ExxonMobil - Santa Ynez Unit
ExxonMobil Interium Trucking for SYU Phased Restart

MOBILE IMPACTS

Diesel Truck Engines

Vehicle Age: 2017 & Newer Diesel Engines
Vehicle Type: T7 Tractor Category- Emission Rates

	Scenario 1: Phillips 66 Santa Maria Truck Rack	**Scenario 2: Plains Pentland Truck Rack**
Crude Delivery Trips per Day:	70	68
Potential Volume Crude Transported (bbl)	4,088,000	3,971,200

NOx: Daily Significance Threshold Exceeded? (Threshold - 25 lb NOx/day)	No	Yes
NOx: Daily Emissions (NOx lb/day)	13.33	32.51
ROG: Daily Significance Threshold Exceeded? (Threshold - 25 lb ROG/day)	No	No
ROG: Daily Emissions (ROG lb/day)	0.91	2.25
PM10: Daily Significance Threshold Exceeded? (Threshold - 80 lb PM10/day)	No	No
ROG: Daily Emissions (ROG lb/day)	10.05	25.13

CO: Daily Significance Threshold Exceeded? (Threshold - N/A)	N/A	N/A
CO: Daily Emissions (CO lb/day)	20	50

GHG: Annual Significance Threshold Exceeded? (Threshold 1,000 MT CO_2e/year)	Yes	Yes
GHG: Annual Emissions (Total CO_2e MT/year)	4,379	10,950

GHG: Estimated CO_2e Cap & Trade Mitigation Costs: $/Yr (2)	**$49,097**	**$144,570**

Notes:
CO, SO2 and PM2.5 have no significance threshold
Truck Capacity = 160 bbl/truck

(1) Require offsets or mitigation project (28.41 Lb/Day) for CEQA environmental analysis (one time cost)
(2) Per APCD guidance, the EMFAC2011 vehicle categorization - T7 Tractor was used to obtain emission rate data.

Table 2 T7 Tractor Diesel Engine Transportation Emissions - Round Trips (EMFAC2014 Emission Factors - 2017 and Later Fleet).

Daily Emissions - Scenario 2															
	Estimated Fleet Size	Trips per	Trip Length	Round Trip	Criteria Pollutant Emissions (Pounds/Day)						GHG Emissions (Pounds/Day)			
Destination	Number of Vehicles	Day	Round-Trip	Miles/Day	ROG	NOx	PM_{10}	$PM_{2.5}$	CO	SO_2	CO_2	CH_4	N_2O	CO_2e
Plains Pentland Truck Rack:														
Travel Within Santa Barbara County	20	68	114	7,752	0.93	13.65	10.30	2.57	5.47	0.23	24,549.73	0.22	0.82	24,798.3
Total Travel Distance	20	68	278	18,904	2.25	32.51	25.13	6.26	13.23	0.57	59,586.69	0.54	1.99	60,192.8
Criteria Pollutant Impacts - Total Travel Within SBC/SLO/Kern Counties (Max - Worst Case)					**2.25**	**32.51**	**25.13**	**6.26**	**13.23**	**0.57**	**(Not Applicable)**			
Significance Thresholds:														
SB County Planning					25	25	80	N/A	N/A	N/A	(Not Applicable)			
SBC APCD					25	25	N/A	N/A	N/A	N/A				
Significant?					**No**	**Yes**	**N/A**	**N/A**	**N/A**	**N/A**	**(Not Applicable)**			

Annual Emissions														
	Estimated Fleet Size	Trips per	Trip Length	Total Round	Criteria Pollutant Emissions (Tons)						GHG Emissions (Metric Tons)			
Destination	Number of Vehicles	Year	Round-Trip	Trip Miles	ROG	NOx	PM_{10}	$PM_{2.5}$	CO	SO_2	CO_2	CH_4	N_2O	CO_2e
Plains Pentland Truck Rack:														
Travel Within Santa Barbara County	20	24,820	114	2,829,480	0.17	2.39	1.88	0.47	0.99	0.04	4,444.88	0.04	0.15	4,490.2
Total Travel Distance	20	24,820	278	6,899,960	0.41	5.83	4.59	1.14	2.40	0.10	10,839.12	0.10	0.36	10,949.7
Greenhouse Gase Impacts - Total Travel Distance (Max - Worst Case)						**(Not Applicable)**								**10,949.7**
Significance Threshold:						(Not Applicable)								
SB County Planning														1,000
SBC APCD														10,000
Significant? (SBC P&D or SBC APCD)						**(Not Applicable)**								**Yes**

Estimated Offset Costs:	$ 14.53	per ton		$144,570

Notes:
If GHG Allowances are purchased to offset CO2e increase, only the amount over the SB County Planning significance threshold must be purchased.

Offset Allowance Price Per Ton based on the reserve price for the upcoming February 2018 Cap-and-Trade Auction.

		Truck Capacity (bbl/truck)	**Crude Transported (bbl/year)**
Potential Maximum Volume Crude Transported to Markets:		160	3,971,200

T7 Tractor Diesel Truck Emission Factors (EMFAC2014).												
			Emission Factors									
Year			ROG	NOx	PM_{10}	$PM_{2.5}$	CO	SO_2	CO_2	CH_4	N_2O	
2018 Factors - 2017+ Vehicles (Santa Barbara Co.)	Running Exhaust	lb/mile	0.00012	0.00169	0.00067	0.00017	0.00070	0.00003	3.14176	0.00003	0.00011	
	Idle Exhaust	lb/vehicle/day	0.00089	0.02714	0.00000	0.00000	0.00329	0.00009	9.73860			

On-road Vehicle Paved Road Dust Entrainment Emission Factors (pounds/mile):

Variable	Reference	Symbol	Value	Unit
PM_{10} particle size multiplier	EPA AP-42 Table 13.2.1-1	k	0.0022	--
$PM_{2.5}$ particle size multiplier	EPA AP-42 Table 13.2.1-1	k	0.00054	--
Road silt loading	CalEEMod 2013.2 value	sL	0.10	g/m^2
Average vehicle weight	CalEEMod 2013.2 value	W	2.4	tons
Paved Road Dust Entrainment		PM_{10}:	6.61E-04	lb/mile
		$PM_{2.5}$:	1.62E-04	lb/mile

$$Ef = k(sL)^{0.91} \times W^{1.02}$$

Notes:

1. Trip distances assume:
   a. 54 miles from the ExxonMobil Las Flores Canyon facility to the Phillips 66 Santa Maria truck rack located at 1580 East Battles Road in Santa Maria.
   b. 57 miles from the ExxonMobil Las Flores Canyon facility to the Santa Barbara County-San Luis Obispo County line.
   c. 139 total miles (within Santa Barbara, San Luis Obispo, and Kern Counties) from the ExxonMobil Las Flores Canyon facility to the Plains Pentland truck rack located at 2311 Basic School Road in Maricopa.
2. Duration (days) is based on the total crude to be transported and the estimated number of truck trips per day, assuming each truck can carry up to: 160 bbl
3. Truck transportation is expected to occur from 2019 - 2022.
4. Source for 2018 T7 Tractor engine emission factors: CARB EMFAC2014 Database - EMFAC2011 vehicle category, emission rate data. (documented separately), including the PM_{10} and $PM_{2.5}$ on-road vehicle paved road dust entrainment emission factors documented above.
5. Fleet size of 20 is based on maximum number of daily trips, and estimated number of trucks to accommodate these trips. The Fleet size is applied in determining the idle exhaust portion of the total emissions.
6. Source for on-road vehicle paved road dust entrainment emission factors: U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors* (AP-42), Section 13.2.1 Paved Roads, Equation 1. CalEEMod 2013.2 assumes a road silt loading of 0.1 g/m^2 and an average vehicle weight of 2.4 tons for Santa Barbara County (*CalEEMod Users Guide Version 2013.2* , Appendix D (Default Data Tables), Table 4.1, July 2013).
7. Conversion factors:
   Global warming potential for methane: 25
   Global warming potential for nitrous oxide: 298
   2,000 pounds/ton
   0.45359 kilograms/pound)
   1,000 kilograms/metric ton

Table B-5. Santa Barbara County On-road T7 Tractor Diesel Engine Emission Factors

	2018 EMFAC2014 Annual Average EMFAC2011 Vehicle Category Emission Factors - T7 Tractor 2017 and Later Vehicles	
	Running Exhaust	Idle Exhaust
Parameter	lb/mile	lb/vehicle/day
Criteria Pollutants		
ROG	0.000118	0.000890
CO	0.000697	0.003290
NOx	0.001691	0.027141
PM_{10}	0.000007	0.000003
$PM_{2.5}$	0.000007	0.000003
SOx	0.000030	0.000093
Greenhouse Gases		
CO_2	3.14176	9.73860
CH_4	0.00003	N/A
N_2O	0.00011	N/A

Notes:

1 EMFAC2014 criteria pollutant and CO_2 emission factors for on-road heavy-heavy diesel trucks are derived from the California Air Resources Board's EMFAC2014 2018 emission estimates for Santa Barbara County. Source: California Air Resources Board, EMFAC2014 Web Database (v1.0.7) (undated), emissions data option, available at www.arb.ca.gov/emfac/2014/ (accessed January 15, 2018). Data reflects the use specific vehicle model years (2017, 2018, 2019) and aggregated vehicle speeds)

2 Vehicle Category based on EMFAC2011 vehicle definitions, applied the T7 Tractor vehicle type as directed by the SBC APCD.

3 Vehicle emissions based on the reported "emission rate" data for the specified vehicle category. This data is reported in terms of g/mile (running exhaust) and g/vehicle/day (idle exhaust).

The running exhaust factor includes emissions from running exhaust, tire wear, and brake wear.

4 CARB received approval of EMFAC2014 by the U.S. Environmental Protection Agency as of 12/14/2015.

5 Carbon dioxide (CO_2) emission factors account for the California Low Carbon Fuel Standard (LCFS) enacted by the California Air Resources Board in 2009.

6 Methane (CH4) and nitrous oxide (N2O) emissions are calculated based on emission factors developed for the California Air Resources Board 2000-2014 Greenhouse Gas Emissions Inventory. Source: California Air Resources Board, Documentation of California's Greenhouse Gas Inventory (9th Edition, last updated March 30, 2016), data for 2014, Category 1A3biii - Road Transportation - Heavy-duty Trucks and Buses - Distillate, available at www.arb.ca.gov/cc/inventory/doc/doc_index.php (accessed April 13, 2017).

0.090 grams methane/gallon of diesel
0.332 grams nitrous oxide/gallon of diesel

6a The use of these factors in terms of g/gallon required the fuel consumption and VMT data for the T7 tractor category which is included in the "Emissions" data of EMFAC2011, not in the "Emissions Rate" data specified for use by the SBC APCD.

7 Criteria pollutant emission factors include total emissions for each pollutant. In addition to running exhaust emissions, emission factors include idle exhaust emissions. PM10 and PM2.5 factors also include emissions from brake wear and tire wear.

8 Conversion factors:
2000 pounds/ton
453.59 grams/pound

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SYU Restart - LFC Interim Trucking
Table B-1 Emission Summary

ExxonMobil - Santa Ynez Unit
ExxonMobil Interium Trucking for SYU Phased Restart

STATIONARY IMPACTS

Emission Source	Reactive Organic Compounds			
SUMMARY	lb/hr	lb/day	TPQ	Total Emissions (Tons/Yr)
Fugitive Hydrocarbon Components	0.244	5.859	0.267	1.069
Crude Loading Activity - VRU	6.002	52.520	2.396	9.585
Total Increase:	**6.246**	**58.379**	**2.664**	**10.654**

GHG - CO_2e			
lb/hr	lb/day	TPQ	Total Emissions (Metric Tons/Yr)
5.305	127.328	5.270	21.080
16.379	143.317	5.932	23.728
21.684	**270.645**	**11.202**	**44.808**

Notes:

[1] Hourly and daily emissions assume the maximum loading rate proposed, 8 trucks/hour and 70 trucks/day.

[2] Fugitive Hydrocarbon components include piping components associated with crude loading activity and the LACT units.

[3] GHG emissions from fugitive components and crude loading operations conservatively assume that the difference between the THC and ROC emissions represents methane emissions.

Emission Source	lb/hr						lb/hr
	NO_x	ROC	CO	SO_x	PM	PM_{10}	GHG - CO_2e
Fugitive Hydrocarbon Components		0.24					5.31
Crude Loading Activity		6.00					16.38
Total Increase:	**0.00**	**6.25**	**0.00**	**0.00**	**0.00**	**0.00**	**21.68**

Emission Source	lb/day						lb/day
	NO_x	ROC	CO	SO_x	PM	PM_{10}	GHG - CO_2e
Fugitive Hydrocarbon Components		5.86					127.33
Crude Loading Activity		52.52					143.32
Total Increase:	**0.00**	**58.38**	**0.00**	**0.00**	**0.00**	**0.00**	**270.64**

Emission Source	TPQ						TPQ
	NO_x	ROC	CO	SO_x	PM	PM_{10}	GHG - CO_2e
Fugitive Hydrocarbon Components		0.27					5.27
Crude Loading Activity		2.40					5.93
Total Increase:	**0.00**	**2.66**	**0.00**	**0.00**	**0.00**	**0.00**	**11.20**

Emission Source	Total Tons/Yr						Total Tons/Yr
	NO_x	ROC	CO	SO_x	PM	PM_{10}	GHG - CO_2e
Fugitive Hydrocarbon Components		1.07					21.08
Crude Loading Activity - VRU		9.58					23.73
Total Increase:	**0.00**	**10.65**	**0.00**	**0.00**	**0.00**	**0.00**	**44.81**

Emission Offset Evaluation	TPQ						
	NO_x	ROC	CO	SO_x	PM	PM_{10}	
Total Emissions to Offset:	0.000	2.664					ROC- TPY
Total ERCs Required at a 1.3:1 ratio (TPQ):	0.000	3.463					13.850

Notes:

[1] Hourly and daily emissions assume the maximum loading rate proposed, 8 trucks/hour and 70 trucks/day.

[2] Fugitive Hydrocarbon components include piping components associated with crude loading activity and the LACT units.

[3] GHG emissions from fugitive components and crude loading operations conservatively assume that the difference between the THC and ROC emissions represents methane emissions.

[4] Source of Emission Reduction Credits will be determined during the course of the permit application review and approval. Offset ratio per APCD Rule 804 Section D.8.

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SYU Restart - LFC Interim Trucking
Table B-2: Crude Loading Rack Emissions

Product Loading Activity Emission Calculations

Scenario 1 and 2
ExxonMobil Production

Exxon - SYU, Las Flores Canyon

Reference: Loading Rack
Rack Type: Enter X as Appropriate

		S Factor
Submerged loading of a clean cargo tank		0.50
Submerged loading: Dedicated normal service	x	0.60
Submerged loading: Dedicated vapor balance service		1.00
Splash loading of a clean cargo tank		1.45
Splash loading: Dedicated normal service		1.45
Splash loading: Dedicated vapor balance service		1.00

Input data			Reference
S = Saturation Factor	0.60	See AP-42 Table 4.4-1	2
M = Molecular Weight	50	Crude Oil: Default = 50 lb/lb-mole	3
P = True Vapor Pressure (psia)	3.780	See AP-42 Table 12.3-5	1
T = Liquid Temperature ^{0}R	560	100 ^{0}F + 460 = ^{0}R	5
C = Storage Capacity (bbl)	4,088,000	171,696,000 gallons (42 gallons = 1 bbl)	1
A = Annual Production (bbl)	4,088,000	171,696,000 gallons (42 gallons = 1 bbl)	1
R = Max Loading Rate (bbl/hr)	1280.00	53,760 gallons (42 gallons = 1 bbl)	1
D = Max Daily Production (bbl)	11,200	470,400 gallons (42 gallons = 1 bbl)	
D2 = Average Daily Production (bbl)	8,960	376,320 gallons (42 gallons = 1 bbl)	
eff = Vapor Recovery Efficiency	0.95	Default = 0.95 (SBC APCD)	1
ROC/THC = Reactivity	0.885	Crude Oil: Default = 0.885	

L_{LTHC} = Loading loss (lb/1000 gal) = 12.46 (S)(P)(M)/T = **2.5232** **lbTHC/1000 gal**
L_{L}ROC= Loading loss (lb/1000 gal) = 12.46 (S)(P)(M)*React/T = **2.2330** **lb ROC/1000 gal**

Total Uncontrolled Hydrocarbon Losses:

	ROC		THC	Estimated CH4, GHG
Hourly				
THL_H = (R)(42 gal/bbl)(L_{LROC}/1000) =	**120.05**	**lbs/hr**	**135.64**	15.60
Max Daily				
THL_D = (D)(42 gal/bbl)(L_{LROC}/1000) =	**1050.40**	**lbs/day**	**1186.89**	136.49
Average Daily				
THL_{D2} = (D2)(42 gal/bbl)(L_{LROC}/1000) =	**840.32**	**lbs/day**	**949.51**	109.19
Quarterly				
THL_Q = THLD(91)(1/2000) =	**47.92**	**TPQ**	**54.15**	6.23
Total Emissions				
THL_A = (A)(42 gal/bbl)(L_{LROC}/1000)(1/2000) =	**191.70**	**TPY**	**216.61**	24.91

Total Controlled Hydrocarbon Losses:

Hourly				
THL_{HC} = (THL_H)(1-eff) =	**6.00**	lbs/hr	**6.78**	0.78
Max Daily				
THL_{DC} = (THL_D)(1-eff) =	**52.52**	lbs/day	**59.34**	6.82
Quarterly				
$THLQ_C$ = (THLQ)(1-eff) =	**2.40**	TPQ	**2.71**	0.31
Total Emissions				
THL_{AC} = (THL_A)(1-eff) =	**9.58**	TPY	**10.83**	1.25

Notes:

1. Data provided by the applicant
   C = Annual Transport Volume.
2. AP-42, (Chapter 5, 5th Edition, January 1995), Table 5.2-1
3. If not otherwise provided, crude oil is assumed to be 50 lb/lb-mole.
4. Vapor pressure as measured from LFC Crude.
5. R is calculated by adding 460 to ^{0}F.
6. A maximum of 70 trucks will be loaded per day; up to 8 per hour. Actual number of trucks/day may be less.
7. The maximum daily rate of 70 trucks was used to determine the maximum quarterly and annual emissions.
8. GHG emissions from loadng operations conservatively assume that the difference between the THC and ROC emissions represents methane emissions.
9. Applied SBC APCD determined truck loading efficiency of 95%;

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Table B-3: Fugitive Hydrocarbon Component Emissions

Santa Barbara County APCD Fugitive ROC Emissions Calculation - CLP Method

Facility Type: (Choose *one* facility type by marking the box to the right of the facility type with an "x")								
Production Field		**Gas Processing Plant**	**x**	**Refinery**			**Offshore Platform**	

Component:		**Count**	**THC[1] Emission Factor (lb/day-clp)**	**ROC/THC Ratio**	**Uncontrolled ROC Emission (lb/day)**	**Control[2,3] Efficiency**	**ROC Emission Factor (Lb/day-clp)**	**Controlled ROC Emission (lb/hr)**	**Controlled ROC Emission (lb/day)**	**Controlled ROC Emission (Tons/Qtr)**	**Controlled ROC Emission (Total Tons)**	**Controlled CH4 Emission (lb/day)**	**Controlled CH4 Emission (Total Tons)**
Gas Condensate Service													
Valve	Accessible		1.058	0.38	0.00	0.80	0.080	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Inaccessible		1.058	0.38	0.00	0.80	0.080	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Unsafe		1.058	0.38	0.00	0.00	0.402	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Bellows / Background ppmv		1.058	0.38	0.00	1.00	0.000	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category A		1.058	0.38	0.00	0.84	0.064	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category B		1.058	0.38	0.00	0.85	0.060	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category C		1.058	0.38	0.00	0.87	0.052	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category E	58	1.058	0.38	23.12	0.88	0.048	0.12	2.77	0.13	0.51	4.526	0.83
Valve	Category G		1.058	0.38	0.00	0.92	0.032	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category H		1.058	0.38	0.00	0.90	0.040	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category H (Inaccessible)		1.058	0.38	0.00	0.90	0.040	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category I		1.058	0.38	0.00	0.92	0.032	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Accessible/Inaccessible		0.058	0.43	0.00	0.80	0.005	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Unsafe		0.058	0.43	0.00	0.00	0.025	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Category B		0.058	0.43	0.00	0.85	0.004	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Category C		0.058	0.43	0.00	0.87	0.003	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Category E	285	0.058	0.43	7.11	0.88	0.003	0.04	0.85	0.04	0.16	1.131	0.21
Connection	Category G		0.058	0.43	0.00	0.92	0.002	0.00	0.00	0.00	0.00	0.000	0.00
Compressor Seal	To VRS		10.794	0.20	0.00	1.00	0.000	0.00	0.00	0.00	0.00	0.000	0.00
Sub Total		343			30.23			0.15	3.63	0.17	0.66	5.66	1.03

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Table B-3: Fugitive Hydrocarbon Component Emissions

Component:		Count	THC[1] Emission Factor (lb/day-clp)	ROC/THC Ratio	Uncontrolled ROC Emission (lb/day)	Control[2,3] Efficiency	ROC Emission Factor (Lb/day-clp)	Controlled ROC Emission (lb/hr)	Controlled ROC Emission (lb/day)	Controlled ROC Emission (Tons/Qtr)	Controlled ROC Emission (Total Tons)	Controlled CH4 Emission (lb/day)	Controlled CH4 Emission (Total Tons)
Oil Service													
Valve	Accessible		0.012	0.85	0.00	0.80	0.002	0.00	0.000	0.00	0.00	0.000	0.00
Valve	Inaccessible		0.012	0.85	0.00	0.80	0.002	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Bellows / Background ppmv		0.4306	0.33	0.00	1.00	0.000	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category B		0.012	0.85	0.00	0.85	0.002	0.00	0.00	0.00	0.00	0.000	0.00
Valve	Category E	92	0.012	0.85	0.93	0.88	0.001	0.00	0.11	0.01	0.02	0.020	0.00
Valve	Category H		0.4306	0.33	0.00	0.90	0.014	0.00	0.0000	0.00	0.00	0.000	0.00
Valve	Category H (Inaccessible)		0.4306	0.33	0.00	0.90	0.014	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Accessible/Inaccessible		0.005	0.85	0.00	0.80	0.001	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Unsafe		0.005	0.85	0.00	0.00	0.004	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Category B		0.005	0.85	0.00	0.85	0.001	0.00	0.00	0.00	0.00	0.000	0.00
Connection	Category E	800	0.005	0.85	3.39	0.88	0.001	0.02	0.41	0.02	0.07	0.074	0.01
Pump Seal	Single	9	1.1	0.85	8.56	0.80	0.186	0.07	1.71	0.08	0.31	0.311	0.06
Pump Seal	Dual/Tandem		1.1	0.85	0.00	1.00	0.000	0.00	0.00	0.00	0.00	0.000	0.00
Sub Total		902			12.88			0.09	2.23	0.10	0.41	0.41	0.07
Total		**1244**			**43.11**			**0.24**	**5.86**	**0.27**	**1.07**	**6.06**	**1.11**

Notes:
1 APCD P&P # 6100.061.1998.
2 A 80% efficiency is assigned to fugitive components Rule 331 implementation.
3 Emission Control efficiencies for the "category x" components are identified in "FHC Control Factors (ver 2.0)"
4. Component count is estimated for four LACT units associated with the loading operations plus 15% contingent for additional components.
5. GHG emissions from fugitive components conservatively assume that the difference between the THC and ROC emissions represents methane emissions.

ExxonMobil - Santa Ynez Unit
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Combined Mobile and Stationary So

Vehicle Age:
Vehicle Type:

Crude Delivery Locations Trips per Day:
Potential Volume Crude Transported (bbl)

NOx: Daily Significance Threshold Exceeded? (Threshold - 55 lb NOx/day)
NOx: Daily Stationary Source Emissions (NOx lb/day)
NOx: Daily Mobile Source Emissions (NOx lb/day)
NOx: Daily Stationary + Mobile Source Emissions (NOx lb/day)
ROC: Daily Significance Threshold Exceeded? (Threshold - 55 lb ROC/day)
ROC: Daily Stationary Source Emissions (ROC lb/day)
ROC: Daily Mobile Source Emissions (ROC lb/day)
ROC: Daily Stationary + Mobile Source Emissions (ROC lb/day)
PM: Daily Significance Threshold Exceeded? (Threshold - 80 lb PM/day)
PM: Daily Stationary Source Emissions (PM lb/day)
PM: Daily Mobile Source Emissions (PM lb/day)
PM: Daily Stationary + Mobile Source Emissions (PM lb/day)

GHG: Annual GHG Significance Threshold Exceeded? (Threshold 1,000 MT CO_2e/year)
GHG: Annual Stationary Source Emissions (MT CO_2e/year)
GHG: Annual Mobile Source Emissions (MT CO_2e/year)
GHG: Annual Stationary + Mobile Source Emissions (MT CO_2e/year)
GHG: Estimated CO_2e Cap & Trade Mitigation Costs: ($/Yr)

Potential Stationary Source Emission Reduction C

ROC (TPY)

Note:
(1) Emission reductions occuring at a different stationa

EMFAC2014 (v1.0.7) Emission Rates
Region Type: Air District
Region: Santa Barbara County APCD
Calendar Year: 2018
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RU

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips
Santa Barbara County APCD	2018	T7 tractor	2014	Aggregated	DSL	7.861468376	1459.813077	0
Santa Barbara County APCD	2018	T7 tractor	2015	Aggregated	DSL	7.907210866	1537.993259	0
Santa Barbara County APCD	2018	T7 tractor	2016	Aggregated	DSL	7.349039663	1474.83916	0
Santa Barbara County APCD	2018	T7 tractor	2017	Aggregated	DSL	7.067558842	1435.256816	0
Santa Barbara County APCD	2018	T7 tractor	2018	Aggregated	DSL	4.913590179	997.8358801	0
Santa Barbara County APCD	2018	T7 tractor	2019	Aggregated	DSL	1.855050714	156.9656889	0

Total: [2014-2019]		7062.703881

Total: [2017-2019]		2590.058385

EMFAC2014 (v1.0.7) Emissions Inventory
Region Type: Air District
Region: Santa Barbara County APCD
Calendar Year: 2018
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips
Santa Barbara County APCD	2018	T7 tractor	2014	Aggregated	DSL	7.861468376	1459.813077	0
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Santa Barbara County APCD	2018	T7 tractor	2018	Aggregated	DSL	4.913590179	997.8358801	0
Santa Barbara County APCD	2018	T7 tractor	2019	Aggregated	DSL	1.855050714	156.9656889	0

Total: [2017-2019]	2590.058385

JNLS, g/vehicle/day for IDLEX, RESTL and DIURN

ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_RESTLOSS
0.071612799	0.403631212	0	0	0	0
0.064474864	0.403631212	0	0	0	0
0.059944263	0.403631212	0	0	0	0
0.055687013	0.403631212	0	0	0	0
0.051379017	0.403631212	0	0	0	0
0.047071023	0.403631212	0	0	0	0
0.35016898	0.000006				
0.053505175	0.403631212				

ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_TOTEX	ROG_DIURN	ROG_HTSK
0.000115237	3.49778E-06	0	0.000118735	0	0
0.000109307	3.51813E-06	0	0.000112825	0	0
9.74533E-05	3.26979E-06	0	0.000100723	0	0
8.81024E-05	3.14455E-06	0	9.12469E-05	0	0
5.65131E-05	2.18619E-06	0	5.86993E-05	0	0
8.14446E-06	8.25362E-07	0	8.96983E-06	0	0
0.00015276	6.1561E-06		0.000158916		

ROG_DIURN	TOG_RUNEX	TOG_IDLEX	TOG_STREX	TOG_HOTSOAK	TOG_RUNLOSS
0	0.08152572	0.45950341	0	0	0
0	0.073399725	0.45950341	0	0	0
0	0.068241981	0.45950341	0	0	0
0	0.063395426	0.45950341	0	0	0
0	0.0584911	0.45950341	0	0	0
0	0.053586776	0.45950341	0	0	0
	0.398640728	0.000007			
	0.060911569	0.45950341			

ROG_RUNLS	ROG_RESTL	ROG_TOTAL	TOG_RUNEX	TOG_IDLEX	TOG_STREX
0	0	0.000118735	0.000131189	3.98196E-06	0
0	0	0.000112825	0.000124438	4.00513E-06	0
0	0	0.000100723	0.000110943	3.7224E-06	0
0	0	9.12469E-05	0.000100298	3.57983E-06	0
0	0	5.86993E-05	6.43359E-05	2.48881E-06	0
0	0	8.96983E-06	9.27185E-06	9.39612E-07	0
		0.000158916	0.000173906	7.00825E-06	

TOG_RESTLOSS	TOG_DIURN	CO_RUNEX	CO_IDLEX	CO_STREX	NOx_RUNEX	NOx_IDLEX
0	0	0.422856941	1.492142544	0	1.327442645	12.31095201
0	0	0.380709096	1.492142544	0	1.030800246	12.31095201
0	0	0.35395695	1.492142544	0	0.921850145	12.31095201
0	0	0.328818877	1.492142544	0	0.819473477	12.31095201
0	0	0.303381163	1.492142544	0	0.715876494	12.31095201
0	0	0.277943454	1.492142544	0	0.612279538	12.31095201
		2.067666481	0.000021		5.427722545	0.000174
		0.315935631	1.492142544		0.767005499	12.31095201

TOG_TOTEX	TOG_DIURN	TOG_HTSK	TOG_RUNLS	TOG_RESTL	TOG_TOTAL	CO_RUNEX
0.000135171	0	0	0	0	0.000135171	0.000680448
0.000128443	0	0	0	0	0.000128443	0.000645434
0.000114666	0	0	0	0	0.000114666	0.000575439
0.000103878	0	0	0	0	0.000103878	0.000520224
6.68247E-05	0	0	0	0	6.68247E-05	0.000333697
1.02115E-05	0	0	0	0	1.02115E-05	4.80912E-05
0.000180914					0.000180914	0.000902012

NOx_STREX	CO2_RUNEX	CO2_IDLEX	CO2_STREX	PM10_RUNEX	PM10_IDLEX	PM10_STREX
0	1466.654904	4546.223051	0	0.004822454	0.001188356	0
0	1466.654904	4546.223051	0	0.004217301	0.001188356	0
0	1466.654904	4546.223051	0	0.003805752	0.001188356	0
0	1425.073102	4417.331007	0	0.003419035	0.001188356	0
0	1425.073102	4417.331007	0	0.003027708	0.001188356	0
0	1425.073102	4417.331007	0	0.00263638	0.001188356	0
	8675.184017	0.063639		0.02192863	0.000000	
	1425.073102	4417.331007		0.003220842	0.001188356	

CO_IDLEX	CO_STREX	CO_TOTEX	NOx_RUNEX	NOx_IDLEX	NOx_STREX	NOx_TOTEX
1.29306E-05	0	0.000693378	0.002136078	0.000106684	0.00038795	0.002630712
1.30058E-05	0	0.00065844	0.001747564	0.000107305	0.000392996	0.002247865
1.20877E-05	0	0.000587527	0.001498681	9.97301E-05	0.000365255	0.001963666
1.16248E-05	0	0.000531849	0.001296488	9.59103E-05	0.000351265	0.001743664
8.0819E-06	0	0.000341779	0.000787411	6.66799E-05	0.00024421	0.001098301
3.0512E-06	0	5.11424E-05	0.00010594	2.5174E-05	9.21979E-05	0.000223312
2.27579E-05		0.00092477	0.002189839	0.000187764	0.000687673	0.003065276

PM10_PMTW	PM10_PMBW	PM2_5_RUNEX	PM2_5_IDLEX	PM2_5_STREX	PM2_5_PMTW
0.03600001	0.061740018	0.004613837	0.001136948	0	0.009000003
0.03600001	0.061740018	0.004034862	0.001136948	0	0.009000003
0.03600001	0.061740018	0.003641117	0.001136948	0	0.009000003
0.03600001	0.061740018	0.003271129	0.001136948	0	0.009000003
0.03600001	0.061740018	0.00289673	0.001136948	0	0.009000003
0.03600001	0.061740018	0.002522332	0.001136948	0	0.009000003
0.216000062	0.370440106	0.020980007	0.000000		0.054000015
		0.00308151	0.001136948		

CO2_RUNEX	CO2_IDLEX	CO2_STREX	CO2_TOTEX	PM10_RUNEX	PM10_IDLEX
2.360094146	0.039396583	0	2.399490728	7.76014E-06	1.0298E-08
2.486488815	0.039625814	0	2.526114629	7.14979E-06	1.0358E-08
2.384386963	0.036828622	0	2.421215585	6.18713E-06	9.62679E-09
2.254607255	0.03441387	0	2.289021126	5.40925E-06	9.25806E-09
1.56747419	0.02392561	0	1.591399799	3.33025E-06	6.4365E-09
0.24657328	0.009032747	0	0.255606028	4.5616E-07	2.43E-09
4.068654725	0.067372227		4.136026953	9.19567E-06	1.81246E-08

PM2_5_PMBW	SOx_RUNEX	SOx_IDLEX	SOx_STREX
0.026460008	0.013992573	0.043373093	0
0.026460008	0.013992573	0.043373093	0
0.026460008	0.013992573	0.043373093	0
0.026460008	0.013595864	0.042143403	0
0.026460008	0.013595864	0.042143403	0
0.026460008	0.013595864	0.042143403	0
0.158760046	0.082765311	0.000001	
	0.013595864	0.042143403	

PM10_STREX	PM10_TOTEX	PM10_PMTW	PM10_PMBW	PM10_TOTAL	PM2_5_RUNEX	PM2_5_IDLEX
0	7.77044E-06	5.79301E-05	9.93501E-05	0.000165051	7.42444E-06	9.85255E-09
0	7.16015E-06	6.10325E-05	0.000104671	0.000172863	6.84049E-06	9.90988E-09
0	6.19676E-06	5.85263E-05	0.000100373	0.000165096	5.91948E-06	9.21034E-09
0	5.41851E-06	5.69556E-05	9.76788E-05	0.000160053	5.17525E-06	8.85756E-09
0	3.33669E-06	3.95973E-05	6.79094E-05	0.000110843	3.18619E-06	6.15806E-09
0	4.5859E-07	6.2289E-06	1.06826E-05	1.73701E-05	4.36426E-07	2.32488E-09
	9.21379E-06	0.000102782	0.000176271	0.000288266	8.79786E-06	1.73405E-08

PM2_5_STREX	PM2_5_TOTEX	PM2_5_PMTW	PM2_5_PMBW	PM2_5_TOTAL	SOx_RUNEX
0	7.43429E-06	1.44825E-05	4.25786E-05	6.44954E-05	2.25164E-05
0	6.8504E-06	1.52581E-05	4.48589E-05	6.69674E-05	2.37223E-05
0	5.92869E-06	1.46316E-05	4.30169E-05	6.35771E-05	2.27482E-05
0	5.18411E-06	1.42389E-05	4.18624E-05	6.12854E-05	2.151E-05
0	3.19235E-06	9.89933E-06	2.9104E-05	4.21957E-05	1.49544E-05
0	4.38751E-07	1.55723E-06	4.57824E-06	6.57422E-06	2.35242E-06
	8.81521E-06	2.56955E-05	7.55446E-05	0.000110055	3.88169E-05

SOx_IDLEX	SOx_STREX	SOx_TOTEX	Fuel_Consumption
3.75862E-07	0	2.28923E-05	0.215954166
3.78049E-07	0	2.41003E-05	0.227350317
3.51362E-07	0	2.30995E-05	0.217909403
3.28324E-07	0	2.18383E-05	0.206011901
2.28262E-07	0	1.51827E-05	0.143225982
8.61766E-08	0	2.4386E-06	0.023004542
6.42763E-07		3.94596E-05	0.372242426

Table 2
Fugitive Emission Factors for Oil and Gas Facilities
Using the Component Count Method (P&P 6100.061.1998)

	FACILITY TYPE				
	Production Field [1]		**Gas Processing Plant [2]**		**Refinery**
Component Type	THC EF lb/day-CLP	ROC/THC Ratio	THC EF lb/day-CLP	ROC/THC Ratio	THC EF lb/day-CLP
Gas/Condensate Service					
Valve	0.295	0.31	1.0580	0.38	1.4200
Connection	0.070	0.31	0.0580	0.43	0.0134
Compressor Seal	2.143	0.31	10.7940	0.20	33.6000
Pump Seal	1.123	0.31	3.3000	0.79	6.0000
Pressure Relief	6.670	0.31	9.9470	0.07	8.6400
Oil Service [5]					
Valve	0.0041	0.56	0.4306	0.33	0.0120
Connection	0.0020	0.56	0.0694	0.33	0.0134
Pump Seal	0.0039	0.56	1.3080	0.33	1.1040
Pressure Relief	0.2670	0.56	1.7400	0.33	0.0000

NOTES:

(1) Eaton, W.S. et al., "Fugitive Hydrocarbon Emissions From Petroleum Operations", American Petroleum Insttitute, Rocky
See Attachment 1 for tehmethodology used to consolidate the API emission factors .

(2) Harris, G.E. et al., "Frequency of Leak Occurence and Emission Factors for Natural Gas Factors for Natural Gas Liquid F
EPA DCN 82-222-018-04-48, July 1982. For oil service components, see page 3 of Attachment 1.

(3) EPA, AP-42, Table 5.1-2

(4) Santa Barbara County APCD, "Modeling of Fugitive Hydrocarbon Emissions", Tecolote Research Inc., January 1986. A
a crude oil site with a significant portion of gas components. For ROC/THC ratios for other facility types, please see pag

(5) Oil service includes water, oil and gas emulsions.

(6) "lb/day-CLP" = pound of pollutant per day for each component CLP.
"THC" = total hydrocarbons (includes methane and ethane)
"ROC" = reactive organic compounds (non-methane, non-ethane)

(3)	Offshore Platform (4)	
ROC/THC Ratio	THC EF lb/day-CLP	ROC/THC Ratio
0.99	0.2230	0.33
0.99	0.2230	0.33
0.99	0.2230	0.33
0.99	0.2230	0.33
0.99	0.2230	0.33
0.99	0.0133	0.33
0.99	0.0133	0.33
0.99	0.0133	0.33
0.99	0.0133	0.33

	757	758
Methane	0.613	0.458
Ethane	0.079	0.069
Benzene	0.001	0.001
C7 cycloparaffins	0.009	0.014
C8 Cycloparaffins	0.003	0.005
isobutane	0.002	0.004
Heptane	0.061	0.097
Hexane	0.052	0.083
Octane	0.046	0.072
Pentane	0.021	0.044
n-butane	0.043	0.063
Propane	0.07	0.09
	0.308	0.473

well International, March 1980,

Plants",

ssumes the facility is primarily
ge 63.

FHC Control Factors - With Additions Specific to Exxon - SYU

03/29/04

	Description	Notes	BACT	Vapor Recovery
1	Valve - Accessible	1		
1	Valve - Inaccessible	1		
2	Valve - Unsafe			
3	Valve - Bellows		x	
4	Valve - Bellows / Background ppmv	2	x	
5	Valve - Category A	3		
6	Valve - Category B			
7	Valve - Category C			
8	Valve - Category D			
9	Valve - Category E			
10	Valve - Category F	4	x	
11	Valve - Category G	4	x	
12	Valve - Category H	5		
12	Valve - Category H (Inaccessible)	5		
13	Valve - Category I	5		
14	Valve - Category J	6	x	
15	Connection - Accessible/Inaccessible			
16	Connection - Unsafe			
17	Connection - Category A	3		
18	Connection - Category B			
19	Connection - Category C			
20	Connection - Category D			
21	Connection - Category E			
22	Connection - Category F	4	x	
23	Connection - Category G	4	x	
24	Connection - Category H	6		
25	Connection - Category I	6		
26	Compressor Seal - To Atm			
27	Compressor Seal - To VRS			x
28	PSV - To Atm/Flare			
29	PSV - To VRS			x
30	Pump Seal - Single			
31	Pump Seal - Dual/Tandem			

Notes:

[1] "Standard" valves and connections/flanges subject to R331 (1000 ppmv/quarterly inspection) = 80% control

[2] Bellows valves with 100% control have a minor leak threshold of any OVA reading above background.

[3] Categories A through E are defined by lower leak threshold limits and/or increased monitoring frequency of standard co

[4] Categories F and G are BACT approved components that have been designed to perform at a lower leak threshold.

[5] Categories H and I valves are valves (LEV) that have been designed to perform at a lower leak threshold. These LEV va requirement. As such, these LEV valves are subject to the 1,000 ppmv LDAR per Rule 331, but maintain the 90% contro for monthly monitoring).

6 Category J valves are valves (LEV) that have been designed to perform at a lower leak threshold. These LEV valves we these LEV valves are subject to a 500 ppmv LDAR per BARCT, but maintain the 90% control efficiency designated for I

Monthly Inspections	LDAR 100 ppmv	LDAR 500 ppmv	Control Efficiency %
			80%
			80%
			0%
	x		90%
			100%
x			84%
		x	85%
	x		87%
x		x	87%
x	x		88%
	x		90%
x	x		92%
			90%
			90%
x			92%
		x	90%
			80%
			0%
x			84%
		x	85%
	x		87%
x		x	87%
x	x		88%
	x		90%
x	x		92%
			90%
x			92%
			80%
			100%
			80%
			100%
			80%
			100%

mponents.

alves were installed per ATC 5651; but not due to a BACT
l efficiency designated for LEV valves monitored quarterly (92%

ere installed prior to ATC 9047; and subject to BARCT. As such,
LEV valves monitored quarterly.

estart\Application Resubmittal 01.23.2018\[SYU IT Emission Calcs - Jan 2018.xlsx]Stationary Emissions