

## **APPENDIX B**

### **Air Emission Calculations**

---



**Chevron El Segundo Refinery - Coke Drum Reliability Project**  
**Peak Day Construction Emission Summary<sup>(1)</sup>**

<b>Emissions from Equipment</b>	<b>Peak NOx/SOx PM10/PM2.5</b>	<b>Peak VOC/CO</b>	<b>Peak Onsite VOC/CO/NOx/ SOx/PM2.5</b>	<b>Peak Onsite PM10</b>
VOC (lb/day)	13.14	43.14	43.81	8.48
CO (lb/day)	50.58	159.42	161.66	34.01
NOx (lb/day)	82.09	303.84	304.24	51.80
SOx (lb/day)	0.11	0.43	0.43	0.07
PM10 (lb/day)	5.59	15.39	15.53	3.80
PM2.5 (lb/day)	5.15	14.16	14.29	3.49
CO <sub>EQ</sub> (lb/day)	9777.10	39942.99	39967.57	5866.50

<b>Emission from Trips</b>	<b>Peak NOx/SOx PM10/PM2.5</b>	<b>Peak VOC/CO</b>	<b>Peak Onsite VOC/CO/NOx/ SOx/PM2.5</b>	<b>Peak Onsite PM10</b>
VOC (lb/day)	0.97	9.28	0.00	0.00
CO (lb/day)	6.60	84.34	0.00	0.00
NOx (lb/day)	6.54	15.21	0.00	0.00
SOx (lb/day)	0.02	0.14	0.00	0.00
PM10 (lb/day)	0.86	4.54	0.00	0.00
Exhaust PM (lb/day)	0.34	1.42	0.00	0.00
Fugitive PM (lb/day)	0.52	3.13	0.00	0.00
PM2.5 (lb/day)	0.40	1.84	0.00	0.00
CO <sub>EQ</sub> (lb/day)	1618.14	15220.96	0.00	0.00

<b>Fugitive PM</b>	<b>Peak NOx/SOx PM10/PM2.5</b>	<b>Peak VOC/CO</b>	<b>Peak Onsite VOC/CO/NOx/ SOx/PM2.5</b>	<b>Peak Onsite PM10</b>
PM10 from Offroad Vehicles (lb/day) <sup>(2)</sup>	1.68	1.15	1.15	1.49
PM10 from Construction (lb/day) <sup>(2)</sup>	0.00	0.00	0.00	13.08
PM2.5 from Offroad Vehicles (lb/day) <sup>(2)</sup>	0.28	0.19	0.19	0.25
PM2.5 from Construction (lb/day) <sup>(2)</sup>	0.00	0.00	0.00	2.72

<b>Paint VOC</b>	<b>Peak NOx/SOx PM10/PM2.5</b>	<b>Peak VOC/CO</b>	<b>Peak Onsite VOC/CO/NOx/ SOx/PM2.5</b>	<b>Peak Onsite PM10</b>
Paint VOC (lb/day)	0.00	4.20	4.20	0.00

<b>Ship Emissions</b>	<b>Peak NOx/SOx PM10/PM2.5</b>	<b>Peak VOC/CO</b>	<b>Peak Onsite VOC/CO/NOx/ SOx/PM2.5</b>	<b>Peak Onsite PM10</b>
VOC (lb/day)	40.09	0.00	0.00	0.00
CO (lb/day)	123.47	0.00	0.00	0.00
NOx (lb/day)	1052.94	0.00	0.00	0.00
SOx (lb/day)	27.02	0.00	0.00	0.00
PM10 (lb/day)	19.23	0.00	0.00	0.00
PM2.5 (lb/day)	15.80	0.00	0.00	0.00
CO <sub>EQ</sub> (lb/day)	42317.28	0.00	0.00	0.00

<b>Total Emissions</b>	<b>Thresholds</b>	<b>Peak NOx/SOx PM10/PM2.5</b>	<b>Peak VOC/CO</b>	<b>Peak Onsite VOC/CO/NOx/ SOx/PM2.5</b>	<b>Peak Onsite PM10</b>
VOC (lb/day)	75	54.20	56.62	48.01	8.48
CO (lb/day)	550	180.65	243.76	161.66	34.01
NOx (lb/day)	100	1141.57	319.05	304.24	51.80
SOx (lb/day)	150	27.14	0.57	0.43	0.07
PM10 (lb/day) <sup>(2)</sup>	150	27.36	21.09	16.68	18.36
PM2.5 (lb/day) <sup>(3)</sup>	55	21.63	16.20	14.48	6.47
CO <sub>EQ</sub> (lb/day)	NA	53712.52	55163.95	39967.57	5866.50

(1) Onsite emissions exclude ship and trip emissions.

(2) Controlled PM.

(3) [https://www.aqmd.gov/ceqa/handbook/PM2\\_5/pm2\\_5.html](https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5.html).



**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2012/2013**

Equipment Type	Hp	2012 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>EQ</sub> <sup>(2)</sup>
Vibrating plate compactor (gasolin	15	0.0050	0.0263	0.0314	0.0001	0.0013	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.1054	0.4098	0.6619	0.0007	0.0574	58.99	0.0095	60.51
Paving machine	120	0.1467	0.5107	0.8788	0.0008	0.0776	69.20	0.0132	71.31

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents(CO<sub>EQ</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (J:

Equipment Type	Hp	2013 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>EQ</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0694	0.3529	0.4565	0.0006	0.0383	51.73	0.0063	52.73
Diesel grader	120	0.1254	0.5310	0.7729	0.0009	0.0676	74.96	0.0113	76.77
Vibrating plate compactor (gasolin	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0986	0.4063	0.6253	0.0007	0.0534	58.99	0.0089	60.41
Concrete pump, trailer mount	50	0.1052	0.3116	0.3228	0.0004	0.0275	34.33	0.0095	35.85
Mortar mixer, gasoline	15	0.0074	0.0386	0.0470	0.0001	0.0021	6.32	0.0007	6.43
Paving machine	120	0.1387	0.5057	0.8357	0.0008	0.0729	69.20	0.0125	71.20
Crane, diesel (20 ton)	120	0.0919	0.3618	0.5508	0.0006	0.0493	50.15	0.0083	51.47
Crane, diesel (150 ton)	250	0.1040	0.2948	0.9948	0.0013	0.0351	112.16	0.0094	113.66
Crane, diesel (400 ton)	500	0.1551	0.5292	1.4230	0.0018	0.0518	180.10	0.0140	182.34
Crane, diesel (1600 ton)	750	0.2625	0.8887	2.4614	0.0030	0.0885	303.04	0.0237	306.83
Manlift, telescoping, propane	50	0.0592	0.1757	0.1840	0.0003	0.0156	19.61	0.0053	20.47
Welder, diesel (250 amp)	50	0.0979	0.2753	0.2535	0.0003	0.0240	25.96	0.0088	27.37
Air compressor, diesel (185 cfm)	50	0.0921	0.2546	0.2221	0.0003	0.0220	22.27	0.0083	23.60
Air compressor, diesel (375 cfm)	120	0.0825	0.3251	0.4991	0.0006	0.0456	46.95	0.0074	48.14
Power Unit	500	0.1818	0.7230	2.3955	0.0033	0.0690	336.85	0.0164	339.48
Generator, diesel ( 6 kW)	25	0.0266	0.0908	0.1594	0.0002	0.0091	17.63	0.0024	18.02
Forklift 15 Ton	175	0.1347	0.7388	1.2314	0.0016	0.0592	141.98	0.0122	143.92
Forklift, diesel (4 ton)	120	0.1106	0.4905	0.7587	0.0009	0.0590	77.95	0.0100	79.55
Hydrotest pump	25	0.0359	0.1004	0.1761	0.0002	0.0109	19.49	0.0032	20.00
Light tower, diesel (4 kW)	25	0.0266	0.0908	0.1594	0.0002	0.0091	17.63	0.0024	18.02
32 Line Platform Trailer Hatz dies	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3542	1.0311	2.9938	0.0044	0.1046	441.74	0.0320	446.85
36 line self propelled transporter	500	0.2170	0.6362	1.7865	0.0027	0.0634	272.33	0.0196	275.47
Roller	120	0.0986	0.4063	0.6253	0.0007	0.0534	58.99	0.0089	60.41
Bobcat skip loader	120	0.0694	0.3529	0.4565	0.0006	0.0383	51.73	0.0063	52.73
Sissor Lifts (propane)	25	0.0166	0.0503	0.0937	0.0001	0.0051	10.96	0.0015	11.20
Track Excavator	250	0.1242	0.3541	1.1360	0.0018	0.0372	158.68	0.0112	160.48
Crane Diesel 300 ton	500	0.1551	0.5292	1.4230	0.0018	0.0518	180.10	0.0140	182.34
Crane Diesel (65 ton)	250	0.1040	0.2948	0.9948	0.0013	0.0351	112.16	0.0094	113.66
Crane, diesel (35 ton)	175	0.1031	0.4821	0.7769	0.0009	0.0445	80.34	0.0093	81.83

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents(CO<sub>EQ</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (J:

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2014**

Equipment Type	Hp	2013 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0634	0.3503	0.4252	0.0006	0.0337	51.73	0.0057	52.64
Diesel grader	120	0.1166	0.5268	0.7270	0.0009	0.0614	74.96	0.0105	76.65
Vibrating plate compactor (gasolin	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0921	0.4030	0.5906	0.0007	0.0494	58.99	0.0083	60.32
Concrete pump, trailer mount	50	0.0949	0.3004	0.3098	0.0004	0.0251	34.33	0.0086	35.70
Mortar mixer, gasoline	15	0.0074	0.0386	0.0466	0.0001	0.0020	6.32	0.0007	6.43
Paving machine	120	0.1311	0.5011	0.7948	0.0008	0.0682	69.20	0.0118	71.09
Crane, diesel (20 ton)	120	0.0859	0.3587	0.5189	0.0006	0.0453	50.15	0.0078	51.39
Crane, diesel (150 ton)	250	0.0979	0.2817	0.9088	0.0013	0.0317	112.16	0.0088	113.57
Crane, diesel (400 ton)	500	0.1468	0.4948	1.2979	0.0018	0.0470	180.10	0.0132	182.22
Crane, diesel (1600 ton)	750	0.2485	0.8312	2.2480	0.0030	0.0803	303.04	0.0224	306.63
Manlift, telescoping, propane	50	0.0534	0.1694	0.1765	0.0003	0.0142	19.61	0.0048	20.38
Welder, diesel (250 amp)	50	0.0886	0.2652	0.2435	0.0003	0.0219	25.96	0.0080	27.24
Air compressor, diesel (185 cfm)	50	0.0831	0.2446	0.2134	0.0003	0.0201	22.27	0.0075	23.47
Air compressor, diesel (375 cfm)	120	0.0758	0.3216	0.4682	0.0006	0.0416	46.95	0.0068	48.04
Power Unit	500	0.1683	0.6904	2.1655	0.0033	0.0627	336.85	0.0152	339.28
Generator, diesel ( 6 kW)	25	0.0256	0.0868	0.1557	0.0002	0.0085	17.63	0.0023	18.00
Forklift 15 Ton	175	0.1236	0.7367	1.1536	0.0016	0.0538	141.98	0.0112	143.76
Forklift, diesel (4 ton)	120	0.1008	0.4857	0.7130	0.0009	0.0537	77.95	0.0091	79.40
Hydrotest pump	25	0.0333	0.0959	0.1721	0.0002	0.0101	19.49	0.0030	19.97
Light tower, diesel (4 kW)	25	0.0256	0.0868	0.1557	0.0002	0.0085	17.63	0.0023	18.00
32 Line Platform Trailer Hatz dies	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3371	0.9944	2.6748	0.0044	0.0937	441.74	0.0304	446.60
36 line self propelled transporter	500	0.2065	0.6134	1.5945	0.0027	0.0567	272.33	0.0186	275.32
Roller	120	0.0921	0.4030	0.5906	0.0007	0.0494	58.99	0.0083	60.32
Bobcat skip loader	120	0.0634	0.3503	0.4252	0.0006	0.0337	51.73	0.0057	52.64
Sissor Lifts (propane)	25	0.0160	0.0494	0.0919	0.0001	0.0048	10.96	0.0014	11.19
Track Excavator	250	0.1180	0.3480	1.0099	0.0018	0.0333	158.68	0.0106	160.39
Crane Diesel 300 ton	500	0.1468	0.4948	1.2979	0.0018	0.0470	180.10	0.0132	182.22
Crane Diesel (65 ton)	250	0.0979	0.2817	0.9088	0.0013	0.0317	112.16	0.0088	113.57
Crane, diesel (35 ton)	175	0.0977	0.4806	0.7306	0.0009	0.0412	80.34	0.0088	81.75

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents(CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (J)

Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Year 1

Equipment	Hours per Day	Pieces per Day		
		Year 1		Month 1
Vibrating plate compactor (gasoline)	8			1
Roller vibrator, diesel	8			1
Paving machine	8			1

VOC	Emission Rate (lb/hr)	lb/day Year 1		
		2012		Month 1
Vibrating plate compactor (gasoline)	0.005021495	0.00	0.00	0.00
Roller vibrator, diesel	0.105445964	0.00	0.00	0.00
Paving machine	0.14671972	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

CO	Emission Rate (lb/hr)	lb/day Year 1		
		2012		Month 1
Vibrating plate compactor (gasoline)	0.02633978	0.00	0.00	0.00
Roller vibrator, diesel	0.409816852	0.00	0.00	0.00
Paving machine	0.510748629	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

NOX	Emission Rate (lb/hr)	lb/day Year 1		
		2012		Month 1
Vibrating plate compactor (gasoline)	0.031446516	0.00	0.00	0.00
Roller vibrator, diesel	0.661932654	0.00	0.00	0.00
Paving machine	0.878813357	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

SOx	Emission Rate (lb/hr)	lb/day Year 1		
		2012		Month 1
Vibrating plate compactor (gasoline)	6.71266E-05	0.00	0.00	0.00
Roller vibrator, diesel	0.000691968	0.00	0.00	0.00
Paving machine	0.0000811709	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

PM10	Emission Rate (lb/hr)	lb/day Year 1		
		2012		Month 1
Vibrating plate compactor (gasoline)	0.001255389	0.00	0.00	0.00
Roller vibrator, diesel	0.057437046	0.00	0.00	0.00
Paving machine	0.077587526	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

CO <sub>eq</sub>	Emission Rate (lb/hr)	lb/day Year 1		
		2012		Month 1
Vibrating plate compactor (gasoline)	4.39	0.00	0.00	0.00
Roller vibrator, diesel	60.51	0.00	0.00	0.00
Paving machine	71.31	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Years 2 and 3**

Equipment	Hours per Day		Pieces per Day																																	
	Normal	Turnaround	Year 2												Year 3																					
			Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19																
Backhoe 580 Case	10	20	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Diesel grader	8	16	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Vibrating plate compactor (gasoline)	8	16	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Roller vibrator, diesel	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Concrete pump, trailer mount	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Mortar mixer, gasoline	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Paving machine	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Crane, diesel (20 ton)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Crane, diesel (150 ton)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Crane, diesel (600 ton)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Crane, diesel (1600 ton)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Mixer, diesel, propane	10	20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Welder, diesel (250)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Welder, diesel (185 cfm)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Air compressor, diesel (185 cfm)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Air compressor, diesel (375 cfm)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Power Unit	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Generator, diesel ( 6 kW)	8	16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Forklift 15 Ton	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Forklift, diesel (4 ton)	8	16	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Hydratex pump	8	16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Light tower, diesel (4 kW)	10	20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
32 Line Platform Trailer Hatz, diesel	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Prime Mover ISX	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
36 line self propelled transporter	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Roller	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bobcat skip loader	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sissor Lifts, propane	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Track Excavator	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Crane Diesel (65 ton)	8	16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Crane, diesel (35 ton)	8	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

(1) Assumes 20 days of construction per month. All fraction of an hour are rounded up to whole hours.



Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Year 2 and 3 (Cont.)

VOC	Emission Rate (lb/hr)		lb/day																			
	2013	2014	Year 2						Year 3													
	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19				
Backhoe 500 Case	0.69	1.30	1.30	1.30	0.69	0.69	1.30	0.69	0.69	0.69	0.69	0.69	0.69	1.21	1.21	1.21	0.63	0.63	0.63	0.00	0.00	0.00
Diesel grader	0.69	1.30	1.30	1.30	0.69	0.69	1.30	0.69	0.69	0.69	0.69	0.69	0.69	1.21	1.21	1.21	0.63	0.63	0.63	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.092	0.184	0.184	0.184	0.092	0.092	0.184	0.092	0.092	0.092	0.092	0.092	0.092	0.167	0.167	0.167	0.083	0.083	0.083	0.00	0.00	0.00
Roller vibrator, diesel	0.092	0.184	0.184	0.184	0.092	0.092	0.184	0.092	0.092	0.092	0.092	0.092	0.092	0.167	0.167	0.167	0.083	0.083	0.083	0.00	0.00	0.00
Concrete pump, trailer mount	0.092	0.184	0.184	0.184	0.092	0.092	0.184	0.092	0.092	0.092	0.092	0.092	0.092	0.167	0.167	0.167	0.083	0.083	0.083	0.00	0.00	0.00
Mortar mixer, trailer mount	0.092	0.184	0.184	0.184	0.092	0.092	0.184	0.092	0.092	0.092	0.092	0.092	0.092	0.167	0.167	0.167	0.083	0.083	0.083	0.00	0.00	0.00
Paving machine	0.131	0.262	0.262	0.262	0.131	0.131	0.262	0.131	0.131	0.131	0.131	0.131	0.131	0.235	0.235	0.235	0.117	0.117	0.117	0.00	0.00	0.00
Crane, diesel (20 ton)	0.086	0.172	0.172	0.172	0.086	0.086	0.172	0.086	0.086	0.086	0.086	0.086	0.086	0.157	0.157	0.157	0.078	0.078	0.078	0.00	0.00	0.00
Crane, diesel (150 ton)	0.098	0.196	0.196	0.196	0.098	0.098	0.196	0.098	0.098	0.098	0.098	0.098	0.098	0.177	0.177	0.177	0.088	0.088	0.088	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.147	0.294	0.294	0.294	0.147	0.147	0.294	0.147	0.147	0.147	0.147	0.147	0.147	0.266	0.266	0.266	0.133	0.133	0.133	0.00	0.00	0.00
Crane, diesel (250 amp)	0.248	0.496	0.496	0.496	0.248	0.248	0.496	0.248	0.248	0.248	0.248	0.248	0.248	0.447	0.447	0.447	0.223	0.223	0.223	0.00	0.00	0.00
Manlift, telescoping, propane	0.053	0.106	0.106	0.106	0.053	0.053	0.106	0.053	0.053	0.053	0.053	0.053	0.053	0.097	0.097	0.097	0.048	0.048	0.048	0.00	0.00	0.00
Welder, diesel (250 amp)	0.089	0.178	0.178	0.178	0.089	0.089	0.178	0.089	0.089	0.089	0.089	0.089	0.089	0.161	0.161	0.161	0.080	0.080	0.080	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.083	0.166	0.166	0.166	0.083	0.083	0.166	0.083	0.083	0.083	0.083	0.083	0.083	0.151	0.151	0.151	0.075	0.075	0.075	0.00	0.00	0.00
Blower, diesel (375 cfm)	0.178	0.356	0.356	0.356	0.178	0.178	0.356	0.178	0.178	0.178	0.178	0.178	0.178	0.321	0.321	0.321	0.160	0.160	0.160	0.00	0.00	0.00
Generator, diesel (6 kW)	0.026	0.052	0.052	0.052	0.026	0.026	0.052	0.026	0.026	0.026	0.026	0.026	0.026	0.047	0.047	0.047	0.023	0.023	0.023	0.00	0.00	0.00
Generator, diesel (6 kW)	0.124	0.248	0.248	0.248	0.124	0.124	0.248	0.124	0.124	0.124	0.124	0.124	0.124	0.223	0.223	0.223	0.111	0.111	0.111	0.00	0.00	0.00
Forklift, 15 Ton	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forklift, diesel (4 ton)	0.101	0.202	0.202	0.202	0.101	0.101	0.202	0.101	0.101	0.101	0.101	0.101	0.101	0.181	0.181	0.181	0.090	0.090	0.090	0.000	0.000	0.000
Hydratex pump	0.033	0.066	0.066	0.066	0.033	0.033	0.066	0.033	0.033	0.033	0.033	0.033	0.033	0.059	0.059	0.059	0.029	0.029	0.029	0.000	0.000	0.000
Light tower, diesel (4 kW)	0.026	0.052	0.052	0.052	0.026	0.026	0.052	0.026	0.026	0.026	0.026	0.026	0.026	0.047	0.047	0.047	0.023	0.023	0.023	0.000	0.000	0.000
32 Line Platform Trailer Hatz diesel	0.012	0.024	0.024	0.024	0.012	0.012	0.024	0.012	0.012	0.012	0.012	0.012	0.012	0.021	0.021	0.021	0.010	0.010	0.010	0.000	0.000	0.000
Prime Mover ISX	0.337	0.674	0.674	0.674	0.337	0.337	0.674	0.337	0.337	0.337	0.337	0.337	0.337	0.607	0.607	0.607	0.303	0.303	0.303	0.000	0.000	0.000
36 line self propelled transporter	0.207	0.414	0.414	0.414	0.207	0.207	0.414	0.207	0.207	0.207	0.207	0.207	0.207	0.373	0.373	0.373	0.186	0.186	0.186	0.000	0.000	0.000
Roller	0.092	0.184	0.184	0.184	0.092	0.092	0.184	0.092	0.092	0.092	0.092	0.092	0.092	0.167	0.167	0.167	0.083	0.083	0.083	0.000	0.000	0.000
Bobcat skip loader	0.063	0.126	0.126	0.126	0.063	0.063	0.126	0.063	0.063	0.063	0.063	0.063	0.063	0.113	0.113	0.113	0.056	0.056	0.056	0.000	0.000	0.000
Sissor Lifts (propane)	0.016	0.032	0.032	0.032	0.016	0.016	0.032	0.016	0.016	0.016	0.016	0.016	0.016	0.028	0.028	0.028	0.014	0.014	0.014	0.000	0.000	0.000
Track Excavator	0.118	0.236	0.236	0.236	0.118	0.118	0.236	0.118	0.118	0.118	0.118	0.118	0.118	0.213	0.213	0.213	0.106	0.106	0.106	0.000	0.000	0.000
Crane Diesel 300 ton	0.147	0.294	0.294	0.294	0.147	0.147	0.294	0.147	0.147	0.147	0.147	0.147	0.147	0.266	0.266	0.266	0.133	0.133	0.133	0.000	0.000	0.000
Crane Diesel (65 ton)	0.088	0.176	0.176	0.176	0.088	0.088	0.176	0.088	0.088	0.088	0.088	0.088	0.088	0.157	0.157	0.157	0.078	0.078	0.078	0.000	0.000	0.000
Crane, diesel (35 ton)	0.098	0.196	0.196	0.196	0.098	0.098	0.196	0.098	0.098	0.098	0.098	0.098	0.098	0.177	0.177	0.177	0.088	0.088	0.088	0.000	0.000	0.000
Total	6.00	8.46	13.14	19.31	18.34	18.06	17.89	19.13	16.93	20.81	16.81	17.97	20.11	43.81	43.14	43.14	22.51	21.44	22.51	0.00	0.00	0.00

Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Year 2 and 3 (Cont.)

CO	Emission Rate (lb/hr)		lb/day												Year 2					Year 3							
	2013	2014	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19							
Backhoe 500 Case	0.3529853038	0.3501	3.53	7.06	7.06	7.06	3.53	7.06	3.53	3.53	3.53	3.53	3.53	3.53	3.50	7.01	7.01	7.01	7.01	3.50	3.50	3.50	0.00	0.00	0.00	0.00	
Diesel grader	0.5309539312	0.5271	0.00	4.25	4.25	4.25	0.00	4.25	8.50	8.50	8.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.0263393771	0.0266	0.21	0.42	0.42	0.21	0.00	0.42	0.84	0.84	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.4063034333	0.4033	3.25	6.50	6.50	3.25	0.00	6.50	13.00	13.00	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.3116017855	0.3099	0.00	2.49	2.49	2.49	0.00	2.49	4.98	4.98	4.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.0385906333	0.0399	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.62	1.23	1.23	1.23	0.62	0.62	0.62	0.00	0.00	0.00	0.00	0.00
Paving machine	0.5056915445	0.5011	0.00	0.00	0.00	0.00	0.00	0.00	2.89	2.89	2.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.36177612	0.3589	0.00	0.00	0.00	0.00	0.00	0.00	2.89	2.89	2.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.294777811	0.282	0.00	0.00	0.00	0.00	0.00	0.00	2.36	2.36	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.529209224	0.495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.23	0.00	0.00	4.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (250 amp)	0.888712966	0.831	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.175745415	0.169	0.00	0.00	0.00	0.00	0.00	0.00	4.22	4.22	4.22	4.22	4.22	4.22	4.07	8.13	8.13	8.13	8.13	4.07	4.07	4.07	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.253244485	0.265	0.00	0.00	0.00	0.00	0.00	0.00	4.41	4.41	4.41	4.41	4.41	4.41	4.24	12.73	12.73	12.73	12.73	4.24	4.24	4.24	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.59586726	0.245	2.04	4.07	4.07	2.04	0.00	4.07	8.14	8.14	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blower, diesel (375 cfm)	0.222859524	0.322	0.00	0.00	0.00	0.00	0.00	0.00	5.78	5.78	5.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel (6 kW)	0.094072481	0.0937	1.45	1.45	1.45	1.45	0.00	1.45	2.90	2.90	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.73802461	0.737	0.00	0.00	0.00	0.00	0.00	0.00	5.91	5.91	5.91	5.91	5.91	5.91	5.89	11.79	11.79	11.79	11.79	5.89	5.89	5.89	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.490530636	0.486	7.85	11.77	11.77	11.77	11.77	11.77	11.77	11.77	11.77	11.77	11.77	11.77	11.66	23.31	23.31	23.31	23.31	11.66	11.66	11.66	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.10035133	0.096	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.090797481	0.087	0.00	0.00	0.00	0.00	0.00	0.00	1.82	1.82	1.82	1.82	1.82	1.82	1.82	3.64	3.64	3.64	3.64	1.82	1.82	1.82	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.061714724	0.062	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.98	0.98	0.98	0.98	0.49	0.49	0.49	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	1.031052268	0.994	0.00	0.00	0.00	0.00	0.00	0.00	8.25	8.25	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.636189987	0.613	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.4063034333	0.4033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.3529853038	0.3501	2.82	2.82	2.82	2.82	0.00	2.82	5.64	5.64	5.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts, propane	0.050324606	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.354148178	0.348	2.83	2.83	2.83	2.83	0.00	2.83	5.66	5.66	5.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.529209224	0.495	0.00	0.00	0.00	0.00	0.00	0.00	8.47	8.47	8.47	8.47	8.47	8.47	8.31	16.62	16.62	16.62	16.62	8.31	8.31	8.31	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.294777811	0.282	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.482105081	0.461	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	23.981	23.401	34.011	50.359	72.710	86.641	69.356	69.191	59.351	63.01	76.89	62.43	64.22	73.19	161.959	199.421	199.421	199.421	199.421	73.19	73.19	73.19	0.00	0.00	0.00	0.00	0.00

Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Year 2 and 3 (Cont.)

NOx	Emission Rate (lb/hr)		lb/day																			
	2013	2014	Year 2						Year 3													
	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19				
Backhoe 500 Case	4.56	9.13	9.13	9.13	9.13	9.13	9.13	4.56	4.56	4.56	4.56	4.56	4.25	8.50	8.50	8.50	4.25	4.25	0.00	0.00	0.00	0.00
Diesel grader	0.425	0.85	0.85	0.85	0.85	0.85	0.85	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.727	1.45	1.45	1.45	1.45	1.45	1.45	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.031	0.062	0.062	0.062	0.062	0.062	0.062	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.310	0.62	0.62	0.62	0.62	0.62	0.62	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.310	0.00	0.00	0.00	0.00
Mortar mixer, trailer mount	0.047	0.094	0.094	0.094	0.094	0.094	0.094	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.00	0.00	0.00	0.00
Paving machine	0.795	1.59	1.59	1.59	1.59	1.59	1.59	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.519	1.04	1.04	1.04	1.04	1.04	1.04	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.909	1.82	1.82	1.82	1.82	1.82	1.82	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	1.298	2.59	2.59	2.59	2.59	2.59	2.59	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	2.467	4.93	4.93	4.93	4.93	4.93	4.93	2.467	2.467	2.467	2.467	2.467	2.467	2.467	2.467	2.467	2.467	2.467	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.177	0.35	0.35	0.35	0.35	0.35	0.35	0.177	0.177	0.177	0.177	0.177	0.177	0.177	0.177	0.177	0.177	0.177	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.213	0.43	0.43	0.43	0.43	0.43	0.43	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.213	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.465	0.93	0.93	0.93	0.93	0.93	0.93	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.465	0.00	0.00	0.00	0.00
Generator, diesel (6 kW)	2.156	4.31	4.31	4.31	4.31	4.31	4.31	2.156	2.156	2.156	2.156	2.156	2.156	2.156	2.156	2.156	2.156	2.156	0.00	0.00	0.00	0.00
Forklift 15 Ton	1.154	2.31	2.31	2.31	2.31	2.31	2.31	1.154	1.154	1.154	1.154	1.154	1.154	1.154	1.154	1.154	1.154	1.154	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.173	0.35	0.35	0.35	0.35	0.35	0.35	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.00	0.00	0.00	0.00
Hydratrac pump	0.176	0.35	0.35	0.35	0.35	0.35	0.35	0.176	0.176	0.176	0.176	0.176	0.176	0.176	0.176	0.176	0.176	0.176	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.159	0.32	0.32	0.32	0.32	0.32	0.32	0.159	0.159	0.159	0.159	0.159	0.159	0.159	0.159	0.159	0.159	0.159	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.074	0.15	0.15	0.15	0.15	0.15	0.15	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.00	0.00	0.00	0.00
Prime Mover ISX	2.675	5.35	5.35	5.35	5.35	5.35	5.35	2.675	2.675	2.675	2.675	2.675	2.675	2.675	2.675	2.675	2.675	2.675	0.00	0.00	0.00	0.00
36 line self propelled transporter	1.595	3.19	3.19	3.19	3.19	3.19	3.19	1.595	1.595	1.595	1.595	1.595	1.595	1.595	1.595	1.595	1.595	1.595	0.00	0.00	0.00	0.00
Roller	0.591	1.18	1.18	1.18	1.18	1.18	1.18	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.00	0.00	0.00	0.00
Bobcat skip loader	0.425	0.85	0.85	0.85	0.85	0.85	0.85	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.00	0.00	0.00	0.00
Sissor Lifts, propane	0.095	0.19	0.19	0.19	0.19	0.19	0.19	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.00	0.00	0.00	0.00
Track Excavator	1.010	2.02	2.02	2.02	2.02	2.02	2.02	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	1.298	2.59	2.59	2.59	2.59	2.59	2.59	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	1.298	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.909	1.82	1.82	1.82	1.82	1.82	1.82	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.731	1.46	1.46	1.46	1.46	1.46	1.46	0.731	0.731	0.731	0.731	0.731	0.731	0.731	0.731	0.731	0.731	0.731	0.00	0.00	0.00	0.00
Total	39.03	78.06	78.06	78.06	78.06	78.06	78.06	39.03	39.03	39.03	39.03	39.03	39.03	39.03	39.03	39.03	39.03	39.03	0.00	0.00	0.00	0.00



Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Year 2 and 3 (Cont.)

PM10	Emission Rate (lb/hr)		lb/day																								
	2013		Year 2												Year 3												
	2013	2014	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19							
Backhoe 500 Case	0.038204316	0.034	0.38	0.71	0.71	0.54	0.38	0.71	0.71	0.38	0.38	0.38	0.38	0.38	0.34	0.67	0.67	0.67	0.67	0.34	0.34	0.00	0.00	0.00	0.00		
Diesel grader	0.067565337	0.061	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Vibrating plate compactor (gasoline)	0.001231811	0.001	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Roller vibrator, diesel	0.055358833	0.049	0.00	0.00	0.22	0.22	0.22	0.22	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Concrete pump, trailer mount	0.027487372	0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mortar mixer, trailer mount	0.0027133557	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Paving machine	0.072895436	0.068	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (20 ton)	0.042820687	0.045	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (150 ton)	0.035091894	0.032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (1600 ton)	0.051834521	0.047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (400 ton)	0.098481972	0.080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Manlift, telescoping, propane	0.015553401	0.014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Welder, diesel (250 amp)	0.023869865	0.022	0.00	0.00	0.00	0.19	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.34	0.68	0.68	0.68	0.68	0.34	0.34	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.022016642	0.020	0.18	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.32	0.64	0.64	0.64	0.64	0.32	0.32	0.16	0.00	0.00	0.00	0.00	
Blower, diesel (375 cfm)	0.0425829716	0.042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generator, diesel (6 kW)	0.009063467	0.009	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.27	0.27	0.27	0.27	0.14	0.14	0.07	0.00	0.00	0.00	0.00	
Forklift, 15 Ton	0.059166504	0.054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift, diesel (4 ton)	0.059006531	0.054	0.84	0.94	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.28	2.58	2.58	2.58	2.58	1.28	1.28	0.63	0.00	0.00	0.00	0.00	
Hydraulic pump	0.01088218	0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Light tower, diesel (4 kW)	0.009063467	0.009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
32 Line Platform Trailer Hatz diesel	0.002825661	0.003	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Prime Mover ISX	0.104608347	0.094	0.00	0.00	0.84	0.84	0.84	0.84	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
36 line self propelled transporter	0.063351203	0.057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Roller	0.055358833	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Bobcat skip loader	0.038294316	0.034	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	
Sissor Lifts (propane)	0.00511528	0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Track Excavator	0.037292711	0.033	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane Diesel 300 ton	0.051834521	0.047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane Diesel (65 ton)	0.035091894	0.032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (35 ton)	0.044516652	0.041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	2.89	3.80	2.89	3.80	5.99	7.46	6.76	7.38	7.41	5.89	6.41	7.87	6.47	6.31	7.18	15.33	15.39	15.39	15.39	7.80	7.80	0.00	0.00	0.00	0.00	0.00	

Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emissions for Year 2 and 3 (Cont.)

CO <sub>2e</sub>	Emission Rate (lb/hr)		lb/day																
	2013	2014	Year 2						Year 3										
	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	
Backhoe 500 Case	52,730	52,730	105,460	105,460	527,300	527,300	1,054,600	527,300	527,300	527,300	527,300	527,300	1,054,600	1,054,600	5,273,000	5,273,000	10,546,000	5,273,000	5,273,000
Diesel grader	0.00	614.20	1228.39	614.20	527.30	1054.60	1054.60	527.30	527.30	527.30	527.30	527.30	1054.60	1054.60	5273.00	5273.00	10546.00	5273.00	5273.00
Vibrating plate compactor (gasoline)	35.09	70.18	140.36	70.18	35.09	70.18	140.36	70.18	70.18	70.18	70.18	70.18	140.36	140.36	701.80	701.80	1403.60	701.80	701.80
Roller vibrator, diesel	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30	483.30
Concrete pump, trailer mount	35,853,006.18	6,427	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor mixer, gasoline	71,198,498.85	6,427	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	51,474,205.26	51,088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	113,690,431.2	113,573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	182,336,937.1	182,220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	306,532,697.96	306,531	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	20,465,888.59	20,383	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	27,375,861.34	27,238	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	23,600,000.98	23,470	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	33,913,382.89	33,824	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel (6 MW)	143,923,532	143,764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	79,546,653.14	79,404	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	20,004,807.05	19,968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydraulic pump	16,015,050.5	16,001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 MW)	10,277,573.93	10,277	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	446,650,062.53	446,604	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	275,452,625.53	275,315	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	60,318	60,318	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	60,411,973.38	60,318	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	52,730,159.26	52,643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	11,200,072.16	11,192	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	160,375,960.07	160,385	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	182,336,937.1	182,220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	113,680,431.2	113,573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	81,833,303.38	81,795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	4501.12	5866.30	9777.10	16622.62	16231.05	14235.00	14403.47	12353.29	14233.84	18122.03	13348.02	14622.21	18536.71	39967.37	39942.99	20376.80	19881.96	0.00	0.00

Chevron El Segundo Refinery - Coke Drum Reliability Project  
Onroad Construction Vehicle Trip Emissions for Year 1

Vehicle	Miles per Day	Vehicles per Day			
		Year 1	Month 1	Month 2	Month 3
Commuters	36				
Cars	5				
Pickups/Livemen Trucks	5				
Total Light Vehicle Miles		0	0	0	0
Water Truck	2				
Stakebed Truck	50				
Street Sweeper	5				
Total Medium Truck Miles		0	0	0	0
Dump Trucks	50				
Transit Mixers	50				
Tractor Trailer	10				
Bus	10				
Total Heavy Truck Miles		0	0	0	0

Emission Rate (lb/mi) <sup>3</sup>	lb/day Year 1			
	2012	Month 1	Month 2	Month 3
<b>VOOC</b>				
Light Duty	0.0007963	0.00	0.00	0.00
Medium Duty	0.0009278	0.00	0.00	0.00
Heavy Duty	0.0025276	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

Emission Rate (lb/mi) <sup>3</sup>	lb/day Year 1			
	2012	Month 1	Month 2	Month 3
<b>CO</b>				
Light Duty	0.0076547	0.00	0.00	0.00
Medium Duty	0.013242	0.00	0.00	0.00
Heavy Duty	0.0102152	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

Emission Rate (lb/mi) <sup>3</sup>	lb/day Year 1			
	2012	Month 1	Month 2	Month 3
<b>NOx</b>				
Light Duty	0.0007758	0.00	0.00	0.00
Medium Duty	0.0173242	0.00	0.00	0.00
Heavy Duty	0.0059238	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

Emission Rate (lb/mi) <sup>3</sup>	lb/day Year 1			
	2012	Month 1	Month 2	Month 3
<b>SOx</b>				
Light Duty	0.0000107	0.00	0.00	0.00
Medium Duty	0.0000267	0.00	0.00	0.00
Heavy Duty	0.0000404	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

Emission Rate (lb/mi) <sup>3</sup>	lb/day Year 1			
	2012	Month 1	Month 2	Month 3
<b>PM10</b>				
Light Duty Exhaust	0.0000898	0.00	0.00	0.00
Medium Duty Exhaust	0.0006487	0.00	0.00	0.00
Heavy Duty Exhaust	0.0013854	0.00	0.00	0.00
Total Exhaust PM		0.00	0.00	0.00
Light Duty Puffing <sup>4</sup>	0.000221	0.00	0.00	0.00
Medium Duty Puffing <sup>4</sup>	0.000467	0.00	0.00	0.00
Heavy Duty Puffing <sup>4</sup>	0.001822	0.00	0.00	0.00
Total Puffing PM		0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

Emission Rate (lb/mi) <sup>3</sup>	lb/day Year 1			
	2012	Month 1	Month 2	Month 3
<b>CO<sub>2e</sub></b>				
Light Duty	1.147477	0.00	0.00	0.00
Medium Duty	2.759548	0.00	0.00	0.00
Heavy Duty	4.252349	0.00	0.00	0.00
<b>Total</b>		0.00	0.00	0.00

(1) All project specific data from engineering estimates.  
 (2) Based on 2007 SCAQMD on-road emission rates. (<http://www.aqmd.gov/calhandbook/calhandbook.htm>)  
 (3) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1.  
 $E = k \cdot (W) \cdot (V) \cdot (1.02)$   
 Where: k = 0.0022 lb/MMT for PM10, sl = road silt loading (gms/m<sup>2</sup>)  
 (0.003 for roads with >10,000 avg. daily trips), W = weight of vehicles (2.4 tons for medium duty trucks and 4.2 tons for heavy trucks).  
 (4) Light Duty Puffing (CO<sub>2e</sub>) = CO<sub>2e</sub> - CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310  
 where light vehicle N<sub>2</sub>O = CH<sub>4</sub>\*0.001/0.0005 EPA Direct Emissions from Mobile Combustion Sources (May 2008)  
 where medium/heavy duty vehicle N<sub>2</sub>O = CH<sub>4</sub>\*0.005/0.0048 EPA Direct Emissions from Mobile Combustion Sources (May 2008)

Chem	lb/mi			
	2012	2012	2012	2012
CO <sub>2e</sub>	1.1015	2.7663	4.2159	
CH <sub>4</sub>	0.0001	0.0001	0.0001	
CO <sub>2e</sub>	1.1477	2.8001	4.2523	





**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Offroad Construction Vehicle Dust Emissions for Year 1**

Vehicle	Miles/Day	Vehicles per Day													
		Year 1											Month 1		
Pickup Truck	0.1														
Total Light Vehicle Miles		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Truck	0.5														1.00
Street Sweeper	0.1														
Lube Truck	0.1														
Total Medium Truck Miles		0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
Dump Trucks	0.1														
Transit Mixers	0.1														
Tractor Trailer	0.1														
Total Heavy Truck Miles		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Backhoe 580 Case	0.1	1													
Diesel grader	0.1														
Roller vibrator, diesel	0.1														1.00
Paving machine	0.1														
Forklift 15 Ton	0.1														
Forklift, diesel (4 ton)	0.1														
Roller	0.1														
Bobcat skip loader	0.1														
Track excavator	0.1														
Total Heavy-Heavy Duty Miles		0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day											
	Year 1											Dec
<b>PM10</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Light Duty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Medium Duty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Duty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Heavy Duty	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Uncontrolled Total	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97
Controlled Total <sup>(3)</sup>	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38

(1) All data from engineering estimates.  
 (2) Based on Section 13.2.2 of EPA's Compilation of Air Pollutant Emission Factors (AP-42).  
 Emission Rate =  $1.5((s/12)^{.9}) * (W/3)^{.45}$   
 s = silt content = 8.5% for construction sites  
 W = Vehicle Weight (ton) = 2.5 for light, 5.5 for medium, 15 for heavy, and 18 for heavy heavy (EMFAC2007).  
 (3) Controlled Emissions assume that watering 3 times per day reduces emissions by 61 percent (Uncontrolled Emissions x 0.39)

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Offroad Construction Vehicle Dust Emissions for Years 2 and 3**

Vehicle	Miles/Day	Year 2												Year 3											
		Vehicles per Day												Vehicles per Day											
		Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19						
Pickup Truck	0.1	3.00	3.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	4.00	3.00	4.00	8.00	8.00	8.00	4.00	4.00							
Total Light Vehicle Miles		0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.8	0.8	0.8	0.4	0.4							
Water Truck	0.5	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00							
Shakebed Truck	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Jobe Truck	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Total Medium Truck Miles		1.1	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8							
Dump Trucks	0.1	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00							
Transit Mixers	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Tractor Trailer	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Total Heavy Truck Miles		1	0.3	0.3	0.4	0.3	0.3	0.4	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1							
Backhoe 580 Case	0.1	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00							
Diesel grader	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Roller vibrator diesel	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Roller vibrator pneumatic	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Front loader 15 ton	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00							
Front loader diesel (4 ton)	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Roller	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Bobcat skip loader	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Track excavator	0.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
Total Heavy-Heavy Duty Miles		0.6	0.8	0.9	1.1	0.8	1.1	1.1	0.7	0.8	0.9	0.7	0.7	0.6	0.6	0.6	0.7	0.6							

Emission Rate (lb/m) <sup>(a)</sup>	Year 2												Year 3											
	lb/day												lb/day											
	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19						
PM10	0.30	0.30	0.41	0.41	0.41	0.41	0.41	0.30	0.30	0.41	0.30	0.41	0.81	0.81	0.81	0.41	0.41							
Light Duty	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497	1.0131497						
Medium Duty	1.4446539	1.59	0.87	1.01	1.16	1.16	1.16	1.16	0.43	0.43	1.16	0.43	0.43	0.43	0.43	0.43	0.43	0.43						
Heavy Duty	2.2690375	2.27	0.68	0.68	0.91	0.68	0.91	0.45	0.23	0.23	0.45	0.23	0.23	0.23	0.23	0.23	0.23	0.23						
Heavy Heavy Duty	1.48	1.97	2.22	2.71	1.97	2.71	1.72	1.97	2.22	2.22	1.72	1.72	1.48	1.48	1.48	1.48	1.48	1.48						
Uncontrolled Total	5.64	3.62	4.31	5.03	4.21	4.95	5.18	3.64	3.28	4.13	2.92	2.79	2.95	2.95	2.95	2.79	2.95	2.95						
Controlled Total <sup>(b)</sup>	2.20	1.49	1.68	1.96	1.64	1.93	2.02	1.42	1.28	1.61	1.14	1.09	1.15	1.15	1.15	1.09	1.15	1.15						

(1) All project specific data from engineering estimates.  
 (2) Based on Section 13.2.2 of EPA's Comparison of Air Pollutant Emission Factors (AP-42).  
 Emission Rate = 1.5/(s/2) \* (W/3) \* 45)  
 s = silt content = 8.5% for construction sites  
 W = Vehicle Weight (ton) = 2.5 for light, 5.5 for medium, 15 for heavy, and 18 for heavy heavy (EMFAC2007).  
 (3) Controlled Emissions assume that watering 3 times per day reduces emissions by 61 percent (Uncontrolled Emissions x 0.39)

Appendix B

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Fugitive PM Construction Emissions**

Earthmoving Operations Construction Activities <sup>(2)</sup>	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor <sup>(1)</sup>	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
	5	5	10	0.348	0.39	6.78	6.78	17.3818261	17.3818261	Table A9-9-F

Stockpiles Construction Activities <sup>(3)</sup>	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
	429	429	0.0035	0.39	0.585585	0.585585	1.5015	1.5015	Table A9-9-G

Assumptions: 1cubic yard trench spoils = 1 ton

Earth Disturbance Construction Activities <sup>(4)</sup>	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	
	20	1	1	0.200	0.200	0.200	0.002	0.002	Table A9-9-E

Loading/Dumping Operations <sup>(5)</sup>	Average Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
Truck Filling	454	454	0.02205	0.39	3.904173	3.904173	10.0107	10.0107	Table A9-9
Truck Dumping	454	454	0.009075	0.39	1.6068195	1.6068195	4.12005	4.12005	Table A9-9

TOTAL PM10 Pounds/day	Average	Peak
(Controlled Emissions)	13.0750	13.07503
(Uncontrolled Emissions)	33.016	33.016

- (1) Mitigated Emissions assume that watering 3 times per day controls emissions by 61 percent (Uncontrolled Emissions x 0.39)
- (2) Emissions (lbs/hr) =  $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$   
where G = silt content (7.5%), H = moisture content (15.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).
- (3) Emissions (lbs/ton) =  $0.00112 \times [(G/5)^{1.3} / (H/2)^{1.4}] \times I/J$   
where G=mean wind speed (12 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day; and J=2,000 lbs/ton
- (4) Emissions (lbs/day/acre) =  $1.7 \times [(G/1.5) \times (365-H) / 235] \times I/15 \times J$   
where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (0.5%) and J= fraction of TSP (0.5). Wind speed data acquired from Long Beach 1981 meteorological file.
- (5) Used SCAQMD Table 9-9 Default emission factors.

**Assumptions**

Acres graded	120	acre
1/4th graded on average day	30	acre
50% contingency on peak day	45	acre
Total cubic yards graded	439000	yd <sup>3</sup>
Total cubic yards excavated	360000	yd <sup>3</sup>
Total excavation/graded	799000	yd <sup>3</sup>
Cubic yards per month (26 months of activity)	19023.80952	yd <sup>3</sup>
Cubic yards per day (20 day months)	951.1904762	yd <sup>3</sup>
50% contingency on peak day	1426.785714	yd <sup>3</sup>
Avg number of land disturbing vehicle types	5	vehicles
Max number of land disturbing vehicle types	10	vehicles
50% contingency on peak day	15	vehicles

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Paint VOC Emissions**

Activity	Year	Year 2												Year 3												
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25	
Volume paint applied per day (gal)	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC content (lb/gal) <sup>(1)</sup>	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
VOC Emissions (lb/day)	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	4.2	4.2	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0

(1) Based on SCAQMD Rule 1113 VOC limit of 50g/L.

## Chevron El Segundo Refinery - Coke Drum Reliability Project Ship Parameters

### OGV Main Engine Usage per One-Way Transit

Activity	Propulsion Max Hp <sup>(2)</sup>	Speed (Kts)	Load Factor <sup>(6)</sup>	Distance (nm/trip) <sup>(12)</sup>	Duration (hr/trip)	Energy Consumed (kW-hr/trip) <sup>(13)</sup>
Fairway: AQMD Overwater Boundary to 24 nmile <sup>(1,5,6,16)</sup>	11,265	12.0	0.58	27.0	2.25	10,922
Fairway: 24 nmile to Precautionary Zone <sup>(5,7,16)</sup>	11,265	12.0	0.58	15.9	1.33	6,444
Precautionary Zone to Breakwater <sup>(8,3)</sup>	11,265	9.0	0.24	8.1	0.90	1,846
Harbor Transit Inbound <sup>(9,10,11)</sup>	11,265	5.0	0.04	3.5	0.70	246
Harbor Transit Outbound <sup>(9,10,11)</sup>	11,265	8.0	0.17	3.5	0.44	630
Turning <sup>(4,17,18)</sup>	11,265	n/a	0.02	n/a	0.23	39
Docking <sup>(15,4,14)</sup>	11,265	n/a	0.02	n/a	0.25	42

Notes: (1) Portion of the trip between the AQMD overwater boundary and the 24-nmle zone.

(2) 8400 kw per Big Lift Spec sheet.

(3) Average speeds in the precautionary zone are from POLA Inventory of Air Emissions 2009 Table 3.5 (Starcrest, 2010).

(4) Load factor of 0.02 represents minimum load factor for propulsion engines (Starcrest, 2010).

(5) Average cruising speeds represent 94% of the maximum speed (Starcrest, 2010). Maximum speeds are from Lloyds data.

(6) Load factor is (speed/max speed)<sup>3</sup>. From Starcrest (2010).

(7) Portion of the trip between the 24-mile zone and Precautionary Zone.

Total average fairway distance from overwater boundary to precautionary zone is 42.9 nmiles (27+15.9 nmiles) for container ships, assuming 100% use north route.

(8) Portion of transit that occurs from PZ boundary to the POLA breakwater.

(9) Portion of the trip that occurs inside the POLA breakwater to the West Basin.

(10) Average Harbor Transit speeds found in POLA Inventory of Air Emissions Section 3.5.6 (Starcrest, 2010).

(11) Average Harbor Transit time (arrival & departure) (Starcrest, 2004 Table 2.51) less 14 minutes of turning time.

(12) Distances from POLA Inventory of Air Emissions Table 3.1 (Starcrest, 2010).

Average One-Way Transit Distances	nmiles
AQMD Boundary to PZ 1-way	42.9
VSRP Zone 1-way (24nm zone)	24.0
PZ to Breakwater 1-way	8.1

(13) 1 hp-hr = 0.746 kW-hr.

(14) Average time for vessel docking is 15 minutes per one-way trip (Starcrest, 2007 Section 2.5.6).

(15) Portion of the trip that occurs once the vessel arrives at the West Basin.

(16) Assume Vessel Speed Reduction (VSR).

(17) Turning would occur during only one trip segment (either inbound or outbound).

(18) Turning time is estimated to take 14 minutes for a 180 degree turn, according to Starcrest 2004 Figure 2.28.

### OGV Auxiliary Generator Usage per One-Way Transit

Activity	Auxiliary kW per Vessel <sup>(1)</sup>	Hours/ Transit	kW-Hrs/ Transit
Fairway: AQMD Overwater Boundary to 24 nmile	234.00	2.25	526
Fairway: 24 nmile to Precautionary Zone	234.00	1.33	310
Precautionary Zone to Breakwater	234.00	0.90	211
Harbor Transit Inbound	619.00	0.70	433
Harbor Transit Outbound	619.00	0.44	271
Turning	619.00	0.23	144
Docking	619.00	0.25	155
Hoteling	138.00	24.0	3,312

Notes: (1) From POLA Inventory of Air Emissions Table 3.13 (Starcrest, 2010).

### OGV Auxiliary Boiler Usage per One-Way Transit

Activity	Boiler kW per Vessel <sup>(1)</sup>	Hours/ Transit	kW-Hrs/ Transit
Fairway: AQMD Overwater Boundary to 24 nmile	-	2.25	-
Fairway: 24 nmile to Precautionary Zone	-	1.33	-
Precautionary Zone to Breakwater	-	0.90	-
Harbor Transit Inbound	-	0.70	-
Harbor Transit Outbound	-	0.44	-
Turning	137.00	0.23	32
Docking	137.00	0.25	34
Hoteling	137.00	24.0	3,288

Notes: (1) From POLA Inventory of Air Emissions Table 3.17 (Starcrest, 2010).

### Tugboat Usage during Assists

Engine Type	Tugboat Average Hp <sup>(1)</sup>	Load Factor <sup>(2)</sup>	Hours/ Assist <sup>(3)</sup>	Tugboats per Assist	Engines in Service <sup>(4)</sup>	kW-Hrs/ Assist
Main Engine	1,934	0.31	2.11	2	2	3,770
Auxiliary Generator	149	0.43	2.11	2	1	201

Notes: (1) From POLA Inventory of Air Emissions Table 4.1/4.2 (Starcrest, 2010).

(2) From POLA Inventory of Air Emissions Table 4.9 (Starcrest, 2010).

(3) Time spent operating per vessel trip. Equal to vessel "Harbor" transit times 1.3 to account for tug movement and assist time.

(4) Assist tugboats have 2 main engines and 2 auxiliary engines. Only 1 auxiliary and both main engines operate during an assist.

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Ship Emission Factors**

Emission Factors for Ships		Fuel Type	VOC	CO	NOx	SOx <sup>(1)</sup>	PM10	PM2.5 <sup>(2)</sup>	CO2	CH4	N2O	Source
Engine Type												
Main Propulsion Engine (g/kW-hr)												
OGV Main Engines	RO	0.60	1.40	18.10	10.50	1.20	620.00	0.01	0.03	3.4		
OGV Main Engines	MGO (0.1% S)	0.60	1.40	17.01	0.42	0.20	620.00	0.01	0.03	3.4.5		
Tugboat Main Engines	Diesel (350ppm)	0.60	2.99	12.98	0.15	0.50	652.00	0.00	0.03	6.7		
Tugboat Main Engines	CARB (15 ppm S)	0.44	2.99	12.07	0.01	0.36	652.00	0.00	0.03	6.7.5		
Auxiliary Engine (g/kW-hr)												
OGV Auxiliary Engines	RO	0.40	1.10	14.70	12.30	1.50	683.00	0.01	0.03	8.9		
OGV Auxiliary Engines	MGO (0.1% S)	0.40	1.10	13.82	0.49	0.20	683.00	0.01	0.03	8.9.5		
Tugboat Auxiliary Engines	Diesel (350ppm)	1.00	4.22	11.00	0.15	0.45	690.00	0.01	0.03	6.7		
Tugboat Auxiliary Engines	CARB (15 ppm S)	0.72	4.22	10.23	0.01	0.32	690.00	0.01	0.03	6.7.5		
Auxiliary Boiler (kg/tonne fuel)												
OGV Auxiliary Boilers	RO	0.10	0.20	2.10	16.50	0.80	970.00	0.00	0.08	10.11		
OGV Auxiliary Boilers	MGO (0.1% S)	0.10	0.20	1.97	0.66	0.14	970.00	0.00	0.08	10.11.5		

(1) SOx emissions based on sulfur content. Assumes all sulfur is converted to SOx.  
 (2) PM2.5 emission factors that were not in the POLA 2009 Emissions Inventory were scaled from PM10 emission factors using CARB CEIDARS speciation profiles (0.87).  
 (3) POLA 2009 Emissions Inventory Table 3.6  
 (4) POLA 2009 Emissions Inventory Table 3.7  
 (5) Fuel Correction Factor - POLA 2009 Emission Inventory Table 3.18 & Table 4.8

Activity	Sulfur Content	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
MDO/MGO	0.1%	1.00	1.00	0.94	0.04	0.17	1.00	1.00	1.00	0.94
ULSD (1995 and older)	15ppm	0.72	1.00	0.93	0.04	0.72	1.00	0.72	1.00	0.93

(6) Tugboat emission factors based on *Emissions Estimation Methodology for Commercial Harbor Craft Operating in California (CARB, 2007)*. Assumes no engine deterioration and average engine model year for tugboats.

(7) GHG emissions based on *Methodology for Calculating Emissions from Ships (VL, 2004)*

(8) POLA 2009 Emissions Inventory Table 3.11

(9) POLA 2009 Emissions Inventory Table 3.12

(10) POLA 2009 Emissions Inventory Table 3.15

(11) POLA 2009 Emissions Inventory Table 3.16

**Load Emission Factor Adjustments for OGV Main Propulsion Engines**

Activity	Load Factor	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Fairway: AQMD Overwater Boundary to 24-nm mile	0.58	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fairway: 24-nm mile to Precautionary Zone	0.58	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Precautionary Zone	0.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Harbor Transit Inbound	0.04	7.20	4.65	2.12	1.00	2.97	2.97	1.00	7.20	2.12
Harbor Transit Outbound	0.17	1.17	1.16	1.03	1.00	1.05	1.05	1.00	1.17	1.03
Turning	0.02	21.11	9.69	4.63	1.00	7.39	7.39	1.00	21.11	4.63
Docking	0.02	21.11	9.69	4.63	1.00	7.39	7.39	1.00	21.11	4.63

Notes: POLA 2009 Emissions Inventory Table 3.8. Factor = Coefficient x Load Factor<sup>Exponent</sup> + Intercept. Factors are normalized by dividing by the factor @ 20% load. See table below.

**Low-Load Emission Factor Regression Factors for OGV Main Propulsion Engines**

Variable	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Exponent	1.5	1	1.5	0	1.5	0	1.5	0	1.5
Intercept	0.39	0.15	10.45	0	0.25	0.25	0	0.39	10.45
Coefficient	0.0667	0.8378	0.1255	1	0.0059	0.0059	1	0.0667	0.1255
Ref. EF @ 20% Load	1.136	4.339	11.853	1	0.316	0.316	1	1.136	11.853

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Ship Emissions Summary**

Total Emissions per Ship Delivery (lb/visit)												
Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e	Hours	
Ships - AQMD to 24 nmile x 2	29.8	69.8	849.6	21.3	12.8	10.3	31,373.6	0.6	1.5	31,841.1	4.49	
Ships - 24 mile to PZ x 2	17.6	41.2	501.2	12.6	7.6	6.1	18,509.8	0.4	0.9	18,785.6	2.65	
Ships - PZ to Breakwater x 2	5.2	12.4	151.0	3.9	2.3	1.8	5,670.0	0.1	0.3	5,754.0	1.80	
Ships - Harbor Transit Inbound	2.7	4.6	32.7	0.7	0.7	0.5	987.0	0.1	0.1	1,007.1	0.70	
Ships - Harbor Transit Outbound	1.2	2.9	32.6	0.9	0.5	0.4	1,266.8	0.0	0.1	1,285.6	0.44	
Ships - Turning	1.2	1.5	11.3	0.2	0.3	0.2	338.7	0.0	0.0	347.4	0.23	
Ships - Docking x 2	2.6	3.3	24.3	0.5	0.5	0.4	725.9	0.1	0.1	744.3	0.50	
Ships - Hoteling	3.6	9.5	115.0	8.4	2.8	2.2	11,993.2	0.1	0.8	12,229.2	24.00	
Tugboats	3.9	26.7	104.6	0.1	3.1	2.7	5,712.9	0.0	0.3	5,791.6	2.11	
<b>Total</b>	<b>67.92</b>	<b>171.84</b>	<b>1,822.25</b>	<b>48.51</b>	<b>30.67</b>	<b>24.71</b>	<b>76,577.87</b>	<b>1.31</b>	<b>3.81</b>	<b>77,785.80</b>	<b>36.92</b>	

Hourly Emission Rates (lb/hour of activity)												
Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e	Hours <sup>(2)</sup>	
Ships - AQMD to 24 nmile x 2	6.6	15.5	189.1	4.7	2.9	2.3	6,984.8	0.1	0.3	7,088.9	2.25	
Ships - 24 mile to PZ x 2	6.6	15.5	189.1	4.7	2.9	2.3	6,984.8	0.1	0.3	7,088.9	2.25	
Ships - PZ to Breakwater x 2	2.9	6.9	83.9	2.1	1.3	1.0	3,150.0	0.1	0.1	3,196.7	0.90	
Ships - Harbor Transit Inbound	3.9	6.5	46.7	1.0	0.9	0.7	1,409.9	0.1	0.1	1,438.7	0.44	
Ships - Harbor Transit Outbound	2.8	6.6	74.4	2.0	1.2	1.0	2,895.5	0.1	0.1	2,938.5	0.86	
Ships - Turning	5.3	6.6	48.5	1.0	1.1	0.9	1,451.7	0.1	0.1	1,488.7	0.44	
Ships - Docking x 2	5.3	6.6	48.5	1.0	1.1	0.9	1,451.7	0.1	0.1	1,488.7	0.44	
Ships - Hoteling	0.2	0.4	4.8	0.3	0.1	0.1	499.7	0.0	0.0	509.5	0.15	
Tugboats	1.9	12.7	49.7	0.0	1.5	1.3	2,711.3	0.0	0.1	2,748.6	0.78	
<b>Total</b>	<b>35.36</b>	<b>77.35</b>	<b>734.77</b>	<b>17.06</b>	<b>12.91</b>	<b>10.42</b>	<b>27,539.57</b>	<b>0.68</b>	<b>1.40</b>	<b>27,987.23</b>	<b>8.15</b>	

Peak Day Emission Rates (lb/day) <sup>(1)</sup>												
Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e	Hours <sup>(2)</sup>	
Ships - AQMD to 24 nmile x 2	14.9	34.9	424.8	10.7	6.4	5.1	15,686.8	0.3	0.7	15,920.5	4.49	
Ships - 24 mile to PZ x 2	8.8	20.6	250.6	6.3	3.8	3.0	9,254.9	0.2	0.4	9,392.8	2.65	
Ships - PZ to Breakwater x 2	2.6	6.2	75.5	1.9	1.2	0.9	2,835.0	0.1	0.1	2,877.0	0.90	
Ships - Harbor Transit Inbound	-	-	-	-	-	-	-	-	-	-	-	
Ships - Harbor Transit Outbound	1.2	2.9	32.6	0.9	0.5	0.4	1,266.8	0.0	0.1	1,285.6	0.44	
Ships - Turning	1.2	1.5	11.3	0.2	0.3	0.2	338.7	0.0	0.0	347.4	0.23	
Ships - Docking	2.6	3.3	24.3	0.5	0.5	0.4	725.9	0.1	0.1	744.3	0.50	
Ships - Hoteling	2.8	7.3	89.1	6.5	2.2	1.7	9,298.9	0.1	0.6	9,481.9	18.61	
Tugboats	2.0	13.3	52.3	0.0	1.6	1.4	2,856.5	0.0	0.1	2,895.8	1.05	
<b>Total</b>	<b>36.13</b>	<b>90.10</b>	<b>960.50</b>	<b>27.02</b>	<b>16.45</b>	<b>13.23</b>	<b>42,263.44</b>	<b>0.70</b>	<b>2.15</b>	<b>42,945.28</b>	<b>24.00</b>	

Notes: (1) Hourly emissions indicated that outbound ship transit emissions are greater than inbound or hoteling emission, therefore, peak day includes outbound ship movement and 18.6 hours of hoteling. Excludes emissions outside the South Coast Air Basin.

(2) Tugboat hours are concurrent with ship activities, therefore are included in the total hours.

Total Project Emissions for Ship Delivery (lb) <sup>(1)</sup>												
Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e	Hours	
Ships - AQMD to 24 nmile x 2	29.8	69.8	849.6	21.3	12.8	10.3	31,373.6	0.6	1.5	31,841.1	4.49	
Ships - 24 mile to PZ x 2	17.6	41.2	501.2	12.6	7.6	6.1	18,509.8	0.4	0.9	18,785.6	2.65	
Ships - PZ to Breakwater x 2	5.2	12.4	151.0	3.9	2.3	1.8	5,670.0	0.1	0.3	5,754.0	1.80	
Ships - Harbor Transit Inbound	2.7	4.6	32.7	0.7	0.7	0.5	987.0	0.1	0.1	1,007.1	0.70	
Ships - Harbor Transit Outbound	1.2	2.9	32.6	0.9	0.5	0.4	1,266.8	0.0	0.1	1,285.6	0.44	
Ships - Turning	1.2	1.5	11.3	0.2	0.3	0.2	338.7	0.0	0.0	347.4	0.23	
Ships - Docking x 2	2.6	3.3	24.3	0.5	0.5	0.4	725.9	0.1	0.1	744.3	0.50	
Ships - Hoteling	3.6	9.5	115.0	8.4	2.8	2.2	11,993.2	0.1	0.8	12,229.2	24.00	
Tugboats	3.9	26.7	104.6	0.1	3.1	2.7	5,712.9	0.0	0.3	5,791.6	2.11	
<b>Total</b>	<b>67.9</b>	<b>171.8</b>	<b>1,822.2</b>	<b>48.5</b>	<b>30.7</b>	<b>24.7</b>	<b>76,577.9</b>	<b>1.3</b>	<b>3.8</b>	<b>77,785.8</b>	<b>36.9</b>	

Notes: (1) Based on 20 ships or two cranes per ship.

### Chevron El Segundo Refinery - Coke Drum Reliability Project Ocean Going Tug Boat Parameters

#### OG Tug Main Engine Usage per One-Way Transit

Activity	Propulsion Max Hp <sup>(2)</sup>	Speed (Kts)	Load Factor <sup>(6)</sup>	Distance (nm/trip) <sup>(12)</sup>	Duration (hr/trip)	Energy Consumed (kW-hr/trip) <sup>(13)</sup>
Fairway: AQMD Overwater Boundary to 24 nmile <sup>(1,5,6,16)</sup>	7,594	9.0	0.24	-	-	-
Fairway: Port to King Harbor <sup>(6,7,16)</sup>	7,594	9.0	0.24	50.0	5.56	7,684
Precautionary Zone to Breakwater <sup>(8,3)</sup>	7,594	9.0	0.24	16.2	1.80	2,490
Harbor Transit Inbound <sup>(9,10,11)</sup>	7,594	5.0	0.04	3.5	0.70	166
Harbor Transit Outbound <sup>(9,10,11)</sup>	7,594	8.0	0.17	3.5	0.44	425
Turning <sup>(4,17,18)</sup>	7,594	n/a	0.02	n/a	0.23	26
Docking <sup>(15,4,14)</sup>	7,594	n/a	0.02	n/a	0.25	28

- Notes: (1) Portion of the trip between the AQMD overwater boundary and the 24-nm zone.  
(2) Average horse power for ocean going tug. POLA Inventory of Air Emissions Table 3.26 (Starcrest, 2010)  
(3) Average speeds in the precautionary zone are from POLA Inventory of Air Emissions 2009 Table 3.5 (Starcrest, 2010).  
(4) Load factor of 0.02 represents minimum load factor for propulsion engines (Starcrest, 2010).  
(5) Average cruising speeds represent 94% of the maximum speed (Starcrest, 2010). Maximum speeds are from Lloyds data.  
(6) Load factor is (speed/max speed)<sup>3</sup>. From Starcrest (2010).  
(7) Portion of the trip between the 24-mile zone and Precautionary Zone.  
Total average fairway distance from overwater boundary to precautionary zone is 42.9 nmiles (27+15.9 nmiles) for container ships, assuming 100% use north route.  
(8) Portion of transit that occurs from PZ boundary to the POLA breakwater.  
(9) Portion of the trip that occurs inside the POLA breakwater to the West Basin.  
(10) Average Harbor Transit speeds found in POLA Inventory of Air Emissions Section 3.5.6 (Starcrest, 2010).  
(11) Average Harbor Transit time (arrival & departure) (Starcrest, 2004 Table 2.51) less 14 minutes of turning time.  
(12) Distances from POLA Inventory of Air Emissions Table 3.1 (Starcrest, 2010).

Average One-Way Transit Distances	nmiles
AQMD Boundary to PZ 1-way	42.9
VSRP Zone 1-way (24nm zone)	24.0
Port to King Harbor 1-way (24nm zone)	50.0
PZ to Breakwater 1-way	8.1

- (13) 1 hp-hr = 0.746 kW-hr.  
(14) Average time for vessel docking is 15 minutes per one-way trip (Starcrest, 2007 Section 2.5.6).  
(15) Portion of the trip that occurs once the vessel arrives at the West Basin.  
(16) Assume Vessel Speed Reduction (VSR).  
(17) Turning would occur during only one trip segment (either inbound or outbound).  
(18) Turning time is estimated to take 14 minutes for a 180 degree turn, according to Starcrest 2004 Figure 2.28.

#### OG Tug Auxiliary Generator Usage per One-Way Transit

Activity	Auxiliary kW per Vessel <sup>(1)</sup>	Hours/ Transit	kW-Hrs/ Transit
Fairway: AQMD Overwater Boundary to 24 nmile	88.00	-	-
Fairway: 24 nmile to Precautionary Zone	88.00	5.56	489
Precautionary Zone to Breakwater	88.00	1.80	158
Harbor Transit Inbound	233.00	0.70	163
Harbor Transit Outbound	233.00	0.44	102
Turning	233.00	0.23	54
Docking	233.00	0.25	58
Hoteling	114.00	8.0	912

Notes: (1) From POLA Inventory of Air Emissions Table 3.13 (Starcrest, 2010).

#### OG Tug Auxiliary Boiler Usage per One-Way Transit

Activity	Boiler kW per Vessel <sup>(1)</sup>	Hours/ Transit	kW-Hrs/ Transit
Fairway: AQMD Overwater Boundary to 24 nmile	-	-	-
Fairway: 24 nmile to Precautionary Zone	-	5.56	-
Precautionary Zone to Breakwater	-	1.80	-
Harbor Transit Inbound	-	0.70	-
Harbor Transit Outbound	-	0.44	-
Turning	-	0.23	-
Docking	-	0.25	-
Hoteling	-	8.0	-

Notes: (1) From POLA Inventory of Air Emissions Table 3.17 (Starcrest, 2010).

#### Assist Tugboat Usage

Engine Type	Assist Tug Average Hp <sup>(1)</sup>	Load Factor <sup>(2)</sup>	Hours/ Assist <sup>(3)</sup>	Assist Tug per Assist	Engines in Service <sup>(4)</sup>	kW-Hrs/ Assist
Main Engine	1,934	0.31	8.00	1	2	7,156
Auxiliary Generator	149	0.43	8.00	1	1	382

- Notes: (1) From POLA Inventory of Air Emissions Table 4.1/4.2 (Starcrest, 2010).  
(2) From POLA Inventory of Air Emissions Table 4.9 (Starcrest, 2010).  
(3) Assumes 1 assist tug per vessel.  
(4) Assist tugboats have 2 main engines and 2 auxiliary engines. Only 1 auxiliary and both main engines operate during an assist.



**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Ocean Going Tug Boat Emission Factors**

Emission Factors for Ocean Going Vessels											
Engine Type	Fuel Type	VOC	CO	NOx	SOx <sup>(1)</sup>	PM10	PM2.5 <sup>(2)</sup>	CO2	CH4	N2O	Source
<b>Main Propulsion Engine (g/kW-hr)</b>											
OGV Main Engines	RO	0.60	1.40	18.10	10.50	1.50	1.20	620.00	0.01	0.03	3.4
OGV Main Engines	MGO (0.1% S)	0.60	1.40	17.01	0.42	0.26	0.20	620.00	0.01	0.03	3.4.5
Tugboat Main Engines	Diesel (350ppm)	0.60	2.99	12.98	0.15	0.50	0.44	652.00	0.00	0.03	6.7
Tugboat Main Engines	CARB (15 ppm S)	0.44	2.99	12.07	0.01	0.36	0.31	652.00	0.00	0.03	6.7.5
<b>Auxiliary Engine (g/kW-hr)</b>											
OGV Auxiliary Engines	RO	0.40	1.10	14.70	12.30	1.50	1.20	683.00	0.01	0.03	8.9
OGV Auxiliary Engines	MGO (0.1% S)	0.40	1.10	13.82	0.49	0.26	0.20	683.00	0.01	0.03	8.9.5
Tugboat Auxiliary Engines	Diesel (350ppm)	1.00	4.22	11.00	0.15	0.45	0.39	690.00	0.01	0.03	6.7
Tugboat Auxiliary Engines	CARB (15 ppm S)	0.72	4.22	10.23	0.01	0.32	0.28	690.00	0.01	0.03	6.7.5
<b>Auxiliary Boiler (kg/tonne fuel)</b>											
OGV Auxiliary Boilers	RO	0.10	0.20	2.10	16.50	0.80	0.60	970.00	0.00	0.08	10.11
OGV Auxiliary Boilers	MGO (0.1% S)	0.10	0.20	1.97	0.66	0.14	0.10	970.00	0.00	0.08	10.11.5

(1) SOx emissions based on sulfur content. Assumes all sulfur is converted to SOx.  
 (2) PM2.5 emission factors that were not in the POLA 2009 Emissions Inventory were scaled from PM10 emission factors using CARB CEIDARS speciation profiles (0.87).  
 (3) POLA 2009 Emissions Inventory Table 3.6  
 (4) POLA 2009 Emissions Inventory Table 3.7  
 (5) Fuel Correction Factor - POLA 2009 Emission Inventory Table 3.18 & Table 4.8

Activity	Sulfur Content	VOC	CO	Nox	SOx	PM10	PM2.5	CO2	CH4	N2O
MDO/MGO	0.1%	1.00	1.00	0.94	0.04	0.17	0.17	1.00	1.00	0.94
ULSD (1995 and older)	15ppm	0.72	1.00	0.93	0.04	0.72	0.72	1.00	0.72	0.93

(6) Tugboat emission factors based on *Emissions Estimation Methodology for Commercial Harbor Craft Operating in California (CARB, 2007)*. Assumes no engine deterioration and average engine model year for tugboats.

(7) GHG emissions based on *Methodology for Calculating Emissions from Ships (VL, 2004)*

(8) POLA 2009 Emissions Inventory Table 3.11

(9) POLA 2009 Emissions Inventory Table 3.12

(10) POLA 2009 Emissions Inventory Table 3.15

(11) POLA 2009 Emissions Inventory Table 3.16

**Load Emission Factor Adjustments for OGV Main Propulsion Engines**

Activity	Load Factor	VOC	CO	Nox	SOx	PM10	PM2.5	CO2	CH4	N2O
Fairway: AQMD Overwater Boundary to 24-nm mile	0.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fairway: 24-nm mile to Precautionary Zone	0.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Precautionary Zone	0.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Harbor Transit Inbound	0.04	7.20	4.65	2.12	1.00	2.97	2.97	1.00	7.20	2.12
Harbor Transit Outbound	0.17	1.17	1.16	1.03	1.00	1.05	1.05	1.00	1.17	1.03
Turning	0.02	21.11	9.69	4.63	1.00	7.39	7.39	1.00	21.11	4.63
Docking	0.02	21.11	9.69	4.63	1.00	7.39	7.39	1.00	21.11	4.63

Notes: POLA 2009 Emissions Inventory Table 3.8. Factor = Coefficient x Load Factor<sup>Exponent</sup> + Intercept. Factors are normalized by dividing by the factor @ 20% load. See table below.

**Low-Lead Emission Factor Regression Factors for OGV Main Propulsion Engines**

Variable	VOC	CO	Nox	SOx	PM10	PM2.5	CO2	CH4	N2O
Exponent	1.5	1	1.5	0	1.5	0	1.5	0	1.5
Intercept	0.39	0.15	10.45	0	0.25	0.25	0	0.39	10.45
Coefficient	0.0667	0.8378	0.1255	1	0.0059	0.0059	1	0.0667	0.1255
Ref. EF @ 20% Load	1.136	4.339	11.853	1	0.316	0.316	1	1.136	11.853

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Ocean Going Tug Boat Emissions**

**Total Emissions per Ship Delivery (lb/visit)**

Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e	Hours
Ships - AQMD to 24 nmile x 2	-	-	-	-	-	-	-	-	-	-	0.00
Ships - Port to King Harbor x 2	21.1	49.7	604.9	15.3	9.2	7.3	22,430.7	0.4	1.0	22,764.4	11.11
Ships - PZ to Breakwater x 2	6.9	16.1	196.0	4.9	3.0	2.4	7,267.5	0.1	0.3	7,375.7	3.60
Ships - Harbor Transit Inbound	1.7	2.8	18.1	0.3	0.4	0.3	471.5	0.0	0.0	482.5	0.70
Ships - Harbor Transit Outbound	0.7	1.8	19.5	0.5	0.3	0.2	732.8	0.0	0.0	743.9	0.44
Ships - Turning	0.8	0.9	6.2	0.1	0.1	0.1	117.8	0.0	0.0	121.6	0.23
Ships - Docking x 2	1.7	2.0	13.3	0.2	0.3	0.2	252.3	0.0	0.0	260.6	0.50
Ships - Docking	0.8	2.2	27.7	1.0	0.5	0.4	1,370.4	0.0	0.1	1,388.8	8.00
Tugboats	7.5	50.6	198.7	0.1	5.9	5.2	10,845.2	0.1	0.5	10,994.5	8.00
<b>Total</b>	<b>41.19</b>	<b>126.06</b>	<b>1,084.52</b>	<b>22.39</b>	<b>19.71</b>	<b>16.18</b>	<b>43,488.16</b>	<b>0.73</b>	<b>2.03</b>	<b>44,131.83</b>	<b>32.58</b>

**Hourly Emission Rates (lb/hour of activity)**

Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e
Ships - AQMD to 24 nmile x 2	-	-	-	-	-	-	-	-	-	-
Ships - 24 mile to PZ x 2	1.9	4.5	54.4	1.4	0.8	0.7	2,018.8	0.0	0.1	2,048.8
Ships - PZ to Breakwater x 2	1.9	4.5	54.4	1.4	0.8	0.7	2,018.8	0.0	0.1	2,048.8
Ships - Harbor Transit Inbound	2.5	4.0	25.9	0.5	0.5	0.4	673.6	0.0	0.0	689.2
Ships - Harbor Transit Outbound	1.7	4.0	44.6	1.1	0.7	0.6	1,675.1	0.0	0.1	1,700.3
Ships - Turning	3.4	3.9	26.7	0.4	0.6	0.5	504.7	0.1	0.0	521.1
Ships - Docking x 2	3.4	3.9	26.7	0.4	0.6	0.5	504.7	0.1	0.0	521.1
Ships - Docking	0.9	0.1	3.5	0.1	0.1	0.1	171.3	0.0	0.0	173.6
Tugboats	0.9	6.3	24.8	0.0	0.7	0.6	1,355.6	0.0	0.1	1,374.3
<b>Total</b>	<b>15.73</b>	<b>31.43</b>	<b>261.03</b>	<b>5.22</b>	<b>4.89</b>	<b>3.96</b>	<b>8,922.42</b>	<b>0.30</b>	<b>0.48</b>	<b>9,077.27</b>

**Peak Day Emission Rates (lb/day)<sup>(1)</sup>**

Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e	Hours <sup>(2)</sup>
Ships - AQMD to 24 nmile x 2	-	-	-	-	-	-	-	-	-	-	-
Ships - 24 mile to PZ x 2	20.0	47.1	573.4	14.5	8.7	7.0	21,259.8	0.4	1.0	21,576.1	10.5
Ships - PZ to Breakwater x 2	6.9	16.1	196.0	4.9	3.0	2.4	7,267.5	0.1	0.3	7,375.7	3.6
Ships - Harbor Transit Inbound	1.7	2.8	18.1	0.3	0.4	0.3	471.5	0.0	0.0	482.5	0.7
Ships - Harbor Transit Outbound	0.7	1.8	19.5	0.5	0.3	0.2	732.8	0.0	0.0	743.9	0.4
Ships - Turning	0.8	0.9	6.2	0.1	0.1	0.1	117.8	0.0	0.0	121.6	0.2
Ships - Docking	1.7	2.0	13.3	0.2	0.3	0.2	252.3	0.0	0.0	260.6	0.5
Ships - Docking	0.8	2.2	27.7	1.0	0.5	0.4	1,370.4	0.0	0.1	1,388.8	8.0
Tugboats	7.5	50.6	198.7	0.1	5.9	5.2	10,845.2	0.1	0.5	10,994.5	8.0
<b>Total</b>	<b>40.09</b>	<b>123.47</b>	<b>1,052.94</b>	<b>21.59</b>	<b>19.23</b>	<b>15.80</b>	<b>42,317.28</b>	<b>0.70</b>	<b>1.97</b>	<b>42,943.53</b>	<b>24.00</b>

Notes: (1) Hourly emissions indicated that outbound OG tug transit emissions are greater than inbound or hoteling emission, therefore, peak day includes outbound ship movement and 18.6 hours of hoteling. Excludes emissions outside the South Coast Air Basin.

(2) Assist tugboat hours are concurrent with OG tug activities, therefore are included in the total hours.

**Total Project Emissions for Ship Delivery (lb)<sup>(1)</sup>**

Project Scenario/Activity	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO2e
Ships - AQMD to 24 nmile x 2	-	-	-	-	-	-	-	-	-	-
Ships - 24 mile to PZ x 2	126.9	298.2	3,629.7	91.5	55.0	44.0	134,584.0	2.5	6.3	136,586.3
Ships - PZ to Breakwater x 2	41.1	96.6	1,176.0	29.7	17.8	14.3	43,605.2	0.8	2.0	44,254.0
Ships - Harbor Transit Inbound	10.3	16.6	108.7	2.0	2.2	1.8	2,829.1	0.2	0.2	2,894.8
Ships - Harbor Transit Outbound	4.5	10.6	117.0	3.0	1.9	1.5	4,397.1	0.1	0.2	4,463.3
Ships - Turning	4.7	5.5	37.4	0.5	0.8	0.7	706.5	0.1	0.1	729.5
Ships - Docking x 2	10.1	11.8	80.1	1.1	1.8	1.4	1,514.0	0.2	0.1	1,563.3
Ships - Docking	4.8	13.2	166.3	5.9	3.1	2.5	8,222.2	0.1	0.4	8,333.0
Tugboats	44.8	303.7	1,191.9	0.6	35.6	31.0	65,071.0	0.3	2.9	65,966.8
<b>Total</b>	<b>247.2</b>	<b>756.4</b>	<b>6,507.1</b>	<b>134.3</b>	<b>118.3</b>	<b>97.1</b>	<b>260,928.9</b>	<b>4.4</b>	<b>12.2</b>	<b>264,791.0</b>

Notes: (1) Based on 6 OG tugs.

## Appendix B

### Chevron El Segundo Refinery - Coke Drum Reliability Project Operational Vehicle Trip Emissions

Vehicle	Miles per Day	Vehicles per Year
		2015
Commuters	36	
Cars	5	
Pickups/Linemen Trucks	5	
Total Light Vehicle Miles		0
Water Truck	2	
Stakebed Truck	50	
Street Sweeper	5	
Lube Truck	2	
Total Medium Truck Miles		0
Dump Trucks	50	
Transit Mixers	50	
Coke Trucks	50	2129.27
Bus	10	
Total Heavy Truck Miles		106463.5895

VOC	Emission Rate (lb/mi) <sup>(2)</sup>	lb/yr
		2015
Light Duty	0.0006635	0.00
Medium Duty	0.0017389	0.00
Heavy Duty	0.0017861	190.15
Total		190.15

CO	Emission Rate (lb/mi) <sup>(2)</sup>	lb/yr
		2015
Light Duty	0.0061411	0.00
Medium Duty	0.0116945	0.00
Heavy Duty	0.0076689	816.46
Total		816.46

NOx	Emission Rate (lb/mi) <sup>(2)</sup>	lb/yr
		2015
Light Duty	0.0006019	0.00
Medium Duty	0.0128503	0.00
Heavy Duty	0.0212268	2259.88
Total		2259.88

SOx	Emission Rate (lb/mi) <sup>(2)</sup>	lb/yr
		2015
Light Duty	0.0000107	0.00
Medium Duty	0.0000274	0.00
Heavy Duty	0.0000408	4.35
Total		4.35

PM10	Emission Rate (lb/mi) <sup>(2)</sup>	lb/yr
		2015
Light Duty Exhaust	0.0000926	0.00
Medium Duty Exhaust	0.0005031	0.00
Heavy Duty Exhaust	0.0010472	111.48
Total Exhaust PM		111.48
Light Duty Fugitive <sup>(3)</sup>	0.00038589	0.00
Medium Duty Fugitive <sup>(3)</sup>	0.00210368	0.00
Heavy Duty Fugitive <sup>(3)</sup>	0.02011945	2141.99
Total Fugitive PM		2141.99
Total		2253.47

CO <sub>Eq</sub>	Emission Rate (lb/mi) <sup>(2)</sup>	lb/yr
		2015
Light Duty	1.1031721	0.00
Medium Duty	2.8141728	0.00
Heavy Duty	4.2107798	448294.73
Total (mt/yr)		203.30

(1) Coker Trucks hold 26.2 tons. Coke is 10% water by weight. 20% contingency added to coke production.

(2) Based on 2007 SCAQMD on-road emission rates. (<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>)

(3) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003

$$E = k(sL/2)^{0.65} \times (W/3)^{1.5} \cdot C$$

Where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m<sup>2</sup>) from CARB Methodology 7.9 for paved roads

(0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for light; 5 for medium trucks, and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

(4) Carbon Dioxide Equivalence (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub> \* 21

Chem	lb/mile		
	Light	Medium	Heavy
	2015	2015	2015
CO <sub>2</sub>	1.1019	2.8125	4.2090
CH <sub>4</sub>	0.0001	0.0001	0.0001
CO <sub>Eq</sub>	1.103	2.814	4.211

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Operational Emissions**

Baseline is 1/1/08 thru 12/31/09.		<b>Incremental Emissions from Improving Coke Drum Reliability</b>														
Process Unit	Combustion Unit	CO2e Emissions, Tons / yr	CO2e Emissions, tonnes / yr	CO Emissions, Tons / yr	NOx Emissions, Tons / yr	SO2 Emissions, Tons / yr	PM Emissions, Tons / yr	VOC Emissions, Tons / yr								
		5,612	5,090													
Coker	Drum Vents CH4 as CO2e -->	0.40076	0.36349													
<b>total coker</b>	<b>Total CO2 Emissions --&gt;</b>	<b>5,602.84</b>	<b>5,081.77</b>	<b>1.316</b>	<b>0.559</b>	<b>0.839</b>	<b>0.297</b>	<b>0.273</b>								
Coker	F-501A / B / C	5.379	4,878.47	1.316	0.559	0.839	0.282	0.263								
Coker	Drum Vents	0.00104	0.00	0.00008			0.00110	0.00972								
Coker	Coke Handling	224.15	203.30				0.014									
<b>Trucks</b>		224.15	203.30	0.408	1.130	0.002	1.127	0.095								
<b>Total</b>		5,826.986	5,285.076	1.724	1.689	0.841	1.424	0.368								
		w/construction														
<b>total</b>	lb/day		5,431.636	7.210501335	3.062187849	4.595629564	1.626272184	1.495246315								
heater vents handling	lb/day-vent lb/day			7.210037174	3.062187849	4.595629564	1.545112619	1.44200355								
heater vents handling	lb/hr lb/hr-vent lb/hr			7.73601E-05			0.001003781	0.008873794								
				co	nox		pm									
				0.300418216	0.12759116	0.191484565	0.064379692	0.060083481								
				3.22334E-06			4.18242E-05	0.000369741								
<b>with 20% contingency</b>							0.003130703									
heater vents handling	lb/day lb/day-vent lb/day			8.652044609	3.674625418	5.514755477	1.854135142	1.73040426								
				9.28321E-05			0.001204537	0.010648553								
				co	nox		pm									
heater vents handling	lb/hr lb/hr-vent lb/hr			0.360501859	0.153109392	0.229781478	0.077255631	0.072100177								
				3.868E-06			5.0189E-05	0.00044369								
							0.003756844									

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Turnaround Emissions Reductions**

Process Unit	Combustion Unit	Emissions Decrease Due to Coker Turnaround										
		CO2e Emissions, Lbs / day	CO2e Emissions, tonnes / day	CO Emissions, Lbs / day	NOx Emissions, Lbs / day	SO2 Emissions, Lbs / day	PM Emissions, Lbs / day	VOC Emissions, Lbs / day				
Coker		Total CO2e Emissions-->	1,162,522	527.20								
		Drum Vents CH4 as CO2e -->	58	0.03								
		Total CO2 Emissions -->	1,160,660	526.36	284	121	181	64	59			
		Thruput										
Coker	F-501A / B / C	75 MBbbls	1,160,660	526.36	284	121	181	61	57			
Coker	Drum Vents	6 Vents	0.20	0.00	0.016			0.209	1.850			
Coker	Coke Handling	4.6 MTons		0.00				3.002				

CO2e equal to CO2 + CH4 + N2O.

Drum vent CH4 emissions converted to CO2e by multiplying by Global Warming Potential factor of 21.

M = 1,000



---

**Chevron El Segundo Refinery  
Coke Drum Reliability Project  
SCAQMD Localized Significance Threshold Analysis  
Revised**

**August 6, 2012**

---

Prepared for: Chevron El Segundo Refinery

By: Environmental Audit, Inc.  
1000-A Ortega Way  
Placentia, CA 92870  
714-632-8521.





**Chevron El Segundo Refinery  
Coke Drum Reliability Project  
SCAQMD Localized Significance Threshold Analysis**

## **INTRODUCTION**

This Localized Significance Threshold (LST) analysis has been prepared to evaluate the potential impacts of the criteria pollutants carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), particulate matter less than 10 microns in diameter (PM<sub>10</sub>), and particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) emitted by the construction activities associated with the proposed Chevron El Segundo Refinery Coke Drum Reliability (CDR) Project. The currently proposed modifications to the CDR Project include the replacement of exiting coke drums with new coke drums at the El Segundo Refinery (Refinery).

As part of the CDR Project, Environmental Audit, Inc. (EAI) has calculated construction emissions to evaluate the potential impacts from construction activities associated with the proposed CDR Project. Based on information provided by Chevron, LST analysis includes a screening analysis and a modeled analysis of the criteria pollutants for the peak daily emissions from the CDR Project. The results of this analysis are provided below.

## **FACILITY LOCATION**

The Refinery is located at 324 West El Segundo Boulevard in the City of El Segundo, California in the southern portion of Los Angeles County (See Figure 1). The SCAQMD identification number for the facility is 800030. The Refinery is bounded by El Segundo Boulevard to the north, Sepulveda Boulevard to the east, Rosecrans Avenue to the south, and Vista Del Mar to the west. The Chevron Refinery is located in an area of mixed land uses, with industrial, recreation, residential, and commercially zoned areas nearby. Land use to the north of the Chevron Refinery is primarily residential, with a mix of commercial and light industrial zoning mixed in. The predominant adjacent land uses west of the Refinery are nearly all heavy industrial, or open space, which includes: Dockweiler State Beach, Manhattan Beach, and the El Segundo Generating Station, although a small parcel of land at the southwest corner of the Chevron property is made up of commercial and multiple-family residential.

Directly south of the Refinery, there is a single-family residential area bordering the entire length of the Refinery separated by Rosecrans Avenue. The corridor immediately east of the Refinery is comprised of a golf course at the corner of Sepulveda Boulevard and El Segundo Boulevard, with light commercial and heavy industrial zoning for the rest of the tract. The Refinery is located in the City of El Segundo within Los Angeles County in an urbanized area that includes a substantial amount of industrial development, due to the proximity of Los Angeles International Airport (LAX).

## **EMISSION ESTIMATES**

Construction emission estimates for the peak day are calculated by each portion of the project that will be under construction during that period (see Table 1). Construction emissions vary based on activities and the worst-case scenario has been evaluated. It is expected that the calculated peak

**Chevron El Segundo Refinery  
Coke Drum Reliability Project  
SCAQMD Localized Significance Threshold Analysis**

day emissions estimates will occur infrequently during the proposed project construction activities and, most of the time, construction emissions will be less.

Based on information provided by Chevron, construction activities by month for the proposed Project are calculated to determine the peak construction day. Only onsite emissions sources are included in the LST. The peak construction day is expected to occur during Month 2 for PM10 and Month 17 for CO, NO<sub>x</sub>, and PM2.5. Construction activities included in this evaluation are the use of construction equipment and fugitive dust emissions from earth moving activities.

### **SCREENING ANALYSIS**

The South Coast Air Quality Management District (SCAQMD) *Localized Significance Threshold Methodology* (SCAQMD, 2009) includes lookup tables for screening emission rates for significance (Appendix C) for projects with an area of five acres or less. If the calculated emission for the construction activity is below the LST emission level found in the LST lookup tables, then the construction activity is not significant. The screening tables were developed using conservative assumptions, including the worst meteorological conditions. If localized emissions exceed the volumes in the lookup tables, dispersion modeling, which is more precise, may be performed. The CO, PM10, and PM2.5 emissions from the construction activities for the proposed Project is below the LST emission levels found in the LST lookup tables, therefore, are not significant. The results can be found in Table 2.

The emissions of NO<sub>x</sub> associated with the proposed Project construction are greater than the LST lookup table value. However, an air dispersion model will demonstrate that the NO<sub>x</sub> concentration is below localized significance levels. The modeling analysis is presented below.

### **CRITERIA POLLUTANT IMPACT MODELING**

In order to determine the groundlevel concentrations, the U.S. EPA ISCST3 air dispersion model was used to calculate the maximum 1-hour concentration. The U.S. EPA AERMOD has become the preferred model for most air dispersion modeling projects, however, ISCST3 will be used to say consistent with the SCAQMD LST Methodology.

The location of the source is identified based on data provided by Chevron and the Venice USGS Quadrangle (see Figure 2). Since the construction period will be less than 3 years and the peak construction emission rates are sporadic, only the 1 hour averaging period will be modeled. The ISCST3 model is run using the Lennox meteorological data available from the SCAQMD. The ISCST3 dispersion model was run using regulatory defaults.

ISCST3 is not set to include algorithms to model the effects of building downwash on emissions since area sources are not influenced by building downwash in ISCST3.

Terrain elevations are taken into account even though the facility and the vicinity are in a relatively flat area.

**Chevron El Segundo Refinery  
Coke Drum Reliability Project  
SCAQMD Localized Significance Threshold Analysis**

The ISCST3 model is run using a receptor grid of 100 meters, and extends at least 1,000 meters in every cardinal direction from the boundaries of the Refinery (see Figure 2).

The maximum impact location is determined for the applicable averaging periods from the ISCST3 model output. The maximum groundlevel concentration and the Universal Transverse Mercator (NAD 83) coordinates for each maximum impact point are presented in Table 3.

### **MODELED CRITERIA POLLUTANT IMPACT ANALYSIS**

The proposed project maximum groundlevel concentrations are compared to the localized significance thresholds<sup>1</sup> to demonstrate that the project will not cause or contribute to a violation of any state ambient air quality standard. Federal ambient air quality standards were not analyzed in this report because the federal standards are based on a 3 years period. The proposed Project construction period will be less than 3 years. The ambient air quality data for Southwest Coastal Los Angeles County (Station No. 820) is used to establish background levels of NO<sub>x</sub>. Table 4 identifies the ambient air quality data for NO<sub>2</sub> published by the SCAQMD in the last three years (2007, 2008, and 2009). The NO<sub>2</sub> maximum 1-hour concentration is combined with the maximum ambient concentration and compared to the Most Stringent Air Quality Standard. The results are presented in Table 5.

The modeled maximum NO<sub>x</sub> impact concentration for 1-hour is 337.8 µg/m<sup>3</sup>. However, Table 2-4 of the SCAQMD LST Methodology shows that only 25.8% of the total NO<sub>x</sub> is converted into NO<sub>2</sub> at 500 meters. The closest sensitive receptor is approximately 400 meters from the laydown area (construction equipment storage area); however, the NO<sub>x</sub> conversion rate is higher at 500 meters, so the 500 meter conversion rate was selected to be conservative. The converted NO<sub>2</sub> concentration at 500 meters is 84.1 µg/m<sup>3</sup>. The total NO<sub>2</sub> concentration with established background levels is 275.9 µg/m<sup>3</sup>, which is below the maximum 1-hour standard of 339 µg/m<sup>3</sup>. Therefore, the maximum NO<sub>2</sub> impact concentration for 1-hour is not significant.

### **CONCLUSIONS**

The localized significance threshold analysis results in no significant change in air quality from construction activities for NO<sub>2</sub>, CO, PM<sub>10</sub>, or PM<sub>2.5</sub>. Therefore, the proposed project complies with the localized significance threshold methodology.

m:\MC\2706 Chevron - Coker Replacement\Construction\2706 LST Report.doc

---

<sup>1</sup> SCAQMD. 2011. SCAQMD Air Quality Significance Thresholds. March.  
[www.aqmd.gov/ceqa/handbook/signthres.pdf](http://www.aqmd.gov/ceqa/handbook/signthres.pdf)

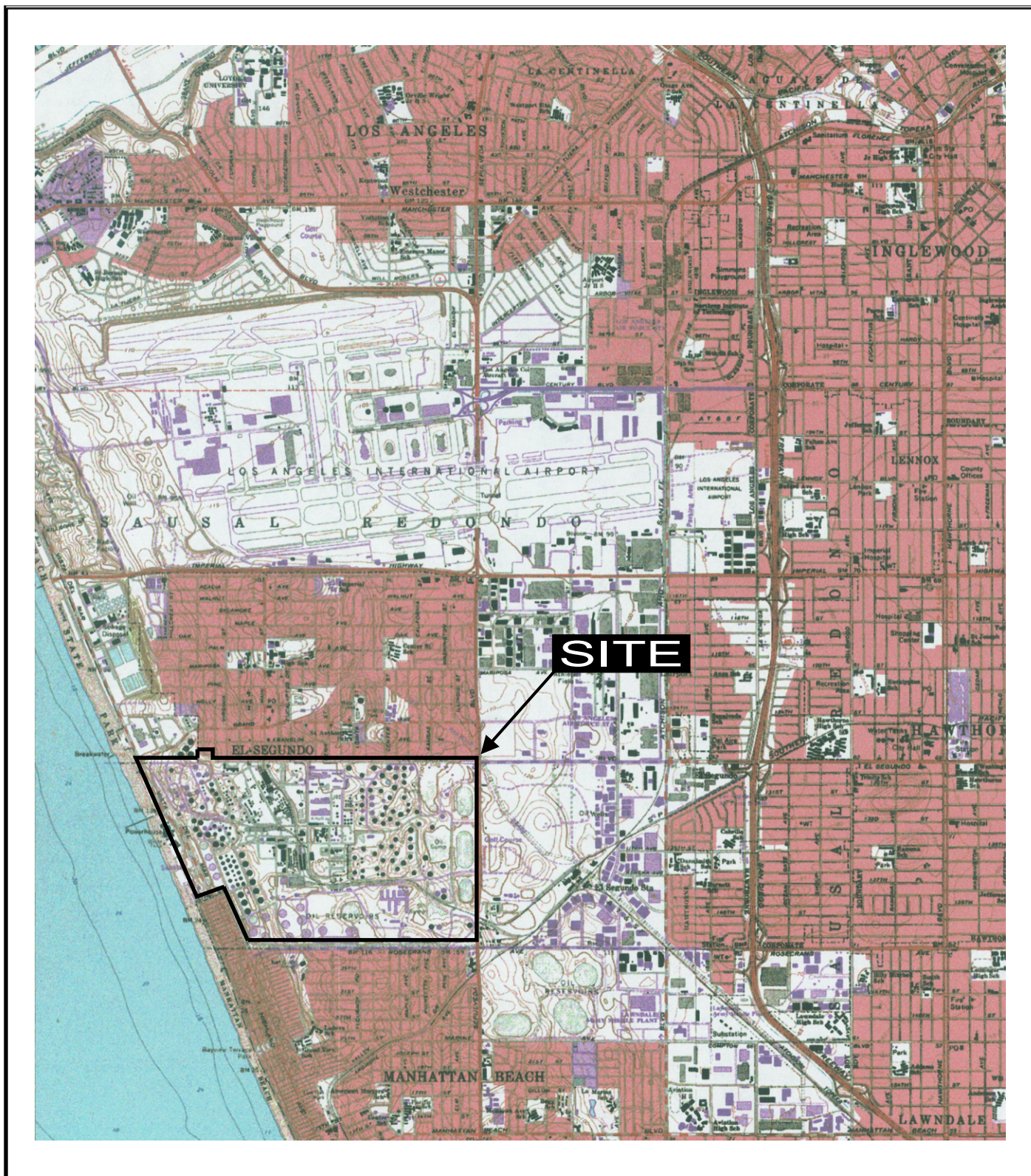


**FIGURE**

---

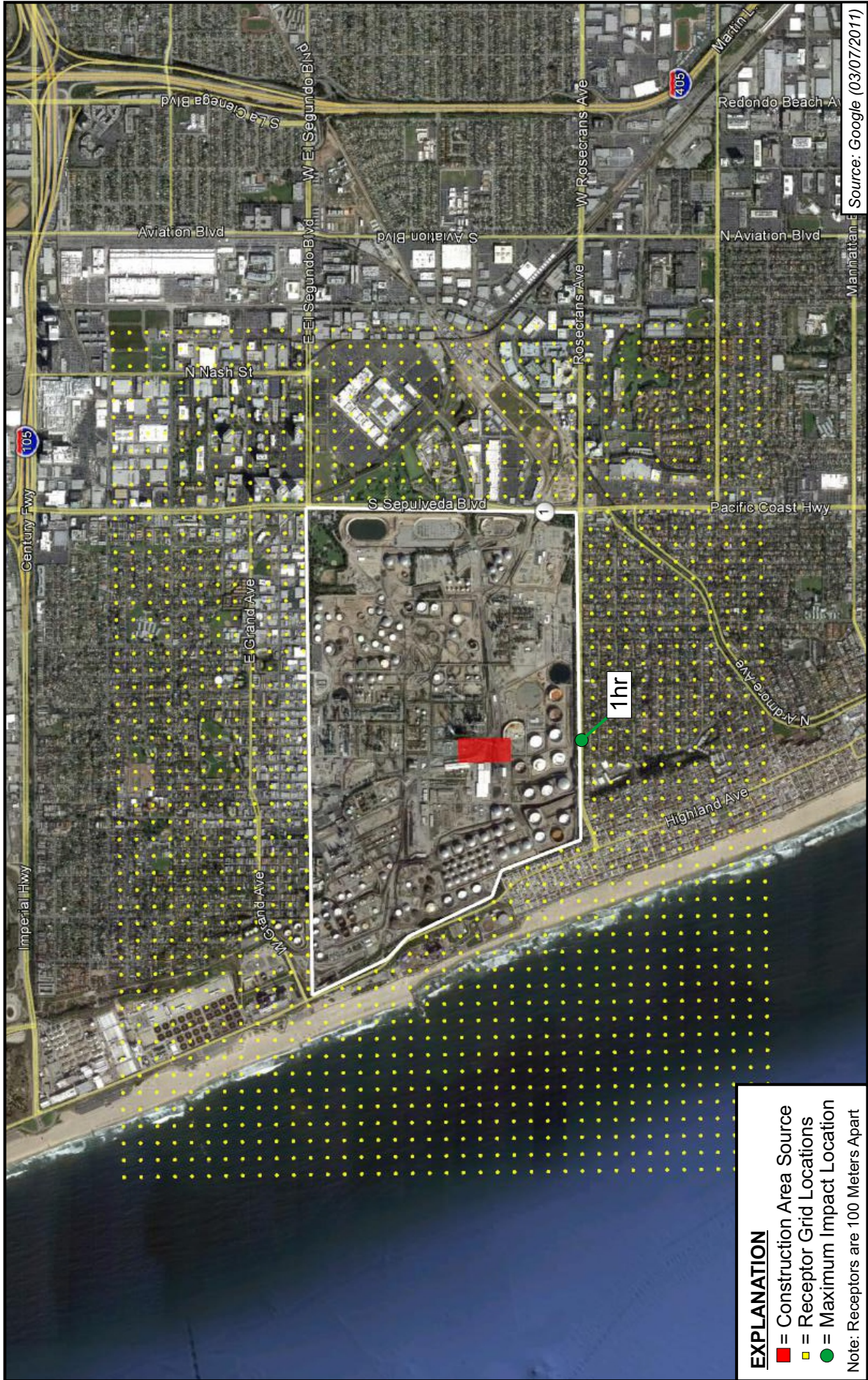






**SITE LOCATION MAP**  
Chevron Products Company  
El Segundo Refinery





**EXPLANATION**

- = Construction Area Source
- = Receptor Grid Locations
- = Maximum Impact Location

Note: Receptors are 100 Meters Apart

**ENVIRONMENTAL AUDIT, INC.**



**MAXIMUM IMPACT MAP**  
Chevron Products Company  
El Segundo Refinery



Source: Google (03/07/2011)

Figure 2



**TABLES**

---



**Localized Significance Threshold Evaluation for  
Chevron El Segundo Refinery  
Coke Drum Reliability Project  
Construction Emissions**

**Table 1 - Peak Day Calculated Construction Emissions and Source Dimensions <sup>(1)</sup>**

Phase	Source Description	Emissions (lb/day)			Emissions (lb/hr)			Area (ft <sup>2</sup> )	Emissions (lb/hr-ft <sup>3</sup> )			
		CO	NOx	PM10 <sup>(2)</sup>	CO	NOx	PM10 <sup>(2)</sup>		CO	NOx	PM10 <sup>(2)</sup>	PM2.5 <sup>(2)</sup>
Onsite - Peak CO/NOx	Construction	161.66	304.24	NA	1.01E+01	1.90E+01	NA	450000	2.25E-05	4.23E-05	NA	2.01E-06
Onsite - Peak PM	Construction	NA	NA	18.36	NA	NA	2.30E+00	450000	NA	NA	5.10E-06	NA

(1) Emissions were allocated to each source by engineering estimates.

(2) PM emissions adjusted to remove off-site fugitive dust emissions.

**Localized Significance Threshold Evaluation for  
The Chevron El Segundo Refinery  
Coke Drum Reliability Project Construction Emissions**

**Table 2 - Localized Significance Threshold Screening for Construction**

	<b>On-site Source Emissions (lbs/day)</b>					
	<b>CO</b>	<b>VOC</b>	<b>NOx</b>	<b>SOx</b>	<b>PM10</b>	<b>PM2.5</b>
Month 17 Construction Emissions	161.66	43.81	304.24	0.43	NA	14.48
Month 2 Construction Emissions	NA	NA	NA	NA	18.36	NA
Screening Value <sup>(1)(2)</sup>	<b>4,119</b>	<b>NA</b>	<b>222</b>	<b>NA</b>	<b>88</b>	<b>35</b>
Significant?	<b>NO</b>	<b>-</b>	<b>YES</b>	<b>-</b>	<b>NO</b>	<b>YES</b>

(1) Screening values for LST analysis from SCAQMD Final Localized Significance Threshold Methodology, Appendix C (October 2009).

**Localized Significance Threshold Evaluation for  
The Chevron El Segundo Refinery  
Coke Drum Reliability Project Construction Emissions**

**Table 3 - ISCST3 Modeling Results for Peak Day Construction Emiss**

Criteria Pollutant	Averaging Period	Modeled GLC ( $\mu\text{g}/\text{m}^3$ )	Calculated GLC for NO <sub>x</sub> to NO <sub>2</sub> Conversion ( $\mu\text{g}/\text{m}^3$ )	UTM Coordinates	
				Easting	Northing
NO <sub>2</sub> <sup>(1)</sup>	1-hr	337.75	87.14	369542.34	3752183

(1) Project Construction Emissions adjusted to NO<sub>2</sub> from NO<sub>x</sub> based on distance to receptor of 500 meters for the 1-hour average. (See Table 2-4 of the SCAQMD Localized Significance Threshold Methodology, July 2009.)

**Localized Significance Threshold Evaluation for  
The Chevron El Segundo Refinery  
Coke Drum Reliability Project Construction Emissions**

**Table 4 - Maximum Ambient Concentration Data<sup>(1)</sup>**

Criteria Pollutant	Averaging Period	Concentration (ppm)			Max Conc.	
		2007	2008	2009	(ppm)	( $\mu\text{g}/\text{m}^3$ )
NO <sub>2</sub>	1-hr	0.08	0.10	0.08	0.1	188.80

(1) Data from Southwest Coastal LA County Station (No. 820)

**Localized Significance Threshold Evaluation for  
The Chevron El Segundo Refinery  
Coke Drum Reliability Project Construction Emissions**

**Table 5 - Modeled Localized Significance Threshold Evaluation**

<b>Criteria Pollutant</b>	<b>Averaging Period</b>	<b>Ambient Background Conc. (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Calculated Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Total Conc. (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Most Stringent Air Quality Standard (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Significant?</b>
NO <sub>2</sub>	1-hr	188.8	87.1	275.9	339	No





**Alternative 2**

---



**Chevron El Segundo Refinery - Coke Drum Reliability Project**  
**Peak Day Construction Emission Summary<sup>(1)</sup>**  
**Alternative 2 - LA Harbor**

Emissions from Equipment	Absolute Peak	Onsite Peak	Onsite Peak
	All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	12.26	8.48	43.81
CO (lb/day)	46.66	34.01	161.66
NOx (lb/day)	76.02	51.80	304.24
SOx (lb/day)	0.10	0.07	0.43
PM10 (lb/day)	5.12	3.80	15.53
PM2.5 (lb/day)	4.71	3.49	14.29
CO <sub>Eq</sub> (lb/day)	9140.73	5866.50	39967.57

Emission from Trips	Peak	Onsite Peak	Onsite Peak
	Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	0.83	0.00	0.00
CO (lb/day)	5.74	0.00	0.00
NOx (lb/day)	5.17	0.00	0.00
SOx (lb/day)	0.01	0.00	0.00
PM10 (lb/day)	3.94	0.00	0.00
Exhaust PM (lb/day)	0.28	0.00	0.00
Fugitive PM (lb/day)	3.65	0.00	0.00
PM2.5 (lb/day)	0.88	0.00	0.00
CO <sub>Eq</sub> (lb/day)	1395.59	0.00	0.00

Fugitive PM	Peak	Onsite Peak	Onsite Peak
	Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
PM10 from Offroad Vehicles (lb/day) <sup>(2)</sup>	1.77	1.39	0.81
PM10 from Construction (lb/day) <sup>(2)</sup>	0.00	13.08	0.00
PM2.5 from Offroad Vehicles (lb/day) <sup>(2)</sup>	0.30	0.24	0.14
PM2.5 from Construction (lb/day) <sup>(2)</sup>	0.00	2.72	0.00

Ship Emissions	Peak	Onsite Peak	Onsite Peak
	Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	36.13	0.00	0.00
CO (lb/day)	90.10	0.00	0.00
NOx (lb/day)	960.50	0.00	0.00
SOx (lb/day)	27.02	0.00	0.00
PM10 (lb/day)	16.45	0.00	0.00
PM2.5 (lb/day)	13.23	0.00	0.00
CO <sub>Eq</sub> (lb/day)	42945.28	0.00	0.00

Total Emissions	Thresholds	Peak	Onsite Peak	Onsite Peak
		Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	75	49.22	8.48	43.81
CO (lb/day)	550	142.50	34.01	161.66
NOx (lb/day)	100	1041.68	51.80	304.24
SOx (lb/day)	150	27.13	0.07	0.43
PM10 (lb/day) <sup>(2)</sup>	150	27.28	18.27	16.34
PM2.5 (lb/day) <sup>(3)</sup>	55	19.12	6.45	14.42
CO <sub>Eq</sub> (lb/day)	NA	53481.60	5866.50	39967.57

(1) Onsite emissions exclude ship and trip emissions.

(2) Controlled PM.

(3) [https://www.aqmd.gov/ceqa/handbook/PM2\\_5/pm2\\_5.html](https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5.html).

Chevron El Segundo Refinery - Coke Drum Reliability Project - LA Harbor Alternative 2  
Construction Emission Summary<sup>(1)</sup>

	Year 1												Year 2												Year 3		
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21						
<b>Emissions from Equipment</b>																											
VOC (lb/day)	5.18	8.48	12.28	11.21	7.15	0.00	0.00	2.42	10.39	17.15	18.02	17.90	14.08	16.28	20.11	43.81	43.14	43.14	43.14	4.14	2.50						
CO (lb/day)	20.52	34.01	46.66	42.20	26.64	0.00	0.00	11.66	42.64	70.66	74.28	73.89	54.66	62.09	75.19	161.66	159.42	159.42	159.42	16.92	11.43						
NOx (lb/day)	33.77	51.80	76.02	69.58	49.47	0.00	0.00	17.11	76.57	116.93	122.39	123.77	96.74	113.35	144.05	304.24	303.84	303.84	303.84	28.77	15.63						
SOx (lb/day)	0.05	0.07	0.10	0.09	0.07	0.00	0.00	0.00	0.11	0.16	0.17	0.17	0.13	0.16	0.20	0.43	0.43	0.43	0.43	0.04	0.02						
PM10 (lb/day)	2.25	3.80	5.12	4.57	2.82	0.00	0.00	1.29	3.99	6.98	7.42	7.43	5.22	5.94	7.18	15.53	15.39	15.39	15.39	1.65	1.14						
PM2.5 (lb/day)	2.07	3.49	4.71	4.20	2.60	0.00	0.00	1.19	3.67	6.42	6.82	6.84	4.80	5.46	6.60	14.29	14.16	14.16	14.16	1.52	1.05						
CO <sub>2</sub> (lb/day)	3882.73	5866.50	9140.73	8491.45	6391.03	0.00	0.00	1905.69	10106.86	14656.75	15228.83	15377.04	12425.77	14603.57	18636.77	39967.57	39942.99	39942.99	39942.99	4022.43	1919.01						

	Year 1												Year 2												Year 3		
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21						
<b>Emission from Trips</b>																											
VOC (lb/day)	0.39	0.80	0.83	2.19	0.57	0.07	0.00	0.00	0.20	0.41	1.93	2.23	3.13	3.18	3.37	2.67	9.24	6.71	6.71	3.31	2.61						
CO (lb/day)	2.93	5.49	5.74	19.30	4.63	0.40	0.00	0.00	1.16	2.14	15.60	18.45	26.95	27.48	27.93	30.28	69.20	60.17	60.17	27.87	22.11						
NOx (lb/day)	1.97	5.24	5.17	5.20	2.37	0.57	0.00	0.00	1.25	4.18	7.36	7.64	6.95	6.43	7.36	6.43	13.71	15.17	15.17	11.99	6.40						
SOx (lb/day)	0.01	0.01	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.05	0.05	0.05	0.12	0.14	0.14	0.04	0.03						
PM10 (lb/day)	0.46	3.52	3.94	3.81	1.77	0.44	0.00	0.00	1.00	3.13	5.22	5.42	7.06	5.04	5.07	4.22	9.06	10.12	10.12	6.44	4.84						
Exhaust PM (lb/day)	0.11	0.28	0.34	0.40	0.14	0.03	0.00	0.00	0.47	0.18	0.93	0.96	1.20	0.86	0.86	0.74	1.20	1.41	1.41	1.08	0.69						
Fugitive PM (lb/day)	1.34	3.64	3.65	3.41	1.62	0.41	0.00	0.00	0.93	4.78	4.95	6.43	4.95	4.95	3.67	7.85	8.71	8.71	7.32	5.75	4.30						
PM2.5 (lb/day)	0.33	0.87	0.88	0.94	0.22	0.10	0.00	0.00	0.22	0.66	1.21	1.27	1.68	1.27	1.28	1.12	2.44	2.78	2.78	2.24	1.61						
CO <sub>2</sub> (lb/day)	641.21	1355.55	1395.59	3444.82	925.14	119.27	0.00	0.00	345.13	792.17	3290.96	3784.75	5395.90	5207.25	5283.90	5553.03	12601.14	15152.38	11037.47	4525.45	3559.28						

	Year 1												Year 2												Year 3		
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21						
<b>Fugitive PM</b>																											
PM10 from Offroad Vehicles (lb/day) <sup>(2)</sup>	0.93	1.39	1.77	2.10	0.93	0.08	0.00	0.40	0.84	1.75	1.84	1.93	1.14	0.86	0.81	0.81	0.81	0.81	0.81	1.51	1.37						
PM10 from Construction (lb/day) <sup>(3)</sup>	13.06	13.08																									
PM2.5 from Offroad Vehicles (lb/day) <sup>(4)</sup>	0.16	0.24	0.30	0.35	0.16	0.01	0.00	0.07	0.14	0.30	0.31	0.33	0.19	0.14	0.14	0.14	0.14	0.14	0.14	0.25	0.23						
PM2.5 from Construction (lb/day) <sup>(5)</sup>	2.72	2.72																									

	Year 1												Year 2												Year 3		
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21						
<b>Ship Emissions<sup>(6)</sup></b>																											
VOC (lb/day)			36.13																								
CO (lb/day)			90.10																								
NOx (lb/day)			960.50																								
SOx (lb/day)			27.02																								
PM10 (lb/day)			16.45																								
PM2.5 (lb/day)			13.23																								
CO <sub>2</sub> (lb/day)			42345.28																								

	Year 1												Year 2												Year 3		
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21						
<b>Total Emissions</b>																											
VOC (lb/day)	5.56	9.28	49.22	13.40	7.72	0.07	0.00	2.62	10.80	19.08	20.25	21.09	17.21	19.46	23.49	51.48	52.37	49.85	49.85	7.45	5.11						
CO (lb/day)	23.46	39.50	142.50	61.49	31.77	0.40	0.00	12.82	44.78	86.26	92.73	100.84	82.14	90.02	105.47	230.86	243.37	219.59	219.59	44.79	33.54						
NOx (lb/day)	100	35.74	56.94	1041.68	74.79	51.84	0.57	18.86	80.75	124.29	130.03	133.42	104.09	120.71	150.48	317.95	319.01	316.65	316.65	40.76	25.03						
SOx (lb/day)	0.05	0.08	0.08	0.13	0.08	0.00	0.00	0.00	0.11	0.19	0.20	0.22	0.18	0.21	0.25	0.55	0.57	0.57	0.57	0.08	0.06						
PM10 (lb/day) <sup>(2)</sup>	150	17.71	27.28	10.47	5.52	0.52	0.00	2.69	7.95	13.94	14.68	16.43	11.40	11.86	12.20	25.39	26.33	24.61	24.61	9.60	7.36						
PM2.5 (lb/day) <sup>(4)</sup>	55	5.28	7.32	19.12	3.16	0.11	0.00	1.48	4.47	7.93	8.41	8.84	6.26	6.88	7.87	16.87	17.08	16.54	16.54	3.39	2.51						
CO <sub>2</sub> (lb/day)	NA	4623.94	7222.05	53481.60	11936.07	7316.17	119.27	0.00	2250.83	10899.03	17947.71	19013.58	20772.95	17633.02	19887.47	24189.80	52568.70	55095.36	50800.46	8547.88	5478.29						
CO <sub>2</sub> (tonnes) <sup>(5)</sup>	NA	47.18	73.69	142.79	121.79	74.65	1.22	0.00	22.97	111.21	183.13	194.01	179.92	202.93	246.83	556.40	562.18	520.19	520.19	87.22	55.90						
Amortized CO <sub>2</sub> (tonnes/yr) <sup>(6)</sup>	NA																					119.21					

(1) Based on a 10 hour day.  
 (2) Controlled PM.  
 (3) Peak day includes cargo vessel hoteling emissions and ocean going tug transit emissions.  
 (4) [https://www.aqmd.gov/ceqa/handbook/PM2.5/pm2\\_5.html](https://www.aqmd.gov/ceqa/handbook/PM2.5/pm2_5.html).  
 (5) Assumes 22.5 construction days per month. Ship emission based on 1 cargo ship and 6 tug trips. Tonnes = Metric tons.  
 (6) Metric tons.

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2013**

Equipment Type	Hp	2013 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0694	0.3529	0.4565	0.0006	0.0383	51.73	0.0063	52.73
Diesel grader	120	0.1254	0.5310	0.7729	0.0009	0.0676	74.96	0.0113	76.77
Vibrating plate compactor (gasoline)	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0986	0.4063	0.6253	0.0007	0.0534	58.99	0.0089	60.41
Concrete pump, trailer mount	50	0.1052	0.3116	0.3228	0.0004	0.0275	34.33	0.0095	35.85
Mortar mixer, gasoline	15	0.0074	0.0386	0.0470	0.0001	0.0021	6.32	0.0007	6.43
Paving machine	120	0.1387	0.5057	0.8357	0.0008	0.0729	69.20	0.0125	71.20
Crane, diesel (20 ton)	120	0.0919	0.3618	0.5508	0.0006	0.0493	50.15	0.0083	51.47
Crane, diesel (150 ton)	250	0.1040	0.2948	0.9948	0.0013	0.0351	112.16	0.0094	113.66
Crane, diesel (400 ton)	500	0.1551	0.5292	1.4230	0.0018	0.0518	180.10	0.0140	182.34
Crane, diesel (1600 ton)	750	0.2625	0.8887	2.4614	0.0030	0.0885	303.04	0.0237	306.83
Manlift, telescoping, propane	50	0.0592	0.1757	0.1840	0.0003	0.0156	19.61	0.0053	20.47
Welder, diesel (250 amp)	50	0.0979	0.2753	0.2535	0.0003	0.0240	25.96	0.0088	27.37
Air compressor, diesel (185 cfm)	50	0.0921	0.2546	0.2221	0.0003	0.0220	22.27	0.0083	23.60
Air compressor, diesel (375 cfm)	120	0.0825	0.3251	0.4991	0.0006	0.0456	46.95	0.0074	48.14
Power Unit	500	0.1818	0.7230	2.3955	0.0033	0.0690	336.85	0.0164	339.48
Generator, diesel ( 6 kW)	25	0.0266	0.0908	0.1594	0.0002	0.0091	17.63	0.0024	18.02
Forklift 15 Ton	175	0.1347	0.7388	1.2314	0.0016	0.0592	141.98	0.0122	143.92
Forklift, diesel (4 ton)	120	0.1106	0.4905	0.7587	0.0009	0.0590	77.95	0.0100	79.55
Hydrotest pump	25	0.0359	0.1004	0.1761	0.0002	0.0109	19.49	0.0032	20.00
Light tower, diesel (4 kW)	25	0.0266	0.0908	0.1594	0.0002	0.0091	17.63	0.0024	18.02
32 Line Platform Trailer Hatz diesel	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3542	1.0311	2.9938	0.0044	0.1046	441.74	0.0320	446.85
36 line self propelled transporter	500	0.2170	0.6362	1.7865	0.0027	0.0634	272.33	0.0196	275.47
Roller	120	0.0986	0.4063	0.6253	0.0007	0.0534	58.99	0.0089	60.41
Bobcat skip loader	120	0.0694	0.3529	0.4565	0.0006	0.0383	51.73	0.0063	52.73
Sissor Lifts (propane)	25	0.0166	0.0503	0.0937	0.0001	0.0051	10.96	0.0015	11.20
Track Excavator	250	0.1242	0.3541	1.1360	0.0018	0.0372	158.68	0.0112	160.48
Crane Diesel 300 ton	500	0.1551	0.5292	1.4230	0.0018	0.0518	180.10	0.0140	182.34
Crane Diesel (65 ton)	250	0.1040	0.2948	0.9948	0.0013	0.0351	112.16	0.0094	113.66
Crane, diesel (35 ton)	175	0.1031	0.4821	0.7769	0.0009	0.0445	80.34	0.0093	81.83

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (Jar

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2014**

Equipment Type	Hp	2013 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0634	0.3503	0.4252	0.0006	0.0337	51.73	0.0057	52.64
Diesel grader	120	0.1166	0.5268	0.7270	0.0009	0.0614	74.96	0.0105	76.65
Vibrating plate compactor (gasoline)	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0921	0.4030	0.5906	0.0007	0.0494	58.99	0.0083	60.32
Concrete pump, trailer mount	50	0.0949	0.3004	0.3098	0.0004	0.0251	34.33	0.0086	35.70
Mortar mixer, gasoline	15	0.0074	0.0386	0.0466	0.0001	0.0020	6.32	0.0007	6.43
Paving machine	120	0.1311	0.5011	0.7948	0.0008	0.0682	69.20	0.0118	71.09
Crane, diesel (20 ton)	120	0.0859	0.3587	0.5189	0.0006	0.0453	50.15	0.0078	51.39
Crane, diesel (150 ton)	250	0.0979	0.2817	0.9088	0.0013	0.0317	112.16	0.0088	113.57
Crane, diesel (400 ton)	500	0.1468	0.4948	1.2979	0.0018	0.0470	180.10	0.0132	182.22
Crane, diesel (1600 ton)	750	0.2485	0.8312	2.2480	0.0030	0.0803	303.04	0.0224	306.63
Manlift, telescoping, propane	50	0.0534	0.1694	0.1765	0.0003	0.0142	19.61	0.0048	20.38
Welder, diesel (250 amp)	50	0.0886	0.2652	0.2435	0.0003	0.0219	25.96	0.0080	27.24
Air compressor, diesel (185 cfm)	50	0.0831	0.2446	0.2134	0.0003	0.0201	22.27	0.0075	23.47
Air compressor, diesel (375 cfm)	120	0.0758	0.3216	0.4682	0.0006	0.0416	46.95	0.0068	48.04
Power Unit	500	0.1683	0.6904	2.1655	0.0033	0.0627	336.85	0.0152	339.28
Generator, diesel ( 6 kW)	25	0.0256	0.0868	0.1557	0.0002	0.0085	17.63	0.0023	18.00
Forklift 15 Ton	175	0.1236	0.7367	1.1536	0.0016	0.0538	141.98	0.0112	143.76
Forklift, diesel (4 ton)	120	0.1008	0.4857	0.7130	0.0009	0.0537	77.95	0.0091	79.40
Hydrotest pump	25	0.0333	0.0959	0.1721	0.0002	0.0101	19.49	0.0030	19.97
Light tower, diesel (4 kW)	25	0.0256	0.0868	0.1557	0.0002	0.0085	17.63	0.0023	18.00
32 Line Platform Trailer Hatz diesel	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3371	0.9944	2.6748	0.0044	0.0937	441.74	0.0304	446.60
36 line self propelled transporter	500	0.2065	0.6134	1.5945	0.0027	0.0567	272.33	0.0186	275.32
Roller	120	0.0921	0.4030	0.5906	0.0007	0.0494	58.99	0.0083	60.32
Bobcat skip loader	120	0.0634	0.3503	0.4252	0.0006	0.0337	51.73	0.0057	52.64
Sissor Lifts (propane)	25	0.0160	0.0494	0.0919	0.0001	0.0048	10.96	0.0014	11.19
Track Excavator	250	0.1180	0.3480	1.0099	0.0018	0.0333	158.68	0.0106	160.39
Crane Diesel 300 ton	500	0.1468	0.4948	1.2979	0.0018	0.0470	180.10	0.0132	182.22
Crane Diesel (65 ton)	250	0.0979	0.2817	0.9088	0.0013	0.0317	112.16	0.0088	113.57
Crane, diesel (35 ton)	175	0.0977	0.4806	0.7306	0.0009	0.0412	80.34	0.0088	81.75

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (Jar

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2015**

Equipment Type	Hp	2015 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0577	0.3480	0.3870	0.0006	0.0293	51.73	0.0052	52.56
Diesel grader	120	0.1081	0.5230	0.6726	0.0009	0.0555	74.96	0.0098	76.53
Vibrating plate compactor (gasoline)	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0857	0.4000	0.5498	0.0007	0.0454	58.99	0.0077	60.23
Concrete pump, trailer mount	50	0.0855	0.2910	0.2982	0.0004	0.0228	34.33	0.0077	35.57
Mortar mixer, gasoline	15	0.0074	0.0386	0.0464	0.0001	0.0019	6.32	0.0007	6.43
Paving machine	120	0.1235	0.4969	0.7477	0.0008	0.0636	69.20	0.0111	70.98
Crane, diesel (20 ton)	120	0.0800	0.3559	0.4822	0.0006	0.0415	50.15	0.0072	51.30
Crane, diesel (150 ton)	250	0.0925	0.2713	0.8284	0.0013	0.0286	112.16	0.0083	113.49
Crane, diesel (400 ton)	500	0.1393	0.4663	1.1812	0.0018	0.0426	180.10	0.0126	182.11
Crane, diesel (1600 ton)	750	0.2358	0.7835	2.0490	0.0030	0.0729	303.04	0.0213	306.45
Manlift, telescoping, propane	50	0.0480	0.1641	0.1699	0.0003	0.0129	19.61	0.0043	20.31
Welder, diesel (250 amp)	50	0.0801	0.2564	0.2346	0.0003	0.0200	25.96	0.0072	27.11
Air compressor, diesel (185 cfm)	50	0.0747	0.2360	0.2056	0.0003	0.0183	22.27	0.0067	23.35
Air compressor, diesel (375 cfm)	120	0.0691	0.3182	0.4334	0.0006	0.0375	46.95	0.0062	47.95
Power Unit	500	0.1556	0.6639	1.9429	0.0033	0.0567	336.85	0.0140	339.10
Generator, diesel ( 6 kW)	25	0.0247	0.0831	0.1522	0.0002	0.0080	17.63	0.0022	17.99
Forklift 15 Ton	175	0.1120	0.7350	1.0463	0.0016	0.0485	141.98	0.0101	143.60
Forklift, diesel (4 ton)	120	0.0910	0.4811	0.6607	0.0009	0.0484	77.95	0.0082	79.26
Hydrotest pump	25	0.0309	0.0919	0.1682	0.0002	0.0094	19.49	0.0028	19.93
Light tower, diesel (4 kW)	25	0.0247	0.0831	0.1522	0.0002	0.0080	17.63	0.0022	17.99
32 Line Platform Trailer Hatz diesel	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3198	0.9645	2.3779	0.0044	0.0835	441.74	0.0289	446.35
36 line self propelled transporter	500	0.1960	0.5949	1.4165	0.0027	0.0505	272.33	0.0177	275.16
Roller	120	0.0857	0.4000	0.5498	0.0007	0.0454	58.99	0.0077	60.23
Bobcat skip loader	120	0.0577	0.3480	0.3870	0.0006	0.0293	51.73	0.0052	52.56
Sissor Lifts (propane)	25	0.0155	0.0486	0.0902	0.0001	0.0046	10.96	0.0014	11.18
Track Excavator	250	0.1117	0.3431	0.8935	0.0018	0.0297	158.68	0.0101	160.29
Crane Diesel 300 ton	500	0.1393	0.4663	1.1812	0.0018	0.0426	180.10	0.0126	182.11
Crane Diesel (65 ton)	250	0.0925	0.2713	0.8284	0.0013	0.0286	112.16	0.0083	113.49
Crane, diesel (35 ton)	175	0.0919	0.4794	0.6684	0.0009	0.0378	80.34	0.0083	81.67

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (Jar





Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Years 1 and 2 (Cont.)

VOC	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 580 Case	0.069432469	0.0633	0.00	0.00	0.00	0.00	0.69	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39			
Diesel grader	0.125376441	0.117	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Vibrating plate compactor (gasoline)	0.005021484	0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	0.098605566	0.092	0.00	0.00	0.00	0.00	0.00	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79			
Concrete pump, trailer mount	0.105182564	0.095	0.00	0.00	0.00	0.00	0.00	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84			
Mortar mixer, gasoline	0.007443205	0.007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	0.138711279	0.131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	0.091887893	0.096	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	0.104033628	0.096	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	0.15508853	0.147	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	0.262463007	0.248	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Manlift, telescoping, propane	0.05915932	0.053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	0.097932466	0.098	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (185 cfm)	0.093	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel (27.5 cfm)	0.08249267	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Power Unit, diesel (27.5 cfm)	0.181748298	0.169	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	0.026683338	0.026	0.00	0.00	0.00	0.00	0.00	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43			
Forklift, 15 Ton	0.134708767	0.124	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	0.110620733	0.101	0.00	0.00	0.00	0.00	0.00	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77			
Hydrotest pump	0.035658104	0.033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	0.026683338	0.026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform Trailer, Haiz, diesel	0.071765477	0.072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	0.354156888	0.337	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	0.216955044	0.207	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	0.098605566	0.092	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skip loader	0.069432469	0.063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Slings Lifts (propane)	0.016628278	0.016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	0.124239779	0.118	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	0.15508853	0.147	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	0.104033628	0.096	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (65 ton)	0.103137251	0.098	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	0.00	5.18	8.48	12.28	11.21	7.15	0.00	0.00	17.53	18.02	17.50	14.08	16.29	20.11	43.81	43.14	43.14			

Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Years 1 and 2 (Cont.)

CO	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
			lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day			
Backhoe, 500 Case	0.352863058	0.560	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Diesel grader	0.520963912	0.827	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Vibrating plate compactor (gasoline)	0.026303777	0.403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	0.406303433	0.300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Concrete pump, trailer mount	0.311601785	0.039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mortar mixer, gasoline	0.03690833	0.501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	0.505691545	0.859	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	0.36177612	0.282	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	0.29477811	0.495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	0.529209224	0.831	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	0.898729666	1.169	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Manlift, telescoping, propane	0.179745415	0.268	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	0.27524985	0.433	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (135 cfm)	0.35059626	0.527	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Power Lift, diesel (27.5 cfm)	0.722605624	0.860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	0.090797481	0.087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, 15 Ton	0.738602461	0.737	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	0.490630698	0.486	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydrotest pump	1.00355133	0.966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	0.090797481	0.087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform Trailer, Haz,diesel	0.061714724	0.062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	1.031052268	0.994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	0.636189987	0.613	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	0.406303433	0.403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skip loader	0.352863058	0.350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Slings Lifts (propane)	0.590324606	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	0.354149178	0.348	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	0.529209224	0.831	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	0.29477811	0.282	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (35 ton)	0.482105081	0.481	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
			20.52	34.01	46.68	42.20	26.64	0.00	0.00	0.00	0.00	11.86	42.84	70.80	74.20	73.89	54.66	62.09	75.19	161.66	159.42	159.42	159.42			

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Years 1 and 2 (Cont.)**

NOx	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
			4.56	8.13	8.13	8.13	4.56	0.00	0.00	0.00	0.00	0.00	4.25	8.50	8.50	8.50	4.25	4.25	4.25	4.25	8.50	8.50	8.50			
Backhoe, 500 Case	0.456476761	0.425	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Diesel grader	0.772857632	0.727	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Vibrating plate compactor (gasoline)	0.031446512	0.031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	0.625316475	0.591	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Concrete pump, trailer mount	0.322837662	0.310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mortar mixer, gasoline	0.046965771	0.047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	0.835686853	0.795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	0.550923185	0.519	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	0.994751506	0.908	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	1.42303836	1.298	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	2.467365211	2.248	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welding, telescoping, propane	0.183959231	0.177	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	0.253471144	0.243	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (185 cfm)	0.222161547	0.216	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Power Unit, diesel (67.5 cfm)	0.1668	0.163	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	2.89545704	2.166	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	0.159359281	0.156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, 15 Ton	1.231364916	1.154	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	0.758742084	0.713	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydrotest pump	0.176133939	0.172	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	0.159359281	0.156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform Trailer, Haiz, diesel	0.073679907	0.074	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	2.993810316	2.675	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	1.786503839	1.595	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	0.625316475	0.591	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skip loader	0.456476761	0.425	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Slings Lifts (propane)	0.093658877	0.092	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	1.19602869	1.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	1.42303836	1.298	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	0.994751506	0.908	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (65 ton)	0.776864358	0.731	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Years 1 and 2 (Cont.)

SOX	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe 580 Case	0.000606796	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Diesel grader	0.0006979376	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Vibrating plate compactor (gasoline)	6.71268E-05	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	0.000691966	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Concrete pump, trailer mount	0.000443864	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mortar mixer, gasoline	9.83443E-05	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	0.000911709	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	0.000588261	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	0.00126198	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	0.001767753	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	0.00304703	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, telescoping, propane	0.002353644	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	0.002535644	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (45 cfm)	0.00339773	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Power Unit	0.00355072	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	0.00330632	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	0.00223709	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, 15 ton	0.001597511	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	0.000914387	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydrotest pump	0.000247256	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	0.000223709	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform, Trailer, Hatz, diesel	0.000157279	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	0.004441558	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	0.002673047	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	0.000691966	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skip loader	0.00069796	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Sissor Lifts (propane)	0.001390663	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	0.001785453	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	0.001767753	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	0.00126198	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (65 ton)	0.000940174	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			



**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Years 1 and 2 (Cont.)**

CO <sub>2e</sub>	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 500 Case	52,730.15626	52,643.00	0.00	0.00	0.00	0.00	527.30	0.00	0.00	0.00	0.00	526.43	1052.87	1052.87	1226.37	1226.37	526.43	526.43	1052.87	1052.87	1052.87	1052.87	1052.87			
Diesel grader	76,774.68074	76,648.00	0.00	0.00	0.00	0.00	614.20	0.00	0.00	0.00	0.00	614.20	1228.39	1228.39	70.18	35.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Vibrating plate compactor (gasoline)	4,386.281015	4,386.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	60,411.97339	60,318.00	0.00	0.00	0.00	0.00	483.30	0.00	0.00	0.00	0.00	483.30	483.30	483.30	70.18	35.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Concrete pump, trailer mount	35,855.00618	35,705.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mortar mixer, gasoline	6,427.653997	6,427.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	71,198.49865	71,088.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	51,474.20526	51,388.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	113,660.4312	113,573.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	182,339.6971	182,220.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Manlift, telescoping, propane	306,832.8798	306,831.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	20,465.9859	20,383.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	27,371.96134	27,238.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (185 cfm)	43,410.93658	43,340.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Power Unit, diesel (67.5 cfm)	4,144.00	4,144.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Power Unit, diesel (67.5 cfm)	339,476.8482	339,281.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	18,015.10905	18,001.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, 15 Ton	143,923.592	143,764.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	79,546.05314	79,404.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydrotest pump	20,004.90705	19,966.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	18,015.10905	18,001.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform Trailer, Haiz, diesel	10,277.15793	10,277.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	446,850.0625	446,604.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	275,465.2653	275,315.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	60,411.97339	60,318.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skip loader	52,730.15626	52,643.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Slings Lifts (propane)	11,200.07216	11,192.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	160,385.00	160,385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	182,339.6971	182,220.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	113,660.4312	113,573.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (65 ton)	81,633.20339	81,758.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	3982.73	5866.50	9140.73	8491.45	6391.03	0.00	0.00	14663.57	15228.93	15377.04	12425.77	14603.57	16636.77	39987.57	39942.99	39942.99	39942.99			

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3**

Equipment	Hours per Day	Pieces per Day				
		Month 20	Month 21	Year 3		
Backhoe 580 Case	2	1	1			
Diesel grader	10	1	1			
Vibrating plate compactor (gasoline)	2	1	1			
Roller vibrator, diesel	1	1	1			
Concrete pump, trailer mount	1					
Mortar mixer, gasoline	1	1	1			
Paving machine	1	1	1			
Crane, diesel (20 ton)	1	1	1			
Crane, diesel (150 ton)	1					
Crane, diesel (400 ton)	1					
Crane, diesel (1600 ton)	1					
Manlift, telescoping, propane	2	2	2			
Welder, diesel (250 amp)	1	2	2			
Air compressor, diesel (185 cfm)	1	1	1			
Air compressor, diesel (375 cfm)	10					
Power Unit	1	1	1			
Generator, diesel ( 6 kW)	2	1	1			
Forklift 15 Ton	1					
Forklift, diesel (4 ton)	2	2	2			
Hydrotest pump	1					
Light tower, diesel (4 kW)	1	2				
32 Line Platform Trailer Hatz diesel	1					
Prime Mover ISX	1					
36 line self propelled transporter	2	1				
Roller	1	1				
Bobcat skip loader	9					
Sissor Lifts (propane)	9					
Track Excavator	8					
Crane Diesel 300 ton	8	1				
Crane Diesel (65 ton)	8					
Crane, diesel (35 ton)	8					

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3 (Cont.)**

VOC	Emission Rate (lb/hr)		lb/day Year 3													
	2015		Month 20		Month 21											
Backhoe 580 Case	0.057672641	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.108142194	1.08	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.005021495	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.085684756	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.08547317	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.007384313	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.123546643	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.080027237	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.092467635	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.139274977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.235809557	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.048038783	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weider, diesel (250 amp)	0.080051021	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.074731714	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.06905289	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.15557147	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel (6 kW)	0.024731312	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.111984024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.090956157	0.36	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.030926281	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.024731312	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.011765479	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.319778066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.195961627	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.085684756	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.057672641	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.015502766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.111686536	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.139274977	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.092467635	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.091907384	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		4.14	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3 (Cont.)**

CO	Emission Rate (lb/hr)	lb/day														
		Year 3														
		2015	Month 20	Month 21												
Backhoe 580 Case	0.347997507	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.523042455	5.23	5.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.026339785	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.399952474	0.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.290951685	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.038590841	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.496861609	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.355931976	0.36	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.271295357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.46629212	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.783537466	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.164090386	0.66	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weider, diesel (250 amp)	0.256415604	0.51	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.23599994	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.318211065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.663908982	0.66	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel (6 kW)	0.083133226	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.734990268	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.481063311	1.92	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.091884087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.083133226	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.061714716	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.964482346	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.594900423	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.399952474	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.347997507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.04862172	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.343072453	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.46629212	3.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.271295357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.479389694	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>		16.92	11.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3 (Cont.)**

NOx	Emission Rate (lb/hr)		lb/day Year 3													
	2015		Month 20		Month 21											
Backhoe 580 Case	0.387035218	0.77	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.672617021	6.73	6.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.031446512	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.549759517	0.55	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.29819597	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.046355179	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.747732788	0.75	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.482170478	0.48	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.828400116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	1.181214337	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	2.048977363	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.169893612	0.68	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weider, diesel (250 amp)	0.234557088	0.47	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.205554502	0.21	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.43336278	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	1.942918896	1.94	1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel (6 kW)	0.152176068	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	1.046256868	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.660747446	2.64	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.168194563	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.152176068	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.073679898	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	2.377890755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	1.416455668	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.549759517	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.387035218	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.090230368	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.893525614	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	1.181214337	9.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.828400116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.668440708	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		28.77	15.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3 (Cont.)**

SOX	Emission Rate (lb/hr)		lb/day Year 3													
	2015		Month 20		Month 21											
Backhoe 580 Case	0.000606796	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.000879376	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	6.71266E-05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.000691968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.000443864	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	9.83483E-05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.000811709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.000588261	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.00126198	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.001767753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.003047031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.000253544	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.000335573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.000287912	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.00055075	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.00330632	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	0.000223709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.001597511	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.000914387	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.000247258	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.000223709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.000157279	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover .ISX	0.004441559	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.002673045	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.000691968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.000606796	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.000139063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.001785453	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.001767753	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.00126198	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.000904014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3 (Cont.)**

PM10	Emission Rate (lb/hr)		lb/day															
	2015		Month 20				Month 21				Year 3							
Backhoe 580 Case	0.029335264	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.05555	0.56	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.001224549	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.045441134	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.022796789	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.001905357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.063629553	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.041503919	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.028633448	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.042634025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.072929265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.012890368	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weider, diesel (250 amp)	0.019982951	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.018293426	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.0374818	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.05669221	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel (6 kW)	0.008033639	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.048496138	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.048409204	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.00936215	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.008033639	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.002877415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.083471166	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.050495698	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.045441134	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.029335264	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.00456736	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.029704441	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.042634025	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.028633448	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.037639485	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		1.65	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Construction Equipment Emissions for Year 3 (Cont.)**

CO <sub>EQ</sub>	Emission Rate (lb/hr)		lb/day Year 3											
	2015													
	Month 20	Month 21												
Backhoe 580 Case	52.56043007	105.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Diesel grader	76.52572132	765.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Vibrating plate compactor (gasoline)	4.386280742	8.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Roller vibrator, diesel	60.22547453	60.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Concrete pump, trailer mount	35.56852785	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mortar mixer, gasoline	6.426804512	6.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Paving machine	70.97959861	70.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (20 ton)	51.30302522	51.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (150 ton)	113.4934863	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (400 ton)	182.1115008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (1600 ton)	306.4482455	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Manlift, telescoping, propane	20.30612256	81.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Weilder, diesel (250 amp)	27.11346471	54.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Air compressor, diesel (185 cfm)	23.34989658	23.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Air compressor, diesel (375 cfm)	47.94689962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Power Unit	339.0983079	339.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generator, diesel ( 6 kW)	17.98837311	35.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift 15 Ton	143.59566068	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift, diesel (4 ton)	79.26222362	317.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Hydrotest pump	19.93372617	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Light tower, diesel (4 kW)	17.98837311	35.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
32 Line Platform Trailer Hatz diesel	10.27715651	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Prime Mover ISX	446.3540324	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
36 line self propelled transporter	275.1622636	550.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Roller	60.22547453	60.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Bobcat skip loader	52.56043007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sissor Lifts (propane)	11.18383177	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Track Excavator	160.2947768	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane Diesel 300 ton	182.1115008	1456.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane Diesel (65 ton)	113.4934863	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (35 ton)	81.67111523	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total		4022.43	1919.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	



Chevron EI Saguindo Refinery - Coke Drum Reliability Project (Alternative 2)  
Onroad Construction Vehicle Trip Emissions for Year 3

Vehicle	Vehicles per Day		
	Month 20	Month 21	Year 3
Commuters	79.00	62.00	
Cars	1.00	1.00	
Pickups	3.00	2.00	
Total Light Vehicle Miles	2864	2247	0
Water Truck	2	1.00	
Stakebed Truck	2.00	2.00	
Street Sweeper	2	1.00	
Light Truck	1.00	1.00	
Total Medium Truck Miles	104	104	0
Dump Trucks	2.00	2.00	
Tractor Trailers	1.00	1.00	
Flatbed Trailers	1.00	1.00	
Bucket Trucks	2.00	1.00	
Total Heavy Truck Miles	220	180	0

Emission Rate (lb/mi) <sup>2a</sup>	lb/day		
	2015	Month 21	Year 3
VOC	0.0009523	2.44	1.92
Light Duty	0.0009523	0.00	0.00
Medium Duty	0.0009523	0.00	0.00
Heavy Duty	0.0009523	0.00	0.00
Total	0.0027854	3.31	2.61

Emission Rate (lb/mi) <sup>2a</sup>	lb/day		
	2015	Month 21	Year 3
CO	0.0026228	23.66	18.57
Light Duty	0.0026228	0.00	0.00
Medium Duty	0.0026228	0.00	0.00
Heavy Duty	0.0026228	0.00	0.00
Total	0.0111246	27.67	22.11

Emission Rate (lb/mi) <sup>2a</sup>	lb/day		
	2015	Month 21	Year 3
NOx	0.0034446	2.42	1.90
Light Duty	0.0034446	0.00	0.00
Medium Duty	0.0034446	0.00	0.00
Heavy Duty	0.0034446	0.00	0.00
Total	0.0345581	11.99	9.40

Emission Rate (lb/mi) <sup>2a</sup>	lb/day		
	2015	Month 21	Year 3
SOx	0.0000108	0.03	0.02
Light Duty	0.0000108	0.00	0.00
Medium Duty	0.0000108	0.00	0.00
Heavy Duty	0.0000108	0.00	0.00
Total	0.0000387	0.04	0.03

Emission Rate (lb/mi) <sup>2a</sup>	lb/day		
	2015	Month 21	Year 3
PM10	0.0000888	0.25	0.20
Light Duty Exhaust	0.0000888	0.00	0.00
Medium Duty Exhaust	0.0000888	0.00	0.00
Heavy Duty Exhaust	0.0000888	0.00	0.00
Total Exhaust PM	0.0000888	0.00	0.00
Light Duty Nonroad <sup>3b</sup>	0.0000888	1.11	0.91
Medium Duty Nonroad <sup>3b</sup>	0.0000888	0.22	0.18
Heavy Duty Nonroad <sup>3b</sup>	0.0000888	0.22	0.18
Total Engine PM	0.00211946	5.78	4.60
Total	0.00423892	6.44	5.18

Emission Rate (lb/mi) <sup>4</sup>	lb/day		
	2015	Month 21	Year 3
CO <sub>2e</sub>	1.1515656	3288.08	2597.57
Light Duty	1.1515656	0.00	0.00
Medium Duty	1.1515656	0.00	0.00
Heavy Duty	1.1515656	0.00	0.00
Total	4.2695336	4525.45	3595.28

Emission Rate (lb/mi) <sup>4</sup>	lb/day		
	2015	Month 21	Year 3
CO <sub>2e</sub>	1.1515656	3288.08	2597.57
Light Duty	1.1515656	0.00	0.00
Medium Duty	1.1515656	0.00	0.00
Heavy Duty	1.1515656	0.00	0.00
Total	4.2695336	4525.45	3595.28

Total project specific data from engineering estimates.  
 (2) Based on 2007 SCAQMD on-road emission rates. (<http://www.aemul.gov/ccep/handbook/roads/increased.html>)  
 (3) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003  
 $E = K(SL2)^{0.65} \times (W3)^{1.2} \times C$   
 Where:  $k = 0.016$  lb/MT for PM10,  $SL =$  road silt loading (gms/m<sup>2</sup>) from CARR Methodology 7.9) for paved roads  
 (0.240 for local roads and 0.037 for major/distributor roads),  $W =$  weight of vehicles (2.4 tons for light, 5 for medium trucks, and 20 for heavy trucks), and  $C =$  emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lb/MT).  
 (4) Carbon Dioxide Emissions (CO<sub>2e</sub>) (lb/day) =  $CO_2e = 16.7 \times (CO_2 + CH_4 + N_2O) \times 10^{-6}$   
 where light vehicle NCO = CH<sub>4</sub> + 0.0006 EPA Direct Emissions from Mobile Combustion Sources (May 2008)  
 where medium/heavy duty vehicle NCO = CH<sub>4</sub> + 0.00510 EPA Direct Emissions from Mobile Combustion Sources (May 2008)

Chem	lb/mile		
	Light	Medium	Heavy
CO <sub>2</sub>	1.1024	2.7518	4.2205
CH <sub>4</sub>	0.0001	0.0001	0.0001
CO <sub>2e</sub>	1.152	2.788	4.261

Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Offroad Construction Vehicle Dust Emissions for Year 1 and 2

Vehicle	Miles/Day	Vehicles per Day																																							
		Year 1												Year 2																											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19																					
Pickup Truck	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Light Vehicle Miles		3.00	3.00	10.00	23.00	3.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	3.00	3.00	4.00	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
Water Truck	0.5	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Stakebed Truck	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Lube Truck	0.1	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Total Medium Truck Miles		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dump Trucks	0.1	1.00	2.00	2.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
Transit Mixers	0.1	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Total Heavy Truck Miles		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Backhoe 580 Case	0.1	1.00	2.00	2.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
Diesel grader	0.1	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Roller/vibrator, diesel	0.1	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Paving machine	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift 15 Ton	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift, diesel (4 ton)	0.1	2.00	2.00	2.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Roller	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bobcat skip loader	0.1	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total Heavy-Heavy Duty Miles		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>PM10</b>	<b>(lb/mi)<sup>a</sup></b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		
Light Duty	1.0131497	0.00	0.30	0.30	1.01	0.30	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	
Medium Duty	1.4446539	0.00	0.87	0.87	0.87	0.87	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	
Heavy Duty	2.2690375	0.00	0.23	0.68	0.68	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	
Heavy Heavy Duty	2.4630500	0.00	0.99	1.72	1.97	1.72	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	
Uncontrolled Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Controlled Total <sup>b</sup>		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

(1) All project specific data from engineering estimates.  
 (2) Based on Section 13.2.2 of EPA's Compilation of Air Pollutant Emission Factors (AP-42).  
 Emission Rate = 1.5((s/12)^0.9)^(W/3)^-.45)  
 s = silt content = 8.5% for construction sites  
 W = Vehicle Weight (ton) = 2.5 for light, 5.5 for medium, 15 for heavy, and 18 for heavy heavy (EMFAC2007).  
 (3) Controlled Emissions assume that watering 3 times per day reduces emissions by 61 percent (Uncontrolled Emissions x 0.39)



**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Offroad Construction Vehicle Dust Emissions for Year 3**

Vehicle	Miles/Day	Vehicles per Day																							
		Year 3																							
		Month 20	Month 21	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec												
Pickup Truck	0.1	3.00	2.00																						
Total Light Vehicle Miles		0.3	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Water Truck	0.5	1.00	1.00																						
Stakebed Truck	0.1	2.00	2.00																						
Lube Truck	0.1	1.00	1.00																						
Total Medium Truck Miles		0.8	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dump Trucks	0.1	2.00	2.00																						
Transit Mixers	0.1	1.00	1.00																						
Total Heavy Truck Miles		0.3	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Backhoe 580 Case	0.1	1	1																						
Diesel grader	0.1	1	1																						
Roller vibrator, diesel	0.1	1	1																						
Paving machine	0.1	1	1																						
Forklift 15 Ton	0.1	0	0																						
Forklift, diesel (4 ton)	0.1	2	2																						
Roller	0.1	1	0																						
Bobcat skip loader	0.1	0	0																						
Total Heavy-Heavy Duty Miles		0.7	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>PM10</b>	<b>Emission Rate (lb/mi)<sup>(2)</sup></b>	<b>lb/day</b>																							
		<b>Year 3</b>																							
Light Duty	1.0131497	Month 20	Month 21	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec												
Medium Duty	1.4446539	0.30	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Duty	2.2690375	1.16	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Heavy Duty	2.4630500	0.68	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uncontrolled Total		1.72	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Controlled Total <sup>(3)</sup>		3.86	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1.51	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(1) All data from the engineering estimates.  
 (2) Based on Section 13.2.2 of EPA's Compilation of Air Pollutant Emission Factors (AP-42).  
 $Emission\ Rate = 1.5((s/12)^{0.9}) * (W/3)^{0.45}$   
 $s = \text{silt content} = 8.5\%$  for construction sites  
 $W = \text{Vehicle Weight (ton)} = 2.5$  for light, 5.5 for medium, 15 for heavy, and 18 for heavy heavy (EMFAC2007).  
 (3) Controlled Emissions assume that watering 3 times per day reduces emissions by 61 percent (Uncontrolled Emissions x 0.39)

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 2)  
Fugitive PM Construction Emissions**

	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor <sup>(1)</sup>	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
Earthmoving Operations										
Construction Activities <sup>(2)</sup>	5	5	10	0.348	0.39	6.78	6.78	17.3818261	17.3818261	Table A9-9-F

	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
Stockpiles									
Construction Activities <sup>(3)</sup>	429	429	0.0035	0.39	0.585585	0.585585	1.5015	1.5015	Table A9-9-G

Assumptions: 1cubic yard trench spoils = 1 ton

	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	
Earth Disturbance									
Construction Activities <sup>(4)</sup>	20	1	1	0.200	0.200	0.200	0.002	0.002	Table A9-9-E

	Average Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
Loading/Dumping Operations <sup>(5)</sup>									
Truck Filling	454	454	0.02205	0.39	3.904173	3.904173	10.0107	10.0107	Table A9-9
Truck Dumping	454	454	0.009075	0.39	1.6068195	1.6068195	4.12005	4.12005	Table A9-9

TOTAL PM10 Pounds/day	Average	Peak
(Controlled Emissions)	13.0750	13.07503
(Uncontrolled Emissions)	33.016	33.016

- (1) Mitigated Emissions assume that watering 3 times per day controls emissions by 61 percent (Uncontrolled Emissions x 0.39)
- (2) Emissions (lbs/hr) =  $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$   
where G = silt content (7.5%), H = moisture content (15.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).
- (3) Emissions (lbs/ton) =  $0.00112 \times [(G/5)^{1.3} / (H/2)^{1.4}] \times I/J$   
where G=mean wind speed (12 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day; and J=2,000 lbs/ton
- (4) Emissions (lbs/day/acre) =  $1.7 \times [(G/1.5) \times (365-H) / 235] \times I / 15 \times J$   
where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (0.5%) and J= fraction of TSP (0.5). Wind speed data acquired from Long Beach 1981 meteorological file.
- (5) Used SCAQMD Table 9-9 Default emission factors.

**Assumptions**

Acres graded	120	acre
1/4th graded on average day	30	acre
50% contingency on peak day	45	acre
Total cubic yards graded	439000	yd <sup>3</sup>
Total cubic yards excavated	360000	yd <sup>3</sup>
Total excavation/graded	799000	yd <sup>3</sup>
Cubic yards per month (26 months of activity)	19023.80952	yd <sup>3</sup>
Cubic yards per day (20 day months)	951.1904762	yd <sup>3</sup>
50% contingency on peak day	1426.785714	yd <sup>3</sup>
Avg number of land disturbing vehicle types	5	vehicles
Max number of land disturbing vehicle types	10	vehicles
50% contingency on peak day	15	vehicles

**Alternative 3 and 4**

---



**Chevron El Segundo Refinery - Coke Drum Reliability Project**  
**Peak Day Construction Emission Summary<sup>(1)</sup>**  
**Alternative 3 and 4 - Onsite Coke Drum Construction**

Emissions from Equipment	Absolute Peak	Onsite Peak	Onsite Peak
	All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	9.37	6.59	41.61
CO (lb/day)	34.24	25.84	155.31
NOx (lb/day)	57.58	39.55	305.39
SOx (lb/day)	0.08	0.05	0.43
PM10 (lb/day)	3.57	2.79	14.68
PM2.5 (lb/day)	3.28	2.56	13.51
CO <sub>EQ</sub> (lb/day)	7275.97	4615.94	40385.27

Emission from Trips	Peak	Onsite Peak	Onsite Peak
	Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	0.68	0.00	0.00
CO (lb/day)	4.96	0.00	0.00
NOx (lb/day)	3.73	0.00	0.00
SOx (lb/day)	0.01	0.00	0.00
PM10 (lb/day)	2.84	0.00	0.00
Exhaust PM (lb/day)	0.21	0.00	0.00
Fugitive PM (lb/day)	2.63	0.00	0.00
PM2.5 (lb/day)	0.64	0.00	0.00
CO <sub>EQ</sub> (lb/day)	1131.82	0.00	0.00

Fugitive PM	Peak	Onsite Peak	Onsite Peak
	Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
PM10 from Offroad Vehicles (lb/day) <sup>(2)</sup>	1.18	1.06	0.73
PM10 from Construction (lb/day) <sup>(2)</sup>	0.00	13.08	0.00
PM2.5 from Offroad Vehicles (lb/day) <sup>(2)</sup>	0.20	0.18	0.12
PM2.5 from Construction (lb/day) <sup>(2)</sup>	0.00	2.72	0.00

Ship Emissions	Peak	Onsite Peak	Onsite Peak
	Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	36.13	0.00	0.00
CO (lb/day)	90.10	0.00	0.00
NOx (lb/day)	960.50	0.00	0.00
SOx (lb/day)	27.02	0.00	0.00
PM10 (lb/day)	16.45	0.00	0.00
PM2.5 (lb/day)	13.23	0.00	0.00
CO <sub>EQ</sub> (lb/day)	42945.28	0.00	0.00

Total Emissions	Thresholds	Peak	Onsite Peak	Onsite Peak
		Onsite - All	PM10	CO/VOC/NOx/SOx/ PM2.5
VOC (lb/day)	75	46.18	6.59	41.61
CO (lb/day)	550	129.30	25.84	155.31
NOx (lb/day)	100	1021.81	39.55	305.39
SOx (lb/day)	150	27.11	0.05	0.43
PM10 (lb/day) <sup>(2)</sup>	150	24.04	16.92	15.42
PM2.5 (lb/day) <sup>(3)</sup>	55	17.35	5.46	13.63
CO <sub>EQ</sub> (lb/day)	NA	51353.07	4615.94	40385.27

(1) Onsite emissions exclude ship and trip emissions.

(2) Controlled PM.

(3) [https://www.aqmd.gov/ceqa/handbook/PM2\\_5/pm2\\_5.html](https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5.html).

Chevron El Segundo Refinery - Coke Drum Reliability Project - Onsite Coke Drum Construction Alternative 3 and 4  
Construction Emission Summary<sup>(1)</sup>

	Year 1												Year 2												Year 3	
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21					
<b>Emissions from Equipment</b>																										
VOC (lb/day)	4.29	6.59	9.37	16.48	13.42	7.37	7.37	6.94	8.55	12.89	18.97	19.83	18.99	15.18	17.66	20.06	42.28	41.61	41.61	5.46	3.03					
CO (lb/day)	16.60	25.84	34.24	58.37	47.07	25.07	25.07	23.98	31.75	50.75	75.91	79.53	76.70	57.48	65.79	74.13	155.31	153.08	153.08	22.17	14.41					
NOx (lb/day)	27.70	39.55	57.58	106.25	84.32	52.19	52.19	48.70	60.11	94.57	130.78	136.24	133.26	106.23	128.71	146.58	306.39	304.99	304.99	40.04	19.75					
SOx (lb/day)	0.04	0.05	0.08	0.14	0.13	0.07	0.07	0.07	0.08	0.13	0.18	0.19	0.18	0.15	0.18	0.20	0.43	0.43	0.43	0.06	0.03					
PM10 (lb/day)	1.78	2.79	3.57	5.94	4.74	2.46	2.46	2.26	3.12	4.72	7.35	7.79	7.57	5.35	6.15	6.93	14.68	14.55	14.55	2.09	1.34					
PM2.5 (lb/day)	1.64	2.56	3.28	5.47	4.36	2.26	2.26	2.07	2.87	4.34	6.76	7.16	6.96	4.92	5.66	6.38	13.51	13.38	13.38	1.92	1.24					
CO <sub>2</sub> (lb/day)	3346.36	4615.94	7275.97	13294.37	11808.15	6197.61	6197.61	6191.40	7461.87	12258.32	16387.11	16869.19	16613.37	13662.10	16728.41	19063.52	40385.27	40360.69	40360.69	5538.98	2450.14					
<b>Emission from Trips</b>																										
VOC (lb/day)	0.37	0.67	0.68	2.01	0.61	0.11	0.06	0.05	0.20	0.31	1.92	2.23	3.19	3.14	3.38	3.38	7.67	9.24	6.71	3.31	2.62					
CO (lb/day)	2.76	4.86	4.96	17.93	4.65	0.55	0.33	0.27	1.24	1.69	15.57	18.42	26.93	27.51	28.00	30.32	69.22	83.96	60.18	27.87	22.15					
NOx (lb/day)	1.92	3.72	3.72	5.62	2.88	1.11	0.66	0.49	2.11	2.94	23.33	27.63	39.23	39.23	40.61	42.22	93.66	113.12	82.77	37.99	30.40					
SOx (lb/day)	0.01	0.01	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.04	0.05	0.05	0.05	0.05	0.12	0.14	0.10	0.04	0.03					
PM10 (lb/day)	0.44	2.63	2.84	4.08	2.19	0.87	0.44	0.43	1.00	2.06	3.21	3.42	4.06	3.03	3.07	4.22	9.03	10.12	8.40	3.44	2.85					
Exhaust PM (lb/day)	0.11	0.21	0.21	0.30	0.17	0.06	0.03	0.02	0.07	0.13	0.43	0.47	0.56	0.36	0.34	0.42	1.20	1.41	1.08	0.69	0.54					
Fugitive PM (lb/day)	1.33	2.62	2.63	3.70	2.02	0.81	0.41	0.41	0.93	1.94	4.78	4.95	6.42	4.50	4.52	3.67	7.85	8.71	7.32	5.75	4.31					
PM2.5 (lb/day)	0.33	0.64	0.64	0.99	0.50	0.19	0.10	0.09	0.22	0.44	1.21	1.27	1.68	1.27	1.28	1.12	2.44	2.78	2.24	1.61	1.23					
CO <sub>2</sub> (lb/day)	612.71	1114.66	1131.82	3197.95	998.76	198.51	107.83	101.98	366.69	574.43	3285.31	3779.10	5390.25	5212.97	5295.39	5558.81	12601.26	15152.50	11037.60	4525.45	3665.04					
<b>Fugitive PM</b>																										
PM10 from Offroad Vehicles (lb/day) <sup>(2)</sup>	0.78	1.06	1.18	1.18	0.90	0.20	0.16	0.12	0.41	0.69	1.59	1.69	1.78	1.03	0.82	0.73	0.73	0.73	0.73	1.35	1.17					
PM10 from Construction (lb/day) <sup>(3)</sup>	13.08	13.08																								
PM2.5 from Offroad Vehicles (lb/day) <sup>(4)</sup>	0.13	0.18	0.20	0.20	0.15	0.03	0.03	0.02	0.07	0.12	0.27	0.29	0.30	0.17	0.14	0.12	0.12	0.12	0.12	0.23	0.20					
PM2.5 from Construction (lb/day) <sup>(5)</sup>	2.72	2.72																								
<b>Ship Emissions<sup>(6)</sup></b>																										
VOC (lb/day)																										
CO (lb/day)																										
NOx (lb/day)																										
SOx (lb/day)																										
PM10 (lb/day)																										
PM2.5 (lb/day)																										
CO <sub>2</sub> (lb/day)																										
<b>Total Emissions</b>																										
VOC (lb/day)	4.66	7.26	46.18	18.49	14.02	7.48	7.43	6.99	8.75	13.20	20.89	22.06	22.18	18.31	20.85	23.43	49.95	50.84	48.31	8.76	5.65					
CO (lb/day)	19.36	30.69	129.30	75.91	51.72	25.62	25.40	24.25	33.00	52.44	91.48	97.95	103.63	84.99	93.79	104.46	224.53	237.03	213.26	50.05	36.56					
NOx (lb/day)	29.63	43.27	102.81	113.76	97.20	53.31	52.76	49.20	61.82	97.51	138.11	143.88	142.88	113.58	136.05	152.98	319.05	320.11	317.76	52.03	29.15					
SOx (lb/day)	0.04	0.06	0.08	0.17	0.14	0.07	0.07	0.07	0.08	0.14	0.21	0.22	0.23	0.20	0.23	0.26	0.55	0.57	0.53	0.10	0.06					
PM10 (lb/day) <sup>(2)</sup>	15.0	17.07	19.75	24.04	11.21	7.82	3.52	3.05	2.80	4.52	7.47	14.16	14.89	16.40	11.42	12.05	11.88	24.47	25.40	23.68	9.89	7.36				
PM2.5 (lb/day) <sup>(4)</sup>	5.5	4.82	6.10	17.35	6.66	5.01	2.48	2.38	3.16	4.90	8.24	8.72	8.94	6.37	7.08	7.62	16.07	16.29	15.74	3.76	2.66					
CO <sub>2</sub> (tonnes) <sup>(5)</sup>	NA	3959.07	5730.60	16492.32	12806.91	6396.12	6305.44	6293.38	7818.56	12832.75	19682.42	20748.29	22003.62	18875.07	22023.80	24622.33	52986.53	55513.19	51398.29	10084.43	6015.14					
CO <sub>2</sub> (tonnes) <sup>(6)</sup>	NA	40.40	58.47	121.07	168.28	130.68	64.34	64.22	79.79	130.94	200.93	211.71	224.52	192.60	224.73	251.24	540.66	566.44	524.46	102.69	61.38					
Amortized CO <sub>2</sub> (tonnes/yr) <sup>(6)</sup>																										
NA																										

(1) Based on a 10 hour day.  
 (2) Controlled PM.  
 (3) Peak day includes cargo vessel handling emissions and ocean going tug transit emissions.  
 (4) [https://www.aqmd.gov/oceq/handbook/PM2.5/pm2\\_5.html](https://www.aqmd.gov/oceq/handbook/PM2.5/pm2_5.html).  
 (5) Assumes 22.5 construction days per month. Ship emission based on 1 cargo ship and 6 tug trips. Tonnes = Metric tons.

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2013**

Equipment Type	Hp	2013 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0694	0.3529	0.4565	0.0006	0.0383	51.73	0.0063	52.73
Diesel grader	120	0.1254	0.5310	0.7729	0.0009	0.0676	74.96	0.0113	76.77
Vibrating plate compactor (gasoline)	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0986	0.4063	0.6253	0.0007	0.0534	58.99	0.0089	60.41
Concrete pump, trailer mount	50	0.1052	0.3116	0.3228	0.0004	0.0275	34.33	0.0095	35.85
Mortar mixer, gasoline	15	0.0074	0.0386	0.0470	0.0001	0.0021	6.32	0.0007	6.43
Paving machine	120	0.1387	0.5057	0.8357	0.0008	0.0729	69.20	0.0125	71.20
Crane, diesel (20 ton)	120	0.0919	0.3618	0.5508	0.0006	0.0493	50.15	0.0083	51.47
Crane, diesel (150 ton)	250	0.1040	0.2948	0.9948	0.0013	0.0351	112.16	0.0094	113.66
Crane, diesel (400 ton)	500	0.1551	0.5292	1.4230	0.0018	0.0518	180.10	0.0140	182.34
Crane, diesel (1600 ton)	750	0.2625	0.8887	2.4614	0.0030	0.0885	303.04	0.0237	306.83
Manlift, telescoping, propane	50	0.0592	0.1757	0.1840	0.0003	0.0156	19.61	0.0053	20.47
Welder, diesel (250 amp)	50	0.0979	0.2753	0.2535	0.0003	0.0240	25.96	0.0088	27.37
Air compressor, diesel (185 cfm)	50	0.0921	0.2546	0.2221	0.0003	0.0220	22.27	0.0083	23.60
Air compressor, diesel (375 cfm)	120	0.0825	0.3251	0.4991	0.0006	0.0456	46.95	0.0074	48.14
Power Unit	500	0.1818	0.7230	2.3955	0.0033	0.0690	336.85	0.0164	339.48
Generator, diesel ( 6 kW)	25	0.0266	0.0908	0.1594	0.0002	0.0091	17.63	0.0024	18.02
Forklift 15 Ton	175	0.1347	0.7388	1.2314	0.0016	0.0592	141.98	0.0122	143.92
Forklift, diesel (4 ton)	120	0.1106	0.4905	0.7587	0.0009	0.0590	77.95	0.0100	79.55
Hydrotest pump	25	0.0359	0.1004	0.1761	0.0002	0.0109	19.49	0.0032	20.00
Light tower, diesel (4 kW)	25	0.0266	0.0908	0.1594	0.0002	0.0091	17.63	0.0024	18.02
32 Line Platform Trailer Hatz diesel	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3542	1.0311	2.9938	0.0044	0.1046	441.74	0.0320	446.85
36 line self propelled transporter	500	0.2170	0.6362	1.7865	0.0027	0.0634	272.33	0.0196	275.47
Roller	120	0.0986	0.4063	0.6253	0.0007	0.0534	58.99	0.0089	60.41
Bobcat skip loader	120	0.0694	0.3529	0.4565	0.0006	0.0383	51.73	0.0063	52.73
Sissor Lifts (propane)	25	0.0166	0.0503	0.0937	0.0001	0.0051	10.96	0.0015	11.20
Track Excavator	250	0.1242	0.3541	1.1360	0.0018	0.0372	158.68	0.0112	160.48
Crane Diesel 300 ton	500	0.1551	0.5292	1.4230	0.0018	0.0518	180.10	0.0140	182.34
Crane Diesel (65 ton)	250	0.1040	0.2948	0.9948	0.0013	0.0351	112.16	0.0094	113.66
Crane, diesel (35 ton)	175	0.1031	0.4821	0.7769	0.0009	0.0445	80.34	0.0093	81.83

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (Jar

**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2014**

Equipment Type	Hp	2013 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0634	0.3503	0.4252	0.0006	0.0337	51.73	0.0057	52.64
Diesel grader	120	0.1166	0.5268	0.7270	0.0009	0.0614	74.96	0.0105	76.65
Vibrating plate compactor (gasoline)	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0921	0.4030	0.5906	0.0007	0.0494	58.99	0.0083	60.32
Concrete pump, trailer mount	50	0.0949	0.3004	0.3098	0.0004	0.0251	34.33	0.0086	35.70
Mortar mixer, gasoline	15	0.0074	0.0386	0.0466	0.0001	0.0020	6.32	0.0007	6.43
Paving machine	120	0.1311	0.5011	0.7948	0.0008	0.0682	69.20	0.0118	71.09
Crane, diesel (20 ton)	120	0.0859	0.3587	0.5189	0.0006	0.0453	50.15	0.0078	51.39
Crane, diesel (150 ton)	250	0.0979	0.2817	0.9088	0.0013	0.0317	112.16	0.0088	113.57
Crane, diesel (400 ton)	500	0.1468	0.4948	1.2979	0.0018	0.0470	180.10	0.0132	182.22
Crane, diesel (1600 ton)	750	0.2485	0.8312	2.2480	0.0030	0.0803	303.04	0.0224	306.63
Manlift, telescoping, propane	50	0.0534	0.1694	0.1765	0.0003	0.0142	19.61	0.0048	20.38
Welder, diesel (250 amp)	50	0.0886	0.2652	0.2435	0.0003	0.0219	25.96	0.0080	27.24
Air compressor, diesel (185 cfm)	50	0.0831	0.2446	0.2134	0.0003	0.0201	22.27	0.0075	23.47
Air compressor, diesel (375 cfm)	120	0.0758	0.3216	0.4682	0.0006	0.0416	46.95	0.0068	48.04
Power Unit	500	0.1683	0.6904	2.1655	0.0033	0.0627	336.85	0.0152	339.28
Generator, diesel ( 6 kW)	25	0.0256	0.0868	0.1557	0.0002	0.0085	17.63	0.0023	18.00
Forklift 15 Ton	175	0.1236	0.7367	1.1536	0.0016	0.0538	141.98	0.0112	143.76
Forklift, diesel (4 ton)	120	0.1008	0.4857	0.7130	0.0009	0.0537	77.95	0.0091	79.40
Hydrotest pump	25	0.0333	0.0959	0.1721	0.0002	0.0101	19.49	0.0030	19.97
Light tower, diesel (4 kW)	25	0.0256	0.0868	0.1557	0.0002	0.0085	17.63	0.0023	18.00
32 Line Platform Trailer Hatz diesel	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3371	0.9944	2.6748	0.0044	0.0937	441.74	0.0304	446.60
36 line self propelled transporter	500	0.2065	0.6134	1.5945	0.0027	0.0567	272.33	0.0186	275.32
Roller	120	0.0921	0.4030	0.5906	0.0007	0.0494	58.99	0.0083	60.32
Bobcat skip loader	120	0.0634	0.3503	0.4252	0.0006	0.0337	51.73	0.0057	52.64
Sissor Lifts (propane)	25	0.0160	0.0494	0.0919	0.0001	0.0048	10.96	0.0014	11.19
Track Excavator	250	0.1180	0.3480	1.0099	0.0018	0.0333	158.68	0.0106	160.39
Crane Diesel 300 ton	500	0.1468	0.4948	1.2979	0.0018	0.0470	180.10	0.0132	182.22
Crane Diesel (65 ton)	250	0.0979	0.2817	0.9088	0.0013	0.0317	112.16	0.0088	113.57
Crane, diesel (35 ton)	175	0.0977	0.4806	0.7306	0.0009	0.0412	80.34	0.0088	81.75

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (Jar



**Chevron El Segundo Refinery - Coke Drum Reliability Project  
Construction Equipment Emission Factors for 2015**

Equipment Type	Hp	2015 Emission Factors lb/hr <sup>(1)</sup>							
		VOC	CO	NOx	SOx	PM10	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>Eq</sub> <sup>(2)</sup>
Backhoe 580 Case	120	0.0577	0.3480	0.3870	0.0006	0.0293	51.73	0.0052	52.56
Diesel grader	120	0.1081	0.5230	0.6726	0.0009	0.0555	74.96	0.0098	76.53
Vibrating plate compactor (gasoline)	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.31	0.0005	4.39
Roller vibrator, diesel	120	0.0857	0.4000	0.5498	0.0007	0.0454	58.99	0.0077	60.23
Concrete pump, trailer mount	50	0.0855	0.2910	0.2982	0.0004	0.0228	34.33	0.0077	35.57
Mortar mixer, gasoline	15	0.0074	0.0386	0.0464	0.0001	0.0019	6.32	0.0007	6.43
Paving machine	120	0.1235	0.4969	0.7477	0.0008	0.0636	69.20	0.0111	70.98
Crane, diesel (20 ton)	120	0.0800	0.3559	0.4822	0.0006	0.0415	50.15	0.0072	51.30
Crane, diesel (150 ton)	250	0.0925	0.2713	0.8284	0.0013	0.0286	112.16	0.0083	113.49
Crane, diesel (400 ton)	500	0.1393	0.4663	1.1812	0.0018	0.0426	180.10	0.0126	182.11
Crane, diesel (1600 ton)	750	0.2358	0.7835	2.0490	0.0030	0.0729	303.04	0.0213	306.45
Manlift, telescoping, propane	50	0.0480	0.1641	0.1699	0.0003	0.0129	19.61	0.0043	20.31
Welder, diesel (250 amp)	50	0.0801	0.2564	0.2346	0.0003	0.0200	25.96	0.0072	27.11
Air compressor, diesel (185 cfm)	50	0.0747	0.2360	0.2056	0.0003	0.0183	22.27	0.0067	23.35
Air compressor, diesel (375 cfm)	120	0.0691	0.3182	0.4334	0.0006	0.0375	46.95	0.0062	47.95
Power Unit	500	0.1556	0.6639	1.9429	0.0033	0.0567	336.85	0.0140	339.10
Generator, diesel ( 6 kW)	25	0.0247	0.0831	0.1522	0.0002	0.0080	17.63	0.0022	17.99
Forklift 15 Ton	175	0.1120	0.7350	1.0463	0.0016	0.0485	141.98	0.0101	143.60
Forklift, diesel (4 ton)	120	0.0910	0.4811	0.6607	0.0009	0.0484	77.95	0.0082	79.26
Hydrotest pump	25	0.0309	0.0919	0.1682	0.0002	0.0094	19.49	0.0028	19.93
Light tower, diesel (4 kW)	25	0.0247	0.0831	0.1522	0.0002	0.0080	17.63	0.0022	17.99
32 Line Platform Trailer Hatz diesel	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.11	0.0011	10.28
Prime Mover ISX	750	0.3198	0.9645	2.3779	0.0044	0.0835	441.74	0.0289	446.35
36 line self propelled transporter	500	0.1960	0.5949	1.4165	0.0027	0.0505	272.33	0.0177	275.16
Roller	120	0.0857	0.4000	0.5498	0.0007	0.0454	58.99	0.0077	60.23
Bobcat skip loader	120	0.0577	0.3480	0.3870	0.0006	0.0293	51.73	0.0052	52.56
Sissor Lifts (propane)	25	0.0155	0.0486	0.0902	0.0001	0.0046	10.96	0.0014	11.18
Track Excavator	250	0.1117	0.3431	0.8935	0.0018	0.0297	158.68	0.0101	160.29
Crane Diesel 300 ton	500	0.1393	0.4663	1.1812	0.0018	0.0426	180.10	0.0126	182.11
Crane Diesel (65 ton)	250	0.0925	0.2713	0.8284	0.0013	0.0286	112.16	0.0083	113.49
Crane, diesel (35 ton)	175	0.0919	0.4794	0.6684	0.0009	0.0378	80.34	0.0083	81.67

(1) Based on SCAQMD emission factors : <http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html>

(2) Carbon Dioxide Equivalents (CO<sub>Eq</sub>) = CO<sub>2</sub> + CH<sub>4</sub>\*21 + N<sub>2</sub>O\*310 where N<sub>2</sub>O = CH<sub>4</sub>\*0.26/0.58 CCAR General Reporting Protocol (Jar



**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 1 and 2 (Cont.)**

VOC	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 580 Case	0.0633	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Diesel driller	0.125376441	0.117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Vibrating plate compactor (gasoline)	0.095021484	0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Roller vibrator, diesel	0.039805568	0.0092	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Concrete pump, trailer mount	0.105182564	0.095	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Mortar mixer, gasoline	0.007443205	0.007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Paving machine	0.138711279	0.131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (20 ton)	0.081887683	0.086	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (150 ton)	0.104033628	0.098	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (400 ton)	0.15608553	0.147	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (1600 ton)	0.262463007	0.248	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Manlift, telescoping, propane	0.05915632	0.053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Welder, diesel (250 amp)	0.097932456	0.089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Air compressor, diesel (185 cfm)	0.029295977	0.083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Air compressor, diesel (375 cfm)	0.18271398	0.176	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Generator, diesel (6 kW)	0.026583338	0.026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Forklift 15 Ton	0.134709767	0.124	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Forklift, diesel (4 ton)	0.110820733	0.101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydratex pump	0.039685104	0.033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Light tower, diesel (4 kW)	0.026683338	0.026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
32 Line Platform Trailer, Heiz diesel	0.011765477	0.012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Prime Mover, ISX	0.354156886	0.337	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
36 line self propelled transporter	0.216955044	0.207	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Roller	0.098605568	0.092	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Bobcat skip loader	0.069432469	0.063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Sissor Lifts (propane)	0.016628278	0.016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Track Excavator	0.124238179	0.118	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane Diesel 300 ton	0.15508553	0.147	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane Diesel (65 ton)	0.104033628	0.098	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (35 ton)	0.103131257	0.098	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Total			0.00	0.00	0.00	0.00	4.29	6.59	9.37	16.48	13.42	7.37	7.37	6.84	8.35	12.89	18.97	19.03	18.99	15.18	17.68	20.06	42.28	41.61	41.61	

M:\WC\2708 Chevron - Coker Replacement\Construction\2708 Construction Emissions - LA Harbor knock down (rev3).xls (Equipment 1)

Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 1 and 2 (Cont.)

CO	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 580 Case	0.3528630538	0.350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Diesel dragger	0.5309653912	0.527	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Vibrating plate compactor (gasoline)	0.026339777	0.026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	0.406303433	0.403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Concrete pump, trailer mount	0.311601785	0.309	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mortar mixer, gasoline	0.036590833	0.039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	0.505691545	0.501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	0.36177612	0.359	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	0.294777811	0.292	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	0.529209224	0.495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	0.889719686	0.831	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mainlift, telescoping, propane	0.175745415	0.169	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	0.275524885	0.265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (185 cfm)	0.245	0.245	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (375 cfm)	0.245	0.245	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	0.329265284	0.326	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	0.0737	0.087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, 15 Ton	0.738802481	0.737	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	0.490630636	0.486	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydratex pump	0.10055133	0.096	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	0.090797481	0.087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform Trailer, Heiz diesel	0.061714724	0.062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	1.031052268	0.994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	0.636189987	0.613	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	0.406303433	0.403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skip loader	0.352863058	0.350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Sissor Lifts (propane)	0.050524696	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	0.354449178	0.348	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	0.529209224	0.495	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	0.294777811	0.282	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (35 ton)	0.462105081	0.461	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

M:\WC\2708 Chevron - Coker Replacement\Construction\2708 Construction Emissions - LA Harbor knock down (rev3).xls Equipment (1)

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 1 and 2 (Cont.)**

NOx	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 580 Case	0.456476761	0.425	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Diesel drader	0.772857832	0.727	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Vibrating plate compactor (gasoline)	0.031446512	0.031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Roller vibrator, diesel	0.625316475	0.591	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Concrete pump, trailer mount	0.322837662	0.310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Mortar mixer, gasoline	0.046965771	0.047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Paving machine	0.835686853	0.795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (20 ton)	0.550824185	0.519	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (150 ton)	0.994751506	0.909	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (400 ton)	1.422038336	1.298	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (1600 ton)	2.461965211	2.248	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Manlift, telescoping, propane	0.193959231	0.177	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Welder, diesel (250 amp)	0.259471144	0.243	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Air compressor, diesel (185 cfm)	0.222891477	0.213	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Air compressor, diesel (375 cfm)	0.492456269	0.468	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Generator, diesel (6 kW)	0.159265281	0.153	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Forklift, 15 Ton	1.231364916	1.154	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Forklift, diesel (4 ton)	0.758742084	0.713	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydratex pump	0.176133839	0.172	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Light tower, diesel (4 kW)	0.159595281	0.156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
32 Line Platform Trailer, Heiz diesel	0.073675907	0.074	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Prime Mover, ISX	2.993810316	2.875	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
36 line self propelled transporter	1.786650839	1.595	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Roller	0.625316475	0.591	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Bobcat skip loader	0.456476761	0.425	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Sissor Lifts (propane)	0.093658677	0.092	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Track Excavator	1.136002809	1.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane Diesel 300 ton	1.422038336	1.298	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane Diesel (65 ton)	0.994751506	0.909	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Crane, diesel (35 ton)	0.776864389	0.731	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 1 and 2 (Cont.)**

SOX	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 580 Case	0.0006506796	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Diesel grader	0.000675376	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Vibrating plate compactor (gasoline)	6.71266E-05	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Roller vibrator, diesel	0.000691968	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Concrete pump, trailer mount	0.000443864	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mortar mixer, gasoline	9.83483E-05	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Paving machine	0.000817709	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (20 ton)	0.00059261	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (150 ton)	0.00726198	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (400 ton)	0.00767753	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (1600 ton)	0.00594703	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Manlift, telescoping, propane	0.000255944	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Welder, diesel (250 amp)	0.000335573	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Air compressor, diesel (165 cfm)	0.00681972	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Air compressor, diesel (375 cfm)	0.00681972	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Power Unit	0.00330632	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generator, diesel ( 6 kW)	0.00223709	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift, 15 Ton	0.001597511	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Forklift, diesel (4 ton)	0.000914387	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Hydrate pump	0.000247258	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Light tower, diesel (4 kW)	0.00023709	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
32-Line Platform Trailer, Hatz diesel	0.000157279	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Prime Mover, ISX	0.004441558	0.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
36 line self propelled transporter	0.002673047	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Roller	0.000691968	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Bobcat skip loader	0.000606796	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sissor Lifts (propane)	0.000139063	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Track Excavator	0.001785463	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane Diesel 300 ton	0.001767753	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane Diesel 165 ton	0.00726198	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Crane, diesel (35 ton)	0.000940014	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 1 and 2 (Cont.)**

PM10	Year 1												Year 2											
	Emission Rate (lb/hr)												lb/day											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19			
Backhoe, 580 Class	0.034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Diesel dragger	0.067565337	0.061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Vibrating plate compactor (gasoline)	0.001231811	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Roller vibrator, diesel	0.053355833	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Concrete pump, trailer mount	0.0027497372	0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mortar mixer, gasoline	0.002133557	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Paving machine	0.072895485	0.068	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane, diesel (20 ton)	0.0492826897	0.045	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane, diesel (150 ton)	0.035091884	0.032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane, diesel (400 ton)	0.051834521	0.047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane, diesel (1600 ton)	0.089481972	0.080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Manlift, telescoping, propane	0.015855401	0.014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Welder, diesel (250 amp)	0.023898985	0.022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Air compressor, diesel (185 cfm)	0.022816842	0.020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Air compressor, diesel (375 cfm)	0.022816842	0.020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Generator, diesel (6 kW)	0.059065482	0.053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Generator, diesel (6 kW)	0.059065482	0.054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Forklift, diesel (4 ton)	0.058006531	0.054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Hydratex pump	0.010888218	0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Light tower, diesel (4 kW)	0.009063467	0.009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
32 Line Platform Trailer, Heiz diesel	0.00285861	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Prime Mover, ISX	0.104606347	0.094	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
36 line self propelled transporter	0.063351203	0.057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Roller	0.053355833	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Bobcat skip loader	0.038294316	0.034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Sissor Lifts (propane)	0.00511528	0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Track Excavator	0.037232711	0.033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane Diesel 300 ton	0.051834521	0.047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane Diesel (65 ton)	0.035091884	0.032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane, diesel (35 ton)	0.044516852	0.041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 1 and 2 (Cont.)

CO <sub>2</sub> e	Emission Rate (lb/hr)		Year 1												Year 2											
	2013	2014	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19					
Backhoe, 580 Case	52.73015326	52.643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Diesel driver	76.77448074	76.648	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Vibrating plate compactor (gasoline)	4.386281015	4.386	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller vibrator, diesel	60.41197339	60.318	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Concrete pump, trailer mount	35.85300618	35.705	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Mortar mixer, gasoline	6.427653897	6.427	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Paving machine	71.19849865	71.088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (20 ton)	51.47420526	51.388	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (150 ton)	113.6604312	113.573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (400 ton)	182.3396971	182.220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (1600 ton)	306.8328798	306.631	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Manlift, telescoping, propane	20.44959859	20.383	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Welder, diesel (250 amp)	27.37195134	27.238	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (185 cfm)	23.60000658	23.470	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Air compressor, diesel (375 cfm)	46.54444444	46.544	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Pump, diesel (1000 gpm)	18.01516905	18.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Generator, diesel ( 6 kW)	143.923592	143.764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Forklift, diesel (4 ton)	79.54605314	79.404	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydratex pump	20.00490705	19.968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Light tower, diesel (4 kW)	18.01510505	18.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
32 Line Platform Trailer, Heiz diesel	10.27715793	10.277	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Prime Mover, ISX	446.6600625	446.604	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
36 line self propelled transporter	275.4652653	275.315	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Roller	60.41197339	60.318	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bobcat skid loader	52.73015326	52.643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Slissor Lifts (propane)	11.20007216	11.192	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Track Excavator	160.47596977	160.385	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel 300 ton	182.3396971	182.220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane Diesel (65 ton)	113.6604312	113.573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Crane, diesel (35 ton)	81.65320339	81.755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Total			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		



**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3**

Equipment	Hours per Day	Pieces per Day				
		Month 20	Month 21	Year 3		
Backhoe 580 Case	2	1	1			
Diesel grader	10	1	1			
Vibrating plate compactor (gasoline)	2	1	1			
Roller vibrator, diesel	1	1	1			
Concrete pump, trailer mount	1					
Mortar mixer, gasoline	1	1	1			
Paving machine	1					
Crane, diesel (20 ton)	1					
Crane, diesel (150 ton)	1	1				
Crane, diesel (400 ton)	1					
Crane, diesel (1600 ton)	1					
Manlift, telescoping, propane	2	2	2			
Welder, diesel (250 amp)	1	2	2			
Air compressor, diesel (185 cfm)	1	1	1			
Air compressor, diesel (375 cfm)	10					
Power Unit	1	1	1			
Generator, diesel ( 6 kW)	2	1	1			
Forklift 15 Ton	1					
Forklift, diesel (4 ton)	2	2	2			
Hydrotest pump	1					
Light tower, diesel (4 kW)	1					
32 Line Platform Trailer Hatz diesel	1					
Prime Mover ISX	1					
36 line self propelled transporter	2	1	1			
Roller	1	1	1			
Bobcat skip loader	9					
Sissor Lifts (propane)	9					
Track Excavator	8					
Crane Diesel 300 ton	8	1				
Crane Diesel (65 ton)	8	1				
Crane, diesel (35 ton)	8	1	1			

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3 (Cont.)**

VOC	Emission Rate (lb/hr)		lb/day												
	2015		Year 3												
	Month 20	Month 21													
Backhoe 580 Case	0.057672641	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.108142194	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.005021495	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.085684756	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.08547317	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.007384313	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.123546643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.080027237	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.092467635	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.139274977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.235809557	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.048038783	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.080051021	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.074731714	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.06905289	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.15557147	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	0.024731312	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.111984024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.090956157	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.030926281	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.024731312	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.011765479	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.319778066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.195961627	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.085684756	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.057672641	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.015502766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.111686536	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.139274977	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.092467635	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.091907384	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		5.46	3.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3 (Cont.)**

CO	Emission Rate (lb/hr)	lb/day Year 3													
		2015		Month 20		Month 21									
Backhoe 580 Case	0.347997507	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.523042455	5.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.026339785	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.399952474	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.290951685	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.038590841	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.496861609	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.355931976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.271295357	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.46629212	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.783537466	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.164090386	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.256415604	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.23599994	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.318211065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.663908982	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	0.083133226	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.734990268	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.481063311	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.091894087	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.083133226	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.061714716	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.964482346	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.594900423	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.399952474	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.347997507	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.04862172	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.343072453	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.46629212	3.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.271295357	2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.479399694	3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		22.17	14.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3 (Cont.)**

NOX	Emission Rate (lb/hr)		lb/day												
	2015		Year 3												
	Month 20	Month 21													
Backhoe 580 Case	0.387035218	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.672617021	6.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.031446512	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.549759517	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.29819597	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.046355179	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.747732788	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.482170478	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.828400116	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	1.181214337	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	2.048977363	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.169893612	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.234557088	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.205554502	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.43336278	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	1.942918896	1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	0.152176068	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	1.046256868	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.660747446	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.168194563	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.152176068	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.073679898	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	2.377890755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	1.416455668	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.549759517	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.387035218	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.090230368	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.893525614	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	1.181214337	9.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.828400116	6.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.668440708	5.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		40.04	19.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3 (Cont.)**

SOX	Emission Rate (lb/hr)		lb/day Year 3															
	2015		Month 20	Month 21														
Backhoe 580 Case	0.000606796	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.000879376	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	6.71266E-05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.000691968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.000443864	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	9.83483E-05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.000811709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.000588261	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.00126198	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.001767753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.003047031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.000253544	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.000335573	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.000287912	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.00055075	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.00330632	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	0.000223709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.001597511	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.000914387	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.000247258	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.000223709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.000157279	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.004441559	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.002673045	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.000691968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.000606796	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.000139063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.001785453	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.001767753	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.00126198	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.000904014	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3 (Cont.)**

PM10	Emission Rate (lb/hr)		lb/day Year 3															
	2015		Month 20	Month 21														
Backhoe 580 Case	0.029335264	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	0.0555	0.56	0.56	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	0.001224549	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	0.045441134	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	0.022796789	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	0.001905357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	0.063629553	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	0.041503919	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	0.028633448	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	0.042634025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	0.072929265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	0.012890368	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	0.019982951	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	0.018293426	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	0.0374818	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	0.05669221	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	0.008033639	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	0.048496138	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	0.048409204	0.19	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	0.00936215	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	0.008033639	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	0.002877415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	0.083471166	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	0.050495698	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.045441134	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	0.029335264	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	0.00456736	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	0.029704441	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	0.042634025	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	0.028633448	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	0.037839485	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		2.09	1.34	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Construction Equipment Emissions for Year 3 (Cont.)**

CO <sub>Eq</sub>	Emission Rate (lb/hr)		lb/day												
	2015		Year 3												
	Month 20	Month 21													
Backhoe 580 Case	52.56043007	105.12	105.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diesel grader	76.52572132	765.26	765.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vibrating plate compactor (gasoline)	4.386280742	8.77	8.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller vibrator, diesel	60.22547453	60.23	60.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump, trailer mount	35.56852785	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mortar mixer, gasoline	6.426804512	6.43	6.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving machine	70.97959861	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (20 ton)	51.30302522	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (150 ton)	113.4934863	113.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (400 ton)	182.1115008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (1600 ton)	306.4482455	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift, telescoping, propane	20.30612256	81.22	81.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder, diesel (250 amp)	27.11346471	54.23	54.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (185 cfm)	23.34989658	23.35	23.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air compressor, diesel (375 cfm)	47.94689962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power Unit	339.0983079	339.10	339.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator, diesel ( 6 kW)	17.98837311	35.98	35.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift 15 Ton	143.5956068	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forklift, diesel (4 ton)	79.26222362	317.05	317.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrotest pump	19.93372617	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light tower, diesel (4 kW)	17.98837311	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Line Platform Trailer Hatz diesel	10.27715651	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prime Mover ISX	446.3540324	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 line self propelled transporter	275.1622636	550.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	60.22547453	60.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bobcat skip loader	52.56043007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sissor Lifts (propane)	11.18383177	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Track Excavator	160.2947768	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel 300 ton	182.1115008	1456.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Diesel (65 ton)	113.4934863	907.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane, diesel (35 ton)	81.67111523	653.37	653.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		5538.98	2450.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00





Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Onroad Construction Vehicle Trip Emissions for Year 3

Vehicle	Miles per Day	Vehicles per Day		
		Month 20	Month 21	Year 3
Commuters	36	79.00	62.00	
Cars	5	1.00	1.00	
Pickups	5	3.00	3.00	
Total Light Vehicle Miles		2864	2252	0
Water Truck	2	1.00	1.00	
Stakebed Truck	50	2.00	2.00	
Street Sweeper	2	1.00	1.00	
Total Medium Truck Miles		104	104	0
Dump Trucks	50	2.00	2.00	
Tractor Trailers	50	1.00	1.00	
Transit Mixers	50	1.00	1.00	
Bus	10	2.00	1.00	
Total Heavy Truck Miles		220	160	0

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day		
	Month 20	Month 21	Year 3
<b>VOC</b>			
Light Duty	0.0008523	2.44	1.92
Medium Duty	0.0024187	0.25	0.25
Heavy Duty	0.0027954	0.61	0.45
Total		3.31	2.62

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day		
	Month 20	Month 21	Year 3
<b>CO</b>			
Light Duty	0.61638	191	151
Medium Duty	0.016324	1.76	1.78
Heavy Duty	0.011246	2.45	1.78
Total		27.87	22.15

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day		
	Month 20	Month 21	Year 3
<b>NOx</b>			
Light Duty	0.0008446	2.42	1.90
Medium Duty	0.018337	1.97	1.98
Heavy Duty	0.0245951	5.61	4.01
Total		11.99	9.40

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day		
	Month 20	Month 21	Year 3
<b>SOx</b>			
Light Duty	0.0005108	0.03	0.02
Medium Duty	0.0002273	0.00	0.00
Heavy Duty	0.000397	0.01	0.01
Total		0.04	0.03

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day		
	Month 20	Month 21	Year 3
<b>PM10</b>			
Light Duty Exhaust	0.0008988	0.25	0.20
Medium Duty Exhaust	0.0007010	0.07	0.07
Heavy Duty Exhaust	0.0016609	0.37	0.27
Total Exhaust PM		0.69	0.54
Light Duty Fugitive <sup>(3)</sup>	0.00036589	1.11	0.67
Medium Duty Fugitive <sup>(3)</sup>	0.00210368	0.22	0.22
Heavy Duty Fugitive <sup>(3)</sup>	0.02011845	4.43	3.22
Total Fugitive PM		5.75	4.31
Total		6.44	4.85

Emission Rate (lb/mi) <sup>(4)</sup>	lb/day		
	Month 20	Month 21	Year 3
<b>CO<sub>2e</sub></b>			
Light Duty	1.151656	3288.98	2559.33
Medium Duty	2.7852519	289.98	289.98
Heavy Duty	4.2808336	937.38	681.73
Total		4525.45	3565.04

(1) All project specific data from engineering estimates.  
 (2) Based on 2007 SCAQMD on-road emission rates. (<http://www.aqmd.gov/ceqa/handbook/online/road.html>)  
 (3) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003  
 $E = K(SL)^{0.9} \times (WV)^{1.5} \times C$   
 where: k = 0.016 lb/VMT for PM10, sl = road silt loading (gms/m<sup>2</sup>) from CARB Methodology 7.9 for paved roads  
 (0.240 for local roads and 0.037 for major collector roads), W = weight of vehicles (2.4 tons for light-duty for medium trucks and 20 for heavy trucks), V = vehicle miles traveled (180's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).  
 (4) Carbon Dioxide Equivalency (CO<sub>2e</sub>) = CO<sub>2</sub> + CH<sub>4</sub> \* 21  
 where light vehicle N2O = CH<sub>4</sub> \* 0.01 \* 0.0095 EPA Direct Emissions from Mobile Combustion Sources (May 2008)  
 where medium/heavy duty vehicle N2O = CH<sub>4</sub> \* 0.051 \* 0.0048 EPA Direct Emissions from Mobile Combustion Sources (May 2008)

Chem	lb/mile		
	Light	Medium	Heavy
CO <sub>2</sub>	1.1024	2.7518	4.2205
CH <sub>4</sub>	0.0001	0.0001	0.0001
CO <sub>2e</sub>	1.152	2.788	4.261



**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Offroad Construction Vehicle Dust Emissions for Year 3**

Vehicle	Miles/Day	Vehicles per Day			
		Month 20	Month 21	Month 20	Month 21
Pickup Truck	0.1	3.00	3.00		
Total Light Vehicle Miles		0.3	0.3	0	0
Water Truck	0.5	1.00	1.00		
Stakebed Truck	0.1	2.00	2.00		
Total Medium Truck Miles		0.7	0.7	0	0
Dump Trucks	0.1	2.00	2.00		
Transit Mixers	0.1	1.00	0.00		
Total Heavy Truck Miles		0.3	0.2	0	0
Backhoe 580 Case	0.1	1.00	1.00		
Diesel grader	0.1	1.00	1.00		
Roller vibrator, diesel	0.1	1.00	1.00		
Paving machine	0.1	0.00	0.00		
Forklift 15 Ton	0.1	0.00	0.00		
Forklift, diesel (4 ton)	0.1	2.00	2.00		
Roller	0.1	1.00	0.00		
Bobcat skip loader	0.1	0.00	0.00		
Total Heavy-Heavy Duty Miles		0.6	0.5	0	0

Emission Rate (lb/mi) <sup>(2)</sup>	lb/day			
	Month 20	Month 21	Month 20	Month 21
PM10				
Light Duty	1.0131497	0.30	0.30	0.00
Medium Duty	1.4446539	1.01	1.01	0.00
Heavy Duty	2.2690375	0.68	0.45	0.00
Heavy Heavy Duty	2.4630500	1.48	1.23	0.00
Uncontrolled Total		3.47	3.00	0.00
Controlled Total <sup>(3)</sup>		1.35	1.17	0.00

- (1) All project specific data from engineering estimates.
- (2) Based on Section 13.2.2 of EPA's Compilation of Air Pollutant Emission Factors (AP-42).  
Emission Rate =  $1.5((s/12)^{.9})^*(W/3)^{.45}$   
s = silt content = 8.5% for construction sites  
W = Vehicle Weight (ton) =2.5 for light, 5.5 for medium, 15 for heavy, and 18 for heavy heavy (EMFAC2007).
- (3) Controlled Emissions assume that watering 3 times per day reduces emissions by 61 percent (Uncontrolled Emissions x 0.39)

**Chevron El Segundo Refinery - Coke Drum Reliability Project (Alternative 3/4)  
Fugitive PM Construction Emissions**

	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor <sup>(1)</sup>	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
Earthmoving Operations										
Construction Activities <sup>(2)</sup>	5	5	10	0.348	0.39	6.78	6.78	17.3818261	17.3818261	Table A9-9-F

	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
Stockpiles									
Construction Activities <sup>(3)</sup>	429	429	0.0035	0.39	0.585585	0.585585	1.5015	1.5015	Table A9-9-G

Assumptions: 1cubic yard trench spoils = 1 ton

	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	
Earth Disturbance									
Construction Activities <sup>(4)</sup>	20	1	1	0.200	0.200	0.200	0.002	0.002	Table A9-9-E

	Average Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
Loading/Dumping Operations <sup>(5)</sup>									
Truck Filling	454	454	0.02205	0.39	3.904173	3.904173	10.0107	10.0107	Table A9-9
Truck Dumping	454	454	0.009075	0.39	1.6068195	1.6068195	4.12005	4.12005	Table A9-9

TOTAL PM10 Pounds/day	Average	Peak
(Controlled Emissions)	13.0750	13.07503
(Uncontrolled Emissions)	33.016	33.016

(1) Mitigated Emissions assume that watering 3 times per day controls emissions by 61 percent (Uncontrolled Emissions x 0.39)

(2) Emissions (lbs/hr) =  $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$   
where G = silt content (7.5%), H = moisture content (15.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).

(3) Emissions (lbs/ton) =  $0.00112 \times [(G/5)^{1.3} / (H/2)^{1.4}] \times I/J$   
where G=mean wind speed (12 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day; and J=2,000 lbs/ton

(4) Emissions (lbs/day/acre) =  $1.7 \times [(G/1.5) \times (365-H) / 235] \times I / 15 \times J$   
where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (0.5%) and J= fraction of TSP (0.5). Wind speed data acquired from Long Beach 1981 meteorological file.

(5) Used SCAQMD Table 9-9 Default emission factors.

**Assumptions**

Acres graded	120	acre
1/4th graded on average day	30	acre
50% contingency on peak day	45	acre
Total cubic yards graded	439000	yd <sup>3</sup>
Total cubic yards excavated	360000	yd <sup>3</sup>
Total excavation/graded	799000	yd <sup>3</sup>
Cubic yards per month (26 months of activity)	19023.80952	yd <sup>3</sup>
Cubic yards per day (20 day months)	951.1904762	yd <sup>3</sup>
50% contingency on peak day	1426.785714	yd <sup>3</sup>
Avg number of land disturbing vehicle types	5	vehicles
Max number of land disturbing vehicle types	10	vehicles
50% contingency on peak day	15	vehicles