

Appendix H Air Quality and Greenhouse Gases Spreadsheets

**Encina Marine Oil Terminal Decommissioning: Pre-Decommissioning Debris Survey
Criteria Pollutants**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ²	Emission Factors: In-Use g/BHP-hr ³					Total Pounds/Segment					Tons					
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	
Survey boat - main engine	Diesel	298	1	38	48	5.06	0.20	0.22	0.11	3.73	60.63	2.40	2.64	1.32	44.70		0.030	0.001	0.001	0.001	0.022
Totals =>										60.6	2.4	2.6	1.32	44.7	Totals =>	0.03	0.00	0.00	0.00	0.02	

Notes:

¹ Load Factors for Survey boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming Work boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

² Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

³ Emission Factors derived from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

0.00025

**Encina Marine Oil Terminal Decommissioning: Onshore Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ²	Total Hours ³	Emission Factors: In-Use g/BHP-hr ³					Total Pounds/Segment					Tons				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ¹	Diesel	228	1	38	840	2.06	0.24	0.07	0.00	0.71	330.52	38.67	10.91	0.64	114.08	0.17	0.02	0.01	0.00	0.06
Bulldozer - CAT D9 ¹	Diesel	448	1	40	320	2.90	0.34	0.11	0.00	1.25	366.36	42.98	14.16	0.51	157.77	0.18	0.02	0.01	0.00	0.08
Front End Loader - CAT 992 ¹	Diesel	907	1	36	160	2.91	0.26	0.09	0.00	0.90	334.58	29.37	10.02	0.35	103.54	0.17	0.01	0.01	0.00	0.05
Rough Terrain Crane	Diesel	160	1	29	360	2.83	0.37	0.16	0.00	1.49	104.22	13.59	6.04	0.11	54.69	0.05	0.01	0.00	0.00	0.03
Concrete Pump - Cummins	Diesel	220	1	74	40	4.14	0.33	0.13	0.01	1.01	59.41	4.72	1.81	0.07	14.46	0.03	0.00	0.00	0.00	0.01
Generator - CAT XQ100	Diesel	173	1	74	700	4.35	0.49	0.21	0.01	2.21	859.00	96.81	41.88	0.99	437.01	0.43	0.05	0.02	0.00	0.22
Industrial Air Compressor	Diesel	48	1	48	240	2.92	1.41	0.32	0.00	3.42	35.60	17.16	3.91	0.05	41.70	0.02	0.01	0.00	0.00	0.02
Welding Machine	Diesel	33	1	45	50	2.68	1.20	0.28	0.00	2.96	4.39	1.96	0.46	0.00	4.85	0.00	0.00	0.00	0.00	0.00
Totals =>						2094.1	245.3	89.2	2.7	928.1	Totals =>	1.05	0.12	0.04	0.00	0.46				

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁴					Peak Pounds/Day					Days ⁵	Tons				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO _x g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO		NO _x	ROG	PM10	SO ₂	CO
110 bbl Vac Truck	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72	5	0.01	0.00	0.00	0.00	0.00
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	4.28	0.10	0.06	0.00	0.57	3	0.00	0.00	0.00	0.00	0.00
Transfer Dump	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72	7	0.01	0.00	0.00	0.00	0.01
Cement Truck	80	4	8.082	0.54	0.318	0.016	3.25	5.70	0.38	0.22	0.01	2.29	7	0.02	0.00	0.00	0.00	0.01
Totals =>			15.68	1.05	0.62	0.03	6.31	Totals =>	0.05	0.00	0.00	0.02						

Light-Duty Trucks

Commute Trips ⁷	Running Exhaust Emissions			Emission Factor, Grams/Mile ⁶				Pounds/Day					Days ⁵	Tons				
	Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO		SO ₂	NO _x	ROG	PM10	CO
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02	75	0.03	0.01	0.00	0.38	0.00
Totals =>			0.85	0.25	0.01	10.13	0.02	Totals =>	0.03	0.01	0.00	0.38	0.00					

Notes:

- ¹ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ² Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ³ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010 and 2014 for heavy equipment
- ⁴ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁷ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Estimates by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁸ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Offshore Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ^{1,2}	Total Hours ⁷	Emission Factors: In-Use g/BHP-hr ^{3,4}					Total Pounds/Segment					Tons					
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	
Derrick Barge - generator	Diesel	275	1	74	1320	4.08	0.32	0.12	0.01	0.99	2413.20	187.73	71.66	2.96	585.09	1.21	0.09	0.04	0.00	0.29	
Derrick Barge - crane	Diesel	285	1	29	860	2.70	0.27	0.10	0.00	0.76	422.78	42.47	15.98	0.47	118.31	0.21	0.02	0.01	0.00	0.06	
Derrick Barge - anchor winch	Diesel	238	1	74	500	4.08	0.32	0.12	0.01	0.99	791.10	61.54	23.49	0.97	191.81	0.40	0.03	0.01	0.00	0.10	
Derrick Barge - pull winch	Diesel	318	1	74	810	4.08	0.32	0.12	0.01	0.99	1712.37	133.21	50.85	2.10	415.17	0.86	0.07	0.03	0.00	0.21	
Tugboat #1 - main engines - CAT 3508	Diesel	1150	1	31	880	5.06	0.20	0.22	0.11	3.73	3499.61	138.32	152.16	76.08	2579.75	1.75	0.07	0.08	0.04	1.29	
Tugboat #1 - generator	Diesel	113	1	43	1320	4.87	0.75	0.38	0.01	2.72	688.47	105.34	54.01	0.71	385.17	0.34	0.05	0.03	0.00	0.19	
Tugboat #2 - main engines - CAT 3508	Diesel	1150	1	31	840	5.06	0.20	0.22	0.11	3.73	3340.54	132.04	145.24	72.62	2462.49	1.67	0.07	0.07	0.04	1.23	
Tugboat #2 - generator	Diesel	113	1	43	1260	4.87	0.75	0.38	0.01	2.72	657.18	100.55	51.56	0.67	367.66	0.33	0.05	0.03	0.00	0.18	
Crew Boat - main engines - Detroit S60	Diesel	450	1	38	440	5.06	0.20	0.22	0.11	3.73	839.32	33.17	36.49	18.25	618.71	0.42	0.02	0.02	0.01	0.31	
Crew Boat - generator	Diesel	113	1	32	1320	4.87	0.75	0.38	0.01	2.72	512.35	78.39	40.20	0.53	286.64	0.26	0.04	0.02	0.00	0.14	
Welding machine	Diesel	33	1	45	390	2.68	0.77	0.19	0.00	2.51	34.22	9.87	2.48	0.04	31.98	0.02	0.00	0.00	0.00	0.02	
Jet Pump XH150/CAT 3406	Diesel	465	1	74	460	3.76	0.20	0.07	0.00	0.84	1312.07	69.79	25.12	1.40	293.12	0.66	0.03	0.01	0.00	0.15	
Industrial Air Compressor	Diesel	142	1	48	175	3.08	0.90	0.22	0.00	2.87	80.99	23.61	5.81	0.11	75.42	0.04	0.01	0.00	0.00	0.04	
Diver's Air Compressor	Diesel	38	1	48	1090	2.92	0.90	0.22	0.00	2.98	127.99	39.45	9.64	0.18	130.62	0.06	0.02	0.00	0.00	0.07	
Totals =>											16432.2	1155.5	684.7	177.1	8541.9	Totals =>	8.22	0.58	0.34	0.09	4.27

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁶					Peak Pounds/Day					Days ⁵	Tons				
			NO _x	ROG	PM10	SO _x	CO	NO _x	ROG	PM10	SO ₂	CO		NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57	48	0.03	0.00	0.00	0.00	0.01
Totals =>							1.43	0.10	0.06	0.00	0.57	Totals =>	0.03	0.00	0.00	0.00	0.01	

Notes:

- Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- Load Factors for Tugboat and Crew Boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming tugboat and Crew boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"
- Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kw-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)
- Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010.
- Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Beach Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ⁵	Emission Factors: In-Use g/BHP-hr ²					Total Pounds/Segment					Tons				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	1	38	600	2.06	0.24	0.07	0.00	0.71	236.08	27.62	7.79	0.46	81.48	0.12	0.01	0.00	0.00	0.04
Bulldozer - CAT D9	Diesel	448	1	40	370	2.90	0.34	0.11	0.00	1.25	423.61	49.70	16.37	0.58	182.42	0.21	0.02	0.01	0.00	0.09
Front End Loader - CAT 992	Diesel	907	1	36	310	2.91	0.26	0.09	0.00	0.90	648.25	56.90	19.41	0.67	200.61	0.32	0.03	0.01	0.00	0.10
Crawler Crane ⁷	Diesel	285	1	29	430	2.70	0.27	0.10	0.00	0.76	211.39	21.23	7.99	0.24	59.15	0.11	0.01	0.00	0.00	0.03

Totals =>	1519.3	155.5	51.6	1.9	523.7	Totals =>	0.76	0.08	0.03	0.00	0.26
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ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day					Days ⁴	Tons				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO _x g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO		NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57	2	0.00	0.00	0.00	0.00	0.00
Totals =>								1.43	0.10	0.06	0.00	0.57	Totals =>	0.00	0.00	0.00	0.00	0.00

Light-Duty Trucks

Commute Trips⁶

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵					Pounds/Day					Days ⁴	Tons				
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂		NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	18	0.220	0.065	0.004	2.610	0.004	0.70	0.21	0.01	8.28	0.01	65	0.02	0.01	0.00	0.27	0.00
Totals =>							0.70	0.21	0.01	8.28	0.01	Totals =>	0.02	0.01	0.00	0.27	0.00	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010
- ⁸ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Surf Zone Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ⁷	Emission Factors: In-Use g/BHP-hr ^{2,10}					Total Pounds/Segment					Tons				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ⁸	Diesel	228	1	38	160	2.06	0.24	0.07	0.00	0.71	62.96	7.37	2.08	0.12	21.73	0.03	0.00	0.00	0.00	0.01
Bulldozer - CAT D9 ⁸	Diesel	448	1	40	80	2.90	0.34	0.11	0.00	1.25	91.59	10.75	3.54	0.13	39.44	0.05	0.01	0.00	0.00	0.02
Front End Loader - CAT 992 ⁸	Diesel	907	1	36	40	2.91	0.26	0.09	0.00	0.90	83.65	7.34	2.51	0.09	25.89	0.04	0.00	0.00	0.00	0.01
Crawler Crane ⁹	Diesel	285	1	29	40	2.70	0.27	0.10	0.00	0.76	19.66	1.98	0.74	0.02	5.50	0.01	0.00	0.00	0.00	0.00
325 Diver's Air Compressor	Diesel	10	1	48	80	2.51	0.90	0.22	0.00	2.87	2.12	0.76	0.19	0.00	2.43	0.00	0.00	0.00	0.00	0.00
Diesel Driven Light Plant	Diesel	14	1	74	80	2.51	0.90	0.22	0.00	2.87	4.59	1.64	0.40	0.01	5.24	0.00	0.00	0.00	0.00	0.00
Derrick Barge - generator	Diesel	275	1	74	480	4.08	0.32	0.12	0.01	0.99	877.53	68.26	26.06	1.08	212.76	0.44	0.03	0.01	0.00	0.11
Derrick Barge - crane	Diesel	285	1	29	340	2.70	0.27	0.10	0.00	0.76	167.14	16.79	6.32	0.19	46.77	0.08	0.01	0.00	0.00	0.02
Derrick Barge - anchor winch	Diesel	238	1	74	95	4.08	0.32	0.12	0.01	0.99	150.31	11.69	4.46	0.18	36.44	0.08	0.01	0.00	0.00	0.02
Derrick Barge - pull winch	Diesel	318	1	74	100	4.08	0.32	0.12	0.01	0.99	211.40	16.45	6.28	0.26	51.26	0.11	0.01	0.00	0.00	0.03
Tugboat #1 - main engines - CAT 3508	Diesel	1150	1	31	320	5.06	0.20	0.22	0.11	3.73	1272.59	50.30	55.33	27.66	938.09	0.64	0.03	0.03	0.01	0.47
Tugboat #1 - generator	Diesel	113	1	43	480	4.87	0.75	0.38	0.01	2.72	250.35	38.31	19.64	0.26	140.06	0.13	0.02	0.01	0.00	0.07
Tugboat #2 - main engines - CAT 3508	Diesel	1150	1	31	120	5.06	0.20	0.22	0.11	3.73	477.22	18.86	20.75	10.37	351.78	0.24	0.01	0.01	0.01	0.18
Tugboat #2 - generator	Diesel	113	1	43	180	4.87	0.75	0.38	0.01	2.72	93.88	14.36	7.37	0.10	52.52	0.05	0.01	0.00	0.00	0.03
Crew Boat - main engines - Detroit S60	Diesel	450	1	45	160	5.06	0.20	0.22	0.11	3.73	361.43	14.29	15.71	7.86	266.43	0.18	0.01	0.01	0.00	0.13
Crew Boat - generator	Diesel	113	1	43	480	4.87	0.75	0.38	0.01	2.72	250.35	38.31	19.64	0.26	140.06	0.13	0.02	0.01	0.00	0.07
Air Compressor - CAT C-15	Diesel	540	1	48	60	1.66	0.17	0.05	0.00	0.58	56.91	5.83	1.85	0.10	19.75	0.03	0.00	0.00	0.00	0.01
Welding machine	Diesel	33	1	43	270	2.68	1.20	0.28	0.00	2.96	22.64	10.11	2.37	0.03	25.00	0.01	0.01	0.00	0.00	0.01
Jet Pump XH150/CAT 3406	Diesel	465	1	74	120	3.76	0.20	0.07	0.00	0.84	342.28	18.21	6.55	0.36	76.47	0.17	0.01	0.00	0.00	0.04
Industrial Air Compressor	Diesel	142	1	43	80	3.08	0.90	0.22	0.00	2.87	33.17	9.67	2.38	0.04	30.89	0.02	0.00	0.00	0.00	0.02
Diver's Air Compressor	Diesel	38	1	43	380	2.92	0.90	0.22	0.00	2.98	39.97	12.32	3.01	0.05	40.79	0.02	0.01	0.00	0.00	0.02
Totals =>						4871.75	373.58	207.19	49.17	2529.31	Totals =>	2.44	0.19	0.10	0.02	1.26				

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day					Days ⁵	Tons					
			NO _x	ROG	PM10	SO _x	CO	NO _x	ROG	PM10	SO ₂	CO		NO _x	ROG	PM10	SO ₂	CO	
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57	5	0.00	0.00	0.00	0.00	0.00	0.00
Totals =>							3.25	1.43	0.10	0.06	0.00	0.57	Totals =>	0.00	0.00	0.00	0.00	0.00	0.00

Light-Duty Trucks

Source	Miles/Trip	Trips/Day	Running Exhaust Emissions				Emission Factor, Grams/Mile ⁵					Pounds/Day					Days ⁶	Tons				
			NO _x	ROG	PM10	CO	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂		NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02	39	0.02	0.02	0.00	0.00	0.20	0.00			
Totals =>							0.85	0.25	0.01	10.13	0.02	Totals =>	0.02	0.00	0.00	0.20	0.00					

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity
- ⁸ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ⁹ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010
- ¹⁰ Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

**Encina Marine Oil Terminal Decommissioning: Post-Decommissioning Seafloor Survey
Criteria Pollutants**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ²	Emission Factors: In-Use g/BHP-hr ³					Total Pounds/Segment					Tons					
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO	
Survey boat - main engine	Diesel	298	1	38	48	5.06	0.20	0.22	0.11	3.73	60.63	2.40	2.64	1.32	44.70		0.03	0.00	0.00	0.00	0.02
Totals =>										60.6	2.4	2.6	1.32	44.7	Totals =>	0.03	0.00	0.00	0.001	0.02	

Notes:

¹ Load Factors for Survey boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming Work boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

² Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

³ Emission Factors derived from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

Encina Marine Oil Terminal Decommissioning: Segment Worst Case Day (Stand Alone)^{1,2}

Criteria Pollutants

Encina MOT Decommissioning - Criteria Pollutants Emissions Summary		NO _x	ROG	PM10	SO ₂	CO
Pre-Survey	Pounds/Day	15.16	0.60	0.66	0.33	11.17
	Tons	0.03	0.00	0.00	0.00	0.02
Onshore Decommissioning	Pounds/Day	61.88	6.39	2.39	0.11	35.01
	Tons	1.13	0.14	0.05	0.00	0.86
Offshore Decommissioning	Pounds/Day	155.68	11.17	6.51	1.65	80.91
	Tons	8.25	0.58	0.34	0.09	4.28
Beach Decommissioning	Pounds/Day	35.88	3.70	1.20	0.06	20.44
	Tons	0.78	0.08	0.03	0.00	0.53
Surf Zone Decommissioning	Pounds/Day	144.44	12.67	5.74	1.03	76.62
	Tons	2.46	0.19	0.10	0.22	1.27
Post-Survey	Pounds/Day	15.16	0.60	0.66	0.33	11.17
	Tons	0.03	0.00	0.00	0.00	0.02

TOTAL - PROJECT AIR EMISSIONS	NO _x	ROG	PM10	SO ₂	CO
Maximum Pounds/Day ³	217.56	17.56	8.90	1.75	115.92
Total Construction Related Emissions/ Tons	12.68	0.99	0.52	0.32	6.99

Notes:

¹ These maximum values (pounds/day) are for the worst case day for each Segment when not combined with simultaneous Segments

² Per Appendix A, Table A1-1 Preliminary Decommissioning Schedule (Onshore and Offshore Segments) will occur simultaneously and (Beach and Surfzone Segment) will occur simultaneously

³ Maximum Pounds/Day for Nox, ROG, PM10, SO2 and CO would be expected from simultaneous operations including the Onshore and Offshore Decommissioning Segments

However, according to Table A1-1 Preliminary Decommissioning Schedule, Worst Case Day for each Segment would not occur simultaneously - see next table for further clarification

Encina Marine Oil Terminal Decommissioning: Segment Worst Case Day (Per Table 2.6-1 Preliminary Decommissioning Schedule including some overlapping segments) ¹
 Criteria Pollutants

Encina MOT Decommissioning - Criteria Pollutants Emissions Summary		NO _x	ROG	PM10	SO ₂	CO
Pre-Survey	Pounds/Day	15.16	0.60	0.66	0.33	11.17
	Tons	0.03	0.00	0.00	0.00	0.02
Onshore Decommissioning ²	Pounds/Day	61.88	6.39	2.39	0.11	35.01
	Tons	1.13	0.14	0.05	0.00	0.86
Offshore Decommissioning ²	Pounds/Day	152.72	10.76	6.38	1.64	79.60
	Tons	8.25	0.58	0.34	0.09	4.28
Beach Decommissioning ³	Pounds/Day	27.05	2.79	0.91	0.05	17.34
	Tons	0.78	0.08	0.03	0.00	0.53
Surf Zone Decommissioning ³	Pounds/Day	144.44	12.67	5.74	1.03	76.62
	Tons	2.46	0.19	0.10	0.22	1.27
Post-Survey	Pounds/Day	15.16	0.60	0.66	0.33	11.17
	Tons	0.03	0.00	0.00	0.00	0.02

TOTAL - PROJECT AIR EMISSIONS	NO _x	ROG	PM10	SO ₂	CO
Maximum Pounds/Day (Onshore and Offshore) ²	214.60	17.15	8.77	1.75	114.61
Maximum Pounds/Day (Beach and Surf Zone) ³	171.49	15.46	6.65	1.08	93.96
Maximum Pounds/Day (Worst Case) ⁴	214.60	17.15	8.77	1.75	114.61
Total Construction Related Emissions/ Tons	12.68	0.99	0.52	0.32	6.99
Peak Tons/Year ⁵	9.44	0.72	0.39	0.09	5.19

Notes:

¹ Per Appendix A, Table A1-1 Preliminary Decommissioning Schedule (Onshore and Offshore Segments) will occur simultaneously and (Beach and Surfzone Segment) will occur simultaneously

² Maximum Pounds/Day for NO_x, ROG, PM10, SO₂ and CO are expected from the (Excavate/Remove Offshore Pipeline) phase of the Offshore Segment occurring simultaneously with the (Cut/Demolish End Structure Vertical Vault) phase of the Onshore Segment per Table A1-1 Preliminary Decommissioning Schedule

³ Maximum Pounds/Day for NO_x, ROG, PM10, SO₂ and CO are expected from the (Restore Rip Rap Groin) phase of the Beach Segment occurring simultaneously with the (Excavate and Prepare) for Surf Zone Segment per Table A1-1 Preliminary Decommissioning Schedule

⁴ Maximum (Worst Case Day) Pounds/Day for NO_x, ROG, PM10, SO₂ and CO is expected from simultaneous operations including the Onshore and Offshore Decommissioning Segments

⁵ Peak Tons/Year was estimated per Table A1-1 Preliminary Decommissioning Schedule (September 2015 through August 2016) [Includes Pre-Survey, Onshore, Offshore, and Post-Survey Segments]

**Encina Marine Oil Terminal Decommissioning: Pre-Decommissioning Debris Survey
Criteria Pollutants**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ²	Emission Factors: In-Use g/BHP-hr ³					Total Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Survey boat - main engine	Diesel	298	1	38	12	5.06	0.20	0.22	0.11	3.73	15.16	0.60	0.66	0.33	11.17
Totals =>										15.2	0.6	0.7	0.33	11.2	

Notes:

¹ Load Factors for Survey boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming Work boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

² Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

³ Emission Factors derived from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

**Encina Marine Oil Terminal Decommissioning: (Remove Submarine Pipeline from Underpass) Onshore Segment Decommissioning Activities (10 days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ²	Hours per Day	Emission Factors: In-Use g/BHP-hr ³					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ¹	Diesel	228	1	38	8	2.06	0.24	0.07	0.00	0.71	3.15	0.37	0.10	0.01	1.09
Bulldozer - CAT D9 ¹	Diesel	448	1	40	0	2.90	0.34	0.11	0.00	1.25	0.00	0.00	0.00	0.00	0.00
Front End Loader - CAT 992 ¹	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Rough Terrain Crane	Diesel	160	1	29	8	2.83	0.37	0.16	0.00	1.49	2.32	0.30	0.13	0.00	1.22
Concrete Pump - Cummins	Diesel	220	1	74	0	4.14	0.33	0.13	0.01	1.01	0.00	0.00	0.00	0.00	0.00
Generator - CAT XQ100	Diesel	173	1	74	10	4.35	0.49	0.21	0.01	2.21	12.27	1.38	0.60	0.01	6.24
Industrial Air Compressor	Diesel	48	1	48	6	2.92	1.41	0.32	0.00	3.42	0.89	0.43	0.10	0.00	1.04
Welding Machine	Diesel	33	1	45	5	2.68	1.20	0.28	0.00	2.96	0.44	0.20	0.05	0.00	0.48
Totals =>											19.1	2.7	1.0	0.0	10.1

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁴					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
110 bbl Vac Truck	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Transfer Dump	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Cement Truck	80	4	8.082	0.54	0.318	0.016	3.25	5.70	0.38	0.22	0.01	2.29
Totals =>							15.68	1.05	0.62	0.03	6.31	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁶				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>							0.85	0.25	0.01	10.13	0.02	

Notes:

- ¹ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ² Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ³ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010 and 2014 for heavy equipment (he)
- ⁴ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁷ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Estimates by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

**Encina Marine Oil Terminal Decommissioning: (Remove Electrical/Piping/Appurtenances-Plug the Fill w/ Slurry Slug) Onshore Segment Decommissioning Activities (10 days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ²	Hours per Day	Emission Factors: In-Use g/BHP-hr ³					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ¹	Diesel	228	1	38	8	2.06	0.24	0.07	0.00	0.71	3.15	0.37	0.10	0.01	1.09
Bulldozer - CAT D9 ¹	Diesel	448	1	40	0	2.90	0.34	0.11	0.00	1.25	0.00	0.00	0.00	0.00	0.00
Front End Loader - CAT 992 ¹	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Rough Terrain Crane	Diesel	160	1	29	8	2.83	0.37	0.16	0.00	1.49	2.32	0.30	0.13	0.00	1.22
Concrete Pump - Cummins	Diesel	220	1	74	2	4.14	0.33	0.13	0.01	1.01	2.97	0.24	0.09	0.00	0.72
Generator - CAT XQ100	Diesel	173	1	74	10	4.35	0.49	0.21	0.01	2.21	12.27	1.38	0.60	0.01	6.24
Industrial Air Compressor	Diesel	48	1	48	6	2.92	1.41	0.32	0.00	3.42	0.89	0.43	0.10	0.00	1.04
Welding Machine	Diesel	33	1	45	0	2.68	1.20	0.28	0.00	2.96	0.00	0.00	0.00	0.00	0.00
Totals =>											21.6	2.7	1.0	0.0	10.3

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁴					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
110 bbl Vac Truck	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Transfer Dump	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Cement Truck	80	4	8.082	0.54	0.318	0.016	3.25	5.70	0.38	0.22	0.01	2.29
Totals =>							15.68	1.05	0.62	0.03	6.31	

Light-Duty Trucks

Commute Trips ⁷	Running Exhaust Emissions			Emission Factor, Grams/Mile ⁶				Pounds/Day				
	Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>								0.85	0.25	0.01	10.13	0.02

Notes:

- ¹ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ² Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ³ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010 and 2014 for heavy equipment (he)
- ⁴ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁷ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Estimates by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

**Encina Marine Oil Terminal Decommissioning: (Cut/Demolish End Structure Vertical Vault) Onshore Segment Decommissioning Activities (15 days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ²	Hours per Day	Emission Factors: In-Use g/BHP-hr ³					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ¹	Diesel	228	2	38	8	2.06	0.24	0.07	0.00	0.71	6.30	0.74	0.21	0.01	2.17
Bulldozer - CAT D9 ¹	Diesel	448	1	40	8	2.90	0.34	0.11	0.00	1.25	9.16	1.07	0.35	0.01	3.94
Front End Loader - CAT 992 ¹	Diesel	907	1	36	8	2.91	0.26	0.09	0.00	0.90	16.73	1.47	0.50	0.02	5.18
Rough Terrain Crane	Diesel	160	1	29	0	2.83	0.37	0.16	0.00	1.49	0.00	0.00	0.00	0.00	0.00
Concrete Pump - Cummins	Diesel	220	1	74	0	4.14	0.33	0.13	0.01	1.01	0.00	0.00	0.00	0.00	0.00
Generator - CAT XQ100	Diesel	173	1	74	10	4.35	0.49	0.21	0.01	2.21	12.27	1.38	0.60	0.01	6.24
Industrial Air Compressor	Diesel	48	1	48	6	2.92	1.41	0.32	0.00	3.42	0.89	0.43	0.10	0.00	1.04
Welding Machine	Diesel	33	1	45	0	2.68	1.20	0.28	0.00	2.96	0.00	0.00	0.00	0.00	0.00
Totals =>											45.3	5.1	1.8	0.1	18.6

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁴					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
110 bbl Vac Truck	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Transfer Dump	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Cement Truck	80	4	8.082	0.54	0.318	0.016	3.25	5.70	0.38	0.22	0.01	2.29
Totals =>							15.68	1.05	0.62	0.03	6.31	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁶				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>							0.85	0.25	0.01	10.13	0.02	

Notes:

- ¹ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ² Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ³ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010 and 2014 for heavy equipment (he)
- ⁴ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁷ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Estimates by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

**Encina Marine Oil Terminal Decommissioning: (Form Underpass Openings/Cement Underpass) Onshore Segment Decommissioning Activities (20 days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ²	Hours per Day	Emission Factors: In-Use g/BHP-hr ³					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ¹	Diesel	228	2	38	8	2.06	0.24	0.07	0.00	0.71	6.30	0.74	0.21	0.01	2.17
Bulldozer - CAT D9 ¹	Diesel	448	1	40	8	2.90	0.34	0.11	0.00	1.25	9.16	1.07	0.35	0.01	3.94
Front End Loader - CAT 992 ¹	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Rough Terrain Crane	Diesel	160	1	29	8	2.83	0.37	0.16	0.00	1.49	2.32	0.30	0.13	0.00	1.22
Concrete Pump - Cummins	Diesel	220	1	74	1	4.14	0.33	0.13	0.01	1.01	1.49	0.12	0.05	0.00	0.36
Generator - CAT XQ100	Diesel	173	1	74	10	4.35	0.49	0.21	0.01	2.21	12.27	1.38	0.60	0.01	6.24
Industrial Air Compressor	Diesel	48	1	48	0	2.92	1.41	0.32	0.00	3.42	0.00	0.00	0.00	0.00	0.00
Welding Machine	Diesel	33	1	45	0	2.68	1.20	0.28	0.00	2.96	0.00	0.00	0.00	0.00	0.00
Totals =>											31.5	3.6	1.3	0.0	13.9

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁴					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
110 bbl Vac Truck	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	4.28	0.10	0.06	0.00	0.57
Transfer Dump	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Cement Truck	80	4	8.082	0.54	0.318	0.016	3.25	5.70	0.38	0.22	0.01	2.29
Totals =>								15.68	1.05	0.62	0.03	6.31

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁶				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>								0.85	0.25	0.01	10.13	0.02

Notes:

- ¹ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ² Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ³ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010 and 2014 for heavy equipment (he)
- ⁴ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁷ Commute trips derived from Appendix A, Table A2.-1 Manpower and Equipment Estimates by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

**Encina Marine Oil Terminal Decommissioning: (Demolish Top 5' of Beach Valve Pit Vert Vault) Onshore Segment Decommissioning Activities (5 days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ²	Hours per Day	Emission Factors: In-Use g/BHP-hr ³					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329 ¹	Diesel	228	2	38	8	2.06	0.24	0.07	0.00	0.71	6.30	0.74	0.21	0.01	2.17
Bulldozer - CAT D9 ¹	Diesel	448	1	40	0	2.90	0.34	0.11	0.00	1.25	0.00	0.00	0.00	0.00	0.00
Front End Loader - CAT 992 ¹	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Rough Terrain Crane	Diesel	160	1	29	8	2.83	0.37	0.16	0.00	1.49	2.32	0.30	0.13	0.00	1.22
Concrete Pump - Cummins	Diesel	220	1	74	0	4.14	0.33	0.13	0.01	1.01	0.00	0.00	0.00	0.00	0.00
Generator - CAT XQ100	Diesel	173	1	74	10	4.35	0.49	0.21	0.01	2.21	12.27	1.38	0.60	0.01	6.24
Industrial Air Compressor	Diesel	48	1	48	6	2.92	1.41	0.32	0.00	3.42	0.89	0.43	0.10	0.00	1.04
Welding Machine	Diesel	33	1	45	0	2.68	1.20	0.28	0.00	2.96	0.00	0.00	0.00	0.00	0.00
Totals =>											21.8	2.9	1.0	0.0	10.7

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁴					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
110 bbl Vac Truck	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Transfer Dump	80	3	8.082	0.54	0.318	0.016	3.25	4.28	0.29	0.17	0.01	1.72
Cement Truck	80	4	8.082	0.54	0.318	0.016	3.25	5.70	0.38	0.22	0.01	2.29
Totals =>							15.68	1.05	0.62	0.03	6.31	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁶				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>							0.85	0.25	0.01	10.13	0.02	

Notes:

- ¹ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014 for heavy equipment
- ² Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ³ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010 and 2014 for heavy equipment (he)
- ⁴ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁷ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Estimates by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

**Encina Marine Oil Terminal Decommissioning: (Flush Submarine Pipeline) Offshore Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ^{1,2}	Hours per Day	Emission Factors: In-Use g/BHP-hr ^{3,4}					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Derrick Barge - generator	Diesel	275	1	74	12	4.08	0.32	0.12	0.01	0.99	21.94	1.71	0.65	0.03	5.32
Derrick Barge - crane	Diesel	285	1	29	4	2.70	0.27	0.10	0.00	0.76	1.97	0.20	0.07	0.00	0.55
Derrick Barge - anchor winch	Diesel	238	2	74	2	4.08	0.32	0.12	0.01	0.99	6.33	0.49	0.19	0.01	1.53
Derrick Barge - pull winch	Diesel	318	1	74	0	4.08	0.32	0.12	0.01	0.99	0.00	0.00	0.00	0.00	0.00
Tugboat #1 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #1 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Tugboat #2 - main engines - CAT 3508	Diesel	1150	2	31	0	5.06	0.20	0.22	0.11	3.73	0.00	0.00	0.00	0.00	0.00
Tugboat #2 - generator	Diesel	113	1	43	0	4.87	0.75	0.38	0.01	2.72	0.00	0.00	0.00	0.00	0.00
Crew Boat - main engines - Detroit S60	Diesel	450	2	38	2	5.06	0.20	0.22	0.11	3.73	7.63	0.30	0.33	0.17	5.62
Crew Boat - generator	Diesel	113	1	32	12	4.87	0.75	0.38	0.01	2.72	4.66	0.71	0.37	0.00	2.61
Welding machine	Diesel	33	2	45	0	2.68	0.77	0.19	0.00	2.51	0.00	0.00	0.00	0.00	0.00
Jet Pump XH150/CAT 3406	Diesel	465	1	74	8	3.76	0.20	0.07	0.00	0.84	22.82	1.21	0.44	0.02	5.10
Industrial Air Compressor	Diesel	142	1	48	5	3.08	0.90	0.22	0.00	2.87	2.31	0.67	0.17	0.00	2.15
Diver's Air Compressor	Diesel	38	1	48	8	2.92	0.90	0.22	0.00	2.98	0.94	0.29	0.07	0.00	0.96
Totals =>											106.7	7.8	4.2	0.9	50.8

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁶					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Notes:

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² Load Factors for Tugboat and Crew Boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming tugboat and Crew boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

³ Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

⁴ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010.

⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)

⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel

**Encina Marine Oil Terminal Decommissioning: (Excavate/Remove Offshore Pipeline) Offshore Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ^{1,2}	Hours per Day	Emission Factors: In-Use g/BHP-hr ^{3,4}					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Derrick Barge - generator	Diesel	275	1	74	12	4.08	0.32	0.12	0.01	0.99	21.94	1.71	0.65	0.03	5.32
Derrick Barge - crane	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Derrick Barge - anchor winch	Diesel	238	2	74	2	4.08	0.32	0.12	0.01	0.99	6.33	0.49	0.19	0.01	1.53
Derrick Barge - pull winch	Diesel	318	1	74	8	4.08	0.32	0.12	0.01	0.99	16.91	1.32	0.50	0.02	4.10
Tugboat #1 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #1 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Tugboat #2 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #2 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Crew Boat - main engines - Detroit S60	Diesel	450	2	38	2	5.06	0.20	0.22	0.11	3.73	7.63	0.30	0.33	0.17	5.62
Crew Boat - generator	Diesel	113	1	32	12	4.87	0.75	0.38	0.01	2.72	4.66	0.71	0.37	0.00	2.61
Welding machine	Diesel	33	2	45	4	2.68	0.77	0.19	0.00	2.51	0.70	0.20	0.05	0.00	0.66
Jet Pump XH150/CAT 3406	Diesel	465	1	74	4	3.76	0.20	0.07	0.00	0.84	11.41	0.61	0.22	0.01	2.55
Industrial Air Compressor	Diesel	142	1	48	1	3.08	0.90	0.22	0.00	2.87	0.46	0.13	0.03	0.00	0.43
Diver's Air Compressor	Diesel	38	1	48	10	2.92	0.90	0.22	0.00	2.98	1.17	0.36	0.09	0.00	1.20
Totals =>											151.3	10.7	6.3	1.6	79.0

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁶					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Notes:

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² Load Factors for Tugboat and Crew Boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming tugboat and Crew boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

³ Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

⁴ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010.

⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)

⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel

**Encina Marine Oil Terminal Decommissioning: (Remove Mooring and Debris) Offshore Segment Decommissioning Activities
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ^{1,2}	Hours per Day	Emission Factors: In-Use g/BHP-hr ^{3,4}					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Derrick Barge - generator	Diesel	275	1	74	12	4.08	0.32	0.12	0.01	0.99	21.94	1.71	0.65	0.03	5.32
Derrick Barge - crane	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Derrick Barge - anchor winch	Diesel	238	2	74	4	4.08	0.32	0.12	0.01	0.99	12.66	0.98	0.38	0.02	3.07
Derrick Barge - pull winch	Diesel	318	1	74	6	4.08	0.32	0.12	0.01	0.99	12.68	0.99	0.38	0.02	3.08
Tugboat #1 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #1 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Tugboat #2 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #2 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Crew Boat - main engines - Detroit S60	Diesel	450	2	38	2	5.06	0.20	0.22	0.11	3.73	7.63	0.30	0.33	0.17	5.62
Crew Boat - generator	Diesel	113	1	32	12	4.87	0.75	0.38	0.01	2.72	4.66	0.71	0.37	0.00	2.61
Welding machine	Diesel	33	1	45	2	2.68	0.77	0.19	0.00	2.51	0.18	0.05	0.01	0.00	0.16
Jet Pump XH150/CAT 3406	Diesel	465	1	74	4	3.76	0.20	0.07	0.00	0.84	11.41	0.61	0.22	0.01	2.55
Industrial Air Compressor	Diesel	142	1	48	4	3.08	0.90	0.22	0.00	2.87	1.85	0.54	0.13	0.00	1.72
Diver's Air Compressor	Diesel	38	1	48	10	2.92	0.90	0.22	0.00	2.98	1.17	0.36	0.09	0.00	1.20
Totals =>											154.3	11.1	6.5	1.6	80.3

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁵	Emission Factors, Input ⁶					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Notes:

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² Load Factors for Tugboat and Crew Boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming tugboat and Crew boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

³ Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kw-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

⁴ Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010.

⁵ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)

⁶ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel

**Encina Marine Oil Terminal Decommissioning: (Remove/Store Rip Rap Groin) Beach Segment Decommissioning Activities (20 Days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO _x	CO	NO _x	ROG	PM10	SO _x	CO
Excavator - CAT 329	Diesel	228	2	38	5	2.06	0.24	0.07	0.00	0.71	3.93	0.46	0.13	0.01	1.36
Bulldozer - CAT D9	Diesel	448	1	40	8	2.90	0.34	0.11	0.00	1.25	9.16	1.07	0.35	0.01	3.94
Front End Loader - CAT 992	Diesel	907	1	36	8	2.91	0.26	0.09	0.00	0.90	16.73	1.47	0.50	0.02	5.18
Crawler Crane ⁷	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Totals =>											33.76	3.40	1.13	0.04	11.58

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO _x g/mile	CO g/mile	NO _x	ROG	PM10	SO _x	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵					Pounds/Day				
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	18	0.220	0.065	0.004	2.610	0.004	0.70	0.21	0.01	8.28	0.01
Totals =>							0.70	0.21	0.01	8.28	0.01	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010

**Encina Marine Oil Terminal Decommissioning: (Remove Sand Cover/Excavate Pipeline) Beach Segment Decommissioning Activities (10 Days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	2	38	8	2.06	0.24	0.07	0.00	0.71	6.30	0.74	0.21	0.01	2.17
Bulldozer - CAT D9	Diesel	448	1	40	6	2.90	0.34	0.11	0.00	1.25	6.87	0.81	0.27	0.01	2.96
Front End Loader - CAT 992	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Crawler Crane ⁷	Diesel	285	1	29	0	2.70	0.27	0.10	0.00	0.76	0.00	0.00	0.00	0.00	0.00
Totals =>											13.2	1.5	0.5	0.0	5.1

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵					Pounds/Day				
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	18	0.220	0.065	0.004	2.610	0.004	0.70	0.21	0.01	8.28	0.01
Totals =>							0.70	0.21	0.01	8.28	0.01	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010

**Encina Marine Oil Terminal Decommissioning: (Remove Pipe/Cut Into Sections) Beach Segment Decommissioning Activities (10 Days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	2	38	8	2.06	0.24	0.07	0.00	0.71	6.30	0.74	0.21	0.01	2.17
Bulldozer - CAT D9	Diesel	448	1	40	0	2.90	0.34	0.11	0.00	1.25	0.00	0.00	0.00	0.00	0.00
Front End Loader - CAT 992	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Crawler Crane ⁷	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Totals =>											10.2	1.1	0.4	0.0	3.3

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵					Pounds/Day				
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	18	0.220	0.065	0.004	2.610	0.004	0.70	0.21	0.01	8.28	0.01
Totals =>							0.70	0.21	0.01	8.28	0.01	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010

Encina Marine Oil Terminal Decommissioning: (Restore Rip Rap Groin) Beach Segment Decommissioning Activities (20 Days)

Criteria Pollutants

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	1	38	4	2.06	0.24	0.07	0.00	0.71	1.57	0.18	0.05	0.00	0.54
Bulldozer - CAT D9	Diesel	448	1	40	6	2.90	0.34	0.11	0.00	1.25	6.87	0.81	0.27	0.01	2.96
Front End Loader - CAT 992	Diesel	907	1	36	6	2.91	0.26	0.09	0.00	0.90	12.55	1.10	0.38	0.01	3.88
Crawler Crane ⁷	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Totals =>											24.9	2.5	0.8	0.0	8.5

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵					Pounds/Day				
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	18	0.220	0.065	0.004	2.610	0.004	0.70	0.21	0.01	8.28	0.01
Totals =>							0.70	0.21	0.01	8.28	0.01	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010

**Encina Marine Oil Terminal Decommissioning: (Restore Beach Contours) Beach Segment Decommissioning Activities (20 Days)
Criteria Pollutants**

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	1	38	0	2.06	0.24	0.07	0.00	0.71	0.00	0.00	0.00	0.00	
Bulldozer - CAT D9	Diesel	448	1	40	6	2.90	0.34	0.11	0.00	1.25	6.87	0.81	0.27	0.01	
Front End Loader - CAT 992	Diesel	907	1	36	6	2.91	0.26	0.09	0.00	0.90	12.55	1.10	0.38	0.01	
Crawler Crane ⁷	Diesel	285	1	29	6	2.70	0.27	0.10	0.00	0.76	2.95	0.30	0.11	0.00	
Totals =>											22.4	2.2	0.8	0.0	7.7

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵					Pounds/Day				
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	18	0.220	0.065	0.004	2.610	0.004	0.70	0.21	0.01	8.28	0.01
Totals =>							0.70	0.21	0.01	8.28	0.01	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2014
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day
- ⁷ Emission factor from the URBEMIS 2007 Users' Guide, Version 9.2, Appendix I- Construction Equipment Emission Factors, with the base year of 2010

Encina Marine Oil Terminal Decommissioning: (Excavate and Prepare) Surf Zone Segment Decommissioning Activities (10 days)

Criteria Pollutants

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	2	38	8	2.06	0.24	0.07	0.00	0.71	6.30	0.74	0.21	0.01	2.17
Bulldozer - CAT D9	Diesel	448	1	40	8	2.90	0.34	0.11	0.00	1.25	9.16	1.07	0.35	0.01	3.94
Front End Loader - CAT 992	Diesel	907	1	36	4	2.91	0.26	0.09	0.00	0.90	8.36	0.73	0.25	0.01	2.59
Crawler Crane	Diesel	285	1	29	4	2.70	0.27	0.10	0.00	0.76	1.97	0.20	0.07	0.00	0.55
325 Diver's Air Compressor	Diesel	10	1	48	8	2.51	0.90	0.22	0.00	2.87	0.21	0.08	0.02	0.00	0.24
Diesel Driven Light Plant	Diesel	14	2	74	4	2.51	0.90	0.22	0.00	2.87	0.46	0.16	0.04	0.00	0.52
Derrick Barge - generator	Diesel	275	1	74	12	4.08	0.32	0.12	0.01	0.99	21.94	1.71	0.65	0.03	5.32
Derrick Barge - crane	Diesel	285	1	29	10	2.70	0.27	0.10	0.00	0.76	4.92	0.49	0.19	0.01	1.38
Derrick Barge - anchor winch	Diesel	238	3	74	1	4.08	0.32	0.12	0.01	0.99	4.75	0.37	0.14	0.01	1.15
Derrick Barge - pull winch	Diesel	318	1	74	4	4.08	0.32	0.12	0.01	0.99	8.46	0.66	0.25	0.01	2.05
Tugboat #1 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #1 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Tugboat #2 - main engines - CAT 3508	Diesel	1150	2	31	0	5.06	0.20	0.22	0.11	3.73	0.00	0.00	0.00	0.00	0.00
Tugboat #2 - generator	Diesel	113	1	43	0	4.87	0.75	0.38	0.01	2.72	0.00	0.00	0.00	0.00	0.00
Crew Boat - main engines - Detroit S60	Diesel	450	2	45	2	5.06	0.20	0.22	0.11	3.73	9.04	0.36	0.39	0.20	6.66
Crew Boat - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Air Compressor - CAT C-15	Diesel	540	2	48	0	1.66	0.17	0.05	0.00	0.58	0.00	0.00	0.00	0.00	0.00
Welding machine	Diesel	33	2	43	6	2.68	1.20	0.28	0.00	2.96	1.01	0.45	0.11	0.00	1.11
Jet Pump XH150/CAT 3406	Diesel	465	1	74	6	3.76	0.20	0.07	0.00	0.84	17.11	0.91	0.33	0.02	3.82
Industrial Air Compressor	Diesel	142	1	43	8	3.08	0.90	0.22	0.00	2.87	3.32	0.97	0.24	0.00	3.09
Diver's Air Compressor	Diesel	38	1	43	8	2.92	0.90	0.22	0.00	2.98	0.84	0.26	0.06	0.00	0.86
Totals =>											142.16	12.33	5.67	1.01	65.92

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Commuter Trips⁶

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>							0.85	0.25	0.01	10.13	0.02	

Notes:

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel

⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)

⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck

⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

Encina Marine Oil Terminal Decommissioning: (Extract) Surf Zone Segment Decommissioning Activities (15 days)
Criteria Pollutants

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	2	38	0	2.06	0.24	0.07	0.00	0.71	0.00	0.00	0.00	0.00	
Bulldozer - CAT D9	Diesel	448	1	40	0	2.90	0.34	0.11	0.00	1.25	0.00	0.00	0.00	0.00	
Front End Loader - CAT 992	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	
Crawler Crane	Diesel	285	1	29	0	2.70	0.27	0.10	0.00	0.76	0.00	0.00	0.00	0.00	
325 Diver's Air Compressor	Diesel	10	1	48	0	2.51	0.90	0.22	0.00	2.87	0.00	0.00	0.00	0.00	
Diesel Driven Light Plant	Diesel	14	2	74	0	2.51	0.90	0.22	0.00	2.87	0.00	0.00	0.00	0.00	
Derrick Barge - generator	Diesel	275	1	74	12	4.08	0.32	0.12	0.01	0.99	21.94	1.71	0.65	0.03	5.32
Derrick Barge - crane	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Derrick Barge - anchor winch	Diesel	238	3	74	1	4.08	0.32	0.12	0.01	0.99	4.75	0.37	0.14	0.01	1.15
Derrick Barge - pull winch	Diesel	318	1	74	4	4.08	0.32	0.12	0.01	0.99	8.46	0.66	0.25	0.01	2.05
Tugboat #1 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #1 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Tugboat #2 - main engines - CAT 3508	Diesel	1150	2	31	0	5.06	0.20	0.22	0.11	3.73	0.00	0.00	0.00	0.00	0.00
Tugboat #2 - generator	Diesel	113	1	43	0	4.87	0.75	0.38	0.01	2.72	0.00	0.00	0.00	0.00	0.00
Crew Boat - main engines - Detroit S60	Diesel	450	2	45	2	5.06	0.20	0.22	0.11	3.73	9.04	0.36	0.39	0.20	6.66
Crew Boat - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Air Compressor - CAT C-15	Diesel	540	2	48	2	1.66	0.17	0.05	0.00	0.58	3.79	0.39	0.12	0.01	1.32
Welding machine	Diesel	33	1	43	2	2.68	1.20	0.28	0.00	2.96	0.17	0.07	0.02	0.00	0.19
Jet Pump XH150/CAT 3406	Diesel	465	1	74	4	3.76	0.20	0.07	0.00	0.84	11.41	0.61	0.22	0.01	2.55
Industrial Air Compressor	Diesel	142	1	43	0	3.08	0.90	0.22	0.00	2.87	0.00	0.00	0.00	0.00	0.00
Diver's Air Compressor	Diesel	38	1	43	10	2.92	0.90	0.22	0.00	2.98	1.05	0.32	0.08	0.00	1.07
Totals =>											108.86	8.05	4.39	0.97	51.86

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>							0.85	0.25	0.01	10.13	0.02	

Notes:

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)

³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel

⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)

⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck

⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

Encina Marine Oil Terminal Decommissioning: (Section) Surf Zone Segment Decommissioning Activities (15 Days)
Criteria Pollutants

OFF-ROAD SOURCES

Source	Fuel	BHP	Number	Load Factor ¹	Hours per Day	Emission Factors: In-Use g/BHP-hr ²					Peak Pounds/Day				
						NO _x	ROG	PM10	SO ₂	CO	NO _x	ROG	PM10	SO ₂	CO
Excavator - CAT 329	Diesel	228	2	38	0	2.06	0.24	0.07	0.00	0.71	0.00	0.00	0.00	0.00	0.00
Bulldozer - CAT D9	Diesel	448	1	40	0	2.90	0.34	0.11	0.00	1.25	0.00	0.00	0.00	0.00	0.00
Front End Loader - CAT 992	Diesel	907	1	36	0	2.91	0.26	0.09	0.00	0.90	0.00	0.00	0.00	0.00	0.00
Crawler Crane	Diesel	285	1	29	0	2.70	0.27	0.10	0.00	0.76	0.00	0.00	0.00	0.00	0.00
325 Diver's Air Compressor	Diesel	10	1	48	0	2.51	0.90	0.22	0.00	2.87	0.00	0.00	0.00	0.00	0.00
Diesel Driven Light Plant	Diesel	14	2	74	0	2.51	0.90	0.22	0.00	2.87	0.00	0.00	0.00	0.00	0.00
Derrick Barge - generator	Diesel	275	1	74	12	4.08	0.32	0.12	0.01	0.99	21.94	1.71	0.65	0.03	5.32
Derrick Barge - crane	Diesel	285	1	29	8	2.70	0.27	0.10	0.00	0.76	3.93	0.40	0.15	0.00	1.10
Derrick Barge - anchor winch	Diesel	238	2	74	1	4.08	0.32	0.12	0.01	0.99	3.16	0.25	0.09	0.00	0.77
Derrick Barge - pull winch	Diesel	318	1	74	0	4.08	0.32	0.12	0.01	0.99	0.00	0.00	0.00	0.00	0.00
Tugboat #1 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #1 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Tugboat #2 - main engines - CAT 3508	Diesel	1150	2	31	4	5.06	0.20	0.22	0.11	3.73	31.81	1.26	1.38	0.69	23.45
Tugboat #2 - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Crew Boat - main engines - Detroit S60	Diesel	450	2	45	2	5.06	0.20	0.22	0.11	3.73	9.04	0.36	0.39	0.20	6.66
Crew Boat - generator	Diesel	113	1	43	12	4.87	0.75	0.38	0.01	2.72	6.26	0.96	0.49	0.01	3.50
Air Compressor - CAT C-15	Diesel	540	2	48	0	1.66	0.17	0.05	0.00	0.58	0.00	0.00	0.00	0.00	0.00
Welding machine	Diesel	33	1	43	8	2.68	1.20	0.28	0.00	2.96	0.67	0.30	0.07	0.00	0.74
Jet Pump XH150/CAT 3406	Diesel	465	1	74	4	3.76	0.20	0.07	0.00	0.84	11.41	0.61	0.22	0.01	2.55
Industrial Air Compressor	Diesel	142	1	43	0	3.08	0.90	0.22	0.00	2.87	0.00	0.00	0.00	0.00	0.00
Diver's Air Compressor	Diesel	38	1	43	10	2.92	0.90	0.22	0.00	2.98	1.05	0.32	0.08	0.00	1.07
Totals =>											133.61	9.32	5.89	1.65	75.62

ON-ROAD SOURCES

On Road Sources	Miles/Trip	Trips/Day ⁴	Emission Factors, Input ³					Peak Pounds/Day				
			NO _x g/mile	ROG g/mile	PM10 g/mile	SO ₂ g/mile	CO g/mile	NO _x	ROG	PM10	SO ₂	CO
Flatbed Truck	80	1	8.082	0.54	0.318	0.016	3.25	1.43	0.10	0.06	0.00	0.57
Totals =>							1.43	0.10	0.06	0.00	0.57	

Light-Duty Trucks

Running Exhaust Emissions			Emission Factor, Grams/Mile ⁵				Pounds/Day					
Source	Miles/Trip	Trips/Day	NO _x	ROG	PM10	CO	SO ₂	NO _x	ROG	PM10	CO	SO ₂
Light-Duty Trucks	80	22	0.220	0.065	0.004	2.610	0.004	0.85	0.25	0.01	10.13	0.02
Totals =>							0.85	0.25	0.01	10.13	0.02	

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² Emission factors from Port of Long Beach 2005 Air Emissions Inventory, assuming Tier 2 engines, Table 3.7, Page 106. The units g/kW-hr was converted to lb/bhp-hr using the multiplier (conversion) of 0.001644 (knowns: 1 gram = 0.0022046 lb & 1 kw = 1.341 bhp)
- ³ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, heavy duty diesel
- ⁴ Days and truck trips estimated from Appendix A, Table A1-1 Preliminary Decommissioning Schedule and Table A1-2 Material Import/Export & Associated Truck Trips (worst case scenario per day)
- ⁵ Emission Factors derived from Emfac2007 V2.3, using 2015 as base year and summer season, light duty truck
- ⁶ Commute trips derived from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity - assuming each worker travels to and from project site avg 80 miles roundtrip per day

**Supplement to Table A2-1 Manpower and Equipment Requirement by Activity
(Segments shown in Phases/Tasks as per Table A1-1 Preliminary Decommissioning Schedule)**

Flush Submarine Pipeline - Biocide - Duration = 5 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Generator - CAT XQ100 - 173 HP	1	10	5	50

Remove Submarine Pipeline from Underpass - Duration = 10 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	1	8	10	80
Rough Terrain Crane - 160 HP	1	8	10	80
Generator - CAT XQ100 - 173 HP	1	10	10	100
Industrial Air Compressor - 185 CFM - 48 HP	1	6	10	60
Welding Machine - 400 AMP - 33 HP	1	5	10	50

Remove Electrical/Piping/Appurtenances - Plug the Fill Line w/ Slurry Slug (concurrent tasks) - Duration = 10 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	1	8	10	80
Rough Terrain Crane - 160 HP	1	8	10	80
Concrete Pump - Cummins 220 HP	1	2	10	20
Generator - CAT XQ100 - 173 HP	1	10	10	100
Industrial Air Compressor - 185 CFM - 48 HP	1	6	10	60

Cut/Demolish End Structure Vertical Vault - Duration = 15 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	2	8	15	240
Bulldozer - CAT D9 - 448 HP	1	8	15	120
Front End Loader (Wheel Loader) CAT 992 - 907 HP	1	8	15	120
Generator - CAT XQ100 - 173 HP	1	10	15	150
Industrial Air Compressor - 185 CFM - 48 HP	1	6	15	90

Form Underpass Openings/Cement Underpass- Duration = 20 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	2	8	20	320
Bulldozer - CAT D9 - 448 HP	1	8	20	160
Rough Terrain Crane - 160 HP	1	8	20	160
Concrete Pump - Cummins 220 HP	1	1	20	20
Generator - CAT XQ100 - 173 HP	1	10	20	200

Demolish Top 5' of Beach Valve Pit Vert Vault- Duration = 5 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	2	8	5	80
Rough Terrain Crane - 160 HP	1	8	5	40
Generator - CAT XQ100 - 173 HP	1	10	5	50
Industrial Air Compressor - 185 CFM - 48 HP	1	6	5	30

Backfill Onshore Vault Area/Site Restoration - Duration = 5 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	1	8	5	40
Front End Loader (Wheel Loader) CAT 992 - 907 HP	1	8	5	40
Generator - CAT XQ100 - 173 HP	1	10	5	50

Backfill/Restore Beach at End Structure - Duration = 5 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Bulldozer - CAT D9 - 448 HP	1	8	5	40

Remove/Store Rip Rap Groin - Duration = 20 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	2	5	20	200
Bulldozer - CAT D9 - 448 HP	1	8	20	160
Front End Loader (Wheel Loader) CAT 992 - 907 HP	1	8	20	160
Crawler Crane - 285 HP	1	8	20	160

Remove Sand Cover/Excavate Pipeline - Duration = 10 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	2	8	10	160
Bulldozer - CAT D9 - 448 HP	1	6	10	60

Remove Pipe/Cut into Sections - Duration = 10 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	2	8	10	160
Crawler Crane - 285 HP	1	8	10	80

Restore Rip Rap Groin - Duration = 20 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Excavators - CAT 329 - 228 HP	1	4	20	80
Bulldozer - CAT D9 - 448 HP	1	6	20	120
Front End Loader (Wheel Loader) CAT 992 - 907 HP	1	6	20	120
Crawler Crane - 285 HP	1	8	20	160

Restore Beach Contours - Duration = 5 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Bulldozer - CAT D9 - 448 HP	1	6	5	30
Front End Loader (Wheel Loader) CAT 992 - 907 HP	1	6	5	30
Crawler Crane - 285 HP	1	6	5	30

Excavate and Prepare for Surf Zone Extraction - Duration = 10 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Onshore - Excavators - CAT 329 - 228 HP	2	8	10	160
Onshore - Bulldozer - CAT D9 - 448 HP	1	8	10	80
Onshore - Front End Loader (Wheel Loader) CAT 992 - 907 HP	1	4	10	40
Onshore - Crawler Crane - 285 HP	1	4	10	40
Onshore - 325 Diver's Air Compressor - Diesel 10 HP	1	8	10	80
Onshore - Diesel Driven Light Plants - 14 HP	2	4	10	80
Offshore - Derrick Barge - Generator 150KW - 275 HP	1	12	10	120
Offshore - Derrick Barge - Crane - 285 HP	1	10	10	100
Offshore - Derrick Barge Anchor Winches - RB90 238 HP	2	1	10	20
Offshore - Derrick Barge Pull Winch DTW150 318 HP	1	4	10	40
Offshore - Tugboat #1 - Mains - CAT 3508 - 1,150 HP	2	4	10	80
Offshore - Tugboat #1 - Generator - 30 KW - 113 HP	1	12	10	120
Offshore - Crew Boat - Mains - Detroit S60 - 450 HP	2	2	10	40
Offshore - Crew Boat - Generator - 30 KW - 113 HP	1	12	10	120
Offshore - Welding Machine - 400 AMP - 33 HP	2	6	10	120
Offshore - Jet Pump - XH150/CAT 3406 - 465 HP	1	6	10	60
Offshore - Industrial Air Compressor - 185 CFM - 48 HP	1	8	10	80
Offshore - 5120 Divers Air Compressor - Diesel 38 HP	1	8	10	80

Extract Surf Zone Segment - Duration = 15 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Offshore - Derrick Barge - Generator 150KW - 275 HP	1	12	15	180
Offshore - Derrick Barge - Crane - 285 HP	1	8	15	120
Offshore - Derrick Barge Anchor Winches - RB90 238 HP	3	1	15	45
Offshore - Derrick Barge Pull Winch DTW150 318 HP	1	4	15	60
Offshore - Tugboat #1 - Mains - CAT 3508 - 1,150 HP	2	4	15	120
Offshore - Tugboat #1 - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Crew Boat - Mains - Detroit S60 - 450 HP	2	2	15	60
Offshore - Crew Boat - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Air Compressor - Sullair 1300 CFM - CAT C-15 540 HP	2	2	15	60
Offshore - Welding Machine - 400 AMP - 33 HP	1	2	15	30
Offshore - Jet Pump - XH150/CAT 3406 - 465 HP	1	4	15	60
Offshore - 5120 Divers Air Compressor - Diesel 38 HP	1	10	15	150

Section Surf Zone Segment - Duration = 15 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Offshore - Derrick Barge - Generator 150KW - 275 HP	1	12	15	180
Offshore - Derrick Barge - Crane - 285 HP	1	8	15	120
Offshore - Derrick Barge Anchor Winches - RB90 238 HP	2	1	15	30
Offshore - Tugboat #1 - Mains - CAT 3508 - 1,150 HP	2	4	15	120
Offshore - Tugboat #1 - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Tugboat #2 - Mains - CAT 3508 - 1,150 HP	2	4	15	120
Offshore - Tugboat #2 - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Crew Boat - Mains - Detroit S60 - 450 HP	2	2	15	60
Offshore - Crew Boat - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Welding Machine - 400 AMP - 33 HP	1	8	15	120
Offshore - 5120 Divers Air Compressor - Diesel 38 HP	1	10	15	150

Flush Submarine Pipeline - Biocide - Duration = 5 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Offshore - Derrick Barge - Generator 150KW - 275 HP	1	12	5	60
Offshore - Derrick Barge - Crane - 285 HP	1	4	5	20
Offshore - Derrick Barge Anchor Winches - RB90 238 HP	2	2	5	20
Offshore - Tugboat #1 - Mains - CAT 3508 - 1,150 HP	2	4	5	40
Offshore - Tugboat #1 - Generator - 30 KW - 113 HP	1	12	5	60
Offshore - Crew Boat - Mains - Detroit S60 - 450 HP	2	2	5	20
Offshore - Crew Boat - Generator - 30 KW - 113 HP	1	12	5	60
Offshore - Jet Pump - XH150/CAT 3406 - 465 HP	1	8	5	40
Offshore - Industrial Air Compressor - 375 CFM - 142 HP	1	5	5	25
Offshore - 5120 Divers Air Compressor - Diesel 38 HP	1	8	5	40

Excavate/Remove Offshore Pipeline - Duration = 90 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Offshore - Derrick Barge - Generator 150KW - 275 HP	1	12	90	1080
Offshore - Derrick Barge - Crane - 285 HP	1	8	90	720
Offshore - Derrick Barge Anchor Winches - RB90 238 HP	2	2	90	360
Offshore - Derrick Barge Pull Winch DTW150 318 HP	1	8	90	720
Offshore - Tugboat #1 - Mains - CAT 3508 - 1,150 HP	2	4	90	720
Offshore - Tugboat #1 - Generator - 30 KW - 113 HP	1	12	90	1080
Offshore - Tugboat #2 - Mains - CAT 3508 - 1,150 HP	2	4	90	720
Offshore - Tugboat #2 - Generator - 30 KW - 113 HP	1	12	90	1080
Offshore - Crew Boat - Mains - Detroit S60 - 450 HP	2	2	90	360
Offshore - Crew Boat - Generator - 30 KW - 113 HP	1	12	90	1080
Offshore - Welding Machine - 400 AMP - 33 HP	1	4	90	360
Offshore - Jet Pump - XH150/CAT 3406 - 465 HP	1	4	90	360
Offshore - Industrial Air Compressor - 375 CFM - 142 HP	1	1	90	90
Offshore - 5120 Divers Air Compressor - Diesel 38 HP	1	10	90	900

Remove Mooring and Debris - Duration = 15 days				
Equipment:	Qty.	Hours:	Days:	Total Hours:
Offshore - Derrick Barge - Generator 150KW - 275 HP	1	12	15	180
Offshore - Derrick Barge - Crane - 285 HP	1	8	15	120
Offshore - Derrick Barge Anchor Winches - RB90 238 HP	2	4	15	120
Offshore - Derrick Barge Pull Winch DTW150 318 HP	1	6	15	90
Offshore - Tugboat #1 - Mains - CAT 3508 - 1,150 HP	2	4	15	120
Offshore - Tugboat #1 - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Tugboat #2 - Mains - CAT 3508 - 1,150 HP	2	4	15	120
Offshore - Tugboat #2 - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Crew Boat - Mains - Detroit S60 - 450 HP	2	2	15	60
Offshore - Crew Boat - Generator - 30 KW - 113 HP	1	12	15	180
Offshore - Welding Machine - 400 AMP - 33 HP	1	2	15	30
Offshore - Jet Pump - XH150/CAT 3406 - 465 HP	1	4	15	60
Offshore - Industrial Air Compressor - 375 CFM - 142 HP	1	4	15	60
Offshore - 5120 Divers Air Compressor - Diesel 38 HP	1	10	15	150

Pre-Decommissioning Debris Survey					
Equipment:	Qty.	Hours:	Days:	Total Hours:	
Survey Boat - main engine - 298HP	1	12	4	48	

Post-Decommissioning Debris Survey					
Equipment:	Qty.	Hours:	Days:	Total Hours:	
Survey Boat - main engine - 298HP	1	12	4	48	

Encina Marine Oil Terminal Decommissioning: Pre-Decommissioning Debris Survey Greenhouse Gas Emissions

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ³	Emission Factors: g/gallon ²			Pounds/Segment			Tons			
						N2O	CH4	CO2	N2O	CH4	CO2	N2O	CH4	CO2	
Survey boat - main engine	Diesel	298	1	38	48	0.26	0.74	10150	0.17	0.49	6689.5	0.000	0.000	3.345	
Totals =>									0.17	0.49	6689.5	Totals =>	0.000	0.000	3.34

Notes:

¹ Load Factor for Survey boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming Work boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

² Emission factors from the California Climate Action Registry General Reporting Protocol (Table C.6: Ships & Boats)

³ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Onshore Segment Decommissioning Activities
Greenhouse Gas Emissions**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ¹¹	Emission Factors: g/gallon ^{2,3}			Pounds/Segment			Tons			
						N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	
Excavator - CAT 329	Diesel	228	1	38	840	0.26	0.58	10150.00	2.29	5.12	89568.11	0.00	0.00	44.78	
Bulldozer - CAT D9	Diesel	448	1	40	320	0.26	0.58	10150.00	1.81	4.03	70573.83	0.00	0.00	35.29	
Front End Loader - CAT 992	Diesel	907	1	36	160	0.26	0.58	10150.00	1.65	3.67	64296.22	0.00	0.00	32.15	
Rough Terrain Crane	Diesel	160	1	29	360	0.26	0.58	10150.00	0.53	1.17	20557.78	0.00	0.00	10.28	
Concrete Pump - Cummins	Diesel	220	1	74	40	0.26	0.58	10150.00	0.21	0.46	8014.38	0.00	0.00	4.01	
Generator - CAT XQ100	Diesel	173	1	74	700	0.26	0.58	10150.00	2.83	6.30	110288.83	0.00	0.00	55.14	
Industrial Air Compressor	Diesel	48	1	48	240	0.26	0.58	10150.00	0.17	0.39	6805.33	0.00	0.00	3.40	
Welding Machine	Diesel	33	1	45	50	0.26	0.58	10150.00	0.02	0.05	913.80	0.00	0.00	0.46	
Totals =>									9.50	21.20	371018.29	Totals =>	0.00	0.01	185.51

On Road Sources	Trip Miles ⁵	Emission Factors, Input ^{3,4}			Emission Factors, Output			Peak Pounds/Day			Trips ⁹	Tons		
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂		N ₂ O	CH ₄	CO ₂
		g/mile	g/mile	kg/gallon	g/mile	g/mile	g/mile							
110 bbl Vac Truck	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.001	0.001	310.68	15	0.00	0.00	2.33
Flatbed Truck	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.001	0.001	310.68	3	0.00	0.00	0.47
Transfer Dump	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.001	0.001	310.68	21	0.00	0.00	3.26
Cement Truck	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.001	0.001	310.68	28	0.00	0.00	4.35
Totals =>								0.003	0.004	1242.71	Totals =>	0.00	0.00	10.41

On Road Sources	MPG ⁸	Emission Factors, Input			Emission Factors, Output		
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂
		g/mile	g/mile	kg/gallon	g/mile	g/mile	g/mile
Light Duty Trucks (gasoline) ^{8,7}	18	0.0132	0.0152	8.8100	0.0132	0.0152	489.44

Light-Duty Trucks Commute Trips	Running Exhaust Emissions			Grams/Mile			Pounds/Day			Tons			
	Source	Miles/Trip	Trips/Day ¹⁰	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	Days	N ₂ O	CH ₄	CO ₂
Light-Duty Trucks	80		22	0.013	0.015	489.444	0.05	0.06	1899.09	75	0.002	0.002	71.22
Totals =>							0.05	0.06	1899.09	Totals =>	0.002	0.002	71.22

Notes:

- 1 Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- 2 N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.6 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles (Vehicle Type: Construction, Fuel Type: Diesel Fuel)
- 3 CO₂ input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.3 Carbon Dioxide Emissions for Transport Fuels (Fuel: Diesel)
- 4 N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.4 Methane and Nitrous Oxide Emission Factors for Highway Vehicles (Vehicle Type: Diesel Heavy-Duty)
- 5 Trip miles estimated for roundtrip within San Diego Area
- 6 Average age of light duty trucks= 9.6 years (Transportation Energy Data Book: Edition 30, June 2011, Table 3.9, 2009)- acquired N₂O and CH₄ input from the California Climate Action Registry General Reporting Protocol (2009), Table C.4, Gasoline Light Trucks, Model Year 2004.
- 7 CO₂ input is from the California Climate Action Registry General Reporting Protocol (2009), Table C.3, Motor Gasoline.
- 8 Miles per gallon (MPG) for light-duty trucks estimated from www.fueleconomy.gov, find a car tab, searching by class, entering: 2002, pick-up trucks, combined MPG; utilizing 18 MPG as a conservative estimate.
- 9 Trips were estimated from Appendix A, Table A1-2 Material Import/Export and Associated Truck Trips
- 10 Trips/day were estimated from Appendix A, Table A2-1 Manpower and Equipment Estimates by Activity
- 11 Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Offshore Segment Decommissioning Activities
Greenhouse Gas Emissions**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ¹	Emission Factors: g/gallon ^{2,3}			Pounds/Segment			Tons			
						N2O	CH4	CO2	N2O	CH4	CO2	N2O	CH4	CO2	
Derrick Barge - generator	Diesel	275	1	74	1320	0.26	0.58	10150.00	8.47	18.89	330593.29	0.00	0.01	165.30	
Derrick Barge - crane	Diesel	285	1	29	860	0.26	0.58	10150.00	2.24	5.00	87477.63	0.00	0.00	43.74	
Derrick Barge - anchor winch	Diesel	238	1	74	500	0.26	0.58	10150.00	2.78	6.19	108376.31	0.00	0.00	54.19	
Derrick Barge - pull winch	Diesel	318	1	74	810	0.26	0.58	10150.00	6.01	13.40	234584.63	0.00	0.01	117.29	
Tugboat #1 - main engines - CAT 3508	Diesel	1150	1	31	880	0.26	0.74	10150.00	9.89	28.15	386098.30	0.00	0.01	193.05	
Tugboat #1 - generator	Diesel	113	1	43	1320	0.26	0.74	10150.00	2.02	5.75	78936.25	0.00	0.00	39.47	
Tugboat #2 - main engines - CAT 3508	Diesel	1150	1	31	840	0.26	0.74	10150.00	9.44	26.87	368548.38	0.00	0.01	184.27	
Tugboat #2 - generator	Diesel	113	1	43	1260	0.26	0.74	10150.00	1.93	5.49	75348.24	0.00	0.00	37.67	
Crew Boat - main engines - Detroit S60	Diesel	450	1	38	440	0.26	0.74	10150.00	2.37	6.75	92598.61	0.00	0.00	46.30	
Crew Boat - generator	Diesel	113	1	32	1320	0.26	0.74	10150.00	1.50	4.28	58743.26	0.00	0.00	29.37	
Welding machine	Diesel	33	1	45	390	0.26	0.58	10150.00	0.18	0.41	7127.66	0.00	0.00	3.56	
Jet Pump XH150/CAT 3406	Diesel	465	1	74	460	0.26	0.58	10150.00	4.99	11.13	194804.14	0.00	0.01	97.40	
Industrial Air Compressor	Diesel	142	1	48	175	0.26	0.58	10150.00	0.38	0.84	14679.91	0.00	0.00	7.34	
Diver's Air Compressor	Diesel	38	1	48	1090	0.26	0.58	10150.00	0.63	1.40	24468.48	0.00	0.00	12.23	
Totals =>									52.83	134.56	2062385.09	Totals =>	0.03	0.07	1031.19

On Road Sources	Trip Miles ⁵	Emission Factors, Input ^{3,4}			Emission Factors, Output			Peak Pounds/Day			Trips	Tons			
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂		N ₂ O	CH ₄	CO ₂	
Flatbed Truck	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.00	0.00	310.68	48	0.00	0.00	7.46	
Totals =>									0.00	0.00	310.68	Totals =>	0.00	0.00	7.46

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.6 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles (Vehicle Type: Construction, Fuel Type: Diesel Fuel)

³ CO₂ input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.3 Carbon Dioxide Emissions for Transport Fuels (Fuel: Diesel)

⁴ N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.4 Methane and Nitrous Oxide Emission Factors for Highway Vehicles (Vehicle Type: Diesel Heavy-Duty)

⁵ Trip miles estimated for roundtrip within San Diego Area

⁶ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Beach Segment Decommissioning Activities
Greenhouse Gas Emissions**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ⁹	Emission Factors: g/gallon ^{2,3}			Pounds/Segment			Tons		
						N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂
Excavator - CAT 329	Diesel	228	1	38	600	0.26	0.58	10150.00	1.64	3.66	63977.22	0.001	0.002	31.989
Bulldozer - CAT D9	Diesel	448	1	40	370	0.26	0.58	10150.00	2.09	4.66	81600.99	0.001	0.002	40.800
Front End Loader - CAT 992	Diesel	907	1	36	310	0.26	0.58	10150.00	3.19	7.12	124573.93	0.002	0.004	62.287
Crawler Crane	Diesel	285	1	29	430	0.26	0.58	10150.00	1.12	2.50	43738.81	0.001	0.001	21.869

Totals => 8.04 17.94 313891.0 Totals => 0.004 0.009 156.9

On Road Sources	Trip Miles ⁵	Emission Factors, Input ^{3,4}			Emission Factors, Output			Peak Pounds/Day			Tons			
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	Trips	N ₂ O	CH ₄	CO ₂
Flatbed Truck	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.00	0.00	310.68	2	0.00	0.00	0.31

Totals => 0.00 0.00 310.68 Totals => 0.00 0.00 0.31

On Road Sources	MPG ⁸	Emission Factors, Input			Emission Factors, Output		
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂
Light Duty Trucks (gasoline) ^{6,7}	18	0.0132	0.0152	8.8100	0.0132	0.0152	489.44

Light-Duty Trucks Commute Trips	Running Exhaust Emissions			Grams/Mile			Pounds/Day			Tons					
	Source	Miles/Trip	Trips/Day	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	Days	N ₂ O	CH ₄	CO ₂		
Light-Duty Trucks	80	18		0.013	0.015	489.444	0.04	0.05	1553.80	65	0.001	0.002	50.50		
				Totals =>			0.04 0.05 1553.80			Totals =>			0.001 0.002 50.50		

Notes:

- ¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors
- ² N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.6 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles (Vehicle Type: Construction, Fuel Type: Diesel Fuel)
- ³ CO₂ input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.3 Carbon Dioxide Emissions for Transport Fuels (Fuel: Diesel)
- ⁴ N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.4 Methane and Nitrous Oxide Emission Factors for Highway Vehicles (Vehicle Type: Diesel Heavy-Duty)
- ⁵ Trip miles estimated for roundtrip within San Diego Area
- ⁶ Average age of light duty trucks= 9.6 years (Transportation Energy Data Book: Edition 30, June 2011, Table 3.9, 2009)- acquired N₂O and CH₄ input from the California Climate Action Registry General Reporting Protocol (2009), Table C.4, Gasoline Light Trucks, Model Year 2004.
- ⁷ CO₂ input is from the California Climate Action Registry General Reporting Protocol (2009), Table C.3, Motor Gasoline.
- ⁸ Miles per gallon (MPG) for light-duty trucks estimated from www.fueleconomy.gov, find a car tab, searching by class, entering: 2002, pick-up trucks, combined MPG; utilizing 18 MPG as a conservative estimate.
- ⁹ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

**Encina Marine Oil Terminal Decommissioning: Surf Zone Segment Decommissioning Activities
Greenhouse Gas Emissions**

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ⁹	Emission Factors: g/gallon ^{2,3}			Pounds/Segment			Tons		
						N2O	CH4	CO2	N2O	CH4	CO2	N2O	CH4	CO2
Excavator - CAT 329	Diesel	228	1	38	160	0.26	0.58	10150.00	0.44	0.97	17060.59	0.00	0.00	8.53
Bulldozer - CAT D9	Diesel	448	1	40	80	0.26	0.58	10150.00	0.45	1.01	17643.46	0.00	0.00	8.82
Front End Loader - CAT 992	Diesel	907	1	36	40	0.26	0.58	10150.00	0.41	0.92	16074.06	0.00	0.00	8.04
Crawler Crane	Diesel	285	1	29	40	0.26	0.58	10150.00	0.10	0.23	4068.73	0.00	0.00	2.03
325 Diver's Air Compressor	Diesel	10	1	48	80	0.26	0.58	10150.00	0.01	0.03	472.59	0.00	0.00	0.24
Diesel Driven Light Plant	Diesel	14	1	74	80	0.26	0.58	10150.00	0.03	0.06	1020.01	0.00	0.00	0.51
Derrick Barge - generator	Diesel	275	1	74	480	0.26	0.58	10150.00	3.08	6.87	120215.74	0.00	0.00	60.11
Derrick Barge - crane	Diesel	285	1	29	340	0.26	0.58	10150.00	0.89	1.98	34584.18	0.00	0.00	17.29
Derrick Barge - anchor winch	Diesel	238	1	74	95	0.26	0.58	10150.00	0.53	1.18	20591.50	0.00	0.00	10.30
Derrick Barge - pull winch	Diesel	318	1	74	100	0.26	0.58	10150.00	0.74	1.65	28961.06	0.00	0.00	14.48
Tugboat #1 - main engines - CAT 3508	Diesel	1150	1	31	320	0.26	0.74	10150.00	3.60	10.24	140399.38	0.00	0.01	70.20
Tugboat #1 - generator	Diesel	113	1	43	480	0.26	0.74	10150.00	0.74	2.09	28704.09	0.00	0.00	14.35
Tugboat #2 - main engines - CAT 3508	Diesel	1150	1	31	120	0.26	0.74	10150.00	1.35	3.84	52649.77	0.00	0.00	26.32
Tugboat #2 - generator	Diesel	113	1	43	180	0.26	0.74	10150.00	0.28	0.78	10764.03	0.00	0.00	5.38
Crew Boat - main engines - Detroit S60	Diesel	450	1	45	160	0.26	0.74	10150.00	1.02	2.91	39875.00	0.00	0.00	19.94
Crew Boat - generator	Diesel	113	1	43	480	0.26	0.74	10150.00	0.74	2.09	28704.09	0.00	0.00	14.35
Air Compressor - CAT C-15	Diesel	540	1	48	60	0.26	0.58	10150.00	0.49	1.09	19140.00	0.00	0.00	9.57
Welding machine	Diesel	33	1	43	270	0.26	0.58	10150.00	0.12	0.27	4715.22	0.00	0.00	2.36
Jet Pump XH150/CAT 3406	Diesel	465	1	74	120	0.26	0.58	10150.00	1.30	2.90	50818.47	0.00	0.00	25.41
Industrial Air Compressor	Diesel	142	1	43	80	0.26	0.58	10150.00	0.15	0.34	6011.77	0.00	0.00	3.01
Diver's Air Compressor	Diesel	38	1	43	380	0.26	0.58	10150.00	0.20	0.44	7641.72	0.00	0.00	3.82
Totals =>								16.65	41.90	650115.5	Totals =>	0.01	0.02	325.06

On Road Sources	Trip Miles ⁵	Emission Factors, Input ^{3,4}			Emission Factors, Output			Peak Pounds/Day			Trips	Tons		
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂		N ₂ O	CH ₄	CO ₂
Flatbed Truck	80	0.0048	0.0051	10.15	0.0048	0.0051	1765	0.00	0.00	310.68	5	0.00	0.00	0.78
Totals =>								0.00	0.00	310.68	Totals =>	0.00	0.00	0.78

On Road Sources	MPG ⁸	Emission Factors, Input			Emission Factors, Output		
		N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂
Light Duty Trucks (gasoline) ^{6,7}	18	0.0132	0.0152	8.8100	0.0132	0.0152	489.44

Light-Duty Trucks Commute Trips	Running Exhaust Emissions			Grams/Mile			Pounds/Day			Tons			
	Source	Miles/Trip	Trips/Day	N ₂ O	CH ₄	CO ₂	N ₂ O	CH ₄	CO ₂	Days	N ₂ O	CH ₄	CO ₂
Light-Duty Trucks	80	22	0.013	0.015	489.444	0.05	0.06	1899.09	39	0.001	0.001	37.03	
Totals =>							0.05	0.06	1899.09	Totals =>	0.001	0.001	37.03

¹ Load Factors derived from CalEEMod, February 2011 Appendix D - Default Data Tables, Table 3.3 OFFROAD Default Horsepower and Load Factors

² N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.6 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles (Vehicle Type: Construction, Fuel Type: Diesel Fuel)

³ CO₂ input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.3 Carbon Dioxide Emissions for Transport Fuels (Fuel: Diesel)

⁴ N₂O and CH₄ are input derived from the California Climate Action Registry General Reporting Protocol, 2009 Appendix C - Calculation References, Table C.4 Methane and Nitrous Oxide Emission Factors for Highway Vehicles (Vehicle Type: Diesel Heavy-Duty)

⁵ Trip miles estimated for roundtrip within San Diego Area

⁶ Average age of light duty trucks= 9.6 years (Transportation Energy Data Book: Edition 30, June 2011, Table 3.9, 2009)- acquired N₂O and CH₄ input from the California Climate Action Registry General Reporting Protocol (2009), Table C.4, Gasoline Light Trucks, Model Year 2004.

⁷ CO₂ input is from the California Climate Action Registry General Reporting Protocol (2009), Table C.3, Motor Gasoline.

⁸ Miles per gallon (MPG) for light-duty trucks estimated from www.fueleconomy.gov, find a car tab, searching by class, entering: 2002, pick-up trucks, combined MPG; utilizing 18 MPG as a conservative estimate.

⁹ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

Encina Marine Oil Terminal Decommissioning: Post-Decommissioning Debris Survey Greenhouse Gas Emissions

Source	Fuel	BHP	Number	Load Factor ¹	Total Hours ³	Emission Factors: g/gallon ²			Pounds/Segment			Tons			
						N2O	CH4	CO2	N2O	CH4	CO2	N2O	CH4	CO2	
Survey boat - main engine	Diesel	298	1	38	48	0.26	0.74	10150.00	0.17	0.49	6689.55	0.00	0.00	3.34	
Totals =>									0.17	0.49	6689.55	Totals =>	0.00	0.00	3.34

Notes:

¹ Load Factor for Survey boat derived from Port of Long Beach 2010 Air Emissions Inventory, assuming Work boat as listed within Table 3.3, page 72 "Harbor Craft Engine Load Factors"

² Emission factors from the California Climate Action Registry General Reporting Protocol (Table C.6: Ships & Boats)

³ Total Estimated Equipment Hours from Appendix A, Table A2-1 Manpower and Equipment Requirements by Activity

Greenhouse Gas Emissions Summary		N2O	CH4	CO2	MTCO2E
Pre-Survey	Pounds/Segment	0.17	0.49	6689.55	
	Tons	0.00	0.00	3.34	3.06
Onshore Decommissioning	Pounds/Segment	9.56	21.20	372261.00	
	Tons	0.01	0.01	267.13	244.44
Offshore Decommissioning	Pounds/Segment	52.83	134.57	2062695.77	
	Tons	0.03	0.07	1038.65	950.93
Beach Decommissioning	Pounds/Segment	8.08	17.99	315755.43	
	Tons	0.01	0.01	207.75	190.17
Surf Zone Decommissioning	Pounds/Segment	16.71	41.96	652325.25	
	Tons	0.01	0.02	362.87	332.21
Post-Survey	Pounds/Segment	0.17	0.49	6689.55	
	Tons	0.00	0.00	3.34	3.06
Project Total		0.05	0.11	1883.09	1723.88
Peak Tons/Year¹		0.03	0.08	1312.47	1201.50