Nahid Zoueshtiagh/R9/USEPA/US
03/08/2006 11:22 AM

To Joseph Lapka/R9/USEPA/US@EPA
cc
bcc
Subject record - Cabrillo Port: Responses to Requests for Information

----- Forwarded by Nahid Zoueshtiagh/R9/USEPA/US on 03/08/2006 11:22 AM -----

KWright@entrix.com
09/12/2005 04:03 PM

To Nahid Zoueshtiagh/R9/USEPA/US@EPA
cc TRWOOD@stoel.com, TUmenhofer@entrix.com
Subject Cabrillo Port: Responses to Requests for Information

Nahid:

As a result of our conference call on Thursday September 8, 2005, Tom Umenhofer and I agreed to provide you with the following information which had previously been submitted to the USCG, but may have not reached your office:

1.) FSRU Start-up Emissions Summary

The Start-up Emissions Summary is attached below (Filename: Response DG 30-7 Attachment 1_7 11 05). Please note that BHPB did not include start-up emissions in its original application. BHPB submitted this summary in response to USCG Data Gap requests (Reference Data Gap No. DG-30-7). A summary of our response is as follows:

BHPB and ENTRIX have completed these start-up emissions estimates, and they are included as Response DG-30-7, Attachment 1. These emissions are based upon the following assumptions:

· FSRU startup commissioning period 60 days, 24 hrs/day, SCR on 9L50DF generators (controlled);

· Two backup 9L50DF generators operating at 75% load for 1440 machine hours, diesel fuel, Wartsila specifications;

· Emergency fire pump and generator operating at 100% load for 16 machine hours each, diesel fuel, 2006 Tier 2 standards; and

· Three Life Boats exercising at 100% load for 8 machine hours total, diesel fuel, 2006 Tier 2 standards.

2.) Results of the OCD modeling analysis which included a building downwash control option.

The AQIA which was submitted by BHPB to your office on April 13, 2005, did not include a building

downwash control option. BHPB performed an additional AQIA which did include a building downwash control option and submitted a summary of the AQIA results in response to USCG Data Gap requests (Reference Data Gap No. DG-39-21). A summary of this revised AQIA summary is attached below (Filename: Supplemental Response DG-39-21).

In addition, you requested clarification of the modeling analysis:

Clarification of FSRU emissions included in AQIA

You asked for clarification concerning emission information included in Table 1-1 and Appendix 1 of the April 13, 2005 AQIA report. Table 1-1 of the report included a summary of all FSRU emissions. Appendix 1 included the emission rates and stack parameters of the Wartsila main generators and the submerged combustion vaporizers (SCV). The purpose of including the emissions summary in Table 1-1 was to demonstrate that emission estimates had been revised since the original AQIA was performed. However, not all emissions sources on the FSRU were modeled. The only FSRU equipment sources included in the modeling were the Wartsila main generator and SCV emissions and stack parameters, as listed in Appendix 1. The diesel-fired operational emissions of the Wartsila back-up generator (100 hours per year), emergency generator, firewater pump, and free-fall life boat emissions were not included in the modeling analysis. The revised analysis performed with the building downwash control option in July 2005 also did not include these emergency equipment emission sources.

Kevin Wright
Air Resources
ENTRIX, Inc.
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Response DG 30-7 Attachment 1_7 11 05.xls Supplemental Response DG-39-21.doc

FSRU Startup Uncontrolled

Quantity	Description	Rating (each)	Fuel	60-Day Emissions, tons					
				NO_X	ROC	CO	SO_2	PM_{10}	CO_2
1.5	Wartsila 9L50DF Backup Generator	8250 KW	CA Diesel	288.8	12.8	20.2	0.1	3.0	10,215
2	Emergency Fire Pump / Generator	600 / 4200 KW	CA Diesel	0.5	0.1	0.3	0.0	0.0	59
1	Freefall Lifeboat	56 KW	CA Diesel	0.0	0.0	0.0	0.0	0.0	0
Total Emissions				**289.2**	**12.9**	**20.5**	**0.1**	**3.0**	**10,274**

Quantity	Description	Rating (each)	Fuel	Emission Rates, lbs/hr					
				NO_X	ROC	CO	SO_2	PM_{10}	CO_2
1.5	Wartsila 9L50DF Backup Generator	8250 KW	CA Diesel	401.1	17.8	28.1	0.2	4.2	14,187
2	Emergency Fire Pump / Generator	600 / 4200 KW	CA Diesel	59.3	8.5	37.0	0.1	2.1	7,408
1	Freefall Lifeboat	56 KW	CA Diesel	0.8	0.1	0.6	0.0	0.0	86
Total Emissions				**461.1**	**26.4**	**65.8**	**0.2**	**6.4**	**21,681**

Device Notes:

FSRU startup commissioning period 60 days, 24 hrs/day, no SCR on 9L50DF generators (uncontrolled)

Two backup 9L50DF generators operating at 75% load for 1440 machine hours, diesel fuel, Wartsila specs

Emergency fire pump and generator operating at 100% load for 16 machine hours each, diesel fuel, 2006 Tier 2 standards

Three Life Boats exercising at 100% load for 8 machine hours total, diesel fuel, 2006 Tier 2 standards

Diesel Fuel Usage	1,050,723

FSRU Startup Controlled

Quantity	Description	Rating (each)	Fuel	60-Day Emissions, tons					
				NO_X	ROC	CO	SO_2	PM_{10}	CO_2
1.5	Wartsila 9L50DF Backup Generator	8250 KW	CA Diesel	41.8	5.8	4.2	0.1	3.1	10,215
2	Emergency Fire Pump / Generator	600 / 4200 KW	CA Diesel	0.5	0.1	0.3	0.0	0.0	59
1	Freefall Lifeboat	56 KW	CA Diesel	0.0	0.0	0.0	0.0	0.0	0
Total Emissions				**42.3**	**5.9**	**4.5**	**0.1**	**3.1**	**10,274**

Quantity	Description	Rating (each)	Fuel	Emission Rates, lbs/hr					
				NO_X	ROC	CO	SO_2	PM_{10}	CO_2
1.5	Wartsila 9L50DF Backup Generator	8250 KW	CA Diesel	58.0	8.1	5.9	0.2	4.2	14,187
2	Emergency Fire Pump / Generator	600 / 4200 KW	CA Diesel	59.3	8.5	37.0	0.1	2.1	7,408
1	Freefall Lifeboat	56 KW	CA Diesel	0.8	0.1	0.6	0.0	0.0	86
Total Emissions				**118.1**	**16.7**	**43.5**	**0.2**	**6.4**	**21,681**

Device Notes:

FSRU startup commissioning period 60 days, 24 hrs/day, SCR on 9L50DF generators (controlled)

Two backup 9L50DF generators operating at 75% load for 1440 machine hours, diesel fuel, Wartsila specs

Emergency fire pump and generator operating at 100% load for 16 machine hours each, diesel fuel, 2006 Tier 2 standards

Three Life Boats exercising at 100% load for 8 machine hours total, diesel fuel, 2006 Tier 2 standards

Diesel Fuel Usage	1,050,723

FSRU Startup HAP Emissions

HAP EMITTENT NAME	Uncontrolled Emissions, lbs			
	Backup Gen	Emergency	Life Boat	Total
	lbs	lbs	lbs	lbs
Acetaldehyde	3.6	0.0	0.0	3.6
Acrolein	1.1	0.0	0.0	1.1
Benzene	111.2	0.5	0.0	111.7
Butadiene -1,3	5.6	0.0	0.0	5.6
Ethyl Benzene	-	-	-	-
Formaldehyde	11.3	0.1	0.0	11.4
Hexane	-	-	-	-
Naphthalene	18.6	0.1	0.0	18.7
PAHs	11.8	0.1	0.0	11.8
Propylene	399.8	1.9	0.0	401.7
Toluene	40.3	0.2	0.0	40.5
Xylenes	27.7	0.1	0.0	27.8
Facility Total HAPS				**634.0**

HAP EMITTENT NAME	Controlled Emissions, lbs			
	Backup Gen	Emergency	Life Boat	Total
	lbs	lbs	lbs	lbs
Acetaldehyde	1.1	0.0	0.0	1.1
Acrolein	0.3	0.0	0.0	0.3
Benzene	72.3	0.5	0.0	72.8
Butadiene -1,3	3.6	0.0	0.0	3.7
Ethyl Benzene	-	-	-	-
Formaldehyde	3.4	0.1	0.0	3.5
Hexane	-	-	-	-
Naphthalene	12.1	0.1	0.0	12.2
PAHs	7.6	0.1	0.0	7.7
Propylene	259.9	1.9	0.0	261.8
Toluene	26.2	0.2	0.0	26.4
Xylenes	18.0	0.1	0.0	18.1
Facility Total HAPS				**407.5**

Device Notes:

FSRU startup commissioning period 60 days, 24 hrs/day

Two backup 9L50DF generators operating at 75% load for 1440 machine hours, diesel fuel

Emergency fire pump and generator operating at 100% load for 16 machine hours each, diesel fuel, 2006 Tier 2 standards

Three Life Boats exercising at 100% load for 8 machine hours total, diesel fuel, 2006 Tier 2 standards

9L50DF Diesel Uncontrolled

SIC	1321		
PROCESS EQPT DESCRIPTION	Dual Fuel ICE generator, Wartsila 50DF		
FUEL TYPE/PROCESS INFO	California diesel, 15 ppm S		
TOTAL YEARLY PROCESS RATE	17820	MW-hrs	
HOURLY PROCESS RATE	12.38	MW	from BHP estimates
PROCESS UNITS	PT071	MW-hrs	
HIGHER HEATING VALUE	137030	BTU/gal	USEPA AP-42
OPERATING SCHEDULE	1440	hrs/yr	
HEAT RATE	8042	BTU/KW-hr	Wartsila Spec 0047057-S504, 13 May 05
CONVERSION EFFICIENCY	42.4%	percent	
HEAT INPUT	99.52	mmBTU/hr	
DRY Fd	9190	dscf/mmBTU	USEPA Method 19
EXHAUST FLOW	3.24	mmdscf/hr	

EMITTENT NAME	EMITTENT PPM	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR	RATE g/kw-hr	RATE g/bhp-hr
Nitrogen Oxides (as NO_2)	1037	1.0000	32.4081	577,513	288.76	401.05	14.700	10.962
Reactive Hydrocarbons (ROC) as CH_4	132	1.0000	1.4352	25,576	12.79	17.76	0.651	0.485
Carbon Monoxide (CO)	119	1.0000	2.2708	40,465	20.23	28.10	1.030	0.768
Sulfur Dioxide (SO_2)	0.3	1.0000	0.013	223	0.11	0.15	0.006	0.004
Particulates (as PM_{10}) (grains/dscf)	0.0091	1.0000	0.3395	6,050	3.03	4.20	0.154	0.115
Carbon Dioxide (CO_2)	3.83%	1.0000	1146.4098	20,429,022	10,215	14,187	520	388
Ammonia Slip (NH_3)								

Wartsila Emission Factors (Uncontrolled)

NO_X = 14.70 g/kw-hr (Wartsila Report 10 May 2005)
VOC = 0.651 g/kw-hr (Wartsila Report 10 May 2005)
CO = 1.03 g/kw-hr (Wartsila Report 10 May 2005)
PM_{10} = 0.154 g/kw-hr (Wartsila Report 10 May 2005)
CO_2 = 520 g/kw-hr (Wartsila)

Diesel Fuel Usage	1,045,818	gal/yr

9L50DF Diesel Uncontrolled

HAP NAME	UNCTL EF lb/mmBTU	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR
Acetaldehyde	2.52E-05	1.00	2.03E-04	3.61	0.002	0.003
Acrolein	7.88E-06	1.00	6.34E-05	1.13	0.001	0.001
Benzene	7.76E-04	1.00	6.24E-03	111.21	0.056	0.077
Butadiene -1,3	3.91E-05	1.00	3.14E-04	5.60	0.003	0.004
Ethyl Benzene		1.00	0.00E+00	-	0.000	0.000
Formaldehyde	7.89E-05	1.00	6.35E-04	11.31	0.006	0.008
Hexane		1.00	0.00E+00	-	0.000	0.000
Naphthalene	1.30E-04	1.00	1.05E-03	18.63	0.009	0.013
PAHs	8.20E-05	1.00	6.59E-04	11.75	0.006	0.008
Propylene	2.79E-03	1.00	2.24E-02	399.83	0.200	0.278
Toluene	2.81E-04	1.00	2.26E-03	40.27	0.020	0.028
Xylenes	1.93E-04	1.00	1.55E-03	27.66	0.014	0.019

HAP Emission Factors: AP-42 Table 3.4-3 , -4
(1,3 Butadiene AP-42 Table 3.3-2)

9L50DF Diesel Controlled

SIC	1321		
PROCESS EQPT DESCRIPTION	Dual Fuel ICE generator, Wartsila 50DF		
FUEL TYPE/PROCESS INFO	California diesel, 15 ppm S		
TOTAL YEARLY PROCESS RATE	17820	MW-hrs	
HOURLY PROCESS RATE	12.38	MW	from BHP estimates
PROCESS UNITS	PT071	MW-hrs	
HIGHER HEATING VALUE	137030	BTU/gal	USEPA AP-42
OPERATING SCHEDULE	1440	hrs/yr	
HEAT RATE	8042	BTU/KW-hr	Wartsila Spec 0047057-S504, 13 May 05
CONVERSION EFFICIENCY	42.4%	percent	
HEAT INPUT	99.52	mmBTU/hr	
DRY Fd	9190	dscf/mmBTU	USEPA Method 19
EXHAUST FLOW	3.24	mmdscf/hr	

EMITTENT NAME	EMITTENT PPM	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR	RATE g/kw-hr	RATE g/bhp-hr
Nitrogen Oxides (as NO_2)	150	1.0000	4.6884	83,547	41.77	58.02	2.127	1.586
Reactive Hydrocarbons (ROC) as CH_4	60	1.0000	0.6523	11,624	5.81	8.07	0.296	0.221
Carbon Monoxide (CO)	25	1.0000	0.4756	8,476	4.24	5.89	0.216	0.161
Sulfur Dioxide (SO_2)	0.29	1.0000	0.013	223	0.11	0.15	0.006	0.004
Particulates (as PM_{10}) (grains/dscf)	0.0092	1.0000	0.3432	6,116	3.06	4.25	0.156	0.116
Carbon Dioxide (CO_2)	3.83%	1.0000	1146.4098	20,429,022	10,215	14,187	520	388
Ammonia Slip (NH_3)	10	1.0000	0.1155	2,058	1.03	1.43	0.052	0.039

Wartsila Emission Factors (Controlled)

NO_X = 150 ppm, 2.127 g/kw-hr (Wartsila Spec 0047057-S504, 13 May 05)

VOC = 60 ppm, 0.296 g/kw-hr (Wartsila Spec 0047057-S504, 13 May 05)

CO = 25 ppm, 0.216 g/kw-hr (Wartsila Spec Spec 0047057-S504, 13 May 05)

PM_{10} = 21 mg/m3, 0.156 g/kw-hr (Wartsila Spec 0047057-S504, 13 May 05)

CO_2 = 520 g/kw-hr (Wartsila)

Backup Diesel Fuel Usage	1,045,818	gal/yr

9L50DF Diesel Controlled

HAP NAME	UNCTL EF lb/mmBTU	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR
Acetaldehyde	2.52E-05	0.30	6.08E-05	1.08	0.001	0.001
Acrolein	7.88E-06	0.30	1.90E-05	0.34	0.000	0.000
Benzene	7.76E-04	0.65	4.06E-03	72.28	0.036	0.050
Butadiene -1,3	3.91E-05	0.65	2.04E-04	3.64	0.002	0.003
Ethyl Benzene		0.65	0.00E+00	-	0.000	0.000
Formaldehyde	7.89E-05	0.30	1.90E-04	3.39	0.002	0.002
Hexane		0.65	0.00E+00	-	0.000	0.000
Naphthalene	1.30E-04	0.65	6.80E-04	12.11	0.006	0.008
PAHs	8.20E-05	0.65	4.29E-04	7.64	0.004	0.005
Propylene	2.79E-03	0.65	1.46E-02	259.89	0.130	0.180
Toluene	2.81E-04	0.65	1.47E-03	26.18	0.013	0.018
Xylenes	1.93E-04	0.65	1.01E-03	17.98	0.009	0.012

HAP Emission Factors: AP-42 Table 3.4-3 , -4
(1,3 Butadiene AP-42 Table 3.3-2)

Firewater Pump

SIC	1321		
PROCESS EQPT DESCRIPTION	Firewater Pump, 600 KW		
FUEL TYPE/PROCESS INFO	California diesel, 15 ppm S		
TOTAL YEARLY PROCESS RATE	10	MW-hrs	
HOURLY PROCESS RATE	0.60	MW	from BHP estimates
PROCESS UNITS	PT071	MW-hrs	
HIGHER HEATING VALUE	137030	BTU/gal	USEPA AP-42
OPERATING SCHEDULE	16	hrs/yr	
HEAT RATE	9751	BTU/KW-hr	
CONVERSION EFFICIENCY	35.0%	percent	
HEAT INPUT	5.85	mmBTU/hr	
DRY Fd	9190	dscf/mmBTU	USEPA Method 19
EXHAUST FLOW	0.19	mmdscf/hr	

EMITTENT NAME	EMITTENT PPM	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR	RATE* g/kw-hr	RATE g/bhp-hr
Nitrogen Oxides (as NO_2)	326	1.0000	12.3460	119	0.06	7.41	5.600	4.176
Reactive Hydrocarbons (ROC) as CH_4	134	1.0000	1.7637	17	0.01	1.06	0.800	0.597
Carbon Monoxide (CO)	334	1.0000	7.7162	74	0.04	4.63	3.500	2.610
Sulfur Dioxide (SO_2)	0.3	1.0000	0.015	0	0.00	0.01	0.007	0.005
Particulates (as PM_{10}) (grains/dscf)	0.0097	1.0000	0.4409	4	0.00	0.26	0.200	0.149
Carbon Dioxide (CO_2)	4.26%	1.0000	1543.2439	14,815	7	926	700	522
Ammonia Slip (NH_3)								

* USEPA Tier 2 Standards (>560 kw)

NO_X + ROC = 6.4 g/kw-hr

CO = 3.5 g/kw-hr

PM_{10} = 0.2 g/kw-hr

CO_2 = 700 g/kw-hr (AP-42, Table 3.3-1)

Diesel Fuel Usage	683	gal/yr

Firewater Pump

HAP NAME	UNCTL EF lb/mmBTU	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR
Acetaldehyde	2.52E-05	1.00	2.46E-04	0.0	0.000	0.000
Acrolein	7.88E-06	1.00	7.68E-05	0.0	0.000	0.000
Benzene	7.76E-04	1.00	7.57E-03	0.1	0.000	0.005
Butadiene -1,3	3.91E-05	1.00	3.81E-04	0.0	0.000	0.000
Ethyl Benzene		1.00	0.00E+00	-	0.000	0.000
Formaldehyde	7.89E-05	1.00	7.69E-04	0.0	0.000	0.000
Hexane		1.00	0.00E+00	-	0.000	0.000
Naphthalene	1.30E-04	1.00	1.27E-03	0.0	0.000	0.001
PAHs	8.20E-05	1.00	8.00E-04	0.0	0.000	0.000
Propylene	2.79E-03	1.00	2.72E-02	0.3	0.000	0.016
Toluene	2.81E-04	1.00	2.74E-03	0.0	0.000	0.002
Xylenes	1.93E-04	1.00	1.88E-03	0.0	0.000	0.001

HAP Emission Factors: AP-42 Table 3.4-3 , -4
(1,3 Butadiene AP-42 Table 3.3-2)

Emergengy Generator

SIC	1321		
PROCESS EQPT DESCRIPTION	Emergency Generator, 4200 KW		
FUEL TYPE/PROCESS INFO	California diesel, 15 ppm S		
TOTAL YEARLY PROCESS RATE	67	MW-hrs	
HOURLY PROCESS RATE	4.20	MW	from BHP estimates
PROCESS UNITS	PT071	MW-hrs	
HIGHER HEATING VALUE	137030	BTU/gal	USEPA AP-42
OPERATING SCHEDULE	16	hrs/yr	
HEAT RATE	8533	BTU/KW-hr	
CONVERSION EFFICIENCY	40.0%	percent	
HEAT INPUT	35.84	mmBTU/hr	
DRY Fd	9190	dscf/mmBTU	USEPA Method 19
EXHAUST FLOW	1.17	mmdscf/hr	

EMITTENT NAME	EMITTENT PPM	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR	RATE* g/kw-hr	RATE g/bhp-hr
Nitrogen Oxides (as NO_2)	372	1.0000	12.3460	830	0.41	51.85	5.600	4.176
Reactive Hydrocarbons (ROC) as CH_4	153	1.0000	1.7637	119	0.06	7.41	0.800	0.597
Carbon Monoxide (CO)	382	1.0000	7.7162	519	0.26	32.41	3.500	2.610
Sulfur Dioxide (SO_2)	0.3	1.0000	0.013	1	0.000	0.056	0.006	0.004
Particulates (as PM_{10}) (grains/dscf)	0.0111	1.0000	0.4409	30	0.01	1.85	0.200	0.149
Carbon Dioxide (CO_2)	4.87%	1.0000	1543.2439	103,706	52	6,482	700	522
Ammonia Slip (NH_3)								

* USEPA Tier 2 Standards (>560 kw)

NO_X + ROC = 6.4 g/kw-hr

CO = 3.5 g/kw-hr

PM_{10} = 0.2 g/kw-hr

CO_2 = 700 g/kw-hr (AP-42, Table 3.3-1)

Diesel Fuel Usage	4,184	gal/yr

Emergengy Generator

HAP NAME	UNCTL EF lb/mmBTU	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR
Acetaldehyde	2.52E-05	1.00	2.15E-04	0.0	0.000	0.001
Acrolein	7.88E-06	1.00	6.72E-05	0.0	0.000	0.000
Benzene	7.76E-04	1.00	6.62E-03	0.4	0.000	0.028
Butadiene -1,3	3.91E-05	1.00	3.34E-04	0.0	0.000	0.001
Ethyl Benzene		1.00	0.00E+00	-	0.000	0.000
Formaldehyde	7.89E-05	1.00	6.73E-04	0.0	0.000	0.003
Hexane		1.00	0.00E+00	-	0.000	0.000
Naphthalene	1.30E-04	1.00	1.11E-03	0.1	0.000	0.005
PAHs	8.20E-05	1.00	7.00E-04	0.0	0.000	0.003
Propylene	2.79E-03	1.00	2.38E-02	1.6	0.001	0.100
Toluene	2.81E-04	1.00	2.40E-03	0.2	0.000	0.010
Xylenes	1.93E-04	1.00	1.65E-03	0.1	0.000	0.007

HAP Emission Factors: AP-42 Table 3.4-3 , -4
(1,3 Butadiene AP-42 Table 3.3-2)

Freefall Lifeboat

SIC	1321		
PROCESS EQPT DESCRIPTION	Freefall Lifeboat Engine, 75 BHP (56 KW)		
FUEL TYPE/PROCESS INFO	California diesel, 15 ppm S		
TOTAL YEARLY PROCESS RATE	0.4	MW-hrs	
HOURLY PROCESS RATE	0.056	MW	from BHP estimates
PROCESS UNITS	PT071	MW-hrs	
HIGHER HEATING VALUE	137030	BTU/gal	USEPA AP-42
OPERATING SCHEDULE	8	hrs/yr	
HEAT RATE	11377	BTU/KW-hr	
CONVERSION EFFICIENCY	30.0%	percent	
HEAT INPUT	0.64	mmBTU/hr	
DRY Fd	9190	dscf/mmBTU	USEPA Method 19
EXHAUST FLOW	0.02	mmdscf/hr	

EMITTENT NAME	EMITTENT PPM	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR	RATE* g/kw-hr	RATE g/bhp-hr
Nitrogen Oxides (as NO_2)	324	1.0000	14.3301	6	0.00	0.80	6.500	4.847
Reactive Hydrocarbons (ROC) as CH_4	143	1.0000	2.2046	1	0.00	0.12	1.000	0.746
Carbon Monoxide (CO)	410	1.0000	11.0232	5	0.00	0.62	5.000	3.729
Sulfur Dioxide (SO_2)	0.3	1.0000	0.018	0	0.00	0.00	0.008	0.006
Particulates (as PM_{10}) (grains/dscf)	0.0167	1.0000	0.8819	0	0.00	0.05	0.400	0.298
Carbon Dioxide (CO_2)	3.65%	1.0000	1543.2439	691	0	86	700	522

* USEPA Tier 2 Standards (>37 kw, <75 kw)

NO_X + ROC = 7.5 g/kw-hr

CO = 5.0 g/kw-hr

PM_{10} = 0.4 g/kw-hr

CO_2 = 700 g/kw-hr (AP-42, Table 3.3-1)

Diesel Fuel Usage	37	gal/yr

Freefall Lifeboat

HAP NAME	UNCTL EF lb/mmBTU	CORR FACTOR	CTL EF LBS/UNIT	ACTUAL LBS/YR	ACTUAL TONS/YR	ACTUAL LBS/HR
Acetaldehyde	7.67E-04	1.00	8.73E-03	0.0	0.000	0.000
Acrolein	9.25E-05	1.00	1.05E-03	0.0	0.000	0.000
Benzene	9.33E-04	1.00	1.06E-02	0.0	0.000	0.001
Butadiene -1,3	3.91E-05	1.00	4.45E-04	0.0	0.000	0.000
Ethyl Benzene		1.00	0.00E+00	-	0.000	0.000
Formaldehyde	1.18E-03	1.00	1.34E-02	0.0	0.000	0.001
Hexane		1.00	0.00E+00	-	0.000	0.000
Naphthalene	8.48E-05	1.00	9.65E-04	0.0	0.000	0.000
PAHs	8.32E-05	1.00	9.47E-04	0.0	0.000	0.000
Propylene	2.58E-03	1.00	2.94E-02	0.0	0.000	0.002
Toluene	4.09E-04	1.00	4.65E-03	0.0	0.000	0.000
Xylenes	2.85E-04	1.00	3.24E-03	0.0	0.000	0.000

HAP Emission Factors: AP-42 Table 3.3-2

SUMMARY

BHP Billiton (BHPB) and the US Environmental Protection Agency, Region IX (EPA) are currently assessing the impacts of the proposed Cabrillo Port Offshore Liquefied Natural Gas (LNG) Import Terminal (Cabrillo Port), a floating storage and regasification unit (FSRU). An ambient air impacts analysis was submitted as part of the December 30, 2003 permit application. Since that time, however, BHPB has further refined the project design and emissions estimates and has submitted a revised ambient air impacts analysis. As part of the final environmental impact analysis for the project, the United States Coast Guard (USCG) and its contractors requested that the ambient air impacts analysis be further revised to include potential effects of platform downwash. This modeling analysis used the same FSRU dimensions that were used for the screening analysis for ammonia impacts.

The modeling analysis is based on predicted maximum Cabrillo Port emissions. Criteria pollutant emissions of NO_2, SO_2, CO, and $PM_{10}/PM_{2.5}$ from the stationary source (including the marine vessels in District waters) were modeled using the EPA-approved Offshore and Coastal Dispersion (OCD) Model. The overwater receptor grid extended approximately 25 miles up and down the coast from the FSRU. The overland receptor grid extended two miles inland from the shoreline. As discussed in the previous modeling report, receptors have been excluded from a 500-meter exclusion zone surrounding the FSRU.

MODELING RESULTS AND CONCLUSIONS

Worst case impacts were determined at both onshore and offshore receptors. The inclusion of platform downwash effects had a minor effect on the modeling results for the onshore receptors. While the maximum modeled effects overwater did increase, the modeled concentrations remain extremely low. As noted previously, the maximum modeled overwater concentrations occur very close to the FSRU. The new modeling analysis does not change the conclusion that Cabrillo Port will not materially impact onshore air quality and will not cause or contribute to on-shore ambient air quality standard violations.

Tables 1 and 2 show that the maximum project concentrations, in micrograms per cubic meter ($\mu g/m^3$), for all pollutants and averaging periods occur at sea. With the exception of annual NO_2 threshold, all project concentrations are well below all significance thresholds. The area in which the modeled annual NO_2 concentrations exceed the significant impact level extends less than 1400 meters to the east of the USCG exclusion zone, immediately adjacent to the FSRU and located over 10 miles from any onshore receptors. Modeled concentrations for all pollutants and averaging periods are much lower onshore.

Tables 3 and 4 show that the project will not cause or contribute to on-shore violations of ambient air quality standards.

Table 1
Comparison of Maximum Modeled Stationary Source Concentrations with PSD Significance Thresholds and Class II Increments

Pollutant	Avg Period	Max. Modeled Offshore Concentration ($\mu g/m^3$)	Max. Modeled Onshore Impact ($\mu g/m^3$)	PSD Significance Threshold ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
NO_2[a]	8-hour	21.4	0.74	--	--
	annual	2.0	0.01	1.0	25
SO_2	3-hour	0.2	0.01	25	325
	24-hour	0.08	<0.01	5	91
	annual	0.01	<0.01	1.0	20
CO	1-hour	97.7	9.5	2,000	--
	8-hour	65.3	2.1	500	--
$PM_{10}/PM_{2.5}$	24-hour	0.9	0.05	5	30
	annual	0.2	<0.01	1.0	17

Note: [a] 8-hr average NO_2 concentration is modeled for use in estimating project ozone impacts.

Table 2
Comparison of Maximum Modeled Project Concentrations with PSD Significance Thresholds and Class II Increments (Stationary Sources and Marine Vessels)

Pollutant	Avg Period	Max. Modeled Offshore Concentration ($\mu g/m^3$)	Max. Modeled Onshore Impact ($\mu g/m^3$)	PSD Significance Threshold ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
NO_2[a]	8-hour	21.4	1.5	--	--
	annual	2.0	0.01	1.0	25
SO_2	3-hour	0.2	0.01	25	325
	24-hour	0.08	<0.01	5	91
	annual	0.01	<0.01	1.0	20
CO	1-hour	97.7	12.5	2,000	--
	8-hour	65.3	2.1	500	--
$PM_{10}/PM_{2.5}$	24-hour	0.9	0.05	5	30
	annual	0.2	<0.01	1.0	17

Note: [a] 8-hr average NO_2 concentration is modeled for use in estimating project ozone impacts.

Table 3
Comparison of Maximum Modeled Onshore Stationary Source Concentrations with Ambient Air Quality Standards

Pollutant	Avg Period	Max. Modeled Onshore Concentration ($\mu g/m^3$)	Background Conc.[a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	annual	0.01	26	26	100
SO_2	3-hour	0.01	39	39	1,300
	24-hour	<0.01	31	31	365
	annual	<0.01	10	10	80
CO	1-hour	9.5	8,469	8,479	40,000
	8-hour	2.1	4,921	4,923	10,000
PM_{10}	24-hour	0.05	124	124	150
	annual	<0.01	31	31	50
$PM_{2.5}$	24-hour	0.05	32[b]	32	65
	annual	<0.01	13	13	15

Note: [a] Background values for NO_2, SO_2, PM_{10}, and $PM_{2.5}$ from El Rio monitoring station (Station ID No. 061113001). Background values for CO from Ventura-Emma Wood State Beach monitoring station (Station ID No. 061112003).
[b] Background values for $PM_{2.5}$ based on 98th percentile.

Table 4
Comparison of Maximum Modeled Project Onshore Concentrations with Ambient Air Quality Standards (Stationary Sources and Marine Vessels)

Pollutant	Avg Period	Max. Modeled Onshore Concentration ($\mu g/m^3$)	Background Conc.[a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	Annual	0.01	26	26	100
SO_2	3-hour	0.01	39	39	1,300
	24-hour	<0.01	31	31	365
	Annual	<0.01	10	10	80
CO	1-hour	12.5	8,469	8,482	40,000
	8-hour	2.1	4,921	4,923	10,000
PM_{10}	24-hour	0.05	124	124	150
	Annual	<0.01	31	31	50
$PM_{2.5}$	24-hour	0.05	32[b]	32	65
	Annual	<0.01	13	13	15

Note: [a] Background values for NO_2, SO_2, PM_{10}, and $PM_{2.5}$ from El Rio monitoring station (Station ID No. 061113001). Background values for CO from Ventura-Emma Wood State Beach monitoring station (Station ID No. 061112003).
[b] Background values for $PM_{2.5}$ based on 98th percentile.