

Emissions Calculations for a Single NG Engine

Application No.		
Plant No.		
Company	EastShore Energy Center	
Input Data		
IC Engine, MMBtu/hr	72.8	
Hours Of Operation, hr/yr	3900	4000
Higher Heating Value, Btu/cf per AP 42 for natural gas	1020	
Calculated Value		
Fuel Usage MMcf/hr	7.14E-02	
Fuel Usage MMcf/yr	278.35	285.49
Abatement Efficiency	40.00%	
# of Engines	14.00	

	MEAN	PEF	MEAN
PAH(s)	lbs/MMCF	equivalents	lbs/MMCF
Benzo(a)anthracene	5.88E-05	0.1	5.88E-06
Benzo(a)pyrene	2.70E-06	1	2.70E-06
Benzo(b)fluoranthene	4.09E-05	0.1	4.09E-06
Benzo(k)fluoranthene	7.83E-06	0.1	7.83E-07
Chrysene	1.43E-05	0.01	1.43E-07
Dibenz(a,h)anthracene	2.70E-06	1.05	2.84E-06
Indeno(1,2,3-cd)pyrene	7.17E-06	0.1	7.17E-07
Total			<b>1.71E-05</b>

CATEF Emission Factors for Natural Gas Fired Industrial Turbines SCC 20200202

Potential hours/yr	8760
Operating hours/yr Maximum	4000

Table #1

SUBSTANCE	MEAN		lbm/hr	lbm/hr after		g/sec 1 hr max	lbm/yr	lbm/yr after		g/sec - Annual
	lbs/MMCF	lbs/MMBtu		Abatement	abatement					
Ammonia	1.39E+01	1.36E-02	9.91E-01	9.908E-01	1.248E-01	3.96E+03	3963.232	5.700E-02		
1,3-Butadiene	3.67E-01	3.60E-04	2.62E-02	1.572E-02	1.980E-03	1.05E+02	62.865	9.042E-04		
Acetaldehyde	5.29E-01	5.19E-04	3.78E-02	2.265E-02	2.854E-03	1.51E+02	90.615	1.303E-03		
Acrolein	5.90E-02	5.78E-05	4.21E-03	2.527E-03	3.183E-04	1.68E+01	10.106	1.454E-04		
Benzene	2.18E-01	2.14E-04	1.56E-02	9.336E-03	1.176E-03	6.22E+01	37.342	5.371E-04		
<b>PAHs [as B(a)P]</b>	1.71E-05	1.68E-08	1.22E-06	7.343E-07	9.253E-08	4.90E-03	0.003	4.225E-08		
Ethylbenzene	7.11E-02	6.97E-05	5.07E-03	3.045E-03	3.836E-04	2.03E+01	12.179	1.752E-04		
Formaldehyde	4.71E+00	4.62E-03	3.36E-01	2.017E-01	2.541E-02	1.34E+03	806.795	1.160E-02		
Naphthalene	2.51E-02	2.46E-05	1.79E-03	1.075E-03	1.354E-04	7.17E+00	4.299	6.184E-05		
Propylene	5.38E+00	5.27E-03	3.84E-01	2.304E-01	2.903E-02	1.54E+03	921.562	1.326E-02		
Toluene	2.39E-01	2.34E-04	1.71E-02	1.023E-02	1.290E-03	6.82E+01	40.939	5.888E-04		
Xylene (Total)	6.46E-01	6.33E-04	4.61E-02	2.766E-02	3.486E-03	1.84E+02	110.656	1.592E-03		

**Health Risk Screening Analysis Summary for Natural Gas-fired Engine Facility = Eastshore Energy Center (Hayward, CA)**

- Plant #18041, Application #15195
- ISCST3 Air Dispersion Model Used
- Union City 5 yrs of Meteorological Data Used
- Hayward Terrain Data Used
- Daytime Scalars Used
- Urban Land Use

**Health Risk Estimates:**

TACs	Maximum Emission Rate (g/sec)		Residential Receptor					Residential Receptor			
	Annual	Hourly	Max. Annual Avg. Conc. <sup>1</sup> (ug/m <sup>3</sup> )	Max. Hourly Conc. <sup>2</sup> (ug/m <sup>3</sup> )	Inhalation Dose <sup>3</sup> (mg/kg-day)	Inhalation Cancer Potency Factor (CPF) (mg/kg-day) <sup>1</sup>	Chronic REL (ug/m <sup>3</sup> )	Acute REL (ug/m <sup>3</sup> )	Max. Cancer Risk <sup>4</sup>	Max. Chronic Non-cancer HQ <sup>5</sup>	Max. Acute Non-cancer HQ <sup>6</sup>
Ammonia	5.7E-02	1.2E-01	6.9E-02	1.3E+01	2.1E-05	NC	2.00E+02	3.20E+03	NC	3.4E-04	4.0E-03
Benzene	5.4E-04	1.2E-03	6.5E-04	1.2E-01	2.0E-07	1.0E-01	6.0E+01	1.3E+03	2.0E-08	1.1E-05	9.3E-05
1,3-Butadiene	9.0E-04	2.0E-03	1.1E-03	2.0E-01	3.3E-07	6.0E-01	2.0E+01	NA	2.0E-07	5.5E-05	NA
Acetaldehyde	1.3E-03	2.9E-03	1.6E-03	2.9E-01	4.8E-07	1.0E-02	9.0E+00	NA	4.8E-09	1.8E-04	NA
PAHs [as B(a)P]	4.2E-08	9.3E-08	5.1E-08	9.5E-06	1.5E-11	6.0E+01	NA	NA	9.3E-10	NA	NA
Ethylbenzene	1.8E-04	3.8E-04	2.1E-04	4.0E-02	6.4E-08	NC	2.0E+03	NA	NC	1.1E-07	NA
Formaldehyde	1.2E-02	2.5E-02	1.4E-02	2.6E+00	4.2E-06	2.1E-02	3.0E+00	9.4E+01	8.9E-08	4.7E-03	2.8E-02
Naphthalene	6.2E-05	1.4E-04	7.5E-05	1.4E-02	2.3E-08	1.2E-01	9.0E+00	NA	2.7E-09	8.3E-06	NA
Propylene	1.3E-02	2.9E-02	1.6E-02	3.0E+00	4.8E-06	NC	3.0E+03	NA	NC	5.3E-06	NA
Toluene	5.9E-04	1.3E-03	7.1E-04	1.3E-01	2.2E-07	NC	3.0E+02	3.7E+04	NC	2.4E-06	3.6E-06
Xylene (Total)	1.6E-03	3.6E-03	1.9E-03	3.6E-01	5.8E-07	NC	7.0E+02	2.2E+04	NC	2.8E-06	1.6E-05
<b>TOTAL RISK =</b>								<b>3.2E-07</b>	<b>0.005</b>	<b>0.028</b>	

Maximum Annual Average Chi/Q (ug/m<sup>3</sup>)(g/sec) at Resident = 1.21000

Maximum Hourly Chi/Q (ug/m<sup>3</sup>)(g/sec) = 103

1. Max. Annual Average Concentration (ug/m<sup>3</sup>) = Max. Annual Emission Rate (g/sec) \* Max. Annual Avg. Chi/Q (ug/m<sup>3</sup> per g/sec)
2. Max. Hourly Concentration (ug/m<sup>3</sup>) = Max. Hourly Emission Rate (g/sec) \* Max. Hourly Chi/Q (ug/m<sup>3</sup> per g/sec)
3. Inhalation Dose (mg/kg-day) = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* BR (L/kg-day) \* UCF (mg-m<sup>3</sup>)(ug/L) \* EAF<sub>(cancer risk)</sub>
4. Max. Cancer Risk = Inhalation Dose (mg/kg-day) \* CPF (mg/kg-day)<sup>1</sup>
5. Max. Chronic Non-cancer Hazard Quotient = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* EAF<sub>(non-cancer)</sub> / Chronic REL (ug/m<sup>3</sup>)
6. Max. Acute Non-cancer Hazard Quotient = Hourly Conc. (ug/m<sup>3</sup>) / Acute REL (ug/m<sup>3</sup>)

TACs	Maximum Emission Rate (g/sec)		Worker Receptor					Worker Receptor			
	Annual	Hourly	Max. Annual Avg. Conc. <sup>1</sup> (ug/m <sup>3</sup> )	Max. Hourly Conc. <sup>2</sup> (ug/m <sup>3</sup> )	Inhalation Dose <sup>3</sup> (mg/kg-day)	Inhalation Cancer Potency Factor (CPF) (mg/kg-day) <sup>1</sup>	Chronic REL (ug/m <sup>3</sup> )	Acute REL (ug/m <sup>3</sup> )	Max. Cancer Risk <sup>4</sup>	Max. Chronic Non-cancer HQ <sup>5</sup>	Max. Acute Non-cancer HQ <sup>6</sup>
Ammonia	5.7E-02	1.2E-01	1.86604	3.0E+01	2.3E-04	NC	2.00E+02	3.20E+03	NC	4.6E-03	9.4E-03
Benzene	5.4E-04	1.2E-03	0.01758	2.8E-01	2.2E-06	1.0E-01	6.0E+01	1.3E+03	2.2E-07	1.4E-04	2.2E-04
1,3-Butadiene	9.0E-04	2.0E-03	0.0296	4.8E-01	3.7E-06	6.0E-01	2.0E+01	NA	2.2E-06	7.3E-04	NA
Acetaldehyde	1.3E-03	2.9E-03	0.04266	6.9E-01	5.3E-06	1.0E-02	9.0E+00	NA	5.3E-08	2.3E-03	NA
PAHs [as B(a)P]	4.2E-08	9.3E-08	0.00000	2.2E-05	1.7E-10	6.0E+01	NA	NA	1.0E-08	NA	NA
Ethylbenzene	1.8E-04	3.8E-04	0.00573	9.3E-02	7.2E-07	NC	2.0E+03	NA	NC	1.4E-06	NA
Formaldehyde	1.2E-02	2.5E-02	0.37987	4.8E-05	4.8E-05	2.1E-02	3.0E+00	9.4E+01	1.0E-06	6.2E-02	6.5E-02
Naphthalene	6.2E-05	1.4E-04	0.00202	3.3E-02	2.5E-07	1.2E-01	9.0E+00	NA	3.0E-08	1.1E-04	NA
Propylene	1.3E-02	2.9E-02	0.43391	7.0E+00	5.4E-05	NC	3.0E+03	NA	NC	7.1E-05	NA
Toluene	5.9E-04	1.3E-03	0.01928	3.1E-01	2.4E-06	NC	3.0E+02	3.7E+04	NC	3.1E-05	8.4E-06
Xylene (Total)	1.6E-03	3.6E-03	0.05210	8.4E-01	6.5E-06	NC	7.0E+02	2.2E+04	NC	3.6E-05	3.8E-05
<b>TOTAL RISK =</b>								<b>3.54E-06</b>	<b>0.065</b>	<b>0.066</b>	

Maximum Annual Average Chi/Q (ug/m<sup>3</sup>)(g/sec) at Worker = 32.73498

Maximum Hourly Chi/Q (ug/m<sup>3</sup>)(g/sec) = 241.45547

1. Max. Annual Average Exposure Concentration (ug/m<sup>3</sup>) = Max. Annual Emission Rate (g/sec) \* Max. Annual Avg. Chi/Q (ug/m<sup>3</sup> per g/sec)
2. Max. Hourly Concentration (ug/m<sup>3</sup>) = Max. Hourly Emission Rate (g/sec) \* Max. Hourly Chi/Q (ug/m<sup>3</sup> per g/sec)
3. Inhalation Dose (mg/kg-day) = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* BR (L/kg-day) \* UCF (mg-m<sup>3</sup>)(ug/L) \* EAF<sub>(cancer risk)</sub>
4. Max. Cancer Risk = Inhalation Dose (mg/kg-day) \* CPF (mg/kg-day)<sup>1</sup>
5. Max. Chronic Non-cancer Hazard Quotient = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* EAF<sub>(non-cancer)</sub> / Chronic REL (ug/m<sup>3</sup>)
6. Max. Acute Non-cancer Hazard Quotient = Hourly Conc. (ug/m<sup>3</sup>) / Acute REL (ug/m<sup>3</sup>)

**Exposure Adjustment Factors (EAFs) for Sources that Operate Intermittently:**

	Daily (hours/day)	Weekly (days/week)	Annually (weeks/year)	Lifetime (years per 70-yr lifetime)	Exposure Adjustment Factors (EAFs) <sup>7</sup>	
Resident is Present While Source is Operating	24	7	50	70	(cancer risk)	(non-cancer hazard quotient)
Worker is Present While Source is Operating	8	5	49	40		
Student is Present While Source is Operating	10	5	36	9		
Source is Operating	16	5	50	70		
Fraction of Time Resident is Present While the Source is Operating	1.00	1.00	1.00	1.00	1.00	1.00
Fraction of Time Worker is Present While the Source is Operating	0.50	1.00	0.98	0.57	0.28	0.49
Fraction of Time Student is Present While the Source is Operating	0.63	1.00	0.72	0.13	0.06	0.45

7. Note that the fraction of time that a receptor is present while a source is operating can not exceed one.

Thus, if a receptor is present 10 hours/day, but the source operates only 8 hours/day, the maximum that the receptor can be present while the source is operating is the number of hours the source is operating (e.g., 8 hours).

**Exposure Parameters:**

Receptor	Breathing Rate (BR) <sup>8</sup> (L/kg-day)	Exposure Time (ET) (hours/day)	Exposure Frequency (EF) (day/year)	Exposure Duration (ED) (years)	Units Conversion Factor (UCF) (mg-m <sup>3</sup> )(ug-L)	Averaging Time (AT - 70 years) (days)
Resident	302	24	350	70	1.0E-06	25,550
Worker	447	8	245	40	1.0E-06	25,550
Student	581	10	180	9	1.0E-06	25,550

8. Based on a 24-hour day. Worker breathing rate is 149 L/kg-day (for an 8-hour workday), and 447 L/kg-day (for a 24-hour day).

**Health Risk Screening Analysis Summary for Natural Gas-fired Engine**

Facility = Eastshore Energy Center (Hayward, CA)

- Plant #18041, Application #15195
- ISCST3 Air Dispersion Model Used
- Union City 5 yrs of Meteorological Data Used
- Hayward Terrain Data Used
- Daytime Scalars Used
- Urban Land Use

**Health Risk Estimates:**

TACs	Maximum Emission Rate (g/sec)		Residential Receptor				Residential Receptor				
	Annual	Hourly	Max. Annual Avg. Conc. (ug/m <sup>3</sup> )	Max. Hourly Conc <sup>2</sup> (ug/m <sup>3</sup> )	Inhalation Dose <sup>3</sup> (mg/kg-day)	Inhalation Cancer Potency Factor (CPF) (mg/kg-day) <sup>1</sup>	Chronic REL (ug/m <sup>3</sup> )	Acute REL (ug/m <sup>3</sup> )	Max. Cancer Risk <sup>4</sup>	Max. Chronic Non-cancer HQ <sup>5</sup>	Max. Acute Non-cancer HQ <sup>5</sup>
Ammonia	5.7E-02	1.2E-01	6.9E-02	1.3E+01	2.1E-05	NC	2.00E+02	3.20E+03	NC	3.4E-04	4.0E-03
Benzene	5.4E-04	1.2E-03	6.5E-04	1.2E-01	2.0E-07	1.0E-01	6.0E+01	1.3E+03	2.0E-08	1.1E-05	9.3E-05
Acrolein	1.5E-04	3.2E-04	1.8E-04	3.3E-02	5.3E-08	NC	6.0E-02	1.9E-01	NC	2.9E-03	1.7E-01
1,3-Butadiene	9.0E-04	2.0E-03	1.1E-03	2.0E-01	3.3E-07	6.0E-01	2.0E+01	NA	2.0E-07	5.5E-05	NA
Acetaldehyde	1.3E-03	2.9E-03	1.6E-03	2.9E-01	4.8E-07	1.0E-02	9.0E+00	NA	4.8E-09	1.8E-04	NA
PAHs [as B(a)P]	4.2E-08	9.3E-08	5.1E-08	9.5E-06	1.5E-11	6.0E+01	NA	NA	9.3E-10	NA	NA
Ethylbenzene	1.8E-04	3.8E-04	2.1E-04	4.0E-02	6.4E-08	NC	2.0E+03	NA	NC	1.1E-07	NA
Formaldehyde	1.2E-02	2.5E-02	1.4E-02	2.6E+00	4.2E-06	2.1E-02	3.0E+00	9.4E+01	8.9E-08	4.7E-03	2.8E-02
Naphthalene	6.2E-05	1.4E-04	7.5E-05	1.4E-02	2.3E-08	1.2E-01	9.0E+00	NA	2.7E-09	8.3E-06	NA
Propylene	1.3E-02	2.9E-02	1.6E-02	3.0E+00	4.8E-08	NC	3.0E+03	NA	NC	5.3E-06	NA
Toluene	5.9E-04	1.3E-03	7.1E-04	1.3E-01	2.2E-07	NC	3.0E+02	3.7E+04	NC	2.4E-06	3.6E-06
Xylene [Total]	1.6E-03	3.5E-03	1.9E-03	3.6E-01	5.8E-07	NC	7.0E+02	2.2E+04	NC	2.8E-06	1.6E-05
Maximum Annual Average ChI/Q (ug/m <sup>3</sup> )(g/sec) at Resident = 1.21006									<b>TOTAL RISK = 3.2E-07</b>		
Maximum Hourly ChI/Q (ug/m <sup>3</sup> )(g/sec) = 103									<b>0.008</b>		
Maximum Annual Average Concentration (ug/m <sup>3</sup> ) = Max. Annual Emission Rate (g/sec) * Max. Annual Avg. ChI/Q (ug/m <sup>3</sup> per g/sec)									<b>0.201</b>		

1. Max. Annual Average Concentration (ug/m<sup>3</sup>) = Max. Annual Emission Rate (g/sec) \* Max. Annual Avg. ChI/Q (ug/m<sup>3</sup> per g/sec)
2. Max. Hourly Concentration (ug/m<sup>3</sup>) = Max. Hourly Emission Rate (g/sec) \* Max. Hourly ChI/Q (ug/m<sup>3</sup> per g/sec)
3. Inhalation Dose (mg/kg-day) = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* BR (L/kg-day) \* UCF (mg-m<sup>3</sup>)/(ug/L) \* EAF<sub>(non-cancer)</sub>
4. Max. Cancer Risk = Inhalation Dose (mg/kg-day) \* CPF (mg/kg-day)<sup>1</sup>
5. Max. Chronic Non-cancer Hazard Quotient = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* EAF<sub>(non-cancer)</sub> / Chronic REL (ug/m<sup>3</sup>)
6. Max. Acute Non-cancer Hazard Quotient = Hourly Conc. (ug/m<sup>3</sup>) / Acute REL (ug/m<sup>3</sup>)

TACs	Maximum Emission Rate (g/sec)		Worker Receptor				Worker Receptor				
	Annual	Hourly	Max. Annual Avg. Conc. (ug/m <sup>3</sup> )	Max. Hourly Conc <sup>2</sup> (ug/m <sup>3</sup> )	Inhalation Dose <sup>3</sup> (mg/kg-day)	Inhalation Cancer Potency Factor (CPF) (mg/kg-day) <sup>1</sup>	Chronic REL (ug/m <sup>3</sup> )	Acute REL (ug/m <sup>3</sup> )	Max. Cancer Risk <sup>4</sup>	Max. Chronic Non-cancer HQ <sup>5</sup>	Max. Acute Non-cancer HQ <sup>5</sup>
Ammonia	5.7E-02	1.2E-01	1.86604	3.0E+01	2.3E-04	NC	2.00E+02	3.20E+03	NC	4.6E-03	9.4E-03
Benzene	5.4E-04	1.2E-03	0.01758	2.8E-01	2.2E-06	1.0E-01	6.0E+01	1.3E+03	2.2E-07	1.4E-04	2.2E-04
Acrolein	1.5E-04	3.2E-04	0.00476	7.7E-02	6.0E-07	NC	6.0E-02	1.9E-01	NC	3.9E-02	4.0E-01
1,3-Butadiene	9.0E-04	2.0E-03	0.0296	4.8E-01	3.7E-06	6.0E-01	2.0E+01	NA	2.2E-06	7.3E-04	NA
Acetaldehyde	1.3E-03	2.9E-03	0.04266	6.9E-01	5.3E-06	1.0E-02	9.0E+00	NA	5.3E-08	2.3E-03	NA
PAHs [as B(a)P]	4.2E-08	9.3E-08	0.00000	2.2E-05	1.7E-10	6.0E+01	NA	NA	1.0E-08	NA	NA
Ethylbenzene	1.8E-04	3.8E-04	0.00573	9.3E-02	7.2E-07	NC	2.0E+03	NA	NC	1.4E-06	NA
Formaldehyde	1.2E-02	2.5E-02	0.37987	6.1E+00	4.8E-05	2.1E-02	3.0E+00	9.4E+01	1.0E-06	6.2E-02	6.5E-02
Naphthalene	6.2E-05	1.4E-04	0.00202	3.3E-02	2.5E-07	1.2E-01	9.0E+00	NA	3.0E-08	1.1E-04	NA
Propylene	1.3E-02	2.9E-02	0.43391	7.0E+00	5.4E-05	NC	3.0E+03	NA	NC	7.1E-05	NA
Toluene	5.9E-04	1.3E-03	0.01928	3.1E-01	2.4E-06	NC	3.0E+02	3.7E+04	NC	3.1E-05	8.4E-06
Xylene [Total]	1.6E-03	3.5E-03	0.05210	8.4E-01	6.5E-06	NC	7.0E+02	2.2E+04	NC	3.6E-05	3.8E-05
Maximum Annual Average ChI/Q (ug/m <sup>3</sup> )(g/sec) at Worker = 32.73498									<b>TOTAL RISK = 3.54E-06</b>		
Maximum Hourly ChI/Q (ug/m <sup>3</sup> )(g/sec) = 241.45547									<b>0.104</b>		
Maximum Annual Average Exposure Concentration (ug/m <sup>3</sup> ) = Max. Annual Emission Rate (g/sec) * Max. Annual Avg. ChI/Q (ug/m <sup>3</sup> per g/sec)									<b>0.470</b>		

1. Max. Annual Average Exposure Concentration (ug/m<sup>3</sup>) = Max. Annual Emission Rate (g/sec) \* Max. Annual Avg. ChI/Q (ug/m<sup>3</sup> per g/sec)
2. Max. Hourly Concentration (ug/m<sup>3</sup>) = Max. Hourly Emission Rate (g/sec) \* Max. Hourly ChI/Q (ug/m<sup>3</sup> per g/sec)
3. Inhalation Dose (mg/kg-day) = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* BR (L/kg-day) \* UCF (mg-m<sup>3</sup>)/(ug/L) \* EAF<sub>(non-cancer)</sub>
4. Max. Cancer Risk = Inhalation Dose (mg/kg-day) \* CPF (mg/kg-day)<sup>1</sup>
5. Max. Chronic Non-cancer Hazard Quotient = Ann. Avg. Conc. (ug/m<sup>3</sup>) \* EAF<sub>(non-cancer)</sub> / Chronic REL (ug/m<sup>3</sup>)
6. Max. Acute Non-cancer Hazard Quotient = Hourly Conc. (ug/m<sup>3</sup>) / Acute REL (ug/m<sup>3</sup>)

**Exposure Adjustment Factors (EAFs) for Sources that Operate Intermittently:**

	Daily (hours/day)	Weekly (days/week)	Annually (weeks/year)	Lifetime (years per 70-yr lifetime)	Exposure Adjustment Factors (EAFs) <sup>7</sup>	
Resident is Present While Source is Operating	24	7	50	70	(cancer risk)	(non-cancer hazard quotient)
Worker is Present While Source is Operating	8	5	49	40		
Student is Present While Source is Operating	10	5	36	9		
Source is Operating	16	5	50	70		
Fraction of Time Resident is Present While the Source is Operating	1.00	1.00	1.00	1.00	1.00	1.00
Fraction of Time Worker is Present While the Source is Operating	0.50	1.00	0.98	0.57	0.28	0.49
Fraction of Time Student is Present While the Source is Operating	0.63	1.00	0.72	0.13	0.06	0.45

7. Note that the fraction of time that a receptor is present while a source is operating can not exceed one.

Thus, if a receptor is present 10 hours/day, but the source operates only 8 hours/day, the maximum that the receptor can be present while the source is operating is the number of hours the source is operating (e.g., 8 hours).

**Exposure Parameters:**

Receptor	Breathing Rate (BR) <sup>8</sup> (L/kg-day)	Exposure Time (ET) (hours/day)	Exposure Frequency (EF) (day/year)	Exposure Duration (ED) (years)	Units Conversion Factor (UCF) (mg-m <sup>3</sup> )/(ug-L)	Averaging Time (AT - 70 years) (days)
Resident	302	24	350	70	1.0E-06	25,550
Worker	447	8	245	40	1.0E-06	25,550
Student	581	10	180	9	1.0E-06	25,550

8. Based on a 24-hour day. Worker breathing rate is 149 L/kg-day (for an 8-hour workday), and 447 L/kg-day (for a 24-hour day).

**Health Risk Screening Analysis Summary for Standby Generator Diesel Engine Facility =Eastshore Energy Center, (Hayward, CA)**

- Plant #18041; Application #15195
- ISC Air Dispersion Model Used
- Union City Meteorological Data Used
- Hayward Terrain Data Used
- Daytime Scalars Used
- Urban Land Use

@ pt of Max for Natural Gas

**Health Risk Estimates:**

Receptor	Max. Annual Emission Rate		Max. Annual Avg. Chi/Q (ug/m <sup>3</sup> per g/sec)	Annual Average Exposure Concentration <sup>1</sup> (ug/m <sup>3</sup> )	Inhalation Dose <sup>2</sup> (mg/kg-day)	Diesel PM		Max. Cancer Risk <sup>3</sup>	Max. Non-cancer Hazard Quotient <sup>4</sup>
	(lb/yr)	(g/sec)				Inhalation Cancer Potency Factor (CPF) (mg/kg-day) <sup>-1</sup>	Inhalation Reference Exposure Level (REL) (ug/m <sup>3</sup> )		
Resident	4.5434	6.5E-05	4.8E-01	0.00003	9.5E-09	1.1E+00	5.0E+00	1.05E-08	6.3E-06
Worker	4.5434	6.5E-05	1.8E+01	0.00115	2.9E-07	1.1E+00	5.0E+00	3.16E-07	2.2E-04
Student	0	0.0E+00	0	0.0E+00	0.0E+00	1.1E+00	5.0E+00	0.0E+00	0.0E+00

1. Annual Average Exposure Concentration (ug/m<sup>3</sup>) = Max. Annual Emission Rate (g/sec) \* Max. Annual Avg. Chi/Q (ug/m<sup>3</sup> per g/sec)

2. Inhalation Dose (mg/kg-day) = Ann. Avg. Exp. Conc. (ug/m<sup>3</sup>) \* BR (L/kg-day) \* UCF (mg-m<sup>3</sup>)/(ug/L) \* EAF<sub>(cancer risk)</sub>

3. Max. Cancer Risk = Inhalation Dose (mg/kg-day) \* CPF (mg/kg-day)<sup>-1</sup>

4. Max. Non-cancer Hazard Quotient = Ann. Avg. Exp. Conc. (ug/m<sup>3</sup>) \* EAF<sub>(non-cancer)</sub> / REL (ug/m<sup>3</sup>)

**Exposure Adjustment Factors (EAFs) for Sources that Operate Intermittently:**

	Daily (hours/day)	Weekly (days/week)	Annually (weeks/year)	Lifetime (years per 70-yr lifetime)	Exposure Adjustment Factors (EAFs) <sup>5</sup>	
Resident is Present While Source is Operating	24	7	50	70	(cancer risk)	(non-cancer hazard quotient)
Worker is Present While Source is Operating	8	5	49	40		
Student is Present While Source is Operating	10	5	36	9	(cancer risk)	(non-cancer hazard quotient)
Source is Operating	1	1	50	70		
Fraction of Time <b>Resident</b> is Present While the Source is Operating	1.00	1.00	1.00	1.00	1.00	1.00
Fraction of Time <b>Worker</b> is Present While the Source is Operating	1.00	1.00	0.98	0.57	0.56	0.98
Fraction of Time <b>Student</b> is Present While the Source is Operating	1.00	1.00	0.72	0.13	0.09	0.72

5. Note that the fraction of time that a receptor is present while a source is operating can not exceed one.

Thus, if a receptor is present 10 hours/day, but the source operates only 8 hours/day, the maximum that the receptor can be present while the source is operating is the number of hours the source is operating (e.g., 8 hours).

**Exposure Parameters:**

Receptor	Breathing Rate (BR) <sup>6</sup> (L/kg-day)	Exposure Time (ET) (hours/day)	Exposure Frequency (EF) (day/year)	Exposure Duration (ED) (years)	Units Conversion Factor (UCF) (mg-m <sup>3</sup> )/(ug/L)	Averaging Time (AT - 70 years) (days)
Resident	302	24	350	70	1.0E-06	25,550
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Student	581	10	180	9	1.0E-06	25,550

6. Based on a 24-hour day. Worker breathing rate is 149 L/kg-day (for an 8-hour workday), and 447 L/kg-day (for a 24-hour day).

**Health Risk Screening Analysis Summary for Standby Generator Diesel Engine Facility =Eastshore Energy Center, (Hayward, CA)**

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- Hayward Terrain Data Used
- Daytime Scalars Used
- Urban Land Use

MAX PT

**Health Risk Estimates:**

Receptor	Max. Annual Emission Rate		Max. Annual Avg. Chi/Q (ug/m <sup>3</sup> per g/sec)	Annual Average Exposure Concentration <sup>1</sup> (ug/m <sup>3</sup> )	Inhalation Dose <sup>2</sup> (mg/kg-day)	Diesel PM		Max. Cancer Risk <sup>3</sup>	Max. Non-cancer Hazard Quotient <sup>4</sup>
	(lb/yr)	(g/sec)				Inhalation Cancer Potency Factor (CPF) (mg/kg-day) <sup>-1</sup>	Inhalation Reference Exposure Level (REL) (ug/m <sup>3</sup> )		
Resident	4.5434	6.5E-05	5.2E-01	0.00003	1.0E-08	1.1E+00	5.0E+00	1.13E-08	6.8E-06
Worker	4.5434	6.5E-05	3.5E+01	0.00229	5.7E-07	1.1E+00	5.0E+00	6.30E-07	4.5E-04
Student	0	0.0E+00	0	0.0E+00	0.0E+00	1.1E+00	5.0E+00	0.0E+00	0.0E+00

1. Annual Average Exposure Concentration (ug/m<sup>3</sup>) = Max. Annual Emission Rate (g/sec) \* Max. Annual Avg. Chi/Q (ug/m<sup>3</sup> per g/sec)

2. Inhalation Dose (mg/kg-day) = Ann. Avg. Exp. Conc. (ug/m<sup>3</sup>) \* BR (L/kg-day) \* UCF (mg-m<sup>3</sup>)/(ug/L) \* EAF<sub>(cancer risk)</sub>

3. Max. Cancer Risk = Inhalation Dose (mg/kg-day) \* CPF (mg/kg-day)<sup>-1</sup>

4. Max. Non-cancer Hazard Quotient = Ann. Avg. Exp. Conc. (ug/m<sup>3</sup>) \* EAF<sub>(non-cancer)</sub> / REL (ug/m<sup>3</sup>)

**Exposure Adjustment Factors (EAFs) for Sources that Operate Intermittently:**

	Daily (hours/day)	Weekly (days/week)	Annually (weeks/year)	Lifetime (years per 70-yr lifetime)	Exposure Adjustment Factors (EAFs) <sup>5</sup>	
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Worker is Present While Source is Operating	8	5	49	40		
Student is Present While Source is Operating	10	5	36	9	(cancer risk)	(non-cancer hazard quotient)
Source is Operating	1	1	50	70		
Fraction of Time <b>Resident</b> is Present While the Source is Operating	1.00	1.00	1.00	1.00	1.00	1.00
Fraction of Time <b>Worker</b> is Present While the Source is Operating	1.00	1.00	0.98	0.57	0.56	0.98
Fraction of Time <b>Student</b> is Present While the Source is Operating	1.00	1.00	0.72	0.13	0.09	0.72

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**Exposure Parameters:**

Receptor	Breathing Rate (BR) <sup>6</sup> (L/kg-day)	Exposure Time (ET) (hours/day)	Exposure Frequency (EF) (day/year)	Exposure Duration (ED) (years)	Units Conversion Factor (UCF) (mg-m <sup>3</sup> )/(ug/L)	Averaging Time (AT - 70 years) (days)
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