APPENDIX B

AIR EMISSION CALCULATIONS

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Valero Wilminton Refinery
New Cogen Project
Construction Emission Summary

	2013											
Emissions from Equipment	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
VOC (lb/day)	3.49	2.46	2.48	1.54	1.54	1.54	1.72	3.72	2.38	0.37	0.00	0.00
CO (lb/day)	30.04	18.56	17.24	9.47	9.47	9.47	13.19	28.65	19.24	3.78	0.00	0.00
NOx (lb/day)	43.16	27.01	26.92	21.79	21.79	21.79	20.51	44.33	28.28	4.46	0.00	0.00
SOx (lb/day)	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.07	0.05	0.01	0.00	0.00
PM10 (lb/day)	2.38	1.63	1.66	1.04	1.04	1.04	1.18	2.50	1.63	0.31	0.00	0.00
PM2.5 (lb/day)(1)	2.34	1.60	1.63	1.02	1.02	1.02	1.15	2.45	1.60	0.30	0.00	0.00
CO_2 (lb/day)	3398.44	2444.99	2318.26	1560.00	1560.00	1560.00	1685.73	3856.13	2595.81	425.41	0.00	0.00

	2013											
Emission from Trips - Onsite/Offsite	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
VOC (lb/day)	0.65	0.65	0.99	0.47	0.47	1.01	1.01	0.97	0.97	0.45	0.45	0.01
CO (lb/day)	5.71	5.72	8.96	4.09	4.10	9.17	9.17	8.79	8.79	3.96	3.96	0.05
NOx (lb/day)	2.17	2.17	2.22	1.70	1.70	2.24	2.24	2.20	2.20	1.53	1.53	0.06
SOx (lb/day)	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.00
PM10 (lb/day)	0.94	0.95	1.13	0.71	0.71	1.15	1.15	1.12	1.12	0.60	0.60	0.04
Exhuast PM (lb/day)	0.14	0.14	0.19	0.11	0.11	0.19	0.19	0.19	0.19	0.10	0.10	0.00
Fugitive PM (lb/day)	0.80	0.80	0.94	0.60	0.60	0.96	0.96	0.94	0.94	0.50	0.50	0.04
PM2.5 (lb/day)(1)	0.28	0.28	0.35	0.21	0.21	0.36	0.36	0.35	0.35	0.19	0.19	0.01
Exhuast PM (lb/day)	0.14	0.14	0.19	0.11	0.11	0.19	0.19	0.19	0.19	0.10	0.10	0.00
Fugitive PM (lb/day)	0.14	0.14	0.16	0.10	0.10	0.16	0.16	0.16	0.16	0.08	0.08	0.01
CO_2 (lb/day)	1102.06	1103.07	1572.31	819.40	820.41	1603.99	1605.00	1545.68	1545.68	783.12	783.12	12.43

	2013											
Fugitive Earthmoving PM - Peak	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
PM10 (lb/day)(2)	34.62	34.62	34.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM2.5 (lb/day)(1)(2)	20.08	20.08	20.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	2013											
Offroad Fugitive PM - Peak	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
PM10 (lb/day)(2)	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20
PM2.5 (lb/day)(1)(2)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09

	2013											
Paint	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
VOC (lb/day)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66	1.66	1.66	0.00	0.00

		2013											
Total Emissions	**Thresholds**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
VOC (lb/day)	75	4.14	3.11	3.47	2.01	2.01	2.55	2.74	6.35	5.01	2.49	0.45	0.01
CO (lb/day)	550	35.75	24.27	26.20	13.56	13.57	18.64	22.37	37.44	28.03	7.75	3.96	0.05
NOx (lb/day)	100	45.33	29.18	29.14	23.48	23.48	24.03	22.75	46.54	30.48	5.99	1.53	0.06
SOx (lb/day)	150	0.07	0.06	0.06	0.04	0.04	0.05	0.05	0.09	0.06	0.02	0.01	0.00
PM10 (lb/day)(2)	150	43.15	42.41	42.62	6.95	6.95	7.39	7.54	8.83	7.96	6.11	5.80	5.24
PM2.5 (lb/day)(1)(2)	55	23.79	23.06	23.15	2.32	2.32	2.46	2.60	3.89	3.04	1.58	1.28	1.10
CO_2 (lb/day)	NA	4500.50	3548.06	3890.57	2379.40	2380.41	3163.99	3290.73	5401.81	4141.49	1208.53	783.12	12.43
CO_2 (tonnes/yr)	NA												354.16
30yr amortized CO_2 (tonnes/yr	NA												11.81

(1) https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5ratio.xls

(2) Mitigated PM.

Valero Wilmington Refinery
New Cogen Project
Construction Equipment Emission Rates

Equipment Type	Hp	2013 Emission Factors lb/hr[1]					
		VOC	CO[2]	NOx	SOx	PM10	CO_{2EQ}
Air Compressor (other)	50	0.0380	0.3376	0.1950	0.0004	0.0177	20.7119
Backhoe	Composite	0.0375	0.3782	0.4460	0.0008	0.0307	42.5410
Bulldozer	Composite	0.1406	1.1749	1.8101	0.0022	0.0927	116.0569
Compactor (other)	50	0.0380	0.0263	0.1950	0.0004	0.0177	20.7119
Crane	Composite	0.0769	0.4737	1.0893	0.0015	0.0519	78.0001
Front-End Loader	Composite	0.0375	0.3782	0.4460	0.0008	0.0307	42.5410
Motor Grader	Composite	0.0756	0.6053	1.0977	0.0017	0.0491	90.6733
Paver	Composite	0.0489	0.5357	0.6433	0.0012	0.0352	63.1138
Pile Driver (other)	Composite	0.0638	0.5159	0.8790	0.0016	0.0433	84.3438
Trencher	Composite	0.0578	0.4675	0.5160	0.0009	0.0353	48.0319

(1) OFF ROAD 2011 inventory.

(2) SCAQMD, 2006 : http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07_25.xls

Valero Wilmington Refinery
New Cogen Project
Construction Equipment Emissions

		2013											
Equipment	**Hours (hr/day)**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	10												
Backhoe	10	1	1	1					1	1			
Bulldozer	10	1											
Compactor	10		1	1					1	1			
Crane	10			1	2	2	2	1	1				
Front-End Loader	10	1	1	1				1	1	1	1		
Motor Grader	10	1	1						1	1			
Paver	10								1	1			
Pile Driver	10												
Trencher	10	1	1	1				1	1				

	Emission Rate (lb/hr)	**2013**											
VOC	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	0.038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe	0.037	0.37	0.37	0.37	0.00	0.00	0.00	0.00	0.37	0.37	0.00	0.00	0.00
Bulldozer	0.141	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	0.038	0.00	0.38	0.38	0.00	0.00	0.00	0.00	0.38	0.38	0.00	0.00	0.00
Crane	0.077	0.00	0.00	0.77	1.54	1.54	1.54	0.77	0.77	0.00	0.00	0.00	0.00
Front-End Loader	0.037	0.37	0.37	0.37	0.00	0.00	0.00	0.37	0.37	0.37	0.37	0.00	0.00
Motor Grader	0.076	0.76	0.76	0.00	0.00	0.00	0.00	0.00	0.76	0.76	0.00	0.00	0.00
Paver	0.049	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.00	0.00	0.00
Pile Driver	0.064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trencher	0.058	0.58	0.58	0.58	0.00	0.00	0.00	0.58	0.58	0.00	0.00	0.00	0.00
Total		3.49	2.46	2.48	1.54	1.54	1.54	1.72	3.72	2.38	0.37	0.00	0.00

	Emission Rate (lb/hr)	**2013**											
CO	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	0.338	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe	0.378	3.78	3.78	3.78	0.00	0.00	0.00	0.00	3.78	3.78	0.00	0.00	0.00
Bulldozer	1.175	11.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	0.026	0.00	0.26	0.26	0.00	0.00	0.00	0.00	0.26	0.26	0.00	0.00	0.00
Crane	0.474	0.00	0.00	4.74	9.47	9.47	9.47	4.74	4.74	0.00	0.00	0.00	0.00
Front-End Loader	0.378	3.78	3.78	3.78	0.00	0.00	0.00	3.78	3.78	3.78	3.78	0.00	0.00
Motor Grader	0.605	6.05	6.05	0.00	0.00	0.00	0.00	0.00	6.05	6.05	0.00	0.00	0.00
Paver	0.536	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.36	5.36	0.00	0.00	0.00
Pile Driver	0.516	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trencher	0.468	4.68	4.68	4.68	0.00	0.00	0.00	4.68	4.68	0.00	0.00	0.00	0.00
Total		30.04	18.56	17.24	9.47	9.47	9.47	13.19	28.65	19.24	3.78	0.00	0.00

	Emission Rate (lb/hr)	**2013**											
NOX	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	0.195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe	0.446	4.46	4.46	4.46	0.00	0.00	0.00	0.00	4.46	4.46	0.00	0.00	0.00
Bulldozer	1.810	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	0.195	0.00	1.95	1.95	0.00	0.00	0.00	0.00	1.95	1.95	0.00	0.00	0.00
Crane	1.089	0.00	0.00	10.89	21.79	21.79	21.79	10.89	10.89	0.00	0.00	0.00	0.00
Front-End Loader	0.446	4.46	4.46	4.46	0.00	0.00	0.00	4.46	4.46	4.46	4.46	0.00	0.00
Motor Grader	1.098	10.98	10.98	0.00	0.00	0.00	0.00	0.00	10.98	10.98	0.00	0.00	0.00
Paver	0.643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.43	6.43	0.00	0.00	0.00
Pile Driver	0.879	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trencher	0.516	5.16	5.16	5.16	0.00	0.00	0.00	5.16	5.16	0.00	0.00	0.00	0.00
Total		43.16	27.01	26.92	21.79	21.79	21.79	20.51	44.33	28.28	4.46	0.00	0.00

Valero Wilmington Refinery
New Cogen Project
Construction Equipment Emissions

	Emission Rate (lb/hr)	2013											
SOx	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	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
Backhoe	0.001	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Bulldozer	0.002	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	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
Crane	0.001	0.00	0.00	0.01	0.03	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00
Front-End Loader	0.001	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00
Motor Grader	0.002	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00
Paver	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Pile Driver	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
Trencher	0.001	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Total		0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.07	0.05	0.01	0.00	0.00

	Emission Rate (lb/hr)	2013											
PM10	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	0.018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe	0.031	0.31	0.31	0.31	0.00	0.00	0.00	0.00	0.31	0.31	0.00	0.00	0.00
Bulldozer	0.093	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	0.018	0.00	0.18	0.18	0.00	0.00	0.00	0.00	0.18	0.18	0.00	0.00	0.00
Crane	0.052	0.00	0.00	0.52	1.04	1.04	1.04	0.52	0.52	0.00	0.00	0.00	0.00
Front-End Loader	0.031	0.31	0.31	0.31	0.00	0.00	0.00	0.31	0.31	0.31	0.31	0.00	0.00
Motor Grader	0.049	0.49	0.49	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.00	0.00	0.00
Paver	0.035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.00	0.00	0.00
Pile Driver	0.043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trencher	0.035	0.35	0.35	0.35	0.00	0.00	0.00	0.35	0.35	0.00	0.00	0.00	0.00
Total		2.38	1.63	1.66	1.04	1.04	1.04	1.18	2.50	1.63	0.31	0.00	0.00

	Emission Rate (lb/hr)	2013											
CO2EQ	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Air Compressor	20.712	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe	42.541	425.41	425.41	425.41	0.00	0.00	0.00	0.00	425.41	425.41	0.00	0.00	0.00
Bulldozer	116.057	1160.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	20.712	0.00	207.12	207.12	0.00	0.00	0.00	0.00	207.12	207.12	0.00	0.00	0.00
Crane	78.000	0.00	0.00	780.00	1560.00	1560.00	1560.00	780.00	780.00	0.00	0.00	0.00	0.00
Front-End Loader	42.541	425.41	425.41	425.41	0.00	0.00	0.00	425.41	425.41	425.41	425.41	0.00	0.00
Motor Grader	90.673	906.73	906.73	0.00	0.00	0.00	0.00	0.00	906.73	906.73	0.00	0.00	0.00
Paver	63.114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	631.14	631.14	0.00	0.00	0.00
Pile Driver	84.344	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trencher	48.032	480.32	480.32	480.32	0.00	0.00	0.00	480.32	480.32	0.00	0.00	0.00	0.00
Total		3398.44	2444.99	2318.26	1560.00	1560.00	1560.00	1685.73	3856.13	2595.81	425.41	0.00	0.00

Valero Wilmington Refinery
New Cogen Project
Offsite Construction Vehicle Trip Emissions

		2013											
Vehicle	**Miles per Day**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Commuters	29.4	25	25	43	18	18	44	44	42	42	18	18	0
Pickup Trucks	16												
Total Light Vehicle Miles		735	735	1264.2	529.2	529.2	1293.6	1293.6	1234.8	1234.8	529.2	529.2	0
Flatbed Truck	16												
Stakebed Truck	16												
Boom Truck	16												
Buses	16												
Delivery Truck	20	1	1	1	1	1	1	1	1	1	1	1	0
Dump Truck	8	2	2										
Water Truck	16												
Total Medium Truck Miles		36	36	20	20	20	20	20	20	20	20	20	0
Semi Tractor	20	1	1	1	1	1	1	1	1	1	1	1	0
Concrete Truck	20	1	1	1	1	1	1	1	1	1	1	1	0
Total Heavy Truck Miles		40	40	40	40	40	40	40	40	40	40	40	0

	Emission Rate (lb/mi)[1]	**2013 Emissions (lb/day)**											
VOC	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0007048	0.52	0.52	0.89	0.37	0.37	0.91	0.91	0.87	0.87	0.37	0.37	0.00
Medium Duty	0.0011406	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Heavy Duty	0.0010927	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00
Total		0.60	0.60	0.96	0.44	0.44	0.98	0.98	0.94	0.94	0.44	0.44	0.00
CO	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0065732	4.83	4.83	8.31	3.48	3.48	8.50	8.50	8.12	8.12	3.48	3.48	0.00
Medium Duty	0.0090458	0.33	0.33	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.00
Heavy Duty	0.0052059	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.00
Total		5.37	5.37	8.70	3.87	3.87	8.89	8.89	8.51	8.51	3.87	3.87	0.00
NOx	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0006348	0.47	0.47	0.80	0.34	0.34	0.82	0.82	0.78	0.78	0.34	0.34	0.00
Medium Duty	0.0111055	0.40	0.40	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.00
Heavy Duty	0.0217857	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.00
Total		1.74	1.74	1.90	1.43	1.43	1.91	1.91	1.88	1.88	1.43	1.43	0.00
SOx	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0000101	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Medium Duty	0.0000227	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	0.0000384	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		0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00
PM10	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty Exhaust	0.0001067	0.08	0.08	0.13	0.06	0.06	0.14	0.14	0.13	0.13	0.06	0.06	0.00
Medium Duty Exhaust	0.0004298	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Heavy Duty Exhaust	0.0008211	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00
Total Exhaust PM		0.13	0.13	0.18	0.10	0.10	0.18	0.18	0.17	0.17	0.10	0.10	0.00
Light Duty Fugitive[2]	0.00041529	0.31	0.31	0.53	0.22	0.22	0.54	0.54	0.51	0.51	0.22	0.22	0.00
Medium Duty Fugitve[2]	0.00087799	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Heavy Duty Fugitive[2]	0.00361070	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00
Total Fugitive PM		0.48	0.48	0.69	0.38	0.38	0.70	0.70	0.67	0.67	0.38	0.38	0.00
Total		0.61	0.61	0.86	0.48	0.48	0.88	0.88	0.85	0.85	0.48	0.48	0.00
CO_{2EQ}	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	1.009	741.49	741.49	1275.37	533.88	533.88	1305.03	1305.03	1245.71	1245.71	533.88	533.88	0.00
Medium Duty	2.486	89.49	89.49	49.72	49.72	49.72	49.72	49.72	49.72	49.72	49.72	49.72	0.00
Heavy Duty	4.311	172.43	172.43	172.43	172.43	172.43	172.43	172.43	172.43	172.43	172.43	172.43	0.00
Total		1003.41	1003.41	1497.51	756.02	756.02	1527.17	1527.17	1467.85	1467.85	756.02	756.02	0.00

(1) Based on EMFAC2011 on-road emission rates.

(2) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, January 2011

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

Where: k = 0.0022 lb/VMT for PM10, sL = road silt loading (gms/m2)

(0.6 for <500 average daily trips and 0.06 for 5000-10000 average daily trips), W = weight of vehicles (2.4 tons for light; 5 for medium trucks,

(3) Carbon Dioxide Equivalence (CO_2) = CO_2 + CH_4 * 21 + N2O*310

where light vehicle CH4 = TOG *0.0408 per CARB guidance for EMFAC2011model (http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

where N2O = NOx * 0.0416 per CARB guidance for EMFAC2011model

Chemical	CO2	CH4	N2O	CO2e
Passenger	1.000	3.15E-05	2.64E-05	1.009
Delivery	2.341	5.12E-05	4.62E-04	2.486
Heavy Duty	4.029	5.08E-05	9.06E-04	4.311

Valero Wilmington Refinery
New Cogen Project
Onsite Construction Vehicle Trip Emissions

		2013											
Vehicle	**Miles per Day**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Commuters	40												
Pickup Trucks	1	3	4	4	5	6	6	7	7	7	6	6	
Total Light Vehicle Miles		3	4	4	5	6	6	7	7	7	6	6	0
Flatbed Truck	5	3	3	3	3	3	4	4	1	1			
Stakebed Truck	5												
Boom Truck	5												
Buses	5												
Delivery Truck	5	1	1	1	1	1	1	1	1	1	1	1	1
Dump Truck	5	2	2						2	2			
Water Truck	5	1	1	1	0	0	0	0	1	1	0	0	0
Total Medium Truck Miles		35	35	25	20	20	25	25	25	25	5	5	5
Semi Tractor	1	1	1	1	1	1	1	1	1	1	1	1	
Concrete Truck	1	1	1	1	1	1	1	1	1	1	1	1	
Total Heavy Truck Miles		2	2	2	2	2	2	2	2	2	2	2	0

	Emission Rate (lb/mi)[1]	**2013 Emissions (lb/day)**											
VOC	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0007048	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	0.0011406	0.04	0.04	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.01	0.01	0.01
Heavy Duty	0.0010927	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	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.01	0.01	0.01
CO	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0065732	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.00
Medium Duty	0.0090458	0.32	0.32	0.23	0.18	0.18	0.23	0.23	0.23	0.23	0.05	0.05	0.05
Heavy Duty	0.0052059	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total		0.35	0.35	0.26	0.22	0.23	0.28	0.28	0.28	0.28	0.10	0.10	0.05
NOx	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0006348	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	0.0111055	0.39	0.39	0.28	0.22	0.22	0.28	0.28	0.28	0.28	0.06	0.06	0.06
Heavy Duty	0.0217857	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00
Total		0.43	0.43	0.32	0.27	0.27	0.33	0.33	0.33	0.33	0.10	0.10	0.06
SOx	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	0.0000101	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	0.0000227	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	0.0000384	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
PM10	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty Exhaust	0.0001067	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 Exhaust	0.0004298	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Heavy Duty Exhaust	0.0008211	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 Exhaust PM		0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Light Duty Fugitive[2]	0.00337564	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Medium Duty Fugitve[2]	0.00713657	0.25	0.25	0.18	0.14	0.14	0.18	0.18	0.18	0.18	0.04	0.04	0.04
Heavy Duty Fugitive[2]	0.02934884	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00
Total Fugitive PM		0.32	0.32	0.25	0.22	0.22	0.26	0.26	0.26	0.26	0.11	0.11	0.04
Total		0.34	0.34	0.26	0.23	0.23	0.27	0.27	0.27	0.27	0.12	0.12	0.04
CO_{2EQ}	**2013**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Light Duty	1.009	3.03	4.04	4.04	5.04	6.05	6.05	7.06	7.06	7.06	6.05	6.05	0.00
Medium Duty	2.486	87.00	87.00	62.14	49.72	49.72	62.14	62.14	62.14	62.14	12.43	12.43	12.43
Heavy Duty	4.311	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	0.00
Total		98.65	99.66	74.80	63.38	64.39	76.82	77.83	77.83	77.83	27.10	27.10	12.43

(1) Based on EMFAC2011 on-road emission rates.

(2) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, January 2011

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

Where: k = 0.0022 lb/VMT for PM10, sL = road silt loading (gms/m2)

(0.6 for <500 average daily trips and 0.06 for 5000-10000 average daily trips), W = weight of vehicles (2.4 tons for light; 5 for medium trucks,

(3) Carbon Dioxide Equivalence (CO_E) = CO_2 + CH_4 * 21 + N2O*310

where light vehicle CH4 = TOG *0.0408 per CARB guidance for EMFAC2011model (http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

where N2O = NOx * 0.0416 per CARB guidance for EMFAC2011model

Chemical	CO2	CH4	N2O	CO2e
Passenger	1.000	3.15E-05	2.64E-05	1.009
Delivery	2.341	5.12E-05	4.62E-04	2.486
Heavy Duty	4.029	5.08E-05	9.06E-04	4.311

Valero Wilmington Refinery
New Cogen Project
Offroad Construction Vehicle Dust Emissions

Vehicle	Miles/Trip	Trips/Day
Mechanics Trucks	0.05	1
Total Light Vehicle Miles		0.05
Delivey Trucks	0.05	1
Total Medium Truck Miles		0.05
Dump Trucks	0.05	2
Flatbed Trucks	0.05	3
Water Trucks	0.05	3
Total Heavy Truck Miles		0.4
Backhoe	1	1
Loader	1	1
Trencher	1	1
Dozer	1	1
Grader	1	1
Total Heavy-Heavy Duty Miles		5

PM10	Emission Rate (lb/mi)[1]	Emissions (lb/day)
Light Duty	1.0131497	0.05
Medium Duty	1.4446539	0.07
Heavy Duty	2.2690375	0.91
Heavy Heavy Duty	2.4630500	12.32
Uncontrolled Total		13.35
Controlled Total[2]		5.20

(1) 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 average construction sites.
W = Vehicle Weight (ton) =2.5 for light, 5.5 for medium, 15 for heavy, and 18 for heavy heavy (EMFAC2007).

(2) Controlled Emissions assume that watering 3 times per day reduces emissions by 61 percent (Uncontrolled Emissions x 0.39)

Valero Wilmington Refinery
New Cogen Project
Paint Emissions

Activity	2013											
	1	2	3	4	5	6	7	8	9	10	11	12
Volume paint applied per day (gal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	0.0	0.0
VOC content (lb/gal)[(1)]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
VOC Emissions (lb/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.7	1.7	0.0	0.0

(1) Based on SCAQMD Rule 1113 VOC limit of 100g/L.

Valero Wilmington Refinery
New Cogen Project
Peak Monthly Fugitive PM Construction Emissions

Grading Operations	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor[5]	Controlled Emissions: Average PM10 Emissions (lbs/day)	Controlled Emissions: Peak PM10 Emissions (lbs/day)	Uncontrolled Emissions: Average PM10 Emissions (lbs/day)	Uncontrolled Emissions: Peak PM10 Emissions (lbs/day)	SCAQMD Emission Factor Source
Construction Activities[1]	1	1	10	5.837	0.39	22.77	22.77	58.3728858	58.3728858	Table A9-9-F

Stockpiles	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor[5]	Controlled Emissions: Average PM10 Emissions Pounds/day	Controlled Emissions: Peak PM10 Emissions Pounds/day	Uncontrolled Emissions: Average PM10 Emissions Pounds/day	Uncontrolled Emissions: Peak PM10 Emissions Pounds/day	SCAQMD Emission Factor Source
Construction Activities[2]	948	948	0.00087	0.39	0.31992559	0.31992559	0.82032202	0.82032202	Table A9-9-G

Assumptions: 1cubic yard trench spoils = 1 ton

WIND EROSION Disturbed Area and Temporary Stockpiles	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	SCAQMD Emission Factor Source
Construction Activities[3]	20	0.25	0.25	0.120	0.030	0.030	0.000	0.000	Table A9-9-E

Filling and Dumping	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor[5]	Controlled Emissions: Average PM10 Emissions Pounds/day	Controlled Emissions: Peak PM10 Emissions Pounds/day	Uncontrolled Emissions: Average PM10 Emissions Pounds/day	Uncontrolled Emissions: Peak PM10 Emissions Pounds/day	SCAQMD Emission Factor Source
Truck Filling[4]	948.0	948.0	0.02205	0.39	8.152326	8.152326	20.9034	20.9034	Table A9-9
Truck Dumping	948.0	948.0	0.009075	0.39	3.355209	3.355209	8.6031	8.6031	Table A9-9

TOTAL PM10 Pounds/day	Average	Peak
(Controlled Emissions)	34.6228	34.62282
(Uncontrolled Emissions)	88.700	88.700

(1) Emissions (lbs/hr) = [0.75 x ($G^{1.5}$)/($H^{1.4}$) x J
where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden)

(2) Emissions (lbs/ton) = 0.00112 x [($G/5$)$^{1.3}$/($H/2$)$^{1.4}$] x I/J
where G=mean wind speed (4.1 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day; and J=2,000 lbs/ton. Wind speed data acquired from Long Beach 2005-200
SCAQMD meteorological file.

(3) Emissions (lbs/day/acre) = 1.7 x [($G/1.5$)*(365-H)/235] x I/15 x 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 (0.3%) and J= fraction of TSP (0.5). Wind speed data acquired from Long Beach 2005-200
SCAQMD meteorological file.

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

(5) Mitigated Emissions assume that watering 3 times per day controls emissions by 61 percent (Uncontrolled Emissions x 0.39). www.AQMD.gov/CEQA/handbook/mitigation/fugitive/Table XI-A.doc

Valero Wilmington Refinery
New Cogen Project
LST Analysis for Construction Emissions

	On-site Source Emissions (lbs/day)			
Criteria Pollutant	**CO**	**NOx**	**PM10**	**PM2.5**
Peak Construction Emissions	37.58	45.50	43.16	23.80
Screening Value[(1)(2)]	**7,558**	**142**	**158**	**93**
Significant?	**NO**	**NO**	**NO**	**NO**

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

(2) 1 acre site located in SRA No. 4 at 500 meters.

Valero Cogen Project
Operational Scenarios

Baseline Comparison

Baseline Operations

Boilers	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
B9002	25.0	77.85	89.6	41.1	41.1	49.5
B9001	13.0	40.11	17.0	21.2	21.2	22.7
B9000	0.0	0.00	0.0	0.0	0.0	0.0
Total (lb/day)	**38.0**	**118.0**	**106.5**	**62.2**	62.2	**72.1**

Based on 98th percentile emissions for combined boiler duty during 2011.

Minimum Firing on B9002 - Operational Emissions

Peak Daily Boiler Operations

Boilers	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmscf)	CO (lb/mmscf)	NOx (lb/mmbtu)	PM10 (lb/mmscf)	PM2.5 (lb/mmscf)	SOx (lbs/mmscf)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
B9002	76.8	24	5.5	43	0.009	7.6	7.6	16.9	8.9	69.29	15.9	12.3	12.3	27.3
B9001	48.5	24	5.5	84	0.01	7.6	7.6	16.9	5.6	85.50	11.6	7.7	7.7	17.2
B9000	0.0	24	5.5	84	0.01	14.3	14.3	16.9	0.0	0.00	0.0	0.0	0.0	0.0

Peak Daily Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmbtu)	CO (lb/mmbtu)	NOx (lb/mmbtu)	PM10 (lb/mmbtu)	PM2.5 (lb/mmbtu)	SOx (lbs/mmbtu)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	22.50	0.00391	0.00912	0.00936	0.007	0.007	0.00258	30.03	70.08	71.96	56.25	56.25	19.80
HRSG	164.5	22.50	0.00391	0.00912	0.00936	0.019	0.000	0.00591	14.46	33.75	34.65	72.00	0.34	21.89

Peak Daily Startup/Shutdown (Uncontrolled) Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/hr)	CO (lb/hr)	NOx (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	SOx (lbs/hr)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	1.50	0.9	18.8	30.9	2.500	2.500	0.87996	1.35	28.20	46.35	3.75	3.75	1.32
HRSG	164.5	1.50	1.6	13.2	16.5	3.200	0.800	0.97267	2.40	19.80	24.75	4.80	1.20	1.46

Boiler Subtotal (lb/day)									14.5	154.8	27.6	20.0	20.0	44.5
Cogen Subtotal (lb/day)									48.2	151.8	177.7	136.8	61.5	44.5
Proposed Scenario Total (lb/day)									**62.7**	**306.6**	**205.3**	**156.8**	**81.5**	**88.9**
Revised Baseline Emissions (lb/day)									**-38.0**	**-118.0**	**-106.5**	**-62.2**	**-62.2**	**-72.1**
Net Emission vs Baseline (lb/day)									**24.8**	**188.7**	**98.8**	**94.6**	**19.3**	**16.8**

General Assumptions

RFG Heat Content (HHV)	1143.6	BTU/scf
NG Heat Content (HHV)	1050	BTU/scf
Molar Volume of Fuel	379	scf/mol
RFG/ Lb Steam	1.12	scf/lb steam
Sulfur Content of RFG	100	ppm (permit limit)
Sulfur Content of NG	16	ppm (AQMD Rule 431.1)

Boiler 9000 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9001 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9002 Assumptions
Minimum firing based on 60 kpph steam.
VOC and PM emissions based on AER default EF for boilers.
CO (50 ppm) and NOx (7ppm)EFs based on Title V permit limits.

Cogen Assumptions
VOC, CO, and NOx EF based on 3, 4, and 2.5 ppm, respectively. Sulfur content of RFG to HRSG is 40 ppm.
PM10 EF based on AER default EFs.
Includes 20 hours of startup/shutdown events per year with uncontrolled emissions of 2.5 lb/hr for VOC, 32 lbs/hr for CO, and 47.4 lbs/hr for NOx.
Shutdown/startup events are expected to only have 15 minutes of uncontrolled emissions, however, worst case assumes 1.5 hours of uncontrolled emissions.

Zero Firing on B9002 - Operational Emissions

Peak Daily Boiler Operations

Boilers	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmscf)	CO (lb/mmscf)	NOx (lb/mmbtu)	PM10 (lb/mmscf)	PM2.5 (lb/mmscf)	SOx (lbs/mmscf)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
B9002	0.0	24	5.5	43	0.009	7.6	7.6	16.9	0.0	0.00	0.0	0.0	0.0	0.0
B9001	95.3	24	5.5	84	0.01	7.6	7.6	16.9	11.0	168.00	22.9	15.2	15.2	33.8
B9000	0.0	24	5.5	84	0.01	14.3	14.3	16.9	0.0	0.00	0.0	0.0	0.0	0.0

Peak Daily Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmbtu)	CO (lb/mmbtu)	NOx (lb/mmbtu)	PM10 (lb/mmbtu)	PM2.5 (lb/mmbtu)	SOx (lbs/mmbtu)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	22.50	0.00391	0.00912	0.00936	0.007	0.007	0.00258	30.03	70.08	71.96	56.25	56.25	19.80
HRSG	164.5	22.50	0.00391	0.00912	0.00936	0.019	0.000	0.00591	14.46	33.75	34.65	72.00	0.34	21.89

Peak Daily Startup/Shutdown (Uncontrolled) Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/hr)	CO (lb/hr)	NOx (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	SOx (lbs/hr)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	1.50	0.9	18.8	30.9	2.500	2.500	0.87996	1.35	28.20	46.35	3.75	3.75	1.32
HRSG	164.5	1.50	1.6	13.2	16.5	3.200	0.800	0.97267	2.40	19.80	24.75	4.80	1.20	1.46

Boiler Subtotal (lb/day)									11.0	168.0	22.9	15.2	15.2	33.8
Cogen Subtotal (lb/day)									48.2	151.8	177.7	136.8	61.5	44.5
Proposed Scenario Total (lb/day)									**59.2**	**319.8**	**200.6**	**152.0**	**76.7**	**78.3**
Revised Baseline Emissions (lb/day)									**-38.0**	**-118.0**	**-106.5**	**-62.2**	**-62.2**	**-72.1**
Net Emission vs Baseline (lb/day)									**21.3**	**201.9**	**94.1**	**89.8**	**14.5**	**6.2**

General Assumptions

RFG Heat Content (HHV)	1143.6	BTU/scf
NG Heat Content (HHV)	1050	BTU/scf
Molar Volume of Fuel	379	scf/mol
RFG/ Lb Steam	1.12	scf/lb steam
Sulfur Content of RFG	100	ppm (permit limit)
Sulfur Content of NG	16	ppm (AQMD Rule 431.1)

Boiler 9000 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9001 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9002 Assumptions
VOC and PM emissions based on AER default EF for boilers.
CO (50 ppm) and NOx (7ppm)EFs based on Title V permit limits.

Cogen Assumptions
VOC, CO, and NOx EF based on 3, 4, and 2.5 ppm, respectively. Sulfur content of RFG to HRSG is 40 ppm.
PM10 EF based on AER default EFs.
Includes 20 hours of startup/shutdown events per year with uncontrolled emissions of 2.5 lb/hr for VOC, 32 lbs/hr for CO, and 47.4 lbs/hr for NOx.
Shutdown/startup events are expected to only have 15 minutes of uncontrolled emissions, however, worst case assumes 1.5 hours of uncontrolled emissions.

Minimum Firing on B9001 - Operational Emissions

Peak Daily Boiler Operations

Boilers	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmscf)	CO (lb/mmscf)	NOx (lb/mmbtu)	PM10 (lb/mmscf)	PM2.5 (lb/mmscf)	SOx (lbs/mmscf)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
B9002	88.5	24	5.5	43	0.009	7.6	7.6	16.9	10.2	79.79	18.4	14.1	14.1	31.4
B9001	38.4	24	5.5	84	0.01	7.6	7.6	16.9	4.4	67.74	9.2	6.1	6.1	13.6
B9000	0.0	24	5.5	84	0.01	14.3	14.3	16.9	0.0	0.00	0.0	0.0	0.0	0.0

Peak Daily Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmbtu)	CO (lb/mmbtu)	NOx (lb/mmbtu)	PM10 (lb/mmbtu)	PM2.5 (lb/mmbtu)	SOx (lbs/mmbtu)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	22.50	0.00391	0.00912	0.00936	0.007	0.007	0.00258	30.03	70.08	71.96	56.25	56.25	19.80
HRSG	164.5	22.50	0.00391	0.00912	0.00936	0.019	0.000	0.00591	14.46	33.75	34.65	72.00	0.34	21.89

Peak Daily Startup/Shutdown (Uncontrolled) Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/hr)	CO (lb/hr)	NOx (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	SOx (lbs/hr)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	1.50	0.9	18.8	30.9	2.500	2.500	0.87996	1.35	28.20	46.35	3.75	3.75	1.32
HRSG	164.5	1.50	1.6	13.2	16.5	3.200	0.800	0.97267	2.40	19.80	24.75	4.80	1.20	1.46

Boiler Subtotal (lb/day)									14.7	147.5	27.6	20.2	20.2	45.0
Cogen Subtotal (lb/day)									48.2	151.8	177.7	136.8	61.5	44.5
Proposed Scenario Total (lb/day)									**62.9**	**299.4**	**205.3**	**157.0**	**81.8**	**89.5**
Revised Baseline Emissions (lb/day)									**-38.0**	**-118.0**	**-106.5**	**-62.2**	**-62.2**	**-72.1**
Net Emission vs Baseline (lb/day)									**24.9**	**181.4**	**98.8**	**94.8**	**19.6**	**17.4**

General Assumptions

RFG Heat Content (HHV)	1143.6	BTU/scf
NG Heat Content (HHV)	1050	BTU/scf
Molar Volume of Fuel	379	scf/mol
RFG/ Lb Steam	1.12	scf/lb steam
Sulfur Content of RFG	100	ppm (permit limit)
Sulfur Content of NG	16	ppm (AQMD Rule 431.1)

Boiler 9000 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9001 Assumptions
Minimum firing based on 30 kpph steam.
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9002 Assumptions
VOC and PM emissions based on AER default EF for boilers.
CO (50 ppm) and NOx (7ppm)EFs based on Title V permit limits.

Cogen Assumptions
VOC, CO, and NOx EF based on 3, 4, and 2.5 ppm, respectively. Sulfur content of RFG to HRSG is 40 ppm.
PM10 EF based on AER default EFs.
Includes 20 hours of startup/shutdown events per year with uncontrolled emissions of 2.5 lb/hr for VOC, 32 lbs/hr for CO, and 47.4 lbs/hr for NOx.
Shutdown/startup events are expected to only have 15 minutes of uncontrolled emissions, however, worst case assumes 1.5 hours of uncontrolled emissions.

Zero Firing on B9001 - Operational Emissions

Peak Daily Boiler Operations

Boilers	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmscf)	CO (lb/mmscf)	NOx (lb/mmbtu)	PM10 (lb/mmscf)	PM2.5 (lb/mmscf)	SOx (lbs/mmscf)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
B9002	133.0	24	5.5	43	0.009	7.6	7.6	16.9	15.4	119.91	27.6	21.2	21.2	47.2
B9001	0.0	24	5.5	84	0.01	7.6	7.6	16.9	0.0	0.00	0.0	0.0	0.0	0.0
B9000	0.0	24	5.5	84	0.01	14.3	14.3	16.9	0.0	0.00	0.0	0.0	0.0	0.0

Peak Daily Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/mmbtu)	CO (lb/mmbtu)	NOx (lb/mmbtu)	PM10 (lb/mmbtu)	PM2.5 (lb/mmbtu)	SOx (lbs/mmbtu)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	22.50	0.00391	0.00912	0.00936	0.007	0.007	0.00258	30.03	70.08	71.96	56.25	56.25	19.80
HRSG	164.5	22.50	0.00391	0.00912	0.00936	0.019	0.000	0.00591	14.46	33.75	34.65	72.00	0.34	21.89

Peak Daily Startup/Shutdown (Uncontrolled) Cogen Operations

Cogen	Duty (mmbtu/hr)	Hour/day	VOC (lb/hr)	CO (lb/hr)	NOx (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	SOx (lbs/hr)	VOC (lb/day)	CO (lb/day)	NOx (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	SOx (lb/day)
Turbine	341.6	1.50	0.9	18.8	30.9	2.500	2.500	0.87996	1.35	28.20	46.35	3.75	3.75	1.32
HRSG	164.5	1.50	1.6	13.2	16.5	3.200	0.800	0.97267	2.40	19.80	24.75	4.80	1.20	1.46

Boiler Subtotal (lb/day)									15.4	119.9	27.6	21.2	21.2	47.2
Cogen Subtotal (lb/day)									48.2	151.8	177.7	136.8	61.5	44.5
Proposed Scenario Total (lb/day)									**63.6**	**271.7**	**205.3**	**158.0**	**82.8**	**91.6**
Revised Baseline Emissions (lb/day)									**-38.0**	**-118.0**	**-106.5**	**-62.2**	**-62.2**	**-72.1**
Net Emission vs Baseline (lb/day)									**25.6**	**153.8**	**98.8**	**95.8**	**20.6**	**19.5**

General Assumptions

RFG Heat Content (HHV)	1143.6	BTU/scf
NG Heat Content (HHV)	1050	BTU/scf
Molar Volume of Fuel	379	scf/mol
RFG/ Lb Steam	1.12	scf/lb steam
Sulfur Content of RFG	100	ppm (permit limit)
Sulfur Content of NG	16	ppm (AQMD Rule 431.1)

Boiler 9000 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9001 Assumptions
VOC, CO, and PM emissions based on AER default EFs for boilers.
NOx EF based on Title V permit limits.

Boiler 9002 Assumptions
VOC and PM emissions based on AER default EF for boilers.
CO (50 ppm) and NOx (7ppm)EFs based on Title V permit limits.

Cogen Assumptions
VOC, CO, and NOx EF based on 3, 4, and 2.5 ppm, respectively. Sulfur content of RFG to HRSG is 40 ppm.
PM10 EF based on AER default EFs.
Includes 20 hours of startup/shutdown events per year with uncontrolled emissions of 2.5 lb/hr for VOC, 32 lbs/hr for CO, and 47.4 lbs/hr for NOx.
Shutdown/startup events are expected to only have 15 minutes of uncontrolled emissions, however, worst case assumes 1.5 hours of uncontrolled emissions.

Valero Cogen Project
Operational Scenarios

Baseline to Proposed Project

	Net Emissions vs Baseline					
	VOC	CO	NOx	PM10	PM2.5	SOx
Scenario	**(lb/day)**	**(lb/day)**	**(lb/day)**	**(lb/day)**	**(lb/day)**	**(lb/day)**
Min. Fire B9002	24.8	188.7	98.8	94.6	19.3	16.8
Zero Fire B9002	21.3	**201.9**	94.1	89.8	14.5	6.2
Min. Fire B9001	24.9	181.4	98.8	94.8	19.6	17.4
Zero Fire B9001	**25.6**	153.8	**98.8**	**95.8**	**20.6**	**19.5**

Negative numbers indicate emissions benefit.

Based on 1.5-hour of cogen startup (uncontrolled) emissions per day.

Appendix B

Valero Cogen Project
GHG Analysis

Baseline Operations

Currently Permitted Operations

Boilers	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
B9002	245	8760	7.1286E-05	9.1535E-10	1.0171E-10	133782.9	1.7	0.2	133878.157
B9001	127.8	8760	7.1286E-05	9.1535E-10	1.0171E-10	69785.5	0.9	0.1	69835.2181
B9000	39	8760	7.1286E-05	9.1535E-10	1.0171E-10	21296.1	0.3	0.0	21311.2168
	MW	**Hours**	**CO2 (lb/mwh)**	**CH4 (lb/mwh)**	**N2O (lb/mwh)**	**CO2 (tonnes/yr)**	**CH4 (tonnes/yr)**	**N2O (tonnes/yr)**	**CO2eq (tonnes/yr)**
3rd Party Power	31	8760	1227.89	0.03	0.01	151217.7	3.6	1.2	151674.447
Total						**354786.1**	**6.2**	**1.5**	**376699.0**

Actual 2009 Emissions

Source	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
Boilers						109558.6	1.6647	0.1849	109650.878
	MW	**Hours**	**CO2 (lb/mwh)**	**CH4 (lb/mwh)**	**N2O (lb/mwh)**	**CO2 (tonnes/yr)**	**CH4 (tonnes/yr)**	**N2O (tonnes/yr)**	**CO2eq (tonnes/yr)**
3rd Party Power	38.96	8760	1227.89	0.03	0.01	190046.5	4.5	1.5	190620.53
Total									**300271.4**

Actual 2010 Emissions

Source	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
Boilers						141866.3	1.824	0.2027	141967.441
	MW	**Hours**	**CO2 (lb/mwh)**	**CH4 (lb/mwh)**	**N2O (lb/mwh)**	**CO2 (tonnes/yr)**	**CH4 (tonnes/yr)**	**N2O (tonnes/yr)**	**CO2eq (tonnes/yr)**
3rd Party Power	27.58	8760	1227.89	0.03	0.01	134535.0	3.2	1.1	134941.33
Total									**276908.8**

Average 2009-2010 Emissions

Source	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
Boilers									125809.159
	MW	**Hours**	**CO2 (lb/mwh)**	**CH4 (lb/mwh)**	**N2O (lb/mwh)**	**CO2 (tonnes/yr)**	**CH4 (tonnes/yr)**	**N2O (tonnes/yr)**	**CO2eq (tonnes/yr)**
3rd Party Power	33.27	8760	1227.89	0.03	0.01	162290.7	3.8	1.3	162780.93
Total									**288590.1**

Assumptions

RFG Heat Content	1143.6	BTU/cf	HHV
NG Heat Content	1050	BTU/cf	HHV
RFG/ Lb Steam	1.12	cf/lb steam	
Molar Volume	379	scf/mol	

RFG GHG EFs from 2010 GHG report.
NG GHG EFs from Regulation for the Manditory Reporting of GHG Emissions.
3rd Power GHG EFs from Local Government Operations Protocol (May 2010).
Actual Boiler GHG from AB32 Reporting Files from Valero.

Appendix B
Valero Cogen Project
GHG Analysis

Peak Proposed Operations

Proposed Cogen Operation

Cogen	Duty (mmbtu/hr)	Hours per Year	CO2 (kg/mmbtu)	CH4 (g/mmbtu)	N2O (g/mmbtu)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
Turbine	341.6	8760	53.0	1.0	0.1	158657.9	3.0	0.0	158735.1
HRSG	164.5	8760	62.3	1.0	0.1	89825.7	1.4	0.1	89872.9
Total						248483.6	4.4	0.1	**248608.0**

Min. Fire B9002

Boilers	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
B9002	76.8	8760	7.12861E-05	9.15353E-10	1.01706E-10	41936.8	0.5	0.1	41966.7
B9001	48.5	8760	7.12861E-05	9.15353E-10	1.01706E-10	26483.6	0.3	0.0	26502.4
Total									68469.1

Zero Fire B9002

Boilers	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
B9002	0	8760	7.12861E-05	9.15353E-10	1.01706E-10	0.0	0.0	0.0	0.0
B9001	95.3	8760	7.12861E-05	9.15353E-10	1.01706E-10	52038.8	0.7	0.1	52075.9
Total									52075.9

Min. Fire B9001

Boilers	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
B9002	88.5	8760	7.12861E-05	9.15353E-10	1.01706E-10	48325.7	0.6	0.1	48360.1
B9001	38.4	8760	7.12861E-05	9.15353E-10	1.01706E-10	20968.4	0.3	0.0	20983.4
Total									69343.4

Zero Fire B9001

Boilers	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
B9002	133	8760	7.12861E-05	9.15353E-10	1.01706E-10	72625.0	0.9	0.1	72676.7
B9001	0	8760	7.12861E-05	9.15353E-10	1.01706E-10	0.0	0.0	0.0	0.0
Total									**72676.7**

MT/yr	B9002	B9001	Boilers	
Scenario	**(kpph)**	**(kpph)**	**CO2eq**	**Project Total**
Min. Fire B9002	76.8	48.5	68469.1	317077.1079
Zero Fire B9002	0	95.3	52075.9	300683.8642
Min. Fire B9001	88.5	38.4	69343.4	317951.4142
Zero Fire B9001	**133.0**	**0**	**72676.7**	**321284.7071**

Assumptions

RFG Heat Content	1143.6	BTU/cf	HHV
NG Heat Content	1050	BTU/cf	HHV
RFG/ Lb Steam	1.12	cf/lb steam	
Molar Volume	379	scf/mol	

RFG GHG EFs from 2010 GHG report.
NG GHG EFs from Regulation for the Manditory Reporting of GHG Emissions.
3rd Power GHG EFs from Local Government Operations Protocol (May 2010).

Appendix B

Valero Cogen Project
GHG Analysis

GHG Comparison

Proposed Boiler Operations

Boilers	Duty (mmbtu/hr)	Hours per Year	CO2 (tonnes/scf)	CH4 (tonnes/scf)	N2O (tonnes/scf)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
B9002	133.0	8760	7.1286E-05	9.1535E-10	1.0171E-10	72625.0	0.9	0.1	72676.7
B9001	0.0	8760	7.1286E-05	9.1535E-10	1.0171E-10	0.0	0.0	0.0	0.0
Subtotal						**72625.0**	**0.9**	**0.1**	**72676.7**

Proposed Cogen Design

Cogen	Duty (mmbtu/hr)	Hours per Year	CO2 (kg/mmbtu)	CH4 (g/mmbtu)	N2O (g/mmbtu)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
Turbine	341.6	8760	53.02	1.00	0.10	158657.9	3.0	0.0	158735.1
HRSG	164.5	8760	62.33	1.00	0.10	89825.7	1.4	0.1	89872.9
Subtotal						**248483.6**	**4.4**	**0.1**	**248608.0**

Average Additional Power Purchased (2009-2010)[(1)]

	MW	Hours	CO2 (lb/mwh)	CH4 (lb/mwh)	N2O (lb/mwh)	CO2 (tonnes/yr)	CH4 (tonnes/yr)	N2O (tonnes/yr)	CO2eq (tonnes/yr)
3rd Party Power	2.27	8760	1227.89	0.03	0.01	11073.0	0.3	0.1	11106.5

(1) The Refinery actual purchases exceeds the Cogen production capability. Therefore, additional power would still be required and is assumed to be provided by LADWP (not Air Products).

SCENARIOS	CO2eq (tonnes/yr)
Permitted Operations	376699.0
Total Project Operations	332391.2
Delta	-44307.8
Actual 2009 Operations	300271.4
Total Project Operations	332391.2
Delta	32119.8
Actual 2010 Operations	276908.8
Total Project Operations	332391.2
Delta	55482.4
2-Year Average Operations	288590.1
Projected Operations	332391.2
Delta	43801.1

Assumptions

RFG Heat Content (HHV)	1143.6	BTU/cf
NG Heat Content (HHV)	1050	BTU/cf
Molecular Vol	379	scf/mol
RFG/lb steam	1.12	scf/lb steam

RFG GHG EFs from 2010 GHG report.

NG GHG EFs from Regulation for the Manditory Reporting of GHG Emissions.

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Ultramar Inc.
Valero Wilmington Refinery
SCAQMD Rule 1303 and 2005
Updated Ambient Air Quality Analysis
New Cogeneration Unit

August 20, 2012

Prepared for: Ultramar Inc.
Prepared by: Environmental Audit, Inc.
1000 Ortega Way, Suite A
Placentia, CA 92780
714-632-8521

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Ultramar Inc.
Valero Wilmington Refinery
SCAQMD Rule 1303 and 2005 Analysis
New Cogeneration Unit

FACILITY DESCRIPTION

The Ultramar Inc. - Valero Wilmington Refinery (Refinery) is located at 2402 East Anaheim Street in the Wilmington district of the City of Los Angeles in the southern portion of Los Angeles County (see Figure 1). The South Coast Air Quality Management District (SCAQMD) identification number for the facility is 800026.

INTRODUCTION

Valero Wilmington Refinery is proposing to build a nominal 35 MW cogeneration unit (Cogen) which includes a 341.6 mmbtu/hr natural gas-fired turbine electric generator, a heat recovery steam generator (HRSG) with 164.5 mmbtu/hr refinery fuel gas-fired supplemental duct burner, and the associated air pollution control equipment.

Following SCAQMD review, Environmental Audit Inc. (EAI) has incorporated changes to the SCAQMD Rules 1303 and 2005 analysis for the proposed Cogen. The PM10, PM2.5 and SOx values have been updated to be consistent with the values agreed upon for the proposed Cogen. The number of uncontrolled hours has also been changed from 10 to 20 hours per year.

EMISSION ESTIMATES

The emissions estimates associated with Cogen are based on 341.6 mmbtu natural gas fired turbine and a 164.5 mmbtu refinery fuel gas fired HRSG. Best available control technology (BACT) considerations were used in these calculations when creating a worst-case scenario for the evaluation. The Cogen is estimated to operate 8,740 hours, with a maximum 20 hours of cold starts (no control) annually. The calculated emissions are presented in Table 1.

CRITERIA POLLUTANT IMPACT MODELING

In order to determine the groundlevel concentrations, the U.S. EPA AERMOD air dispersion model was used to calculate the annual average and maximum 1-hour, 8-hour, and 24-hour concentrations. The location of the source was identified based on data provided by Valero and the Long Beach USGS Quadrangle (see attached Figures 1 and 2). Unitized emissions rates were used in the AERMOD model. Per SCAQMD guidelines, AERMOD model was run three separate times using three consecutive years of meteorological data (2005-2007). The meteorological data was representative of Long Beach, California. The AERMOD model used all regulatory default settings.

AERMOD includes algorithms to model the effects of building downwash on emissions from nearby or adjacent point sources. The model makes use of direction-specific information for all building downwash cases. Terrain elevations were also taken into account, though the Refinery and the vicinity are in a relatively flat region (see Figure 2).

For most combustion sources, only a fraction of the NOx emission coming from the stack is actually NO_2. NO_2 forms as nitrogen oxide (NO) interacts with the ozone in the atmosphere. The

longer NO is exposed to ozone, the higher the conversion rate to NO_2. As such, NOx to NO_2 conversion becomes a function of distance from the stack and ambient ozone concentration. The most conservative method to account for NO_2 concentration is the EPA Tier 1 analysis outlined in the Guideline on Air Quality Models (40 CFR Part 51, Appendix W), which assumes 100 percent conversion of NOx to NO_2. In order to simplify the model, the most conservative method was used for this analysis.

The AERMOD 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 for a receptor is determined from the applicable averaging periods from the AERMOD model output (see Appendix A). The maximum groundlevel concentration and the Universal Tranverse Mercator (NAD 27) coordinates for each maximum impacted receptor are presented in Table 2. An electronic copy of the model is presented in Appendix B.

CRITERIA POLLUTANT IMPACT ANALYSIS

The Cogen maximum groundlevel concentrations are compared to the significance thresholds established in Rules 1303 and 2005 to demonstrate that the project will not cause a violation of any state or federal ambient air quality standard. The ambient air quality data for South Coastal Los Angeles County (Station No. 072) is used to establish background levels of CO, NO_2, PM10, and PM2.5. Federal NOx and SOx ambient background concentrations are based on the 98^{th} and 99^{th} percentile of the last 3 years of data, respectively. Table 3 identifies the ambient background concentrations of these pollutants at Station No. 072 for the last three published years (2008, 2009, and 2010), as well as federal NO_2 and SOx ambient background concentration data published by SCAQMD.

The CO 1-hour, CO 8-hour, NO_2 1-hour, NO_2 annual average, SOx 1-hour, SOx 24-hour, and SOx annual average concentrations are combined with the ambient background concentrations and compared to the Most Stringent Air Quality Standard. The PM10 and PM2.5 24-hour, and PM10 and PM2.5 annual average concentrations are compared to the Significant Change in Air Quality Concentration thresholds.

State Standards

The maximum CO impact concentrations for 1-hour and 8-hour averages are 3,467.15 and 2,992.52 micrograms per cubic meter ($\mu g/m^3$), respectively. The maximum NO_2 impact concentrations for 1-hour and annual averages are 273.51 and 40.30 $\mu g/m^3$, respectively. The maximum SOx impact concentrations for 1-hour and 24-hour averages are 237.72 and 31.87 $\mu g/m^3$, respectively. The maximum PM10 impact concentrations for 24-hour and annual averages are 0.71 and 0.16 $\mu g/m^3$, respectively. The maximum PM2.5 impact concentrations for 24-hour and annual averages are 0.71 and 0.16 $\mu g/m^3$, respectively. Therefore, the Cogen modification modeling results are below all state criteria pollutant significance thresholds. The results are presented in Table 4.

Federal Standards

The maximum CO impact concentrations for 1-hour and 8-hour averages are 3,467.15 and 2,992.52 micrograms per cubic meter ($\mu g/m^3$), respectively. The maximum NO_2 impact concentrations for 1-hour and annual averages are 175.33 and 40.30 $\mu g/m^3$, respectively. The maximum SOx impact concentrations for 1-hour, 24-hour, and annual averages are 56.31, 31.87, and 5.86 $\mu g/m^3$, respectively. The maximum PM10 impact concentrations for 24-hour and annual averages are 0.71 and 0.16 $\mu g/m^3$, respectively. The maximum PM2.5 impact concentrations for 24-hour and annual averages are 0.71 and 0.16 $\mu g/m^3$, respectively. Therefore, the Cogen modification modeling results are below all state criteria pollutant significance thresholds. The results are presented in Table 5.

CONCLUSIONS

The Rules 1303 and 2005 analysis for the Cogen modification results in no significant changes in air quality and no exceedances of any state or federal air quality standards for CO, NO_2, SOx, PM10, or PM2.5.

MRB:mc

Attachments

M:\MC\2709 Valero - Cogen\AAQ\2709 Cogen AAQ report(Rev2).doc

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FIGURES

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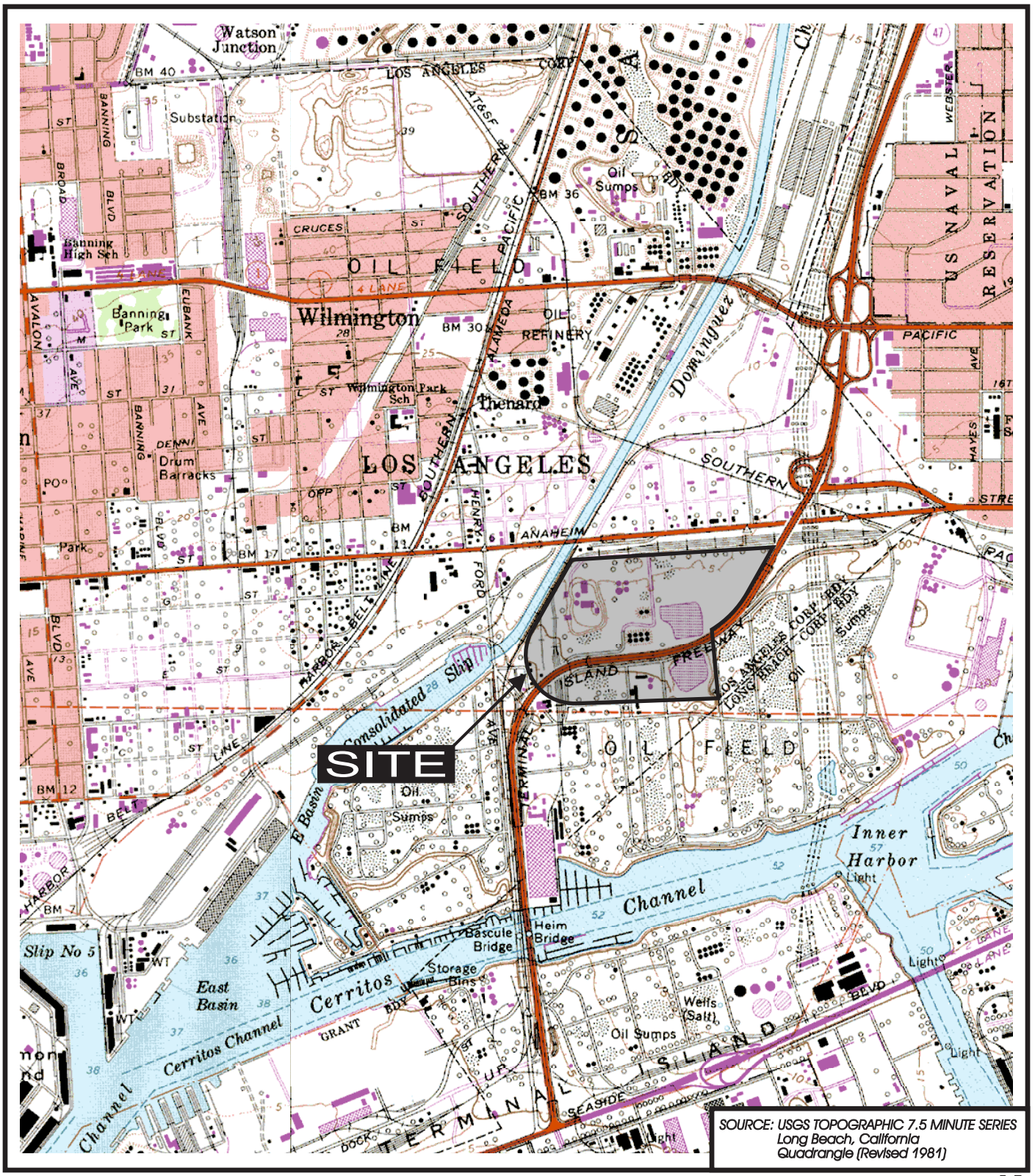


SOURCE: USGS TOPOGRAPHIC 7.5 MINUTE SERIES
Long Beach, California
Quadrangle (Revised 1981)

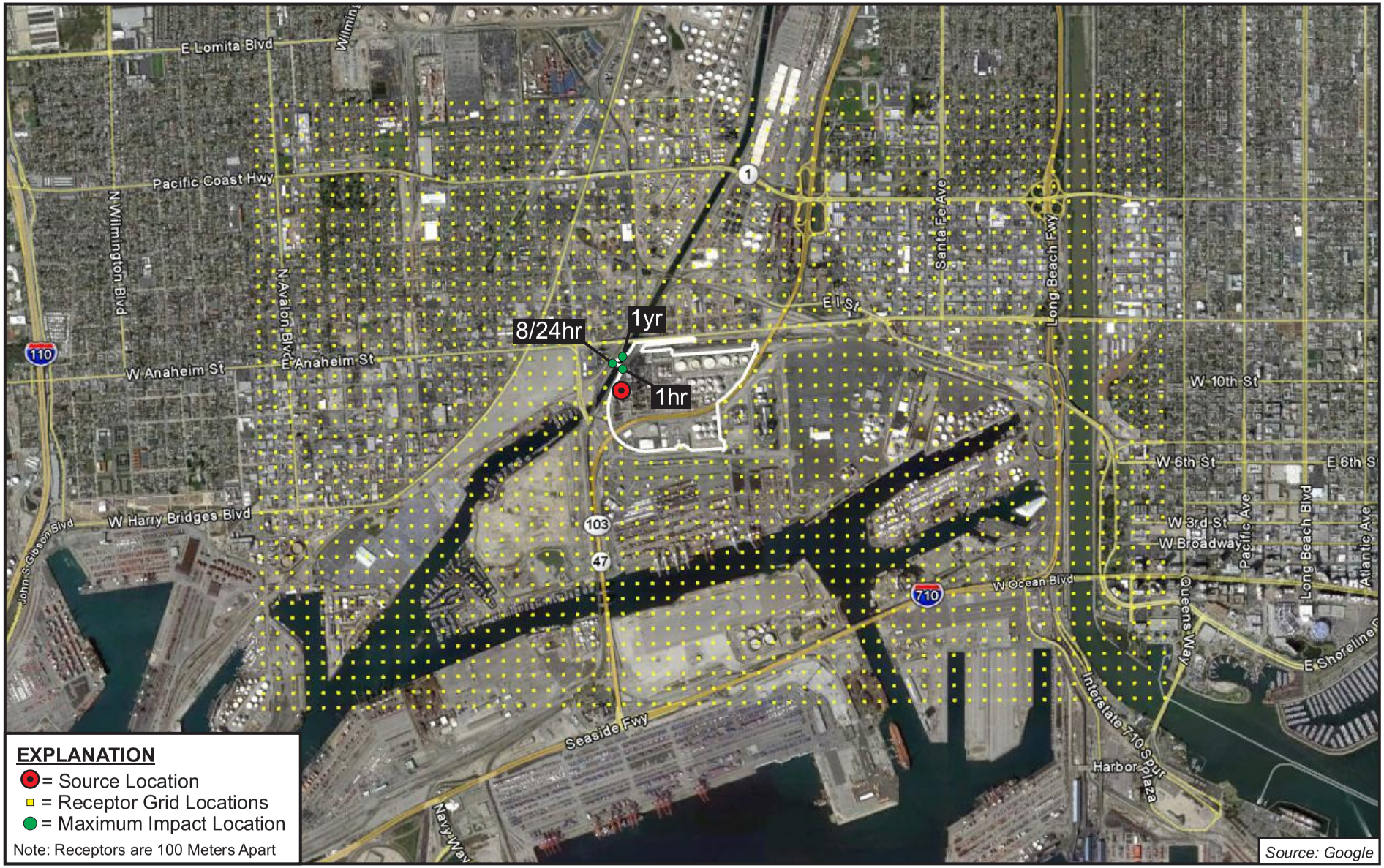
Environmental Audit, Inc.

SITE LOCATION MAP
VALERO WILMINGTON REFINERY

Project No. 2709

Figure 1

N:\2709\SiteLocMap.cdr



ENVIRONMENTAL AUDIT, INC.

SOURCE LOCATION AND RECEPTOR MAP
VALERO WILMINGTON REFINERY
NEW COGEN

Project No. 2709

Figure 2

N:\2709\AAQ (Cogen).cdr

TABLES

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TABLE 1

Valero Wilmington Refinery - Cogen
Source Parameters and Criteria Pollutant Emission Rates

Source	UTME	UTMN	Height (ft)	Temperature (F)	Diameter (ft)	Velocity (ft/s)
Cogen	385407	3738093	95	253	9	61.4

	Startup [1]				Normal Operation [2]			
Time Weight Average Emissions	CO (lb/hr)	NOx (lb/hr)	SOx (lb/hr)	PM10 (lb/hr)	CO (lb/hr)	NOx (lb/hr)	SOx (lb/hr)	PM10 (lb/hr)
Annual average [3]	6.11	7.08	1.85	4.10	4.61	4.74	1.85	4.10
Maximum 1 hour [4]	32.00	47.40	1.85	4.10	4.61	4.74	1.85	4.10
Maximum 8 hour [3][5]	9.75	12.74	1.85	4.10	4.61	4.74	1.85	4.10
Maximum 24 hour [3][6]	6.32	7.41	1.85	4.10	4.61	4.74	1.85	4.10

(1) Based on uncontrolled emissions from the turbine and HRSG.

(2) Based on controlled emissions of 2.5 ppm NO_2 and 4 ppm CO @ 15% O_2.

(3) Based on 341.6 mmbtu/hr natural gas fired turbine and 164.5 mmbtu/hr refinery fuel gas fired HRSG. 20 hours of uncontrolled emissions per year for startup case.

(4) Based on uncontrolled 36 ^{o} F full fired turbine and HRSG.

(5) CO and NOx emissions based on 1.5 hour of startup/shutdown and 6.5 hours of hour normal operation.

(6) CO and NOx emissions based on 1.5 hour of startup/shutdown and 22.5 hours of normal operation.

TABLE 2

Valero Wilmington Refinery - Cogen
Criteria Pollutant Groundlevel
Concentration Calculations

Criteria Pollutant	Averaging Period	Peak Model Year	Unitized GLC ($\mu g/m^3$)	Calculated GLC ($\mu g/m^3$)	UTM Coordinates	
					Easting	Northing
CO	1-hr	2007	0.5921	18.95	385420.31	3738238.4
	8-hr	2005	0.4181	4.08	385350.75	3738263.4
NO_2	1-hr	2007	0.5921	28.07	385420.31	3738238.4
	Annual	2007	0.0385	0.27	385413.75	3738300.1
SO_2	1-hr	2007	0.5921	1.10	385420.31	3738238.4
	24-hr	2006	0.1732	0.32	385350.75	3738263.4
	Annual	2007	0.0385	0.07	385413.75	3738300.1
PM10	24-hr	2006	0.1732	0.71	385350.75	3738263.4
	Annual	2007	0.0385	0.16	385413.75	3738300.1
PM2.5	24-hr	2006	0.1732	0.71	385350.75	3738263.4
	Annual	2007	0.0385	0.16	385413.75	3738300.1

GLC = Groundlevel Concentration

PM2.5 = PM10

TABLE 3

Valero Wilmington Refinery - Cogen
Criteria Pollutant Ambient
Concentration Calculations

Criteria Pollutant	Averaging Period	Concentration (ppm)			Max Conc.		Federal 1-hr Conc.	
		2008	2009	2010	(ppm)	($\mu g/m^3$)	(ppm)	($\mu g/m^3$)
CO	1-hr	3	3	3	3	3448.20		
	8-hr	2.6	2.2	2.1	2.6	2988.44		
NO_2	1-hr	0.13	0.11	0.0928	0.13	245.44	0.08	147.27
	AAM	0.0208	0.0212	0.0198	0.0212	40.03		
SO_2	1-hr	0.09	0.02	0.04	0.09	236.62	0.02	55.21
	24-hr	0.012	0.005	0.006	0.012	31.55		
	AAM	0.0022			0.0022	5.78		
		Concentration ($\mu g/m^3$)						
PM10	24-hr	62	62	44		62.00		
	AAM	29.1	30.5	22		30.50		
PM2.5	24-hr	57.2	63.4	35		63.40		
	AAM	14.2	13	10.5		14.20		

Data from Source No. 4 South Coastal LA County 1 Station number 072

AAM = Annual Arithmetic Mean

TABLE 4

Valero Wilmington Refinery - Cogen
State Significance Threshold Evaluation

Criteria Pollutant	*Averaging Period*	*Ambient Background Conc. ($\mu g/m^3$)*	*Calculated Conc. ($\mu g/m^3$)*	*Total Conc. ($\mu g/m^3$)*	*Most Stringent Air Quality Standard ($\mu g/m^3$)*	*Significant Change in Air Quality Conc. ($\mu g/m^3$)*	*Below Threshold? Yes/No*
CO	*1-hr*	*3448.20*	*18.95*	***3467.15***	***23000***	*1100*	*Yes*
	8-hr	*2988.44*	*4.08*	***2992.52***	***10000***	*500*	*Yes*
NO_2	*1-hr*	*245.44*	*28.07*	***273.51***	***339***	*20*	*Yes*
	AAM	*40.03*	*0.27*	***40.30***	***57***	*1*	*Yes*
SO_2	*1-hr*	*236.62*	*1.10*	***237.72***	***655***	*NA*	*Yes*
	24-hr	*31.55*	*0.32*	***31.87***	***105***	*NA*	*Yes*
PM10	*24-hr*	*62.00*	***0.71***	*62.71*	*50*	***2.5***	*Yes*
	AAM	*30.50*	***0.16***	*30.66*	*20*	***1***	*Yes*
PM2.5	*24-hr*	*63.40*	***0.71***	*64.11*	*35*	***2.5***	*Yes*
	AAM	*14.20*	***0.16***	*14.36*	*12*	***1***	*Yes*

Evaluation Criteria ***Bolded***

TABLE 5

Valero Wilmington Refinery - Cogen
Federal Significance Threshold Evaluation

Criteria Pollutant	*Averaging Period*	*Ambient Background Conc. ($\mu g/m^3$)*	*Calculated Conc. ($\mu g/m^3$)*	*Total Conc. ($\mu g/m^3$)*	*Most Stringent Air Quality Standard ($\mu g/m^3$)*	*Significant Change in Air Quality Conc. ($\mu g/m^3$)*	*Below Threshold? Yes/No*
CO	*1-hr*	*3448.20*	*18.95*	***3467.15***	***40000***	*1100*	*Yes*
	8-hr	*2988.44*	*4.08*	***2992.52***	***10000***	*500*	*Yes*
NO_2	*1-hr*	*147.27*	*28.07*	***175.33***	***188***	*20*	*Yes*
	AAM	*40.03*	*0.27*	***40.30***	***100***	*1*	*Yes*
SO_2	*1-hr*	*55.21*	*1.10*	***56.31***	***655***	*NA*	*Yes*
	24-hr	*31.55*	*0.32*	***31.87***	***105***	*NA*	*Yes*
	AAM	*5.78*	*0.07*	***5.86***	***80***	*NA*	*Yes*
PM10	*24-hr*	*62.00*	***0.71***	*62.71*	*150*	***2.5***	*Yes*
	AAM	*30.50*	***0.16***	*30.66*	*NA*	***1***	*Yes*
PM2.5	*24-hr*	*63.40*	***0.71***	*64.11*	*35*	***2.5***	*Yes*
	AAM	*14.20*	***0.16***	*14.36*	*15*	***1***	*Yes*

Evaluation Criteria ***Bolded***

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APPENDIX A

AERMOD Model Output Summary Tables

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**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 1 YEARS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)				OF TYPE	NETWORK GRID-ID
COGEN	1ST HIGHEST VALUE IS	0.03704	385413.75,	3738300.12,	0.00,	0.00, 0.00)	DC	
	2ND HIGHEST VALUE IS	0.03677	385459.69,	3738329.00,	0.65,	0.65, 0.00)	DC	
	3RD HIGHEST VALUE IS	0.03642	385400.00,	3738300.00,	0.00,	2.13, 0.00)	DC	
	4TH HIGHEST VALUE IS	0.03420	385420.31,	3738238.44,	1.27,	1.27, 0.00)	DC	
	5TH HIGHEST VALUE IS	0.03273	385400.00,	3738400.00,	2.13,	2.13, 0.00)	DC	
	6TH HIGHEST VALUE IS	0.03187	385350.75,	3738263.38,	1.75,	1.75, 0.00)	DC	
	7TH HIGHEST VALUE IS	0.03156	385501.69,	3738397.25,	0.45,	0.45, 0.00)	DC	
	8TH HIGHEST VALUE IS	0.03148	385500.00,	3738400.00,	0.30,	1.52, 0.00)	DC	
	9TH HIGHEST VALUE IS	0.03000	385539.75,	3738336.88,	2.13,	2.13, 0.00)	DC	
	10TH HIGHEST VALUE IS	0.02841	385300.00,	3738300.00,	1.83,	1.83, 0.00)	DC	
ALL	1ST HIGHEST VALUE IS	0.03704	385413.75,	3738300.12,	0.00,	0.00, 0.00)	DC	
	2ND HIGHEST VALUE IS	0.03677	385459.69,	3738329.00,	0.65,	0.65, 0.00)	DC	
	3RD HIGHEST VALUE IS	0.03642	385400.00,	3738300.00,	0.00,	2.13, 0.00)	DC	
	4TH HIGHEST VALUE IS	0.03420	385420.31,	3738238.44,	1.27,	1.27, 0.00)	DC	
	5TH HIGHEST VALUE IS	0.03273	385400.00,	3738400.00,	2.13,	2.13, 0.00)	DC	
	6TH HIGHEST VALUE IS	0.03187	385350.75,	3738263.38,	1.75,	1.75, 0.00)	DC	
	7TH HIGHEST VALUE IS	0.03156	385501.69,	3738397.25,	0.45,	0.45, 0.00)	DC	
	8TH HIGHEST VALUE IS	0.03148	385500.00,	3738400.00,	0.30,	1.52, 0.00)	DC	
	9TH HIGHEST VALUE IS	0.03000	385539.75,	3738336.88,	2.13,	2.13, 0.00)	DC	
	10TH HIGHEST VALUE IS	0.02841	385300.00,	3738300.00,	1.83,	1.83, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN HIGH 1ST HIGH VALUE IS	0.58895	ON 05072311:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL HIGH 1ST HIGH VALUE IS	0.58895	ON 05072311:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
 *** AERMOD - VERSION  11103 ***   *** C:\Documents and Settings\Micheal\My Documents\My Projects\2644Ultr\ ***        09/07/11
                                   *** 2005                                                                ***        13:42:26
                                                                                                                      PAGE 461
 **MODELOPTs:  NonDFAULT CONC                                        FLAT and  ELEV
                                                           NODRYDPLT NOWETDPLT

                                                   *** THE SUMMARY OF HIGHEST  3-HR RESULTS ***

                                    ** CONC OF TOXIC    IN MICROGRAMS/M**3                          **

                                                         DATE                                                                  NETWORK
GROUP ID                         AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

COGEN    HIGH   1ST HIGH VALUE IS       0.56124  ON 05072312: AT (  385350.75,  3738263.38,     1.75,     1.75,    0.00)  DC

ALL      HIGH   1ST HIGH VALUE IS       0.56124  ON 05072312: AT (  385350.75,  3738263.38,     1.75,     1.75,    0.00)  DC

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	HIGH 1ST HIGH VALUE IS	0.41814	ON 05072316:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.41814	ON 05072316:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 12-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	HIGH 1ST HIGH VALUE IS	0.20260	ON 05072312:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.20260	ON 05072312:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	HIGH 1ST HIGH VALUE IS	0.16328	ON 05071924:	AT (385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.16328	ON 05071924:	AT (385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 2 Warning Message(s)
A Total of 48 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 48 Missing Hours Identified (0.55 Percent)

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********
RE W213 86 RECART:ELEV Input Inconsistent With Option: Input Ignored UCART1
ME W396 102 MEOPEN:Met data from outdated version of AERMET, version: 06341

****
*** AERMOD Finishes Successfully ***
****

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 1 YEARS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	1ST HIGHEST VALUE IS	0.03393 AT	(385413.75, 3738300.12, 0.00, 0.00, 0.00)	DC	
	2ND HIGHEST VALUE IS	0.03354 AT	(385459.69, 3738329.00, 0.65, 0.65, 0.00)	DC	
	3RD HIGHEST VALUE IS	0.03341 AT	(385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC	
	4TH HIGHEST VALUE IS	0.03118 AT	(385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC	
	5TH HIGHEST VALUE IS	0.02994 AT	(385400.00, 3738400.00, 2.13, 2.13, 0.00)	DC	
	6TH HIGHEST VALUE IS	0.02964 AT	(385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
	7TH HIGHEST VALUE IS	0.02885 AT	(385501.69, 3738397.25, 0.45, 0.45, 0.00)	DC	
	8TH HIGHEST VALUE IS	0.02877 AT	(385500.00, 3738400.00, 0.30, 1.52, 0.00)	DC	
	9TH HIGHEST VALUE IS	0.02738 AT	(385539.75, 3738336.88, 2.13, 2.13, 0.00)	DC	
	10TH HIGHEST VALUE IS	0.02665 AT	(385300.00, 3738300.00, 1.83, 1.83, 0.00)	DC	
ALL	1ST HIGHEST VALUE IS	0.03393 AT	(385413.75, 3738300.12, 0.00, 0.00, 0.00)	DC	
	2ND HIGHEST VALUE IS	0.03354 AT	(385459.69, 3738329.00, 0.65, 0.65, 0.00)	DC	
	3RD HIGHEST VALUE IS	0.03341 AT	(385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC	
	4TH HIGHEST VALUE IS	0.03118 AT	(385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC	
	5TH HIGHEST VALUE IS	0.02994 AT	(385400.00, 3738400.00, 2.13, 2.13, 0.00)	DC	
	6TH HIGHEST VALUE IS	0.02964 AT	(385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
	7TH HIGHEST VALUE IS	0.02885 AT	(385501.69, 3738397.25, 0.45, 0.45, 0.00)	DC	
	8TH HIGHEST VALUE IS	0.02877 AT	(385500.00, 3738400.00, 0.30, 1.52, 0.00)	DC	
	9TH HIGHEST VALUE IS	0.02738 AT	(385539.75, 3738336.88, 2.13, 2.13, 0.00)	DC	
	10TH HIGHEST VALUE IS	0.02665 AT	(385300.00, 3738300.00, 1.83, 1.83, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
 *** AERMOD - VERSION  11103 ***   *** C:\Documents and Settings\Micheal\My Documents\My Projects\2644Ultr\ ***        09/07/11
                                   *** 2006                                                                  ***        12:40:42
                                                                                                                         PAGE 460
 **MODELOPTs:  NonDFAULT CONC                                FLAT and  ELEV
                                                   NODRYDPLT NOWETDPLT

                                                  *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                    ** CONC OF TOXIC    IN MICROGRAMS/M**3                          **

                                                        DATE                                                                 NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

COGEN    HIGH   1ST HIGH VALUE IS       0.56575  ON 06070212: AT (  385420.31,  3738238.44,     1.27,     1.27,    0.00)  DC

ALL      HIGH   1ST HIGH VALUE IS       0.56575  ON 06070212: AT (  385420.31,  3738238.44,     1.27,     1.27,    0.00)  DC

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 3-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN HIGH 1ST HIGH VALUE IS	0.51470	ON 06071012:	AT (385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC	
ALL HIGH 1ST HIGH VALUE IS	0.51470	ON 06071012:	AT (385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN HIGH 1ST HIGH VALUE IS	0.38419	ON 06072516:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL HIGH 1ST HIGH VALUE IS	0.38419	ON 06072516:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 12-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	HIGH 1ST HIGH VALUE IS	0.21886	ON 06072524:	AT (385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.21886	ON 06072524:	AT (385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	HIGH 1ST HIGH VALUE IS	0.17323	ON 06072524:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.17323	ON 06072524:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 2 Warning Message(s)
A Total of 58 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 10 Missing Hours Identified (0.11 Percent)

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********
RE W213 86 RECART:ELEV Input Inconsistent With Option: Input Ignored UCART1
ME W396 102 MEOPEN:Met data from outdated version of AERMET, version: 06341

****
*** AERMOD Finishes Successfully ***
****

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 1 YEARS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	1ST HIGHEST VALUE IS	0.03849 AT (385413.75, 3738300.12, 0.00, 0.00, 0.00)	DC		
	2ND HIGHEST VALUE IS	0.03825 AT (385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC		
	3RD HIGHEST VALUE IS	0.03701 AT (385459.69, 3738329.00, 0.65, 0.65, 0.00)	DC		
	4TH HIGHEST VALUE IS	0.03464 AT (385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC		
	5TH HIGHEST VALUE IS	0.03431 AT (385400.00, 3738400.00, 2.13, 2.13, 0.00)	DC		
	6TH HIGHEST VALUE IS	0.03396 AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC		
	7TH HIGHEST VALUE IS	0.03126 AT (385501.69, 3738397.25, 0.45, 0.45, 0.00)	DC		
	8TH HIGHEST VALUE IS	0.03122 AT (385500.00, 3738400.00, 0.30, 1.52, 0.00)	DC		
	9TH HIGHEST VALUE IS	0.02981 AT (385300.00, 3738300.00, 1.83, 1.83, 0.00)	DC		
	10TH HIGHEST VALUE IS	0.02884 AT (385539.75, 3738336.88, 2.13, 2.13, 0.00)	DC		
ALL	1ST HIGHEST VALUE IS	0.03849 AT (385413.75, 3738300.12, 0.00, 0.00, 0.00)	DC		
	2ND HIGHEST VALUE IS	0.03825 AT (385400.00, 3738300.00, 0.00, 2.13, 0.00)	DC		
	3RD HIGHEST VALUE IS	0.03701 AT (385459.69, 3738329.00, 0.65, 0.65, 0.00)	DC		
	4TH HIGHEST VALUE IS	0.03464 AT (385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC		
	5TH HIGHEST VALUE IS	0.03431 AT (385400.00, 3738400.00, 2.13, 2.13, 0.00)	DC		
	6TH HIGHEST VALUE IS	0.03396 AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC		
	7TH HIGHEST VALUE IS	0.03126 AT (385501.69, 3738397.25, 0.45, 0.45, 0.00)	DC		
	8TH HIGHEST VALUE IS	0.03122 AT (385500.00, 3738400.00, 0.30, 1.52, 0.00)	DC		
	9TH HIGHEST VALUE IS	0.02981 AT (385300.00, 3738300.00, 1.83, 1.83, 0.00)	DC		
	10TH HIGHEST VALUE IS	0.02884 AT (385539.75, 3738336.88, 2.13, 2.13, 0.00)	DC		

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN HIGH 1ST HIGH VALUE IS	0.59209	ON 07083012:	AT (385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC	
ALL HIGH 1ST HIGH VALUE IS	0.59209	ON 07083012:	AT (385420.31, 3738238.44, 1.27, 1.27, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
 *** AERMOD - VERSION  11103 ***   *** C:\Documents and Settings\Micheal\My Documents\My Projects\2644Ultr\ ***        09/07/11
                                   *** 2007                                                                ***        13:11:11
                                                                                                                      PAGE 461
 **MODELOPTs:  NonDFAULT CONC                                   FLAT and  ELEV
                                                      NODRYDPLT NOWETDPLT

                                                *** THE SUMMARY OF HIGHEST  3-HR RESULTS ***


                                   ** CONC OF TOXIC    IN MICROGRAMS/M**3                          **

                                                        DATE                                                                    NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

COGEN    HIGH   1ST HIGH VALUE IS       0.55280  ON 07081712: AT (  385420.31,  3738238.44,     1.27,     1.27,    0.00)  DC

ALL      HIGH   1ST HIGH VALUE IS       0.55280  ON 07081712: AT (  385420.31,  3738238.44,     1.27,     1.27,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN	HIGH 1ST HIGH VALUE IS	0.39881	ON 07071516:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	0.39881	ON 07071516:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
 *** AERMOD - VERSION  11103 ***   *** C:\Documents and Settings\Micheal\My Documents\My Projects\2644Ultr\ ***        09/07/11
                                   *** 2007                                                                ***        13:11:11
                                                                                                                      PAGE 463
 **MODELOPTs:  NonDFAULT CONC                                      FLAT and  ELEV
                                                         NODRYDPLT NOWETDPLT

                                                     *** THE SUMMARY OF HIGHEST 12-HR RESULTS ***

                                    ** CONC OF TOXIC    IN MICROGRAMS/M**3                          **

                                                        DATE                                                                NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

COGEN    HIGH   1ST HIGH VALUE IS       0.21294  ON 07071512: AT (  385300.00,  3738300.00,     1.83,     1.83,    0.00)  DC

ALL      HIGH   1ST HIGH VALUE IS       0.21294  ON 07071512: AT (  385300.00,  3738300.00,     1.83,     1.83,    0.00)  DC

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

**MODELOPTs: NonDFAULT CONC FLAT and ELEV
NODRYDPLT NOWETDPLT

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF TOXIC IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
COGEN HIGH 1ST HIGH VALUE IS	0.16308	ON 07071524:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	
ALL HIGH 1ST HIGH VALUE IS	0.16308	ON 07071524:	AT (385350.75, 3738263.38, 1.75, 1.75, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
*** AERMOD - VERSION  11103 ***   *** C:\Documents and Settings\Micheal\My Documents\My Projects\2644Ultr\ ***        09/07/11
                                  *** 2007                                                                ***        13:11:11
                                                                                                                     PAGE 465

**MODELOPTs:  NonDFAULT CONC                                        FLAT and  ELEV
                                                          NODRYDPLT NOWETDPLT

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            2 Warning Message(s)
A Total of           97 Informational Message(s)

A Total of         8760 Hours Were Processed

A Total of            0 Calm Hours Identified

A Total of           39 Missing Hours Identified (  0.45 Percent)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
RE W213      86 RECART:ELEV Input Inconsistent With Option: Input Ignored       UCART1
ME W396     102 MEOPEN:Met data from outdated version of AERMET, version:        06341

   ***********************************
   *** AERMOD Finishes Successfully ***
   ***********************************
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APPENDIX B

AERMOD Model Electronic Files

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The electronic files on file at the SCAQMD.