8/9/2012 12:47:36 PM

Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name:

Project Name: San Onofre LOED Construction

Project Location: South Coast AQMD

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

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (lbs/day unmitigated)	3.64	36.72	14.94	0.00	0.00	1.57	1.57	0.00	1.45	1.45	4,724.85

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
Time Slice 4/1/2013-4/5/2013 Active Days: 5	0.77	6.82	2.95	**0.00**	**0.00**	0.27	0.27	**0.00**	0.24	0.24	870.26
Building 04/01/2013-04/05/2013	0.77	6.82	2.95	0.00	0.00	0.27	0.27	0.00	0.24	0.24	870.26
Building Off Road Diesel	0.77	6.82	2.95	0.00	0.00	0.27	0.27	0.00	0.24	0.24	870.26
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

8/9/2012 12:47:36 PM

Time Slice 4/8/2013-4/11/2013 Active Days: 4	3.64	36.72	14.94	**0.00**	**0.00**	1.57	1.57	**0.00**	1.45	1.45	4,724.85
Building 04/08/2013-04/11/2013	0.92	6.16	4.09	0.00	0.00	0.48	0.48	0.00	0.44	0.44	644.66
Building Off Road Diesel	0.92	6.16	4.09	0.00	0.00	0.48	0.48	0.00	0.44	0.44	644.66
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building 04/08/2013-04/19/2013	2.72	30.56	10.85	0.00	0.00	1.10	1.10	0.00	1.01	1.01	4,080.19
Building Off Road Diesel	2.72	30.56	10.85	0.00	0.00	1.10	1.10	0.00	1.01	1.01	4,080.19
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 4/12/2013-4/19/2013 Active Days: 6	2.72	30.56	10.85	**0.00**	**0.00**	1.10	1.10	**0.00**	1.01	1.01	4,080.19
Building 04/08/2013-04/19/2013	2.72	30.56	10.85	0.00	0.00	1.10	1.10	0.00	1.01	1.01	4,080.19
Building Off Road Diesel	2.72	30.56	10.85	0.00	0.00	1.10	1.10	0.00	1.01	1.01	4,080.19
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase Assumptions

Phase: Building Construction 4/8/2013 - 4/11/2013 - Tremie barge (batch plant)

Off-Road Equipment:

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

4 Pumps (53 hp) operating at a 0.74 load factor for 4 hours per day

Phase: Building Construction 4/1/2013 - 4/5/2013 - Landside LOED assembly and construction

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

8/9/2012 12:47:36 PM

Phase: Building Construction 4/8/2013 - 4/19/2013 - Waterside LOED installation

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day

1 Generator Sets (549 hp) operating at a 0.74 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

8/9/2012 12:48:03 PM

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name:

Project Name: San Onofre LOED Construction

Project Location: South Coast AQMD

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

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (tons/year unmitigated)	0.02	0.18	0.07	0.00	0.00	0.01	0.01	0.00	0.01	0.01	23.87

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

8/9/2012 12:48:03 PM

2013	0.02	0.18	0.07	0.00	0.00	0.01	0.01	0.00	0.01	0.01	23.87
Building 04/01/2013-04/05/2013	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.18
Building Off Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.18
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building 04/08/2013-04/11/2013	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
Building Off Road Diesel	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building 04/08/2013-04/19/2013	0.01	0.15	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.01	20.40
Building Off Road Diesel	0.01	0.15	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.01	20.40
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase Assumptions

Phase: Building Construction 4/8/2013 - 4/11/2013 - Tremie barge (batch plant)

Off-Road Equipment:

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

4 Pumps (53 hp) operating at a 0.74 load factor for 4 hours per day

Phase: Building Construction 4/1/2013 - 4/5/2013 - Landside LOED assembly and construction

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

Phase: Building Construction 4/8/2013 - 4/19/2013 - Waterside LOED installation

8/9/2012 12:48:03 PM

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day

1 Generator Sets (549 hp) operating at a 0.74 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

San Onofre Nuclear Generating Station
Large Organism Exclusion Device (LOED) Construction Emissions

DAILY EMISSIONS

Construction Activities/Phase	VOC	NO_X	CO	SO_2	PM	PM_{10}	$PM_{2.5}$	CO_2	CO_2e
Landside LOED Assembly	0.77	6.82	2.95	0		0.27	0.24	-	-
Mobilization	11.83	606.51	97.75	46.89	15.28	15.28	14.06	41479.20	42682.42
Waterside Construction	2.72	30.56	10.85	0		1.1	1.01	-	
Tremie Barge - Construction	0.92	6.16	4.09	0		0.48	0.44	-	
Subtotal - Overlap	*3.64*	*36.72*	*14.94*	*0*	*0*	*1.58*	*1.45*	-	
Waterside Construction	2.72	30.56	10.85	0		1.1	1.01	-	
Mobilize Tremie Barge	7.88	404.34	65.17	31.26	10.19	10.19	9.37	27652.80	28454.95
Subtotal - Overlap	*10.60*	*434.90*	*76.02*	*31.26*	*10.19*	*11.29*	*10.38*		
Demobilization	10.01	695.31	91.78	54.00	17.38	17.38	15.99	46878.45	48238.29
Maximum Daily	***11.83***	***695.31***	***97.75***	***54.00***	***17.38***	***17.38***	***15.99***		
Average Daily	***2.32***	***68.87***	***13.16***	***4.41***	***0.00***	***2.10***	***1.98***		

UNIT 1 ANNUAL EMISSIONS (tons/year)

								Metric Tons	
Construction Activities/Phase	**VOC**	**NO_X**	**CO**	**SO_2**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CO_2e**
Construction Emissions	0.02	0.18	0.07	0		0.01	0.01	21.655	22.794
Mobilization	0.01	0.51	0.08	0.04		0.01	0.01	34.57	35.57
Demobilization	0.01	0.35	0.05	0.03		0.01	0.01	23.44	24.12
Total Construction Emissions	**0.03**	**1.03**	**0.20**	**0.07**		**0.03**	**0.03**	**79.66**	**82.48**

TOTAL ANNUAL EMISSIONS	0.07	2.07	0.39	0.13	0.00	0.06	0.06	159.32	164.96

San Onofre Nuclear Generating Station LOED Construction
Tugboat and Barge Emission Factor Derivation and Emissions

Assumptions

Tug Boat Main Generator Engine	2000	bhp
	1491.4	kW
Tug Boat Aux Generator Engine	150	bhp
	111.9	kW
VOC/Total Hydrocarbon Ratio	1.053	
bhp	kW	
1	0.74569	
Diesel Fuel Sulfur Content	15	
	0.0015	ppm

Derrick Barge	Equipment	Pollutant Emissions (lbs) HC	VOC	NO_X	CO	SO_2	PM	PM_{10}	$PM_{2.5}$	CO_2	CO_2e
Round Trip Emissions (per tug)											
One-Way Loaded Trip (lbs/day)	Main	3.50	3.68	188.09	30.40	14.55	4.74	4.74	4.36	12,866.52	13,239.75
One-Way Loaded Trip (lbs/day)	Gen	0.25	0.26	14.08	2.18	1.09	0.35	0.35	0.33	959.88	987.72
One-Way Empty Trip (lbs/day)	Main	1.73	1.82	129.29	16.84	10.05	3.23	3.23	2.97	8,709.20	8,961.84
One-Way Empty Trip (lbs/day)	Gen	0.17	0.18	9.77	1.52	0.75	0.25	0.25	0.23	666.49	685.82
Total Round Trip Emissions (lbs/day)	Main & Gen	5.65	5.94	341.23	50.94	26.43	8.57	8.57	7.88	23,202.09	23,875.13
Mobilization Trip (lbs/day)	Main & Gen	3.74	3.94	202.17	32.58	15.63	5.09	5.09	4.69	13826.40	14227.47
Demobilization Trip (lbs/day)	Main & Gen	1.90	2.00	139.06	18.36	10.80	3.48	3.48	3.20	9375.69	9647.66
Total Daily Barge Delivery Emissions (lbs/day)	Main & Gen	3.74	3.94	202.17	32.58	15.63	5.09	5.09	4.69	13,826.40	14,227.47

Derrick Barge	Distance (mi)	Speed (mph)	Time (hr)	Load Factor (LF) Main	Load Factor (LF) Gen	Weighted LF Main	Weighted LF Gen
Loaded Barge	38.00	7.55	5.033	50.0%	50.0%	47.6%	47.6%
Idling			0.250	5.0%	50.0%	0.2%	2.4%
Total			5.283			47.9%	50.0%
Empty Barge	38.00	10.359	3.668	60.0%	50.0%		

Tugs/trip	1
Total Trips/Day	1

Pollutant	Emission Factor (g/kW-hr) Cons (loaded)	Cons (empty)	Main Loaded	Main Empty	Gen
PM	na	na	0.27	0.27	0.27
NO_X	na	na	10.83	10.72	10.80
SO_2	0.35	0.35	0.84	0.83	0.83
CO	na	na	1.75	1.40	1.68
HC	na	na	0.20	0.14	0.19
CO_2	na	na	740.72	722.10	736.80

Flat-Deck Barge	Equipment	Pollutant Emissions (lbs) HC	VOC	NO_X	CO	SO_2	PM	PM_{10}	$PM_{2.5}$	CO_2	CO_2e
Round Trip Emissions (per tug)											
One-Way Loaded Trip (lbs/day)	Main	3.50	3.68	188.09	30.40	14.55	4.74	4.74	4.36	12,866.52	13,239.75
One-Way Loaded Trip (lbs/day)	Gen	0.25	0.26	14.08	2.18	1.09	0.35	0.35	0.33	959.88	987.72
One-Way Empty Trip (lbs/day)	Main	1.73	1.82	129.29	16.84	10.05	3.23	3.23	2.97	8,709.20	8,961.84
One-Way Empty Trip (lbs/day)	Gen	0.17	0.18	9.77	1.52	0.75	0.25	0.25	0.23	666.49	685.82
Total Round Trip Emissions (lbs/day)	Main & Gen	5.65	5.94	341.23	50.94	26.43	8.57	8.57	7.88	23,202.09	23,875.13
Mobilization Trip (lbs/day)	Main & Gen	3.74	3.94	202.17	32.58	15.63	5.09	5.09	4.69	13826.40	14227.47
Demobilization Trip (lbs/day)	Main & Gen	1.90	2.00	139.06	18.36	10.80	3.48	3.48	3.20	9375.69	9647.66
Total Daily Barge Delivery Emissions (lbs/day)	Main & Gen	3.74	3.94	202.17	32.58	15.63	5.09	5.09	4.69	13,826.40	14,227.47

Flat-Deck Barge	Distance (mi)	Speed (mph)	Time (hr)	Load Factor (LF) Main	Load Factor (LF) Gen	Weighted LF Main	Weighted LF Gen
Loaded Barge	38.00	7.55	5.033	50.0%	50.0%	47.6%	47.6%
Idling			0.250	5.0%	50.0%	0.2%	2.4%
Total			5.283			47.9%	50.0%
Empty Barge	38.00	10.359	3.668	60.0%	50.0%		

Tugs/trip	1
Total Trips/Day	1

Pollutant	Emission Factor (g/kW-hr) Cons (loaded)	Cons (empty)	Main Loaded	Main Empty	Gen
PM	na	na	0.27	0.27	0.27
NO_X	na	na	10.83	10.72	10.80
SO_2	0.35	0.35	0.84	0.83	0.83
CO	na	na	1.75	1.40	1.68
HC	na	na	0.20	0.14	0.19
CO_2	na	na	740.72	722.10	736.80

Tremie Barge (Batch Plant)	Equipment	Pollutant Emissions (lbs) HC	VOC	NO_X	CO	SO_2	PM	PM_{10}	$PM_{2.5}$	CO_2	CO_2e
Round Trip Emissions (per tug)											
One-Way Loaded Trip (lbs/day)	Main	3.50	3.68	188.09	30.40	14.55	4.74	4.74	4.36	12,866.52	13,239.75
One-Way Loaded Trip (lbs/day)	Gen	0.25	0.26	14.08	2.18	1.09	0.35	0.35	0.33	959.88	987.72
One-Way Empty Trip (lbs/day)	Main	1.73	1.82	129.29	16.84	10.05	3.23	3.23	2.97	8,709.20	8,961.84
One-Way Empty Trip (lbs/day)	Gen	0.17	0.18	9.77	1.52	0.75	0.25	0.25	0.23	666.49	685.82
Total Round Trip Emissions (lbs/day)	Main & Gen	5.65	5.94	341.23	50.94	26.43	8.57	8.57	7.88	23,202.09	23,875.13
Mobilization Trip (lbs/day)	Main & Gen	3.74	3.94	202.17	32.58	15.63	5.09	5.09	4.69	13826.40	14227.47
Demobilization Trip (lbs/day)	Main & Gen	1.90	2.00	139.06	18.36	10.80	3.48	3.48	3.20	9375.69	9647.66
Total Daily Barge Delivery Emissions (lbs/day)	Main & Gen	3.74	3.94	202.17	32.58	15.63	5.09	5.09	4.69	13,826.40	14,227.47

Tremie Barge	Distance (mi)	Speed (mph)	Time (hr)	Load Factor (LF) Main	Load Factor (LF) Gen	Weighted LF Main	Weighted LF Gen
Loaded Barge	38.00	7.55	5.033	50.0%	50.0%	47.6%	47.6%
Idling			0.250	5.0%	50.0%	0.2%	2.4%
Total			5.283			47.9%	50.0%
Empty Barge	38.00	10.359	3.668	60.0%	50.0%		

Tugs/trip	1
Total Trips/Day	1

Pollutant	Emission Factor (g/kW-hr) Fuel Cons (loaded)	Fuel Cons (empty)	Main Loaded	Main Empty	Gen
PM	na	na	0.27	0.27	0.27
NO_X	na	na	10.83	10.72	10.80
SO_2	0.35	0.35	0.84	0.83	0.83
CO	na	na	1.75	1.40	1.68
HC	na	na	0.20	0.14	0.19
CO_2	na	na	740.72	722.10	736.80

Source:

South Coast Air Quality Management District. 2006 (October). Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds. Available: <http://aqmd.gov/ceqa/handbook/PM2_5/PM2_5.html>

USEPA. 2003. Converstion Factor for Hydrocarbon Emission Components. Available: <http://www.epa.gov/otaq/models/nonrdmdl/p03002.pdf>