APPENDIX 5.1C

Screening Health Risk Assessment

The screening level health risk assessment has been prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program and associated guidance in the OEHHA's Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (August 2003). The HARP model was used to assess cancer risk as well as chronic and acute risk impacts. The following paragraphs describe the procedures used to prepare this risk assessment.

Modeling Inputs

The risk assessment module of the HARP model was run using unit ground level impacts to obtain derived cancer risks for each toxic chemical of interest.2 Cancer risks were obtained for the derived (OEHHA) method, the derived (adjusted) method, average point estimate and high-end point estimate options. The HARP model output was cancer risk by pollutant and route for each type of analysis, based on an exposure of 1.0 μg/m3. The results of the turbine screening analysis were then combined with the HARP unit values to determine final actual cancer risk and hazard indices. HARP model output showing the unit values is included as Attachment HRA-2. Individual cancer risks are expressed in units of risk per μg/m3 of exposure. To calculate the weighted risk for each source, the annual average emission rate in g/s for each pollutant was multiplied by the individual cancer risk for that pollutant in (μg/m3)-1. The resulting weighted cancer risks for each pollutant were then summed for the source. An identical approach was used to determine the acute and chronic health impacts associated with the proposed project.

Risk Analysis Method

The total weighted risk "rate" for each source was used in place of emission rates with the modeled unit impacts from the turbine screening analysis. The calculated value was then the total cancer risk at each receptor. As discussed in Section 5.1.5.3.1, the turbine screening modeling analysis for the criteria pollutant modeling analysis was performed using the AERMOD model, the meteorological data collected at the Travis AFB in Fairfield during the period from 2003 through 2007, specific receptor grids, and the stack parameters for six turbine operating cases. The highest full-load annual average unit impact from the screening analysis was used to characterize cancer risks for the proposed project.

The chronic health hazard index is calculated in the same manner using the same annual average modeled unit impact and the total weighted chronic HHI input value. The acute health hazard index is calculated using the maximum annual full load one-hour average unit impact and the total weighted acute HHI input value.

Summary of Results

The results of the screening level health risk assessment are summarized in the following table.

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[2] Procedure is described in Part B of Topic 8 of the HARP How-To Guides: How to Perform Health Analyses Using a Ground Level Concentration.

Table 5.1C-1 Screening Level Risk Assessment Results	
Risk Methodology	Gas Turbines
Modeled Residential Cancer Risk (in one million)	
Residential: Derived (OEHHA) Method	3.0
Residential: Average Point Estimate	1.4
Residential: High-end Point Estimate	3.1
Residential: Derived (adjusted) Method	277
Modeled Worker Cancer Risk (in one million)	
Worker Exposure: Derived (OEHHA) Method	0.8
Modeled Acute and Chronic Impacts	
Acute HHI	0.05
Chronic HHI	0.11

As shown in Table 5.1C-1, the cancer risk from the project is well below the YSAQMD significance level of 10 in one million. In addition, the acute and chronic health impacts are well below the YSAQMD significance level of one. Consequently, there are no significant toxic air contaminant impacts issues associated with the proposed project.

Figure 5.1C-1

Derived OEHHA Cancer Risk (in a million)

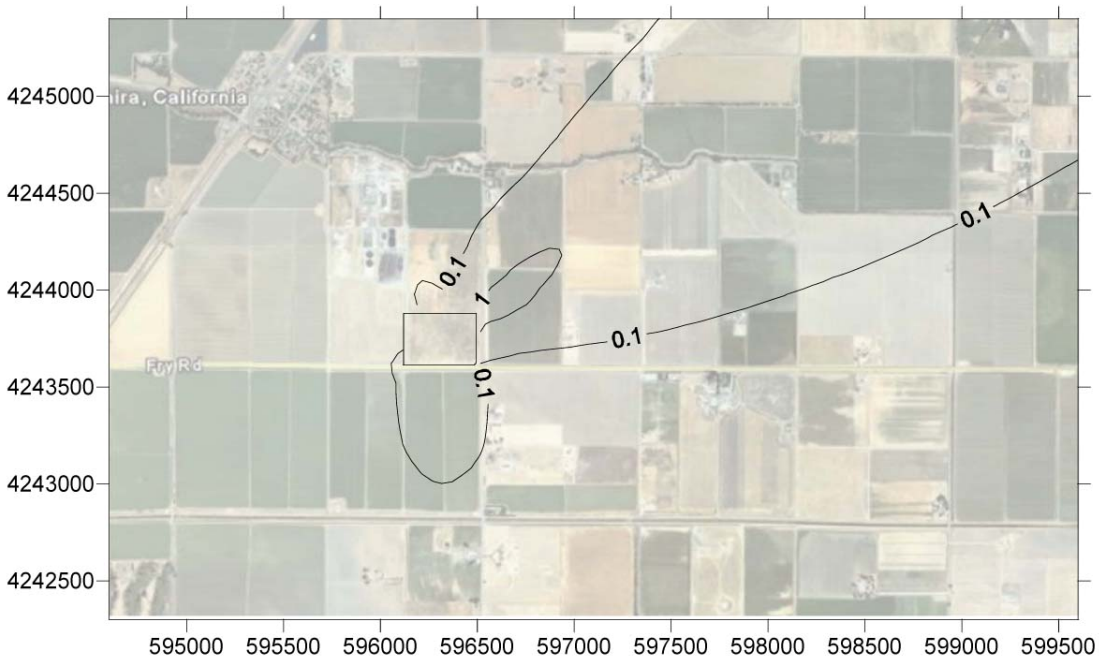

Table 5.1C-2
Calculation of Noncriteria Pollutant Emissions from Gas Turbines
GE 7FA with HRSG

Compound	Emission Factor, lb/MMscf (1)	Maximum Hourly Emissions, lb/hr Each CTG (2)	Maximum Hourly Emissions, lb/hr Total, 2 CTGs	Total Annual Emissions, 2 CTGs (3) lb/yr	Total Annual Emissions, 2 CTGs (3) tpy
Ammonia	(4)	15.64	31.27	206,591.4	103.3
Propylene	7.71E-01	1.74	3.47	26,411.0	13.2
Hazardous Air Pollutants					
Acetaldehyde	4.08E-02	9.19E-02	1.84E-01	1,397.6	0.70
Acrolein	3.69E-03	8.31E-03	1.66E-02	126.4	6.32E-02
Benzene	3.33E-03	7.50E-03	1.50E-02	114.1	5.70E-02
1,3-Butadiene	4.39E-04	9.89E-04	1.98E-03	15.0	7.52E-03
Ethylbenzene	3.26E-02	7.34E-02	1.47E-01	1,116.7	5.58E-01
Formaldehyde	3.67E-01	0.83	1.65	12,571.8	6.29
Hexane	2.59E-01	0.58	1.17	8,872.2	4.44
Naphthalene	1.66E-03	3.74E-03	7.48E-03	56.9	2.84E-02
PAHs (listed individually below)	1.79E-04	4.03E-04	8.07E-04	6.1	3.07E-03
Anthracene	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	2.98E-02	6.71E-02	0.13	1,020.8	0.51
Toluene	1.33E-01	3.00E-01	0.60	4,556.0	2.28
Xylene	6.53E-02	1.47E-01	0.29	2,236.9	1.12
Total HAPs			4.22	32,090.4	16.05

Notes:

(1) All factors except PAHs, hexane and propylene from AP-42, Table 3.4-1. Acrolein, benzene and formaldehyde reflect oxidation catalyst. Individual PAHs, hexane and propylene are CATEF mean results as AP-42 does not include factors for these compounds.

(2) Based on max hourly per turbine fuel use of 2,327 MMBtu/hr and fuel HHV of 1032.91 Btu/scf. 2.25 MMscf/hr

(3) Based on total annual turbine fuel use of 35,382,800 MMBtu/yr fuel HHV of 1032.91 Btu/scf. 34,255 MMscf/yr

(4) Based on 5 ppm ammonia slip from SCR system.

Table 5.1C-3
Auxiliary Boiler
Annual and Maximum Hourly Non-Criteria Pollutant Emissions (per unit)

Pollutant	Emission Factor lb/MM Cu Ft	Boiler Max firing rate MM Cu Ft/hr	Boiler Fuel Use MM Cu Ft/yr	Boiler Emissions lbs/hr	Boiler Emissions tons/yr	Hourly Emission Rate g/sec	Annual Emission Rate g/sec
Acetaldehyde		0.036	138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrolein		0.036	138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	2.10E-03	0.036	138	7.52E-05	5.19E-06	9.48E-06	1.49E-07
Formaldehyde	7.50E-02	0.036	138	2.69E-03	1.85E-04	3.39E-04	5.33E-06
Hexane	1.80E+00	0.036	138	6.45E-02	4.45E-03	8.12E-03	1.28E-04
Naphthalene	6.10E-04	0.036	138	2.19E-05	1.51E-06	2.75E-06	4.33E-08
PAHs – Total	1.00E-04	0.036	138	3.58E-06	2.47E-07	4.51E-07	7.11E-09
Benzo(a)anthracene							
Benzo(a)pyrene							
Benzo(b)fluoranthene							
Benzo(k)fluoranthene							
Chrysene							
Dibenzo(a,h)anthrancene							
Indeno(1,2,3-cd)pyrene							
Toluene	3.40E-03	0.036	138	1.22E-04	8.40E-06	1.53E-05	2.42E-07
Xylene		0.036	138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HAP Total =				**0.0674**	**0.0046**		

Table 5.1C-4
Diesel Engines
Annual and Maximum Hourly Non-Criteria Pollutant Emissions (per unit)

Pollutant	Engine Emissions lbs/hr	Engine Emissions tons/yr	Hourly Emission Rate g/sec	Annual Emission Rate g/sec
Emergency Engine				
Diesel Particulate	7.61E-02	1.90E-03	9.58E-03	5.47E-05
Firepump Engine				
Diesel Particulate	7.94E-02	1.98E-03	1.00E-02	5.71E-05
HAP Total =	**0.0794**	**0.0020**		

Table 5.1C-5
CPV Vaca Station
Annual and Maximum Hourly Non-Criteria Pollutant Emissions From Siemens SGT6500F 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	1.56E+01	3.13E+01	51.65	103.30	1.97E+00	1.49E+00
Propylene	7.71E-01	1.87E+00	3.74E+00	7.18	14.35	2.36E-01	2.06E-01
Hazardous Air Pollutants (HAPs, federal)	-						
Acetaldehyde	4.08E-02	9.91E-02	1.98E-01	0.38	0.76	1.25E-02	1.09E-02
Acrolein	3.69E-03	8.96E-03	1.79E-02	0.034	0.069	1.13E-03	9.88E-04
Benzene	3.33E-03	8.09E-03	1.62E-02	0.031	0.062	1.02E-03	8.92E-04
1,3-Butadiene	4.39E-04	1.07E-03	2.13E-03	0.0041	0.0082	1.34E-04	1.18E-04
Ethylbenzene	3.26E-02	7.92E-02	1.58E-01	0.30	0.61	9.97E-03	8.73E-03
Formaldehyde	3.67E-01	8.91E-01	1.78E+00	3.42	6.83	1.12E-01	9.83E-02
Hexane	2.59E-01	6.29E-01	1.26E+00	2.41	4.82	7.92E-02	6.94E-02
Naphthalene	1.66E-03	4.03E-03	8.06E-03	0.0155	0.031	5.08E-04	4.45E-04
PAHs (listed individually below)	1.31E-04	3.18E-04	6.36E-04	0.00122	2.44E-03	4.01E-05	3.51E-05
Benzo(a)anthracene	2.26E-05	5.49E-05	1.10E-04	0.00021	4.21E-04	6.91E-06	6.05E-06
Benzo(a)pyrene	1.39E-05	3.38E-05	6.75E-05	0.00013	2.59E-04	4.25E-06	3.72E-06
Benzo(b)fluoranthrene	1.13E-05	2.74E-05	5.49E-05	0.00011	2.10E-04	3.46E-06	3.03E-06
Benzo(k)fluoranthrene	1.10E-05	2.67E-05	5.34E-05	0.00010	2.05E-04	3.37E-06	2.95E-06
Chrysene	2.52E-05	6.12E-05	1.22E-04	0.00023	4.69E-04	7.71E-06	6.75E-06
Dibenz(a,h)anthracene	2.35E-05	5.71E-05	1.14E-04	0.00022	4.38E-04	7.19E-06	6.29E-06
Indeno(1,2,3-cd)pyrene	2.35E-05	5.71E-05	1.14E-04	0.00022	4.38E-04	7.19E-06	6.29E-06
Propylene oxide	3.00E-02	7.27E-02	1.45E-01	0.28	0.56	9.16E-03	8.02E-03
Toluene	1.33E-01	3.23E-01	6.46E-01	1.24	2.48	4.07E-02	3.56E-02
Xylene	6.53E-02	1.59E-01	3.17E-01	0.61	1.22	2.00E-02	1.75E-02
Total HAPs =					17.44		

1) All factors are from AP-42, Table 3.1-3, 4/00 except PAHs, hexane, propylene and the following three that are reduced according to the control effectiveness of the oxidation catalyst: acrolein (42.4%), benzene (72.8%) and formaldehyde (49.3%). 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) = 2,508

3) Natural gas heat content (Btu/scf high heating value, HHV) = 1,032.9

4) Maximum single turbine hourly fuel flow (MMscf/hr) = 2.43

5) Maximum single turbine annual fuel flow (MMscf/yr) = 18,617

Non-Criteria Pollutant Emissions from Emergency Standby Engines

Engine	Toxic Air Contaminant	Emission Rate Hourly (lbs/hr)	Emission Rate Annual (tons/yr)	g/sec Hourly	g/sec Annual
Generator Engine	Diesel PM	0.076	0.0019	9.58E-03	5.47E-05
Fire Water Pump Engine	Diesel PM	0.079	0.0020	1.00E-02	5.71E-05

Table 5.1C-5A
Auxiliary Boiler
Annual and Maximum Hourly Non-Criteria Pollutant Emissions (per unit)

Pollutant	Emission Factor [1] lb/MMscf	Boiler Fuel Use Rate Max Hourly MMscf/hr	Boiler Fuel Use Rate Annual MMscf/yr	Boiler Emissions lbs/hr	Boiler Emissions tons/yr	Emission Rate Hourly g/sec	Emission Rate Annual
Propylene	1.55E-02	0.036	137.9	5.56E-04	1.07E-03	7.01E-05	3.08E-05
Hazardous Air Pollutants							
Acetaldehyde [2]	8.90E-03	0.036	137.9	3.19E-04	6.14E-04	4.02E-05	1.77E-05
Acrolein [2]	2.70E-03	0.036	137.9	9.67E-05	1.86E-04	1.22E-05	5.36E-06
Benzene	2.10E-03	0.036	137.9	7.52E-05	1.45E-04	9.48E-06	4.17E-06
Ethylbenzene [3]	2.00E-03	0.036	137.9	7.16E-05	1.38E-04	9.03E-06	3.97E-06
Formaldehyde	7.50E-02	0.036	137.9	2.69E-03	5.17E-03	3.39E-04	1.49E-04
Hexane [3]	1.30E-03	0.036	137.9	4.66E-05	8.96E-05	5.87E-06	2.58E-06
Naphthalene	6.10E-04	0.036	137.9	2.19E-05	4.21E-05	2.75E-06	1.21E-06
PAHs – Total	1.31E-04	0.036	137.9	4.69E-06	9.03E-06	5.91E-07	2.60E-07
Benzo(a)anthracene	2.26E-05	0.036	137.9	8.10E-07	1.56E-06	1.02E-07	4.48E-08
Benzo(a)pyrene	1.39E-05	0.036	137.9	4.98E-07	9.58E-07	6.27E-08	2.76E-08
Benzo(b)fluoranthene	1.13E-05	0.036	137.9	4.05E-07	7.79E-07	5.10E-08	2.24E-08
Benzo(k)fluoranthene	1.10E-05	0.036	137.9	3.94E-07	7.59E-07	4.96E-08	2.18E-08
Chrysene	2.52E-05	0.036	137.9	9.03E-07	1.74E-06	1.14E-07	5.00E-08
Dibenzo(a,h)anthrancene	2.35E-05	0.036	137.9	8.42E-07	1.62E-06	1.06E-07	4.66E-08
Indeno(1,2,3-cd)pyrene	2.35E-05	0.036	137.9	8.42E-07	1.62E-06	1.06E-07	4.66E-08
Toluene	3.40E-03	0.036	137.9	1.22E-04	2.34E-04	1.53E-05	6.74E-06
Xylene [3]	2.00E-02	0.036	137.9	7.16E-04	1.38E-03	9.03E-05	3.97E-05
HAP Total =				**0.0042**	**0.0080**		

(1) Emission factors from AP-42 (USEPA. *Compilation of Air Pollutant Emission Factors, Volume 1 - Stationary Point and Area Sources, Chapter 1 - External Combustion, Section 1.4 -Natural Gas Combustion,* Table 1.4-3, July 1998.
(2) Emission factor from CATEF.
(3) Ventura County APCD.

Table 5.1C-5B
Calculation of Noncriteria Pollutant Emissions from Cooling Tower (1)
CPV Vaca
Station

Constituent	Concentration in Cooling Tower Return Water (2) (ppmw, mg/l)	Emissions			Model Input Emission Rate	
		lb/hr	ton/yr	lbs/year	Hourly (g/s)	Annual (g/s)
Copper	1.38E-01	6.38E-05	2.79E-04	5.6E-01	8.03E-06	8.0E-06
Zinc	6.89E-01	3.19E-04	1.40E-03	2.8E+00	4.02E-05	4.0E-05
Hazardous Air Pollutants						
Antimony	4.92E-03	2.28E-06	9.97E-06	1.99E-02	2.87E-07	2.9E-07
Arsenic	1.60E-02	7.40E-06	3.24E-05	6.48E-02	9.32E-07	9.3E-07
Beryllium	4.68E-02	2.16E-05	9.47E-05	1.89E-01	2.73E-06	2.7E-06
Cadmium	1.23E-03	5.69E-07	2.49E-06	4.99E-03	7.17E-08	7.2E-08
Chromium (VI)	2.46E-03	1.14E-06	4.99E-06	9.97E-03	1.43E-07	1.4E-07
Cyanide	1.85E-02	8.54E-06	3.74E-05	7.48E-02	1.08E-06	1.1E-06
Lead	1.05E-02	4.84E-06	2.12E-05	4.24E-02	6.10E-07	6.1E-07
Manganese	1.12E-01	5.18E-05	2.27E-04	4.54E-01	6.53E-06	6.5E-06
Mercury	7.26E-05	3.36E-08	1.47E-07	2.94E-04	4.23E-09	4.2E-09
Nickel	4.92E-02	2.28E-05	9.97E-05	1.99E-01	2.87E-06	2.9E-06
Selenium	1.48E-02	6.83E-06	2.99E-05	5.98E-02	8.61E-07	8.6E-07
Total HAPs			5.60E-04	1.12		

(1) Emissions calculated from maximum drift rate of 462.32 lb/hr.
(2) Cycles of concentration = 12.3 , based on Final recirculating water TDS (mg/l) = 9,000 , and Initial makeup water TDS (mg/l) = 731

Table 5.1C-6 Calculation of Cancer Risk

Toxic Air Contaminant	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 µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk
Siemens SGT6500F Gas Turbines																
Acetaldehyde	1.09E-02	3.77E-06	4.12E-02	6.93E-02	2.60E-06	2.84E-02	3.34E-02	3.77E-06	4.12E-02	6.94E-02	2.90E-06	3.17E-02	5.85E-02	5.72E-07	6.25E-03	1.44E-02
Benzene	8.92E-04	3.77E-05	3.36E-02	5.66E-02	2.60E-05	2.32E-02	2.72E-02	3.77E-05	3.36E-02	5.67E-02	2.90E-05	2.59E-02	4.78E-02	5.72E-06	5.10E-03	1.18E-02
1,3-Butadiene	1.18E-04	2.26E-04	2.66E-02	4.47E-02	1.56E-04	1.83E-02	2.15E-02	2.26E-04	2.66E-02	4.48E-02	1.74E-04	2.05E-02	3.78E-02	3.43E-05	4.03E-03	9.30E-03
Formaldehyde	9.83E-02	7.91E-06	7.77E-01	1.31E+00	5.46E-06	5.37E-01	6.30E-01	7.91E-06	7.77E-01	1.31E+00	6.08E-06	5.98E-01	1.10E+00	1.20E-06	1.18E-01	2.72E-01
Naphthalene	4.45E-04	4.52E-05	2.01E-02	3.38E-02	3.12E-05	1.39E-02	1.63E-02	4.52E-05	2.01E-02	3.39E-02	3.48E-05	1.55E-02	2.86E-02	6.86E-06	3.05E-03	7.04E-03
PAHs [(1)](listed individually below)																
Benzo(a)anthracene	6.05E-06	3.98E-03	2.41E-02	4.05E-02	8.05E-04	4.87E-03	5.72E-03	4.02E-03	2.43E-02	4.10E-02	3.98E-03	2.41E-02	4.45E-02	*1.47E-03*	8.90E-03	2.05E-02
Benzo(a)pyrene	3.72E-06	3.98E-02	1.48E-01	2.49E-01	8.05E-03	3.00E-02	3.52E-02	4.02E-02	1.50E-01	2.52E-01	3.98E-02	1.48E-01	2.74E-01	*1.47E-02*	5.47E-02	1.26E-01
Benzo(b)fluoranthrene	3.03E-06	3.98E-03	1.20E-02	2.03E-02	8.05E-04	2.44E-03	2.86E-03	4.02E-03	1.22E-02	2.05E-02	3.98E-03	1.20E-02	2.22E-02	*1.47E-03*	4.45E-03	1.03E-02
Benzo(k)fluoranthrene	2.95E-06	3.98E-03	1.17E-02	1.97E-02	8.05E-04	2.37E-03	2.79E-03	4.02E-03	1.18E-02	2.00E-02	3.98E-03	1.17E-02	2.17E-02	*1.47E-03*	4.33E-03	9.99E-03
Chrysene	6.75E-06	3.98E-04	2.69E-03	4.52E-03	8.05E-05	5.43E-04	6.38E-04	4.02E-04	2.71E-03	4.57E-03	3.98E-04	2.69E-03	4.96E-03	*1.47E-04*	9.92E-04	2.29E-03
Dibenz(a,h)anthracene	6.29E-06	1.43E-02	9.00E-02	1.51E-01	3.47E-03	2.18E-02	2.57E-02	1.48E-02	9.31E-02	1.57E-01	1.43E-02	9.00E-02	1.66E-01	*5.17E-03*	3.25E-02	7.51E-02
Indeno(1,2,3-cd)pyrene	6.29E-06	3.98E-03	2.50E-02	4.22E-02	8.05E-04	5.07E-03	5.95E-03	4.02E-03	2.53E-02	4.27E-02	3.98E-03	2.50E-02	4.63E-02	*1.47E-03*	9.25E-03	2.13E-02
Propylene oxide	8.02E-03	4.90E-06	3.93E-02	6.62E-02	3.38E-06	2.71E-02	3.19E-02	4.90E-06	3.93E-02	6.63E-02	3.76E-06	3.02E-02	5.57E-02	7.43E-07	5.96E-03	1.37E-02
			1.25E+00 per µg/m^3	2.11E+00 in one million		7.15E-01 per µg/m^3	8.40E-01 in one million		1.26E+00 per µg/m^3	2.12E+00 in one million		1.03E+00 per µg/m^3	1.91E+00 in one million		2.57E-01 per µg/m^3	5.94E-01 in one million

(1) Maximum unit risk value applied to all PAHs for purposes of this analysis.

Table 5.1C-6 Calculation of Cancer Risk, Continued

		Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exposure: Derived (OEHHA) Method		
Compound	Annual Average Emissions, g/s	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk
Diesel Emergency Engines																
Generator Engine DPM	5.47E-05	4.15E-04	2.27E-02	5.40E-01	2.86E-04	1.56E-02	3.72E-01	4.15E-04	2.27E-02	5.40E-01	3.19E-04	1.74E-02	4.15E-01	6.29E-05	3.44E-03	8.19E-02
Fire Water Pump Engine DPM	5.71E-05	4.15E-04	2.37E-02	9.84E-01	2.86E-04	1.63E-02	6.78E-01	4.15E-04	2.37E-02	9.84E-01	3.19E-04	1.82E-02	7.56E-01	6.29E-05	3.59E-03	1.49E-01
			per µg/m^3	in one million		per µg/m^3	in one million		per µg/m^3	in one million		per µg/m^3	in one million		per µg/m^3	in one million

		Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exp: Derived (OEHHA) Method		
Compound	Annual Average Emissions (g/s)	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk
Auxiliary Boiler																
Acetaldehyde	1.77E-05	3.77E-06	6.66E-05	1.58E-03	2.60E-06	4.59E-05	1.09E-03	3.77E-06	6.66E-05	1.58E-03	2.90E-06	5.12E-05	1.22E-03	5.72E-07	1.01E-05	2.40E-04
Benzene	4.17E-06	3.77E-05	1.57E-04	3.74E-03	2.60E-05	1.08E-04	2.58E-03	3.77E-05	1.57E-04	3.74E-03	2.90E-05	1.21E-04	2.87E-03	5.72E-06	2.38E-05	5.67E-04
Formaldehyde	1.49E-04	7.91E-06	1.18E-03	2.80E-02	5.46E-06	8.12E-04	1.93E-02	7.91E-06	1.18E-03	2.80E-02	6.08E-06	9.05E-04	2.15E-02	1.20E-06	1.79E-04	4.25E-03
Naphthalene	1.21E-06	4.52E-05	5.4693E-05	1.30E-03	3.12E-05	3.78E-05	8.98E-04	4.52E-05	5.47E-05	1.30E-03	3.48E-05	4.21E-05	1.00E-03	6.86E-06	8.30E-06	1.98E-04
Polycyclic Aromatic Hydrocarbons	2.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(a)anthracene	4.48E-08	3.98E-03	1.78E-04	1.63E-02	8.05E-04	3.61E-05	2.31E-03	4.02E-03	1.80E-04	1.64E-02	3.98E-03	1.78E-04	1.72E-02	*1.47E-03*	6.59E-05	7.10E-03
Benzo(a)pyrene	2.76E-08	3.98E-02	1.10E-03	1.00E-01	8.05E-03	2.22E-04	1.42E-02	4.02E-02	1.11E-03	1.01E-01	3.98E-02	1.10E-03	1.06E-01	*1.47E-02*	4.05E-04	4.37E-02
Benzo(b)fluoranthrene	2.24E-08	3.98E-03	8.92E-05	8.14E-03	8.05E-04	1.80E-05	1.15E-03	4.02E-03	9.01E-05	8.21E-03	3.98E-03	8.92E-05	8.62E-03	*1.47E-03*	3.30E-05	3.55E-03
Benzo(k)fluoranthrene	2.18E-08	3.98E-03	8.68E-05	7.93E-03	8.05E-04	1.76E-05	1.12E-03	4.02E-03	8.77E-05	7.99E-03	3.98E-03	8.68E-05	8.39E-03	*1.47E-03*	3.21E-05	3.46E-03
Chrysene	5.00E-08	3.98E-04	1.99E-05	1.82E-03	8.05E-05	4.02E-06	2.57E-04	4.02E-04	2.01E-05	1.83E-03	3.98E-04	1.99E-05	1.92E-03	*1.47E-04*	7.35E-06	7.92E-04
Dibenz(a,h)anthracene	4.66E-08	1.43E-02	6.67E-04	6.09E-02	3.47E-03	1.62E-04	1.03E-02	1.48E-02	6.90E-04	6.29E-02	1.43E-02	6.67E-04	6.44E-02	*5.17E-03*	2.41E-04	2.60E-02
Indeno(1,2,3-cd)pyrene	4.66E-08	3.98E-03	1.86E-04	1.69E-02	8.05E-04	3.75E-05	2.40E-03	4.02E-03	1.87E-04	1.71E-02	3.98E-03	1.86E-04	1.79E-02	*1.47E-03*	6.85E-05	7.39E-03
			3.78E-03 per µg/m^3	3.45E-01 in one million		1.50E-03 per µg/m^3	9.60E-02 in one million		3.82E-03 per µg/m^3	3.48E-01 in one million		3.44E-03 per µg/m^3	3.33E-01 in one million		1.07E-03 per µg/m^3	1.16E-01 in one million

		Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exp: Derived (OEHHA) Method		
Compound	Annual Average Emissions (g/s)	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk	Unit Risk (per µg/m^3)	Cancer Risk Model Input (g/s per µg/m^3)	Modeled Contribution to Cancer Risk
Cooling Tower																
Arsenic	9.32E-07	3.40E-02	3.17E-02	4.96E-01	1.45E-02	1.35E-02	2.12E-01	3.54E-02	3.30E-02	5.17E-01	3.40E-02	3.17E-02	4.96E-01	1.19E-02	1.11E-02	1.74E-01
Beryllium	2.73E-06	3.17E-03	8.64E-03	1.35E-01	2.18E-03	5.94E-03	9.30E-02	3.17E-03	8.64E-03	1.35E-01	2.43E-03	6.62E-03	1.04E-01	4.80E-04	1.31E-03	2.05E-02
Cadmium	7.17E-08	5.65E-03	4.05E-04	6.35E-03	3.90E-03	2.80E-04	4.38E-03	5.65E-03	4.05E-04	6.35E-03	4.34E-03	3.11E-04	4.87E-03	8.57E-04	6.15E-05	9.63E-04
Chromium (VI)	1.43E-07	1.92E-01	2.75E-02	4.31E-01	1.33E-01	1.91E-02	2.99E-01	1.92E-01	2.75E-02	4.31E-01	1.48E-01	2.12E-02	3.32E-01	2.91E-02	4.17E-03	6.54E-02
Lead	6.10E-07	9.77E-05	5.96E-05	9.33E-04	7.00E-05	4.27E-05	6.68E-04	1.03E-04	6.28E-05	9.83E-04	9.77E-05	5.96E-05	9.33E-04	3.25E-05	1.98E-05	3.10E-04
Nickel	2.87E-06	3.43E-04	9.84E-04	1.54E-02	2.36E-04	6.77E-04	1.06E-02	3.43E-04	9.84E-04	1.54E-02	2.64E-04	7.57E-04	1.19E-02	5.20E-05	1.49E-04	2.34E-03
			6.93E-02 per µg/m^3	1.09E+00 in one million		3.95E-02 per µg/m^3	6.19E-01 in one million		7.06E-02 per µg/m^3	1.11E+00 in one million		6.07E-02 per µg/m^3	9.50E-01 in one million		1.68E-02 per µg/m^3	2.63E-01 in one million

Table 5.1C-7
Calculation of Siemens SGT6500F Gas Turbine HHIs
CPV Vaca Station

Toxic Air Contaminant	Max Hourly Emissions Per Turbine (g/s)	HARP Acute HI (per µg/m^3)	Acute HHI Model Input (g/s per µg/m^3)	Modeled Contribution to Acute HHI (1)	Annual Average Emissions (g/s)	HARP Chronic HI (per µg/m^3)	Chronic HHI Model Input (g/s per µg/m^3)	Modeled Contribution to Chronic HHI (2)
Ammonia	1.9702	3.13E-04	6.17E-04	8.81E-03	1.49E+00	5.00E-03	7.43E-03	6.71E-03
Propylene	0.2359	--	--	--	2.06E-01	3.33E-04	6.88E-05	6.21E-05
Acetaldehyde	1.248E-02	--	--	--	1.09E-02	1.11E-01	1.21E-03	1.09E-03
Acrolein	1.129E-03	5.26E+00	5.94E-03	8.49E-02	9.88E-04	1.67E+01	1.65E-02	1.49E-02
Benzene	1.019E-03	7.69E-04	7.83E-07	1.12E-05	8.92E-04	1.67E-02	1.49E-05	1.34E-05
1,3-Butadiene	1.343E-04	--	--	--	1.18E-04	5.00E-02	5.88E-06	5.31E-06
Ethylbenzene	9.974E-03	--	--	--	8.73E-03	5.00E-04	4.36E-06	3.94E-06
Formaldehyde	1.123E-01	1.06E-02	1.19E-03	1.70E-02	9.83E-02	3.33E-01	3.27E-02	2.95E-02
Hexane	7.924E-02	--	--	--	6.94E-02	1.43E-04	9.92E-06	8.95E-06
Naphthalene	5.079E-04	--	--	--	4.45E-04	1.11E-01	4.93E-05	4.45E-05
PAHs (listed individually below)	4.008E-05	--	--	--	3.51E-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	9.164E-03	3.23E-04	2.96E-06	4.23E-05	8.02E-03	3.33E-02	2.67E-04	2.41E-04
Toluene	4.069E-02	2.70E-05	1.10E-06	1.57E-05	3.56E-02	3.33E-03	1.19E-04	1.07E-04
Xylene	1.998E-02	4.55E-05	9.09E-07	1.30E-05	1.75E-02	1.43E-03	2.50E-05	2.26E-05
		Total =	7.75E-03	1.11E-01		Total =	5.84E-02	5.28E-02

1) Based on modeled non-cancer acute HHI from both CTG (-) = **0.11078**
2) Based on modeled non-cancer chronic HHI from both CTG (-) = 5.28E-02

Table 5.1C-8
Calculation of Emergency Standby Engine HHIs
CPV Vaca Station

Toxic Air Contaminant	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
Emergency Standby Engine								
Generator Engine DPM	NA	NA	NA	NA	5.47E-05	0.2	1.09E-05	2.60E-04
Fire Water Pump Engine DPM	NA	NA	NA	NA	5.71E-05	0.2	1.14E-05	4.70E-04

Table 5.1C-8A
Calculation of Risk Assessment Modeling Inputs and Results for Auxiliary Boiler and Cooling Tower

Non-Criteria Pollutant	Max Hourly Emissions. g/s	HARP Acute HI (per µg/m^3)	Acute HHI Model Input (g/s per µg/m^3)	Modeled Contribution to Acute HHI	Annual Average Emissions, g/s	HARP Chronic HI (per µg/m^3)	Chronic HHI Model Input (g/s per µg/m^3)	Modeled Contribution to Chronic HHI
Auxiliary Boiler								
Propylene	7.01E-05	-	-	-	3.08E-05	3.33E-04	1.03E-08	3.78E-07
Acetaldehyde	4.02E-05	1.333E-03	5.36E-08	8.90E-05	1.77E-05	1.11E-01	1.96E-06	7.23E-05
Acrolein	1.22E-05	4.35E-01	5.30E-06	8.81E-03	5.36E-06	-	-	-
Benzene	9.48E-06	7.69E-04	7.29E-09	1.21E-05	4.17E-06	1.67E-02	6.94E-08	2.56E-06
Ethylbenzene	9.03E-06	-	-	-	3.97E-06	5.00E-04	1.98E-09	7.31E-08
Formaldehyde	3.39E-04	1.82E-02	6.15E-06	1.02E-02	1.49E-04	3.33E-01	4.95E-05	1.83E-03
Hexane	5.87E-06	-	-	-	2.58E-06	1.43E-04	3.68E-10	1.36E-08
Naphthalene	2.75E-06	-	-	-	1.21E-06	1.11E-01	1.34E-07	4.95E-06
Toluene	1.53E-05	2.70E-05	4.15E-10	6.90E-07	6.74E-06	3.33E-03	2.25E-08	8.28E-07
Xylene	9.03E-05	4.55E-05	4.10E-09	6.82E-06	3.97E-05	1.43E-03	5.67E-08	2.09E-06
		Total =	1.15E-05	1.92E-02 (1)		Total =	5.18E-05	1.91E-03
Cooling Tower								
Antimony	2.87E-07	-	-	-	2.87E-07	5.00E+00	1.43E-06	2.25E-05
Arsenic	9.32E-07	5.26E+00	4.91E-06	0.00E+00	9.32E-07	3.33E+01	3.11E-05	4.87E-04
Beryllium	2.73E-06	-	-	-	2.73E-06	1.43E+02	3.89E-04	6.10E-03
Cadmium	7.17E-08	-	-	-	7.17E-08	5.00E+01	3.59E-06	5.61E-05
Chromium (VI)	1.43E-07	-	-	-	1.43E-07	5.00E+00	7.17E-07	1.12E-05
Copper	8.03E-06	1.00E-02	8.03E-08	0.00E+00	8.03E-06	4.17E-01	3.35E-06	5.24E-05
Cyanide	1.08E-06	2.94E-03	3.16E-09	0.00E+00	1.08E-06	1.11E-01	1.20E-07	1.87E-06
Manganese	6.53E-06	1.67E-01	1.09E-06	0.00E+00	6.53E-06	1.67E-01	1.09E-06	1.70E-05
Mercury	4.23E-09	2.70E-05	1.14E-13	0.00E+00	4.23E-09	3.33E-03	1.41E-11	2.21E-10
Nickel	2.87E-06	1.67E-01	4.78E-07	0.00E+00	2.87E-06	2.00E+01	5.74E-05	8.98E-04
Selenium	8.61E-07	-	-	-	8.61E-07	5.00E-02	4.30E-08	6.74E-07
Zinc	4.02E-05	-	-	-	4.02E-05	2.86E-02	1.15E-06	1.80E-05
		Total =	6.556E-06			Total =	4.893E-04	7.66E-03

1) Modeled non-cancer acute HHI from the auxiliary boiler.
2) Modeled non-cancer chronic HHI from the auxiliary boiler.

Table 5.1C-9
Summary of Modeling Inputs
CPV Vaca Station

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
Each SGT6500F Turbine	1.252E+00	7.146E-01	1.257E+00	1.035E+00	2.575E-01	7.751E-03	5.843E-02
Auxiliary Boiler	3.779E-03	1.501E-03	3.819E-03	3.443E-03	1.074E-03	1.152E-05	5.180E-05
Generator Engine	2.270E-02	1.564E-02	2.270E-02	1.745E-02	3.441E-03	NA	1.094E-05
Fire Water Pump Engine	2.369E-02	1.632E-02	2.369E-02	1.821E-02	3.590E-03	NA	1.142E-05
Cooling Tower	6.933E-02	3.954E-02	7.063E-02	6.068E-02	1.681E-02	6.556E-06	4.893E-04

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