rate:	**42.6**	turnovers per year
Turnover Factor, K_N:	**0.871**	

Calculated Values:

Vapor Space Expansion Factor, $K_E = \{\Delta T_V / (T + 459.57)\} + \{(\Delta P_V - \Delta P_B) / (P_A - P)\}$ AP-42 eqn 1-7

where:

ΔT_V = 25.02727 deg F (deg R); daily temperature range in the vapor space AP-42 eqn 1-8

Tlx = 78.46 deg F Pvx = 0.014 psia

Tln = 65.95 deg F Pvn = 0.008 psia

ΔP_V = **0.0060** psia

ΔP_B = 0.06 psi; vent setting range

K_E = **0.0433**

Vented Vapor Saturation Factor, $K_S = 1 / (1 + 0.053\ P\ H_{VO})$ AP-42 eqn 1-20

K_S = **0.9902**

Vent Setting Correction Factor, K_B:

K_B = 1; except when:

$K_N [(P_{BP} + P_A) / (P_I + P_A)] > 1$ AP-42 eqn 1-36

$K_B = [(P_I + P_A)/K_N - P] / [P_{BP} + P_A - P]$ AP-42 eqn 1-37

where:

P_{BP} = 0.03 psig; vent pressure setting

P_I = 21.45 psig; initial gauge pressure (nominal operating pressure)

K_B = **1**

Emissions Estimate for: **August 2019**

Standing Storage Loss:	**67.94**	lb per	month	AP-42 eqn 1-4
Working Loss:	**281.50**	lb per	month	AP-42 eqn 1-35
Total Emissions:	**349.44**	lb per	month	AP-42 eqn 1-1
	0.1747	tons per	month	

Sample Calculation of Estimated Emissions - Fixed-Roof Tanks

Company: **Phillips 66**
Location: **Portland Terminal a, OR**
Calculations for Tank No.: **Rack Red Dye Tank**
Emission estimates per EPA's AP-42 Chapter 7.1 (Nov 2006), for: **August 2019**

Meteorological Data:

Avg Atmos Pressure, Pa:	**14.7465**	psia
Avg Ambient Temp, Taa:	**68.6**	degrees F
Avg Daily Temp Range, ΔTa:	**23.4**	degrees F
Avg Daily Solar Insolation, I:	**1718.334**	Btu / ft^2 day

Tank Data:

Tank Type:	**Horizontal**		shell color:	**white paint**
Average alpha:	**0.17**		shell condition:	**good**
Tank Diameter:	**4.4**	ft	shell alpha:	**0.17**
Tank Height:	**2.4**	ft	roof color:	**white paint**
Maximum Fill Height:	**1.36**	ft	roof condition:	**good**
Minimum Liquid Level:	**1**	ft	roof alpha:	**0.17**
Net Working Height:	**0.36**	ft		
Fixed Roof Type:	**Horizontal Tank**		effective roof height:	**0** ft
Average outage, H_{VO}:	**1.18**	ft		
Max Vent Setting:	**0.03**	psig		
Min Vent Setting:	**-0.03**	psig		

Service Data:

Service (stored liquid):	**Unisol Liquid Red BK-50**			
Product Factor, K_P:	**1**		Vapor Pressure Constants:	
Reid VaporPressure:		psi (if specified)	A:	**12.39**
ASTM Distillation Slope:		(if specified)	B:	**8933**
Molecular Weight, M_V:	**130**	lb/lb-mol	C:	
Liquid Bulk Temp, Tb:	**70.9**	degrees F		
Constant Temp Tank?	**NO**			
Liquid Bulk Temp Basis?	given by user			
Liquid Surface Temp, T:	**72.2**	degrees F	per AP-42 equation 1-26	
True Vapor Pressure, P:	**0.0117**	psia	per AP-42 equation 1-24	
Stock Vapor Density, W_V:	**0.0003**	lb/ft^3	per AP-42 equation 1-21	

Operational Data:

Throughput:	**0**	bbl per month
Days this Period:	**31**	days
Turnover Rate:	**0.0**	turnovers per year
Turnover Factor, K_N:	**1.000**	

Calculated Values:

Vapor Space Expansion Factor, $K_E = \{\Delta T_V / (T + 459.57)\} + \{(\Delta P_V - \Delta P_B) / (P_A - P)\}$ — AP-42 eqn 1-7

where:

ΔT_V = 25.02727 deg F (deg R); daily temperature range in the vapor space — AP-42 eqn 1-8

Tlx = 78.46 deg F Pvx = 0.014 psia

Tln = 65.95 deg F Pvn = 0.010 psia

ΔP_V = **0.0040** psia

ΔP_B = 0.06 psi; vent setting range

K_E = **0.0434**

Vented Vapor Saturation Factor, $K_S = 1 / (1 + 0.053\ P\ H_{VO})$ — AP-42 eqn 1-20

K_S = **0.9993**

Vent Setting Correction Factor, K_B:

K_B = 1; except when:

$K_N [(P_{BP} + P_A) / (P_I + P_A)] > 1$ — AP-42 eqn 1-36

$K_B = [(P_I + P_A)/K_N - P] / [P_{BP} + P_A - P]$ — AP-42 eqn 1-37

where:

P_{BP} = 0.03 psig; vent pressure setting

P_I = 1.1781 psig; initial gauge pressure (nominal operating pressure)

K_B = **1**

Emissions Estimate for: **August 2019**

Standing Storage Loss:	**0.01**	lb per month	AP-42 eqn 1-4
Working Loss:	**0.00**	lb per month	AP-42 eqn 1-35
Total Emissions:	**0.01**	lb per month	AP-42 eqn 1-1
	0.0000	tons per month	

Sample Calculation of Estimated Emissions - Floating-Roof Tanks

Company: **Phillips 66**
Location: **Portland Terminal a, OR**
Calculations for Tank No.: **3407**
Emission estimates per EPA's AP-42 Chapter 7.1 (Nov 2006), for: **August 2019**

Meteorological Data:
- Avg Atmos Pressure, Pa: **14.7465** psia
- Avg Ambient Temp, Taa: **68.6** degrees F
- Avg Daily Solar Insolation, I: **1718.334** Btu / ft^2 day
- Avg Wind Speed, V: **7.1** mph

shell color: **white paint**
shell condition: **good**
shell alpha: **0.17**
roof color: **white paint**
roof condition: **good**
roof alpha: **0.17**

Tank Data:
- Tank Type: **IFRT**
- Average alpha: **0.17**
- Tank Diameter, D: **120** ft
- Rim Seal Type: **Mechanical-Shoe Primary with NO Secondary**

$Lr = [(Kra + Krb V^n) D] \times [P^* Mv Kc]$ per AP-42 equation 2-2
$Lr = [Fr] \times [P^* Mv Kc]$ defining a Rim Seal Emission Factor, Fr
$Fr = [(Kra + Krb V^n) D]$

Rim Seal Emission Factor (Fr): **696** lb-mol/yr

$Ld = [(Kd Sd) D^2] \times [P^* Mv Kc]$ per AP-42 equation 2-9
$Ld = [Fd] \times [P^* Mv Kc]$ defining a Deck Seam Emission Factor, Fd
$Fd = [(Kd Sd) D^2]$

Deck Seam Emission Factor (Fd): **403** lb-mol/yr

$Lfi = [Ffi] \times [P^* Mv Kc]$ per AP-42 equation 2-5
$Ffi = Nfi [Kfi]$ per AP-42 equation 2-6
$Kfi = [Kfai + Kfbi (Kv V)^{mi}]$ per AP-42 equation 2-7

- Guidepole Emission Factor (Ffgp): **21** lb-mol/yr
- Deck Fittings Emission Factor (Ffi-n): **432** lb-mol/yr (all deck fittings other than the guidepole)
- Total Emission Factors (Fr + Fd + Ff): **1,552** lb-mol/yr
- Number of columns, Nc: **16**
- Effective column diameter, Fc: **1** feet

Service Data:
- Service (stored liquid): **Gasoline RVP X.XX**
- Product Factor, K_C: **1**
- Reid VaporPressure: **7.8** psi (if specified)
- ASTM Distillation Slope: **3** (if specified)
- Molecular Weight, M_V: **66** lb/lb-mol
- Liquid Bulk Temp, Tb: **68.6** degrees F
- Constant Temp Tank? **NO**
- Liquid Bulk Temp Basis? calculated from ambient, per AP-42 equation 1-28
- Liquid Surface Temp, Tla: **70.9** degrees F per AP-42 equation 1-26
- True Vapor Pressure, Pva: **4.873** psia per AP-42 equation 1-25

$P^* = [Pva/Pa] / [1 + (1 - Pva/Pa)^{0.5}]^2$

- Vapor Pressure Function, P*: **0.09994** dimensionless per AP-42 equation 2-3
- Liquid density, Wl: **5.6** lb/gal
- Clingage factor, Cs: **0.0015** bbl per 1000 sq.ft.

Operational Data:
- Throughput, Q: **555,775** bbl per month

Emissions Estimate for: **August 2019**
Days This Period: **31**

Standing Storage Loss (Lr + Ld + Lf) = [Fr + Fd + Ff] × [P* Mv Kc] per AP-42 equations 2-2, 2-5, 2-9
Standing Storage Loss: **869.55** lb per month
Withdrawal Loss (Lwd) = [(0.943 Q Cs Wl)/D] × [1 + (Nc Fc)/D] per AP-42 equation 2-4
Withdrawal Loss: **41.58** lb per month
Total Emissions: **911.13** lb per month per AP-42 equation 2-1
0.456 tons per month

Phillips 66
Portland Terminal, WA
Sample Calculations for Furnaces

Combustion Units - Boilers

General notes:

Combustion units generate emissions as by-products of combustion. These emissions are estimated from emission factors that may depend on the type of combustion unit, the size of the unit, the type of fuel, and the usage (i.e., the volume of fuel combusted in the given time period). The emission factors vary in terms of the units of measurement used, and thus the estimation of emissions requires conversion of the emission factor values to the units of measurement used in the equations.

Furthermore, usage may be given gallons for liquid fuels, million standard cubic feet (MMscf) for gaseous fuel, or in hours of usage. The usage units must then be reconciled with the units of measurement in the equations.

Emission factors for products of combustion are from AP-42, except for greenhouse gases, for which the emission factors are from EPA's GHG MRR -- 40 CFR Part 98 Subpart C, Tables C-1 & C-2.

High heat values (HHV) used to convert fuel volume to MMBtu are from EPA's GHG MRR Subpart C, Table C-1.

General equation:

Emissions (lbs) = (EF1*S1 + EF2*C2*S2 + EF3) * K * (U*H)

where:
- **EF1** is a fuel oil Emission Factor dependent on the sulfur content
- **S1** is the sulfur content in fuel oil (wt%)
- **EF2** is a natural gas Emission Factor dependent on the sulfur content
- **C2** is a conversion from a (2,000 grains/MMscf) basis to a (1wt%) basis; use:
  - 1,435 where the Emission Factor is based on (2,000 grains/MMscf)
  - 1 where the Emission Factor is based on (1wt%)
- **S2** is the sulfur content in natural gas (wt%)
- **EF3** is an Emission Factor that is not related to sulfur content
- **K** is a factor to convert from kilograms to pounds; use:
  - 2.20462 if the Emission Factor is in units of kilograms
  - 1 if the Emission Factor is in units of pounds
- **U** is the Usage (in units of MMscf, gal, or hours)
- **H** is evaluated specifically for the given scenario:

If usage is given as volume of fuel used and the Emission Factor is per MMBtu, then:
H = HHV (MMBtu/volume)

If usage is given as volume of fuel used and the Emission Factor is per volume of fuel, then:
H = 1

If usage is given in hours (HR) and the Emission Factor is per hp-hr, then:
H = horsepower (hp)

If usage is given in hours (HR) and the Emission Factor is per volume of fuel, then:
H = (HR)*(typical fuel feed rate)

If usage is given in hours (HR) and the Emission Factor is per MMBtu, then:
H = (HR)*(typical fuel feed rate)*HHV

Source Information:

Source ID:	Portland Terminal a, OR	
Type of unit:	Boiler	
MMBtu/hr	<100 MMBtu/hr	for boilers/heaters/furnaces
Type of Fuel:	natural gas	
Typical fuel feed rate:	0.004166	MMscf per hour

Sulfur Content (default values):

Sulfur content S1:	15	ppm, for diesel / #2 fuel oil	These are defaults values that are used in the absence of user entry of sulfur content.
Sulfur content S2:	6.96864	ppm, for natural gas	
Convert ppm to weight percent:			
Sulfur content S1:	1.50E-03	wt%, for diesel / #2 fuel oil	
Sulfur content S2:	6.97E-04	wt%, for natural gas	

Service Information:

Source ID: Portland Terminal a, OR

Time Period (mm/yyyy): Aug-2019

Usage input value: 2.21

Usage units: MMscf

Sulfur content S1: ppm, for fuel oil not applicable for gas-fired units

Sulfur content S2: ppm, for natural gas

Sulfur Content:

Sulfur content S1: 0.0015 wt%, for fuel oil not applicable for gas-fired units

Sulfur content S2: 0.0007 wt%, for natural gas

Conversion of Usage Values (application of the variable H):

Usage input value: 2.21 MMscf

Fuel feed rate: 0.004166 MMscf per hour

Fuel usage: 2.21 MMscf

HHV: 1028 MMBtu/MMscf

Energy usage (U*H): 2,272 MMBtu

Calculated Emissions (pounds):

Emissions (lbs) = (EF1*S1 + EF2*C2*S2 + EF3) * K * (U*H)

code for EF lookup: 1111

	EF1	EF2	C2	EF3	Emission Factor Units	K		Emissions This Period (lb)
				53.02	kg/MMBtu	2.20462	CO2	265,557.67
				1.00E-04	kg/MMBtu	2.20462	N2O	0.50
				1.00E-03	kg/MMBtu	2.20462	CH4	5.01
8				100.000	lb/MMscf	1	NOx	221.00
9				84	lb/MMscf	1	CO	185.64
11				5.50E+00	lb/MMscf	1	VOC	12.16
12	0.00E+00			1.90E+00	lb/MMscf	1	PM	4.20
14	0.00E+00	6.00E-01	1435	0.00E+00	lb/MMscf	1	SOx	1.33
19				2.10E-03	lb/MMscf	1	Benzene	0.00
20				No Data	lb/MMscf	1	Ethylbenzene	No Data
21				3.40E-03	lb/MMscf	1	Toluene	0.01
22				No Data	lb/MMscf	1	Xylenes	No Data
23				1.80E+00	lb/MMscf	1	n-Hexane	3.98
24				6.10E-04	lb/MMscf	1	Naphthalene	0.00
25				7.50E-02	lb/MMscf	1	Formaldehyde	0.17

TRAACS ✓
ACEs ✓
DK

KELLY W. HAYES
Senior Environmental Consultant
Midstream Operations

PHILLIPS 66
520 East D Street
Tacoma, WA 98421
Office: (253) 207-5569
Kelly.W.Hayes@p66.com

January 22, 2020

Mr. Dave Kauth
Oregon DEQ NW Region
700 NE Multnomah St., Suite 600
Portland, OR 97232

UPS 1Z E53 32W 02 9388 8362

RE: 40 CFR 63, Subpart BBBBBB
GD-GACT Semi-Annual Report
Portland Products Terminal
Permit 26-2026
Phillips 66

Dear Mr. Kauth:

Phillips 66 (P66) owns and operates the Portland Products Terminal, a bulk storage and loading terminal, for finished gasoline and distillate products. The terminal is subject to the Gasoline Distribution Generally Available Control Technology (40 CFR 63, Subpart BBBBBB GD-GACT) because it is a minor source under Title III of the 1990 Clean Air Act Amendments.

The attached report summary and certification meets the semi-annual reporting requirements of §63.11095(a) and (b) as well as §63.10(e)(3).

If you have any questions about this report or require any additional information, please call at (253) 207-5569.

Sincerely,

Kelly W Hayes

Cc:
Regional Administrator
United States Environmental Protection Agency, Region 10
1200 Sixth Ave, Suite 900, AWT-107
Seattle, WA 98101

UPS 1Z E53 32W 02 9444 8157

Phillips 66
Portland Products Terminal
GD-GACT Semi-Annual Report
Bulk Gasoline Terminal

Reporting Period: July 01 through December 31, 2019

Regulatory Section	Report Type	Status
40 CFR 63.11095(a)(1)	Semi-Annual Compliance	The following gasoline storage tank seal inspections were conducted during this reporting period. Through Hatch Visual Inspections – 8/8 10yr up-close Visual – T-3408 9/18
40 CFR 63.11095(a)(2) 40 CFR 63.11095(b)(1&2)	Semi-Annual Compliance and Excess Emission	All gasoline cargo tanks vapor tightness documentation was received by the facility prior to granting the authorization to load. The facility computer system will not allow loading of a cargo tank unless vapor tightness documentation is on file for the specific trailer.
40 CFR 63.11095(a)(3) 40 CFR 63.11095(b)(5)	Semi-Annual Compliance	The first attempt at repair occurred within 5 days and all leaks were repaired within fifteen days of detection.
40 CFR 63.11095(b)(3)	Semi-Annual Excess Emission	All VRU monitored operating parameters were within normal ranges, with no excess emissions during this period based on 80 mg/L limit for GD GACT.
40 CFR 63.10(e)(3)(i-viii) 40 CFR 63.11095(b)	Excess Emission	There were no excess emissions during this period.
40 CFR 63.10(e)(3)(vi)(K)	Changes to CMS process or controls	None

I, Gabe Munoz, certify that to the best of my knowledge, that the statements and information submitted in this report are true, accurate and complete and they demonstrate compliance with the relevant standards of the Gasoline Distribution GACT (40 CFR 63, Subpart BBBBBB).

Signature: Gabe Munoz Date: 01/24/2020

Name and Title: Gabe Munoz, Manager Western Region

Phillips 66 Company
Portland Products Terminal
40 CFR 63 A and BBBBBB

Summary Report
Gaseous and Opacity Excess Emissions and Continuous Monitoring System Performance

Reporting Period: July 01 to December 31, 2019

Facility Name: Phillips 66 Portland Terminal
Address: 5528 NW Doane Ave
Portland, OR 97201

Description of Process Unit:
Gasoline truck loading rack with a 2-bed carbon adsorption Vapor Recovery Unit (VRU)

Hazardous Air Pollutants Monitored:
Gasoline Vapors containing one or more of the following HAPs: Benzene, Cumene, Ethylbenzene, Hexane, Naphthalene, Toluene, Total Xylenes, 2,2,4-trimethylpentane

Emission Limitations:
40 CFR 63 BBBBBB: 80 mg VOC / Liter of gasoline loaded
Facility Permit: 26-2026

Operational Limits:
Facility Permit Limit: 80 mg VOC / Liter of gasoline loaded

Monitoring Equipment Details:
Type: CEMS
Manufacturer: Infrared Industries
Model Number: IR8400 D

Latest CMS Certifications and/or Audits:
Certification Date: 6/20/2018
Description: Performance Evaluation

Audit Date: NA
Description: Cylinder Gas Audit

VRU System total operating time during reporting period: 4,416.00 hours

Changes to the CMS, processes or controls were made since the last reporting period: None
If Yes, describe the changes.

Emission Data Summary

(§63.10(e)(3)(vi)((I))

Basis for Excess Emission	Total Hours	Percentage of Total
Total operating time during reporting period:	4,416	
Total duration of excess emissions:	0.00	0.00
Total duration of excess emissions due to:		
Startup / Shutdown:	0.00	0.00
Control equipment problems:	0.00	0.00
Process Problems:	0.00	0.00
Other known causes:	0.00	0.00
Other unknown causes:	0.00	0.00
TOTAL:	0.00	0.00

CMS Performance Summary

(§63.10(e)(3)(vi)((J))

Basis for CMS Downtime	Total Hours	Percentage of Total
Total operating time during reporting periods:	4,416	
Total CMS downtime:	2.31	0.05
Summary CMS downtime causes:		
Monitoring equipment malfunctions:	0.00	0.00
Non-monitoring equipment malfunctions:	1.70	73.49
Quality assurance/control calibrations:	0.61	26.51
Other known causes:	0.00	0.00
Other unknown causes:	0.00	0.00
TOTAL:	2.31	100.00

Total duration of excess emissions and/or exceedances of control system parameter greater than 1% of the total operating time during reporting period? No

Total CMS downtime greater than 5% of the total operating time during reporting period? No

If NO to both of the above, **only** the summary report must be submitted for the reporting period.

If YES to either of the above, a full report must be submitted for the reporting period. This report must include:

Summary Report	
Full Excess Emissions Data	Attachment - CEMS/CMS Output Reports
CMS Performance Report	Attachment - CEMS/CMS Output Reports