APPENDIX 5.9B

TAC Emission and HRA Calculations

Table 5.9B-1
Carlsbad Energy Center
Annual and Maximum Hourly Non-Criteria Pollutant Emissions From Gas Turbines during Normal Operation

Toxic Air Contaminant	Emission Factor (1)	Emission Rate Maximum Hourly lbs/hour		Emission Rate Annual tons/year		Emission Rate Per Turbine g/sec (each)	
	lb/MMscf	1 Turbine	2 Turbines	1 Turbine	2 Turbines	Hourly	Annual
Ammonia	5 ppmv slip	1.40E+01	2.80E+01	26.81	53.62	1.77E+00	7.71E-01
Propylene	7.71E-01	1.58E+00	3.16E+00	3.24	6.47	1.99E-01	9.31E-02
Hazardous Air Pollutants (HAPs, federal)							
Acetaldehyde	4.08E-02	8.35E-02	1.67E-01	0.17	0.34	1.05E-02	4.93E-03
Acrolein	3.69E-03	7.56E-03	1.51E-02	0.015	0.031	9.52E-04	4.46E-04
Benzene	3.33E-03	6.82E-03	1.36E-02	0.014	0.028	8.59E-04	4.02E-04
1,3-Butadiene	4.39E-04	8.99E-04	1.80E-03	0.0018	0.0037	1.13E-04	5.30E-05
Ethylbenzene	3.26E-02	6.67E-02	1.33E-01	0.14	0.27	8.41E-03	3.94E-03
Formaldehyde	3.67E-01	7.51E-01	1.50E+00	1.54	3.08	9.47E-02	4.43E-02
Hexane	2.59E-01	5.30E-01	1.06E+00	1.09	2.17	6.68E-02	3.13E-02
Naphthalene	1.66E-03	3.40E-03	6.80E-03	0.0070	0.014	4.28E-04	2.00E-04
PAHs (listed individually below)	1.31E-04	2.68E-04	5.36E-04	0.00055	1.10E-03	3.38E-05	1.58E-05
Benzo(a)anthracene	2.26E-05						
Benzo(a)pyrene	1.39E-05						
Benzo(b)fluoranthrene	1.13E-05						
Benzo(k)fluoranthrene	1.10E-05						
Chrysene	2.52E-05						
Dibenz(a,h)anthracene	2.35E-05						
Indeno(1,2,3-cd)pyrene	2.35E-05						
Propylene oxide	2.96E-02	6.06E-02	1.21E-01	0.12	0.25	7.63E-03	3.57E-03
Toluene	1.33E-01	2.72E-01	5.45E-01	0.56	1.12	3.43E-02	1.61E-02
Xylene	6.53E-02	1.34E-01	2.67E-01	0.27	0.55	1.68E-02	7.88E-03
Total HAPs =					7.86		

1) All factors except PAHs, hexane and propylene from AP-42, Table 3.1-3, 4/00. Acrolein, benzene and formaldehyde reflect no oxidation catalyst, such as might occur during the first hour of a startup or commissioning. Individual PAHs, hexane and propylene are CATEF mean results because AP-42 does not include factors for these compounds.

2) Single turbine maximum heat input (MMBtu/hr) = 2087
3) Natural gas heat content (Btu/scf high heating value, HHV) = 1019.3
4) Maximum single turbine hourly fuel flow (MMscf/hr) = 2.0474
5) Maximum turbine annual operating time (hours) = 4100
6) Maximum single turbine annual fuel flow (MMscf/yr) = 8394.5

Non-Criteria Pollutant Emissions from Standby/Emergency Engine

Engine	Pollutant	Hourly Emissions (lbs/hr)	Annual Emissions (tons/yr)
Fire Water Pump Engine	Diesel PM	0.07	0.0001

Table 5.9B-2
Carlsbad Energy Center
Maximum Hourly TAC Emissions From the Gas Turbines during Commissioning Hours without Oxidation Catalyst

Pollutant	Emission Factor (1) lb/MMscf	1 Turbine Max. Hourly Emissions lbs/hr (each)	2 Turbines Max. Hourly Emissions lbs/hr	Hourly Emission Rate Per Turbine g/sec (each)
Ammonia	5 ppmv slip	1.40E+01	2.80E+01	1.77E+00
Propylene	7.71E-01	1.58E+00	3.16E+00	1.99E-01
Hazardous Air Pollutants (HAPs)				
Acetaldehyde	4.08E-02	8.35E-02	1.67E-01	1.05E-02
Acrolein	6.53E-03	1.34E-02	2.67E-02	1.68E-03
Benzene	1.22E-02	2.50E-02	5.00E-02	3.15E-03
1,3-Butadiene	4.39E-04	8.99E-04	1.80E-03	1.13E-04
Ethylbenzene	3.26E-02	6.67E-02	1.33E-01	8.41E-03
Formaldehyde	7.24E-01	1.48E+00	2.96E+00	1.87E-01
Hexane	2.59E-01	5.30E-01	1.06E+00	6.68E-02
Naphthalene	1.66E-03	3.40E-03	6.80E-03	4.28E-04
PAHs (listed individually below)	1.31E-04	2.68E-04	5.36E-04	3.38E-05
Benzo(a)anthracene	2.26E-05			
Benzo(a)pyrene	1.39E-05			
Benzo(b)fluoranthrene	1.13E-05			
Benzo(k)fluoranthrene	1.10E-05			
Chrysene	2.52E-05			
Dibenz(a,h)anthracene	2.35E-05			
Indeno(1,2,3-cd)pyrene	2.35E-05			
Propylene oxide	2.96E-02	6.06E-02	1.21E-01	7.63E-03
Toluene	1.33E-01	2.72E-01	5.45E-01	3.43E-02
Xylene	6.53E-02	1.34E-01	2.67E-01	1.68E-02

1) All factors except PAHs, hexane and propylene from AP-42, Table 3.1-3, 4/00. Acrolein, benzene and formaldehyde reflect no oxidation catalyst, such as might occur during the first hour of a startup or commissioning. Individual PAHs, hexane and propylene are CATEF mean results (i.e., not in AP-42).

2) Single turbine maximum heat input (MMBtu/hr) = 2087
3) Natural gas heat content (Btu/scf high heating value, HHV) = 1019.3
4) Maximum single turbine hourly fuel flow (MMscf/hr) = 2.0474
5) Maximum turbine annual operating time (hours) = 4100
6) Maximum single turbine annual fuel flow (MMscf/yr) = 8394.5

Table 5.9B-3
Emergency Fire Water Pump Engine Criteria Pollutant Emissions

Parameter (Units)	Value
Rating (bhp)	240
Fuel	Diesel
Fuel Consumption (gal/hr)	11.2
Exhaust Temperature (F)	853
Exhaust Diameter (inches)	6
Exhaust Flow Rate (acfm)	1345
Exhaust Velocity (ft/sec)	114.17
Daily Operating Hours	1
Annual Operating Hours	50

	NOx	CO	VOC	PM10	SOx
Emission Factor (g/bhp-hr)	4.70	0.55	0.20	0.13	0.0049
Hourly Emissions (lbs/hr)	2.487E+00	2.910E-01	1.058E-01	6.878E-02	2.593E-03
Daily Emissions (lbs/day)	2.487E+00	2.910E-01	1.058E-01	6.878E-02	2.593E-03
Annual Emissions (lbs/year)	1.243E+02	1.455E+01	5.291E+00	3.439E+00	1.296E-01
Annual Emissions (tons/year)	6.217E-02	7.275E-03	2.646E-03	1.720E-03	6.481E-05

Table 5.9B-4
Maximum TAC Pollutant Emissions From Emergency Fire Water Pump Engine

Rating (bhp) =	240
Fuel =	Diesel
Fuel Consumption (gal/hr) =	11.2
Exhaust Temperature (F) =	853
Exhaust Diameter (inches) =	6
Exhaust Flow Rate (acfm) =	1345
Exhaust Velocity (ft/sec) =	114.1672423
Daily Operating Hours =	1
Annual Operating Hours =	50

TAC	Emission Factor [1]	Hourly Emission Rate		Annual Emission Rate	
	lbs/1000 gal	lbs/hr	g/s	lbs/yr	g/s
PM10		6.88E-02	1.91E-05	3.44E+00	1.09E-07
Acrolein	0.0339	3.80E-04	1.05E-07	1.90E-02	6.02E-10
Arsenic	0.0016	1.79E-05	4.98E-09	8.96E-04	2.84E-11
Benzene	0.1863	2.09E-03	5.80E-07	1.04E-01	3.31E-09
Copper	0.0041	4.59E-05	1.28E-08	2.30E-03	7.28E-11
Formaldehyde	1.7261	1.93E-02	5.37E-06	9.67E-01	3.07E-08
Hydrogen chloride	0.1863	2.09E-03	5.80E-07	1.04E-01	3.31E-09
Mercury	0.0020	2.24E-05	6.22E-09	1.12E-03	3.55E-11
Nickel	0.0039	4.37E-05	1.21E-08	2.18E-03	6.93E-11
Toluene	0.1054	1.18E-03	3.28E-07	5.90E-02	1.87E-09
Xylenes	0.0424	4.75E-04	1.32E-07	2.37E-02	7.53E-10

1) Ventura County Air Pollution Control District. AB 2588 Combustion Emission Factors,Diesel (Internal) Combustion Factors, May 17, 2001.

Table 5.9B-5
Calculation of Cancer Risk
Carlsbad Energy Center

Compound	Annual Average Emissions Per Turbine (g/s)	Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exp: Derived (OEHHA) Method		
		Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (2)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (3)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (4)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (5)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (6)
Gas Turbines																
Ammonia	7.71E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propylene	9.31E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetaldehyde	4.93E-03	3.77E-06	1.86E-02	2.99E-03	2.60E-06	1.28E-02	2.06E-03	3.77E-06	1.86E-02	2.99E-03	2.90E-06	1.43E-02	2.30E-03	5.72E-07	2.82E-03	4.54E-04
Acrolein	4.46E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzene	4.02E-04	3.77E-05	1.52E-02	2.44E-03	2.60E-05	1.05E-02	1.68E-03	3.77E-05	1.52E-02	2.44E-03	2.90E-05	1.17E-02	1.88E-03	5.72E-06	2.30E-03	3.70E-04
1,3-Butadiene	5.30E-05	2.26E-04	1.20E-02	1.93E-03	1.56E-04	8.27E-03	1.33E-03	2.26E-04	1.20E-02	1.93E-03	1.74E-04	9.22E-03	1.49E-03	3.43E-05	1.82E-03	2.93E-04
Ethylbenzene	3.94E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Formaldehyde	4.43E-02	7.91E-06	3.51E-01	5.64E-02	5.46E-06	2.42E-01	3.90E-02	7.91E-06	3.51E-01	5.64E-02	6.08E-06	2.69E-01	4.34E-02	1.20E-06	5.32E-02	8.56E-03
Hexane	3.13E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphthalene	2.00E-04	4.52E-05	9.06E-03	1.46E-03	3.12E-05	6.25E-03	1.01E-03	4.52E-05	9.06E-03	1.46E-03	3.48E-05	6.98E-03	1.12E-03	6.86E-06	1.37E-03	2.21E-04
PAHs (1)(listed individually below)	1.58E-05	3.98E-02	6.30E-01	1.01E-01	8.05E-03	1.27E-01	2.05E-02	4.02E-02	6.36E-01	1.02E-01	3.98E-02	6.30E-01	1.01E-01	1.47E-02	2.33E-01	3.74E-02
Benzo(a)anthracene		*3.98E-03*			*8.05E-04*			*4.02E-03*			*3.98E-03*			*1.47E-03*		
Benzo(a)pyrene		*3.98E-02*			*8.05E-03*			*4.02E-02*			*3.98E-02*			*1.47E-02*		
Benzo(b)fluoranthrene		*3.98E-03*			*8.05E-04*			*4.02E-03*			*3.98E-03*			*1.47E-03*		
Benzo(k)fluoranthrene		*3.98E-03*			*8.05E-04*			*4.02E-03*			*3.98E-03*			*1.47E-03*		
Chrysene		*3.98E-04*			*8.05E-05*			*4.02E-04*			*3.98E-04*			*1.47E-04*		
Dibenz(a,h)anthracene		*1.43E-02*			*3.47E-03*			*1.48E-02*			*1.43E-02*			*5.17E-03*		
Indeno(1,2,3-cd)pyrene		*3.98E-03*			*8.05E-04*			*4.02E-03*			*3.98E-03*			*1.47E-03*		
Propylene oxide	3.57E-03	4.90E-06	1.75E-02	2.82E-03	3.38E-06	1.21E-02	1.94E-03	4.90E-06	1.75E-02	2.82E-03	3.76E-06	1.34E-02	2.16E-03	7.43E-07	2.65E-03	4.27E-04
Toluene	1.61E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylene	7.88E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1.05E+00 per ug/m3	1.69E-01 in one million		4.19E-01 per ug/m3	6.75E-02 in one million		1.06E+00 per ug/m3	1.70E-01 in one million		9.55E-01 per ug/m3	1.54E-01 in one million		2.97E-01 per ug/m3	4.78E-02 in one million

(1) Maximum unit risk value applied to all PAHs for purposes of this analysis.
(2) Based on modeled cancer risk from both CTG (in one million) = 0.16946 and from engine (in one million) = 0.00080
(3) Based on modeled cancer risk from both CTG (in one million) = 0.0675 and from engine (in one million) = 0.00055
(4) Based on modeled cancer risk from both CTG (in one million) = 0.17048 and from engine (in one million) = 0.00080
(5) Based on modeled cancer risk from both CTG (in one million) = 0.15371 and from engine (in one million) = 0.00062
(6) Based on modeled cancer risk from both CTG (in one million) = 0.04777 and from engine (in one million) = 0.00012

Compound	Annual Average Emissions, g/s	Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exposure: Derived (OEHHA) Method		
		Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (2)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (3)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (4)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (5)	Unit Risk (per $\mu g/m^3$)	Cancer Risk Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Cancer Risk (6)
Diesel Emergency Fire Water Pump Engine Testing																
Diesel Exhaust Particulate Matter (DPM)	1.09E-07	4.15E-04	4.53E-05 per ug/m3	8.00E-04 in one million	2.86E-04	3.12E-05 per ug/m3	5.50E-04 in one million	4.15E-04	4.53E-05 per ug/m3	8.00E-04 in one million	3.19E-04	3.48E-05 per ug/m3	6.20E-04 in one million	6.29E-05	6.86E-06 per ug/m3	1.20E-04 in one million

The combined Maximum Incremental Cancer Risk (MICR) at the Point of Maximum Impact (PMI) is 0.15 and occurs at UTME and UTMN coordinates: 469250 3666550 in NAD 27.
The combined Maximum Incremental Cancer Risk (MICR) at the Maximally-Exposed Individual Resident (MEIR) is 0.075 and occurs at UTME and UTMN coordinates: 469928 3666111 in NAD 27.
The combined Maximum Incremental Cancer Risk (MICR) at the Maximally-Exposed Individual Worker (MEIW) is 0.080 and occurs at UTME and UTMN coordinates: 469728 3666090 in NAD 27.

Table 5.9B-6
Calculation of Gas Turbine HHIs
Carlsbad Energy Center

Compound	Max Hourly Emissions Per Turbine (g/s)	HARP Acute HI (per $\mu g/m^3$)	Acute HHI Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Acute HHI (1)	Annual Average Emissions (g/s)	HARP Chronic HI (per $\mu g/m^3$)	Chronic HHI Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Chronic HHI (2)
Ammonia	1.7660	3.13E-04	5.53E-04	7.78E-03	7.71E-01	5.00E-03	3.86E-03	6.20E-04
Propylene	0.1989	--	--	--	9.31E-02	3.33E-04	3.10E-05	4.99E-06
Acetaldehyde	1.053E-02	--	--	--	4.93E-03	1.11E-01	5.47E-04	8.80E-05
Acrolein	9.519E-04	5.26E+00	5.01E-03	7.05E-02	4.46E-04	1.67E+01	7.44E-03	1.20E-03
Benzene	8.591E-04	7.69E-04	6.61E-07	9.30E-06	4.02E-04	1.67E-02	6.71E-06	1.08E-06
1,3-Butadiene	1.133E-04	--	--	--	5.30E-05	5.00E-02	2.65E-06	4.26E-07
Ethylbenzene	8.410E-03	--	--	--	3.94E-03	5.00E-04	1.97E-06	3.17E-07
Formaldehyde	9.468E-02	1.06E-02	1.00E-03	1.41E-02	4.43E-02	3.33E-01	1.48E-02	2.37E-03
Hexane	6.682E-02	--	--	--	3.13E-02	1.43E-04	4.47E-06	7.19E-07
Naphthalene	4.282E-04	--	--	--	2.00E-04	1.11E-01	2.22E-05	3.58E-06
PAHs (listed individually below)	3.379E-05	--	--	--	1.58E-05	--	--	--
Benzo(a)anthracene								
Benzo(a)pyrene								
Benzo(b)fluoranthrene								
Benzo(k)fluoranthrene								
Chrysene								
Dibenz(a,h)anthracene								
Indeno(1,2,3-cd)pyrene								
Propylene oxide	7.631E-03	3.23E-04	2.46E-06	3.47E-05	3.57E-03	3.33E-02	1.19E-04	1.91E-05
Toluene	3.431E-02	2.70E-05	9.26E-07	1.30E-05	1.61E-02	3.33E-03	5.35E-05	8.60E-06
Xylene	1.685E-02	4.55E-05	7.66E-07	1.08E-05	7.88E-03	1.43E-03	1.13E-05	1.81E-06
		Total =	6.57E-03	9.25E-02		Total =	2.69E-02	4.32E-03

1) Based on modeled non-cancer acute HHI from both CTG (-) = 0.0925
2) Based on modeled non-cancer chronic HHI from both CTG (-) = 0.00432

Table 5.9B-7
Calculation of HHI Modeling Inputs for Gas Turbines During Commissioning Hours without Oxidation Catalyst
Carlsbad Energy Center

Compound	Max Hourly Emissions Per Turbine g/s	HARP Acute HI (per $\mu g/m^3$)	Acute HHI Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Acute HHI (1)
Ammonia	1.7660	3.13E-04	5.53E-04	4.48E-03
Propylene	0.1989	--	--	--
Acetaldehyde	1.05E-02	--	--	--
Acrolein	1.68E-03	5.26E+00	8.86E-03	7.19E-02
Benzene	3.15E-03	7.69E-04	2.42E-06	1.96E-05
1,3-Butadiene	1.13E-04	--	--	--
Ethylbenzene	8.41E-03	--	--	--
Formaldehyde	1.87E-01	1.06E-02	1.98E-03	1.61E-02
Hexane	6.68E-02	--	--	--
Naphthalene	4.28E-04	--	--	--
PAHs (listed individually below)	3.38E-05	--	--	--
Benzo(a)anthracene				
Benzo(a)pyrene				
Benzo(b)fluoranthrene				
Benzo(k)fluoranthrene				
Chrysene				
Dibenz(a,h)anthracene				
Indeno(1,2,3-cd)pyrene				
Propylene oxide	7.63E-03	3.23E-04	2.46E-06	2.00E-05
Toluene	3.43E-02	2.70E-05	9.26E-07	7.52E-06
Xylene	1.68E-02	4.55E-05	7.66E-07	6.22E-06
		Total =	1.14E-02	9.25E-02

1) Based on modeled non-cancer acute HHI from both CTG (-) = 0.0925

Table 5.9B-8
Calculation of Emergency Fire Water Pump Engine HHIs
Carlsbad Energy Center

Non-Criteria Pollutant	Max Hourly Emissions (g/s)	HARP Acute HI (per $\mu g/m^3$)	Acute HHI Model Input (g/s per $\mu g/m^3$)	Modeled Contribution to Acute HHI	Annual Average Emissions (g/s)	HARP Chronic HI (per $\mu g/m^3$)	Chronic HHI Model Input (g/s per $\mu g/m3$)	Modeled Contribution to Chronic HHI
Fire Water Pump Engine								
DPM	NA	NA	NA	NA	1.09E-07	0.2	2.18E-08	< 0.0001
Acrolein	1.05E-07	5.26E+00	5.55E-07	3.19E-04				
Arsenic	4.98E-09	5.26E+00	2.62E-08	1.50E-05				
Benzene	5.80E-07	7.69E-04	4.46E-10	2.56E-07				
Copper	1.28E-08	1.00E-02	1.28E-10	7.33E-08				
Formaldehyde	5.37E-06	1.06E-02	5.69E-08	3.27E-05				
Hydrogen chloride	5.80E-07	4.76E-04	2.76E-10	1.59E-07				
Mercury	6.22E-09	5.56E-01	3.46E-09	1.99E-06				
Nickel	1.21E-08	1.67E-01	2.02E-09	1.16E-06				
Toluene	3.28E-07	2.70E-05	8.85E-12	5.08E-09				
Xylenes	1.32E-07	4.55E-05	6.00E-12	3.45E-09				
		Total =	6.44E-07	3.70E-04				

Table 5.9B-9
Summary of Modeling Inputs
Carlsbad Energy Center

Emitting Unit	Derived (OEHHA) Method Cancer Risk Model Input (Res)	Average Point Estimate Cancer Risk Model Input (Res)	High-end Point Estimate Cancer Risk Model Input (Res)	Derived (Adjusted) Method Cancer Risk Model Input (Res)	Derived (OEHHA) Method Cancer Risk Model Input (Worker)	Acute HHI Model Input	Chronic HHI Model Input
Turbine acute HHI wo ox cat						1.140E-02	
Each Turbine	1.052E+00	4.191E-01	1.059E+00	9.545E-01	2.967E-01	6.568E-03	2.685E-02
Fire Water Pump Engine	4.526E-05	3.119E-05	4.526E-05	3.479E-05	6.860E-06	6.442E-07	2.181E-08

All modeling input values are in units of g/s per $\mu g/m^3$

Table 5.9B-10

Maximum Potential to Emit Annual Non-Criteria Pollutant Emissions For Existing Units

Pollutant	Boiler Emission Factors(1) lb/MMscf	GT Emission Factors(2) lb/MMscf	Unit 1 Max Firing Rate MMBtu/hr	Unit 2 Max Firing Rate MMBtu/hr	Unit 3 Max Firing Rate MMBtu/hr	Unit 4 Max Firing Rate MMBtu/hr	Unit 5 Max Firing Rate MMBtu/hr	GT Max Firing Rate MMBtu/hr	Natural Gas HHV Btu/scf	Per Unit Operating Hours hrs/yr	Unit 1 Annual Avg Firing Rate MMscf/yr	Unit 2 Annual Avg Firing Rate MMscf/yr	Unit 3 Annual Avg Firing Rate MMscf/yr	Unit 4 Annual Avg Firing Rate MMscf/yr	Unit 5 Annual Avg Firing Rate MMscf/yr	GT Annual Avg Firing Rate MMscf/yr	Unit 1 Annual Emissions tons/yr	Unit 2 Annual Emissions tons/yr	Unit 3 Annual Emissions tons/yr	Unit 4 Annual Emissions tons/yr	Unit 5 Annual Emissions tons/yr	GT Annual Emissions tons/yr	Total tons/yr
Benzene	2.10E-03	1.22E-02	1,013.0	1,013.0	1,128.0	3,245.0	3,475.0	317.0	1,019.3	8,760	8,706	8,706	9,694	27,887	29,864	2,724	0.01	0.01	0.01	0.03	0.03	0.02	0.11
Formaldehyde	7.50E-02	7.24E-01	1,013.0	1,013.0	1,128.0	3,245.0	3,475.0	317.0	1,019.3	8,760	8,706	8,706	9,694	27,887	29,864	2,724	0.33	0.33	0.36	1.05	1.12	0.99	4.17
Hexane	1.30E-03		1,013.0	1,013.0	1,128.0	3,245.0	3,475.0	317.0	1,019.3	8,760	8,706	8,706	9,694	27,887	29,864	2,724	0.01	0.01	0.01	0.02	0.02	0.00	0.06
Naphthalene	6.10E-04	1.30E-03	1,013.0	1,013.0	1,128.0	3,245.0	3,475.0	317.0	1,019.3	8,760	8,706	8,706	9,694	27,887	29,864	2,724	0.00	0.00	0.00	0.01	0.01	0.00	0.03
Dichlorobenzene	1.20E-03		1,013.0	1,013.0	1,128.0	3,245.0	3,475.0	317.0	1,019.3	8,760	8,706	8,706	9,694	27,887	29,864	2,724	0.01	0.01	0.01	0.02	0.02	0.00	0.05
Toluene	3.40E-03	1.33E-01	1,013.0	1,013.0	1,128.0	3,245.0	3,475.0	317.0	1,019.3	8,760	8,706	8,706	9,694	27,887	29,864	2,724	0.01	0.01	0.02	0.05	0.05	0.18	0.33
1,3-Butadiene		4.00E-04														2,724						0.00	0.00
Acetaldehyde		4.08E-02														2,724						0.06	0.06
Acrolein		6.50E-03														2,724						0.01	0.01
Ethyl Benzene		3.26E-02														2,724						0.04	0.04
PAHs (other)		2.20E-03														2,724						0.00	0.00
Xylene		6.53E-02														2,724						0.09	0.09
Total HAPs =																							4.93

Notes:

(1) All factors except hexane from the SDAPCD 2005 Toxic Inventory Report for the Encina Power Plant, November 17, 2006.
Hexane from the Ventura County APCD AB2588 emission factors for natural gas external combustion equipment (greater than 100 MMBtu/hr), May 17, 2001.

(2) All factors from the SDAPCD 2005 Toxic Inventory Report for the Encina Power Plant, November 17, 2006.

Table 5.9B-11
Calculation of Construction Cancer Risk
Carlsbad Energy Center

	HRA Method:	Derived (OEHHA) Method		Average Point Estimate		High-End Point Estimate		Derived (Adjusted) Method		Worker Exposure: Derived (OEHHA) Method	
Toxic Air Contaminant	Maximum Annual Average Concentration (µg/m3)	Unit Risk (per $\mu g/m^3$)	Cancer Risk (in one million)	Unit Risk (per $\mu g/m^3$)	Cancer Risk (in one million)	Unit Risk (per $\mu g/m^3$)	Cancer Risk (in one million)	Unit Risk (per $\mu g/m^3$)	Cancer Risk (in one million)	Unit Risk (per $\mu g/m^3$)	Cancer Risk (in one million)
Construction Equipment Diesel Engine Exhaust											
Diesel Exhaust Particulate Matter (DPM)	0.74	4.15E-04	39 (1)	2.86E-04	27 (1)	4.15E-04	39 (1)	3.19E-04	30 (1)	6.29E-05	10 (1)
			9.1 (2)		6.3 (2)		9.1 (2)		7.0 (2)		2.4 (2)

1) The 70-year cancer risk is reduced by the ratio 9/70 to recognize the smaller impact of the temporary 25-month construction period, following guidance in OEHHA (2003).

2) The 70-year cancer risk is reduced by the ratio (25/12)/70 to recognize the smaller impact of the temporary 25-month construction period.