

APPENDIX M
GREENHOUSE GAS CALCULATIONS

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\22242\Desktop\Shipyards\Shipyards 05 27 11.urb924

Project Name: Shipyards

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5</u>	<u>PM2.5</u>	<u>CO2</u>
2013 TOTALS (tons/year unmitigated)	1.94	19.76	9.29	0.03	0.95	0.81	1.76	0.21	0.74	0.95	3,512.30
2014 TOTALS (tons/year unmitigated)	0.16	1.29	0.98	0.00	0.01	0.07	0.07	0.00	0.06	0.06	250.71

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2013	1.94	19.76	9.29	0.03	0.95	0.81	1.76	0.21	0.74	0.95	3,512.30
Demolition 01/01/2013-02/28/2013	0.10	0.83	0.42	0.00	0.01	0.04	0.05	0.00	0.03	0.04	118.88
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demo Off Road Diesel	0.10	0.82	0.39	0.00	0.00	0.04	0.04	0.00	0.03	0.03	115.58
Demo On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demo Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30
Building 02/01/2013-05/31/2013	0.16	1.20	0.97	0.00	0.01	0.06	0.06	0.00	0.05	0.06	227.88
Building Off Road Diesel	0.12	0.68	0.41	0.00	0.00	0.04	0.04	0.00	0.04	0.04	80.91
Building Vendor Trips	0.04	0.51	0.40	0.00	0.00	0.02	0.02	0.00	0.02	0.02	128.86

Phase Assumptions

Phase: Demolition 1/1/2013 - 2/28/2013 - Demolition of existing lagoon features

Building Volume Total (cubic feet): 0

Building Volume Daily (cubic feet): 0

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Crushing/Processing Equip (142 hp) operating at a 0.78 load factor for 8 hours per day

2 Excavators (350 hp) operating at a 0.57 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (300 hp) operating at a 0.55 load factor for 6 hours per day

Phase: Fine Grading 2/1/2013 - 5/31/2013 - Dredging for jetty construction and import of material for construction

Total Acres Disturbed: 2.27

Maximum Daily Acreage Disturbed: 0.03

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 162.5 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 1483.96

Off-Road Equipment:

1 Cranes (1200 hp) operating at a 0.5 load factor for 8 hours per day

2 Generator Sets (570 hp) operating at a 0.55 load factor for 8 hours per day

Phase: Fine Grading 4/2/2013 - 5/31/2013 - Dredging for storm drains

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 125

Off-Road Equipment:

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Phase: Fine Grading 6/3/2013 - 11/29/2013 - Export of Dredged sediment to Kettleman

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 7474.35

Off-Road Equipment:

Phase: Fine Grading 12/2/2013 - 3/31/2014 - Used to estimate import for cap. Equipment list is split between this and the construction phase.

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 456.74

Off-Road Equipment:

Phase: Paving 4/1/2014 - 4/29/2014 - Type Your Description Here

Acres to be Paved: 10

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 2/1/2013 - 5/31/2013 - Construction of Jetty

Off-Road Equipment:

2 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Pumps (50 hp) operating at a 0.6 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

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Phase: Building Construction 4/2/2013 - 5/31/2013 - Construction of storm drain extensions

Off-Road Equipment:

2 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Pumps (50 hp) operating at a 0.6 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Phase: Building Construction 6/3/2013 - 11/29/2013 - Placement of fill

Off-Road Equipment:

2 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

8 Pumps (50 hp) operating at a 0.6 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Phase: Building Construction 12/2/2013 - 3/31/2014 - Construction of cap

Off-Road Equipment:

2 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Tug Boat GHG Emissions During Convair Lagoon Alternative Construction

Source: U.S. Environmental Protection Agency. 2009. Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories - Final Report. April

Emissions = $\Sigma(\text{emissions Factor for Engine Tier}) \times \text{Load Factor} \times \text{Annual Activity} \times \# \text{ of Engines} \times \text{KW} \times \text{Correction Factor}$

GHG Emissions (grams) - Containment Barrier Construction

Pollutant	Emissions Factor (g/kWH)	Load Factor	Annual Activity (Hours)	Engine Power (KW)	Total Emissions (g)	Emissions (Metric Tons)	CO2e
CO2	690	0.79	80	1,231	53,681,448	53.681448	53.681448
N2O	0.02	0.79	80	1,231	1,556	0.001556	0.49791488
CH4	0.09	0.79	80	1,231	7,002	0.0070019	0.147040488
Total GHG Emissions							54.32640337

GHG Emissions (grams) - Sediment Transport

Pollutant	Emissions Factor (g/kWH)	Load Factor	Annual Activity (Hours)	Engine Power (KW)	Total Emissions (g)	Emissions (Metric Tons)	CO2e
CO2	690	0.79	980	1,231	657,597,738	657.59774	657.597738
N2O	0.02	0.79	980	1,231	19,061	0.0190608	6.09945728
CH4	0.09	0.79	980	1,231	85,774	0.0857736	1.801245978
Total GHG Emissions							665.4984413

Factor	Assumption	Basis
Engine Tier	Tier 0	Most conservative, baseline for EPA Report
Load Factor = 0.31 - based on EPA report	0.79	Based on EPA Report for Port of LA and Port of Long Beach. No separate load factor for idling available
Annual Activity - Full Operation Jetty Construction	80 hours	80 working days. AQ analysis assumes one tug boat would operated for 8 hours a day to estimate maximum daily emissions. This would overestimate annual emissions because barges would generally be stationary during this phase. It is assumed tug boats would operated for 1 hour per working day to move barges into position
Annual Activity - Idling during Sediment Transport	784 hours	Assume tugboats are idling during loading and unloading. Assume 4 hours per trip for loading and 4 hours per trip for unloading. Based on Design Rate Simulations. 2011. Port of Mobile Barge Terminal Hypothetical Barge Unloading Simulation Case Study. Available at http://design-rate.com/case_study_barge_unloading.htm , accessed May 11, 2011. While the construction equipment required to load the barges is included in the impact analysis for the proposed project, therefore it is not included in the impact analysis for this alternative, the idling barges during loading was not considered in the proposed project analysis. Therefore, GHG from barge idling during loading is included in this analysis
Annual Activity - Full Operation Sediment Transport	196 hours	98 trips, 10 miles round trips. Speed limit around lagoons is 5 mph. Assume tow boats would travel at 5 mph. Round trip would take 2 hours.
Number of Engines	1	Sum of HP of all engines is 1,650 HP
Engine Power	1231 kW	Convert 1,650 HP to KW
Correcton Factor	1	Based on EPA Report. Same for all GHGs

Greenhouse Gas Emission Worksheet

Construction Emissions

Project: 0
 Project Number: 0 1 ton (short, US) = 0.90718474 metric ton.

Off-Road Construction Equipment

Phase	tons CO2 ⁽²⁾	metric tons CO2	MT N2O(3)	CO2e	MT CH4(3)	CO2e	Total CO2e
Demolition	119	108	0.003239	1.003981352	0.014034	0.294717	109
Excavation of Construction of Containment Barrier (no tug boats)	799	725	0.021745	6.741017648	0.094229	1.978815	734
Storm Drain Extension	128	116	0.003484	1.079912714	0.015096	0.317007	118
Sediment Placement (no tug boats)	431	391	0.01173	3.636268593	0.05083	1.067421	396
Landfill Disposal	1956	1774	0.053234	16.50241617	0.230679	4.844258	1796
Sand Cap Placement	310	281	0.008437	2.615413605	0.03656	0.76775	285
Paving	20	18	0.000544	0.168736362	0.002359	0.049532	18
Containment Barrier Tugboats(1)		54					54
Sediment Transfer Tugboats(1)		665					665
		0					0
		0					0
		0					0
		0					0
Total		4133		32		9	
Total CO2e		4174					

(1) MT CO2 is CO2e based on the EPA's Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories - Final Report (EPA,
 (2) Source: URBEMIS 2007, version 9.2.4
 (3) Estimated using the ratio of N2O and CH4 emissions to CO2 emissions in the EPA's Current Methodologies in Preparing Mobile Source Port-