

Appendix H3.3: Health Risks

El Camino Project HRA

Unmitigated Cancer Health Risk Calculations (DPM) - Residential

METHODOLOGY

$$\text{Dose (Air)} = \text{Cair} \times \text{DBR} \times \text{A} \times \text{EF} \times \text{CF}$$

Where:

- Cair: Chemical concentration in air ($\mu\text{g}/\text{m}^3$)
- DBR: Daily breathing rate ($\text{L}/\text{kg}\cdot\text{day}$)
- A: Inhalation adsorption factor (unitless)
- EF: Exposure Frequency, days at home / days in year (unitless)
- CF: 10^{-6} Conversion Factor (m^3/L and $\text{mg}/\mu\text{g}$)

$$\text{Cancer Risk (per million)} = \text{Dose (Air)} \times \text{CPF} \times \text{ASF} \times (\text{ED}/\text{AT}) \times \text{FAH} \times 1,000,000$$

Where:

- Dose: Dose of chemical in the air ($\mu\text{g}/\text{m}^3$)
- CPF: Cancer Potency Factor ($\text{mg}/\text{kg}\cdot\text{day}$)⁻¹
- ASF: Age Sensitivity Factor
- ED: Exposure Duration (years)
- AT: Averaging Time for lifetime cancer risks
- FAH: Fraction of daily time spent at home / school

Risk Parameter Values by Age Bin

Variable	Residential Age Bin				
	3rd Trimester	0-2 Years	2-16 Years	16-30 Years	30-70 Years
DBR	361	1090	572	261	233
A	1	1	1	1	1
EF	0.96	0.96	0.96	0.96	0.96
CF	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
CPF	1.1	1.1	1.1	1.1	1.1
ASF	10	10	3	1	1
ED	0.25	2	14	14	54
AT	70	70	70	70	70
FAH	1	1	1	0.73	0.73

AERMOD Modeled DPM Concentrations (PMI/MEIR)

	MEIR			PMI		
	Conc.	X	Y	Conc.	X	Y
P1Y1 (Con; Year 1)	0.01965	447705.00	3771665.00	0.56676	447297.00	3771755.00
P1Y2 (Con; Year 2)	0.01739	447705.00	3771665.00	0.2541	447297.00	3771770.00
Ops (Year 3 - 30)	0.00198	447705.00	3771665.00	0.01997	447260.00	3771975.00
P2Y1 (Con; Year 3)	0.00361	447705.00	3771665.00	0.18221	447145.00	3772117.00
P2Y2 (Con; Year 4)	0.00014	447705.00	3771665.00	0.02019	447145.00	3772117.00

Combined DPM Concentrations for HRA

	MEIR		
	Conc.	X	Y
Year 1 (P1Y1)	0.01965	447705.00	3771665.00
Year 2 (P1Y2)	0.01739	447705.00	3771665.00
Year 3 (P2Y1+Ops)	0.00559	447705.00	3771665.00
Year 4 (P2Y2+Ops)	0.00212	447705.00	3771665.00
Year 5-30 (Ops)	0.00198	447705.00	3771665.00

Risk Assessment at MEIR

Scenario	AERMOD DPM Conc.	Chronic Hazard Quotient
Year 1 (P1Y1)	0.01965	0.00393
Year 2 (P1Y2)	0.01739	0.00348
Year 3 (P2Y1+Ops)	0.00559	0.00112
Year 4 (P2Y2+Ops)	0.00212	0.00042
Year 5-30 (Ops)	0.00198	0.00040

Year 1 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.01965	361	1	0.96	1.00E-06	=	6.80E-06
0-2 Years	0.01965	1090	1	0.96	1.00E-06	=	2.05E-05
2-16 Years	0.01965	572	1	0.96	1.00E-06	=	1.08E-05
16-30 Years	0.01965	261	1	0.96	1.00E-06	=	4.92E-06
30-70 Years	0.01965	233	1	0.96	1.00E-06	=	4.39E-06

Year 1 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	6.80E-06	1.1	10	0.25	70	1	1,000,000	0.3
0-2 Years	2.05E-05	1.1	10	1.00	70	1	1,000,000	3.2
2-16 Years	1.08E-05	1.1	3	1.00	70	1	1,000,000	0.5
16-30 Years	4.92E-06	1.1	1	1.00	70	0.73	1,000,000	0.1
30-70 Years	4.39E-06	1.1	1	1.00	70	0.73	1,000,000	0.1

Year 2 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
0-2 Years	0.01739	1090	1	0.96	1.00E-06	=	1.82E-05
2-16 Years	0.01739	572	1	0.96	1.00E-06	=	9.54E-06
16-30 Years	0.01739	261	1	0.96	1.00E-06	=	4.35E-06
30-70 Years	0.01739	233	1	0.96	1.00E-06	=	3.89E-06

Year 2 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
0-2 Years	1.82E-05	1.1	10	1.00	70	1	1,000,000	2.9
2-16 Years	9.54E-06	1.1	3	1.00	70	1	1,000,000	0.4
16-30 Years	4.35E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	3.89E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Year 3 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
2-16 Years	0.00559	572	1	0.96	1.00E-06	=	3.07E-06
16-30 Years	0.00559	261	1	0.96	1.00E-06	=	1.40E-06
30-70 Years	0.00559	233	1	0.96	1.00E-06	=	1.25E-06

Year 3 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-16 Years	3.07E-06	1.1	3	1.00	70	1	1,000,000	0.1
16-30 Years	1.40E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	1.25E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Year 4 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
2-16 Years	0.00212	572	1	0.96	1.00E-06	=	1.16E-06
16-30 Years	0.00212	261	1	0.96	1.00E-06	=	5.31E-07
30-70 Years	0.00212	233	1	0.96	1.00E-06	=	4.74E-07

Year 4 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-16 Years	1.16E-06	1.1	3	1.00	70	1	1,000,000	0.1
16-30 Years	5.31E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	4.74E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Year 5 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF	=	Dose
2-16 Years	0.00198	572	1	0.96	1.00E-06	=	1.09E-06
16-30 Years	0.00198	261	1	0.96	1.00E-06	=	4.96E-07
30-70 Years	0.00198	233	1	0.96	1.00E-06	=	4.42E-07

Year 5 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-16 Years	1.09E-06	1.1	3	1.00	70	1	1,000,000	0.1
16-30 Years	4.96E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	4.42E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Total Excess Risk at MEIR (Cumulative, Based on Age at Start of Construction)

Exposure Year	Infant	Child < 2	Child 2≤x<16	Adult 16≤x<30	Adult 30≤x<70
Year 1	3.5	3.2	0.5	0.1	0.1
Year 2	2.9	2.9	0.4	0.0	0.0
Year 3	0.1	0.1	0.1	0.0	0.0
Year 4	0.1	0.1	0.1	0.0	0.0
Year 5-16	0.6	0.6	0.5	0.1	0.1
Year 16-30	0.1	0.1	0.1	0.1	0.1
DPM Subtotal	7.2	6.9	1.7	0.3	0.2

SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: Boiler 1	0.069	0.0436	0.0436	0.0436	0.0436
SCAQMD RT: Boiler 2	0.069	0.0436	0.0436	0.0436	0.0436
Total	7.9	7.5	2.3	0.9	0.9

Appendix H3.3: Health Risks

El Camino Project HRA

Unmitigated Cancer Health Risk Calculations (DPM) - Construction Exposure Ranges

METHODOLOGY

$$\text{Dose (Air)} = \text{Cair} \times \text{DBR} \times \text{A} \times \text{EF} \times \text{CF}$$

Where:

- Cair: Chemical concentration in air ($\mu\text{g}/\text{m}^3$)
- DBR: Daily breathing rate ($\text{L}/\text{kg}\cdot\text{day}$)
- A: Inhalation adsorption factor (unitless)
- EF: Exposure Frequency, days at home / days in year (unitless)
- CF: 10^{-6} Conversion Factor (m^3/L and $\text{mg}/\mu\text{g}$)

$$\text{Cancer Risk (per million)} = \text{Dose (Air)} \times \text{CPF} \times \text{ASF} \times (\text{ED}/\text{AT}) \times \text{FAH} \times 1,000,000$$

Where:

- Dose: Dose of chemical in the air ($\mu\text{g}/\text{m}^3$)
- CPF: Cancer Potency Factor ($\text{mg}/\text{kg}\cdot\text{day}$)⁻¹
- ASF: Age Sensitivity Factor
- ED: Exposure Duration (years)
- AT: Averaging Time for lifetime cancer risks
- FAH: Fraction of daily time spent at home / school

Risk Parameter Values by Age Bin

Variable	Residential Age Bin				
	3rd Trimester	0-2 Years	2-16 Years	16-30 Years	30-70 Years
DBR	361	1090	572	261	233
A	1	1	1	1	1
EF	0.96	0.96	0.96	0.96	0.96
CF	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
CPF	1.1	1.1	1.1	1.1	1.1
ASF	10	10	3	1	1
ED	0.25	2	14	14	54
AT	70	70	70	70	70
FAH	1	1	1	0.73	0.73

AERMOD Modeled DPM Concentrations (PMI/MEIR)

	MEIR			PMI		
	Conc.	X	Y	Conc.	X	Y
P1Y1 (Con; Year 1)	0.01965	447705.00	3771665.00	0.56676	447297.00	3771755.00
P1Y2 (Con; Year 2)	0.01739	447705.00	3771665.00	0.2541	447297.00	3771770.00
Ops (Year 3 - 30)	0.00198	447705.00	3771665.00	0.01997	447260.00	3771975.00
P2Y1 (Con; Year 3)	0.00361	447705.00	3771665.00	0.18221	447145.00	3772117.00
P2Y2 (Con; Year 4)	0.00014	447705.00	3771665.00	0.02019	447145.00	3772117.00

Combined DPM Concentrations for HRA

	MEIR		
	Conc.	X	Y
Year 1 (P1Y1)	0.01965	447705.00	3771665.00
Year 2 (P1Y2)	0.01739	447705.00	3771665.00
Year 3 (P2Y1+Ops)	0.00559	447705.00	3771665.00
Year 4 (P2Y2+Ops)	0.00212	447705.00	3771665.00
Year 5-30 (Ops)	0.00198	447705.00	3771665.00

Risk Assessment at MEIR

Scenario	AERMOD DPM Conc.	Chronic Hazard Quotient
Year 1 (P1Y1)	0.01965	0.00393
Year 2 (P1Y2)	0.01739	0.00348
Year 3 (P2Y1+Ops)	0.00559	0.00112
Year 4 (P2Y2+Ops)	0.00212	0.00042
Year 5-30 (Ops)	0.00198	0.00040

Year 1 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.01965	361	1	0.96	1.00E-06	=	6.80E-06
0-2 Years	0.01965	1090	1	0.96	1.00E-06	=	2.05E-05
2-16 Years	0.01965	572	1	0.96	1.00E-06	=	1.08E-05
16-30 Years	0.01965	261	1	0.96	1.00E-06	=	4.92E-06
30-70 Years	0.01965	233	1	0.96	1.00E-06	=	4.39E-06

Year 1 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	6.80E-06	1.1	10	0.25	70	1	1,000,000	0.3
0-2 Years	2.05E-05	1.1	10	1.00	70	1	1,000,000	3.2
2-16 Years	1.08E-05	1.1	3	1.00	70	1	1,000,000	0.5
16-30 Years	4.92E-06	1.1	1	1.00	70	0.73	1,000,000	0.1
30-70 Years	4.39E-06	1.1	1	1.00	70	0.73	1,000,000	0.1

Year 2 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.01739	361	1	0.96	1.00E-06	=	6.02E-06
0-2 Years	0.01739	1090	1	0.96	1.00E-06	=	1.82E-05
2-16 Years	0.01739	572	1	0.96	1.00E-06	=	9.54E-06
16-30 Years	0.01739	261	1	0.96	1.00E-06	=	4.35E-06
30-70 Years	0.01739	233	1	0.96	1.00E-06	=	3.89E-06

Year 2 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	6.02E-06	1.1	10	0.25	70	1	1,000,000	0.2
0-2 Years	1.82E-05	1.1	10	1.00	70	1	1,000,000	2.9
2-16 Years	9.54E-06	1.1	3	1.00	70	1	1,000,000	0.4
16-30 Years	4.35E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	3.89E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Year 3 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00559	361	1	0.96	1.00E-06	=	1.94E-06
0-2 Years	0.00559	1090	1	0.96	1.00E-06	=	5.84E-06
2-16 Years	0.00559	572	1	0.96	1.00E-06	=	3.07E-06
16-30 Years	0.00559	261	1	0.96	1.00E-06	=	1.40E-06
30-70 Years	0.00559	233	1	0.96	1.00E-06	=	1.25E-06

Year 3 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	1.94E-06	1.1	10	0.25	70	1	1,000,000	0.1
0-2 Years	5.84E-06	1.1	10	1.00	70	1	1,000,000	0.9
2-16 Years	3.07E-06	1.1	3	1.00	70	1	1,000,000	0.1
16-30 Years	1.40E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	1.25E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Year 4 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00212	361	1	0.96	1.00E-06	=	7.34E-07
0-2 Years	0.00212	1090	1	0.96	1.00E-06	=	2.22E-06
2-16 Years	0.00212	572	1	0.96	1.00E-06	=	1.16E-06
16-30 Years	0.00212	261	1	0.96	1.00E-06	=	5.31E-07

30-70 Years	0.00212	233	1	0.96	1.00E-06	=	4.74E-07
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Year 4 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	7.34E-07	1.1	10	0.25	70	1	1,000,000	0.0
0-2 Years	2.22E-06	1.1	10	1.00	70	1	1,000,000	0.3
2-16 Years	1.16E-06	1.1	3	1.00	70	1	1,000,000	0.1
16-30 Years	5.31E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	4.74E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Year 5 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00198	361	1	0.96	1.00E-06	=	6.85E-07
0-2 Years	0.00198	1090	1	0.96	1.00E-06	=	2.07E-06
2-16 Years	0.00198	572	1	0.96	1.00E-06	=	1.09E-06
16-30 Years	0.00198	261	1	0.96	1.00E-06	=	4.96E-07
30-70 Years	0.00198	233	1	0.96	1.00E-06	=	4.42E-07

Year 5 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	6.85E-07	1.1	10	1.00	70	1	1,000,000	0.1
0-2 Years	2.07E-06	1.1	10	1.00	70	1	1,000,000	0.3
2-16 Years	1.09E-06	1.1	3	1.00	70	1	1,000,000	0.1
16-30 Years	4.96E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	4.42E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Total Excess Risk at MEIR (Cumulative, Based on Exposure Starting Year 2)

Exposure Year	Infant	Child < 2	Child 2≤x<16	Adult 16≤x<30	Adult 30≤x<70
Year 1	--	--	--	--	--
Year 2	3.1	2.9	0.4	0.0	0.0
Year 3	0.9	0.9	0.1	0.0	0.0
Year 4	0.1	0.1	0.1	0.0	0.0
Year 5-16	0.6	0.6	0.5	0.1	0.1
Year 16-30	0.1	0.1	0.1	0.1	0.1
DPM Subtotal	4.8	4.5	1.2	0.2	0.2
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: Boiler 1	0.069	0.0436	0.0436	0.0436	0.0436
SCAQMD RT: Boiler 2	0.069	0.0436	0.0436	0.0436	0.0436
Total	5.4	5.1	1.9	0.8	0.8

Total Excess Risk at MEIR (Cumulative, Based on Exposure Starting Year 3)

Exposure Year	Infant	Child < 2	Child 2≤x<16	Adult 16≤x<30	Adult 30≤x<70
Year 1	--	--	--	--	--
Year 2	--	--	--	--	--
Year 3	1.0	0.9	0.1	0.0	0.0
Year 4	0.3	0.3	0.1	0.0	0.0
Year 5-16	0.6	0.6	0.1	0.1	0.1
Year 16-30	0.2	0.2	0.2	0.1	0.1
DPM Subtotal	2.1	2.0	0.4	0.2	0.1
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: Boiler 1	0.069	0.0436	0.0436	0.0436	0.0436
SCAQMD RT: Boiler 2	0.069	0.0436	0.0436	0.0436	0.0436
Total	2.7	2.6	1.0	0.8	0.8

Total Excess Risk at MEIR (Cumulative, Based on Exposure Starting Year 4)

Exposure Year	Infant	Child < 2	Child 2≤x<16	Adult 16≤x<30	Adult 30≤x<70
Year 1	--	--	--	--	--
Year 2	--	--	--	--	--
Year 3	--	--	--	--	--
Year 4	0.4	0.3	0.1	0.0	0.0
Year 5-16	0.8	0.8	0.6	0.1	0.1
Year 16-30	0.2	0.2	0.2	0.1	0.1
DPM Subtotal	1.4	1.4	0.8	0.1	0.1
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: Boiler 1	0.069	0.0436	0.0436	0.0436	0.0436
SCAQMD RT: Boiler 2	0.069	0.0436	0.0436	0.0436	0.0436
Total	2.1	2.0	1.4	0.8	0.7

Total Excess Risk at MEIR (Cumulative, Based on Exposure Starting Year 5)

Exposure Year	Infant	Child < 2	Child 2≤x<16	Adult 16≤x<30	Adult 30≤x<70
Year 1	--	--	--	--	--
Year 2	--	--	--	--	--
Year 3	--	--	--	--	--
Year 4	--	--	--	--	--
Year 5-16	0.9	0.8	0.6	0.1	0.1
Year 16-30	0.3	0.3	0.3	0.1	0.1
DPM Subtotal	1.2	1.1	0.8	0.1	0.1
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: CoGen	0.264	0.264	0.264	0.264	0.264
SCAQMD RT: Boiler 1	0.069	0.0436	0.0436	0.0436	0.0436
SCAQMD RT: Boiler 2	0.069	0.0436	0.0436	0.0436	0.0436
Total	1.9	1.7	1.4	0.8	0.7

Appendix H3.3: Health Risks**El Camino Project HRA****Unmitigated Cancer Health Risk Calculations (DPM)- Worker****METHODOLOGY**

$$\text{Dose (Air)} = \text{Cair} \times \text{WAF} \times \text{DBR} \times \text{A} \times \text{EF} \times \text{CF}$$

Where:

- Cair: Chemical concentration in air ($\mu\text{g}/\text{m}^3$)
- WAF: Worker Adjustment Factor
- DBR: Daily breathing rate (L/kg-day)
- A: Inhalation adsorption factor (unitless)
- EF: Exposure Frequency, days at home / days in year (unitless)
- CF: 10^{-6} Conversion Factor (m^3/L and $\text{mg}/\mu\text{g}$)

$$\text{Cancer Risk (per million)} = \text{Dose (Air)} \times \text{CPF} \times \text{ASF} \times (\text{ED}/\text{AT}) \times \text{FAH} \times 1,000,000$$

Where:

- Dose: Dose of chemical in the air ($\mu\text{g}/\text{m}^3$)
- CPF: Cancer Potency Factor ($\text{mg}/\text{kg}\cdot\text{day})^{-1}$
- ASF: Age Sensitivity Factor
- ED: Exposure Duration (years)
- AT: Averaging Time for lifetime cancer risks

Risk Parameter Values

Variable	Age 16-70 Years
DBR	230
WAF	1
A	1
EF	0.68
CF	1.00E-06
CPF	1.1
ASF	1
ED	25
AT	70

AERMOD Modeled DPM Concentrations (MEIW)

	Conc.	<u>MEIW</u>	
		X	Y
P1Y1 (Con; Year 1)	0.44624	447312.00	3771755.00
P1Y2 (Con; Year 2)	0.21355	447312.00	3771755.00
Ops (Year 3 - 25)	0.00680	447312.00	3771755.00
P2Y1 (Con; Year 3)	0.02316	447312.00	3771755.00
P2Y2 (Con; Year 4)	0.00034	447312.00	3771755.00

Combined DPM Concentrations for HRA

	Conc.	<u>MEIW</u>		Chronic Hazard Quotient
		X	Y	
Year 1 (P1Y1)	0.44624	447312.00	3771755.00	0.08925
Year 2 (P1Y2)	0.21355	447312.00	3771755.00	0.04271
Year 3 (P2Y1+Ops)	0.02996	447312.00	3771755.00	0.00599
Year 4 (P2Y2+Ops)	0.00714	447312.00	3771755.00	0.00143
Year 5-25 (Ops)	0.00680	447312.00	3771755.00	0.00136

Year 1 Dose @ MEIW

Age Group	Cair x	BR	WAF	A	EF	CF	=	Dose
16-70 Years	0.44624	230	1	1	0.68	1.00E-06	=	6.98E-05

Year 1 Excess Risk at MEIW

Age Group	Dose	CPF	ASF	ED	AT	Conversior	Risk
16-70 Years	6.98E-05	1.1	1	1	70	1,000,000	1.1

Year 2 Dose @ MEIW

Age Group	Cair x	BR	WAF	A	EF	CF	=	Dose
16-70 Years	0.21355	230	1	1	0.68	1.00E-06	=	3.34E-05

Year 2 Excess Risk at MEIW

Age Group	Dose	CPF	ASF	ED	AT	Conversior	Risk
16-70 Years	3.34E-05	1.1	1	1	70	1,000,000	0.5

Year 3 Dose @ MEIW

Age Group	Cair x	BR	WAF	A	EF	CF	=	Dose
16-70 Years	0.02996	230	1	1	0.68	1.00E-06	=	4.69E-06

Year 3 Excess Risk at MEIW

Age Group	Dose	CPF	ASF	ED	AT	Conversior	Risk
16-70 Years	4.69E-06	1.1	1	1	70	1,000,000	0.1

Year 4 Dose @ MEIW

Age Group	Cair x	BR	WAF	A	EF	CF	=	Dose
16-70 Years	0.00714	230	1	1	0.68	1.00E-06	=	1.12E-06

Year 4 Excess Risk at MEIW

Age Group	Dose	CPF	ASF	ED	AT	Conversior	Risk
16-70 Years	1.12E-06	1.1	1	1	70	1,000,000	0.0

Year 5-25 Dose @ MEIW

Age Group	Cair x	BR	WAF	A	EF	CF	=	Dose
16-70 Years	0.00680	230	1	1	0.68	1.00E-06	=	1.06E-06

Year 5-25 Excess Risk at MEIW

Age Group	Dose	CPF	ASF	ED	AT	Conversior	Risk
16-70 Years	1.06E-06	1.1	1	1	70	1,000,000	0.0

Total Excess Risk at MEIW (Cumulative)

	16-70
Year 1	1.1
Year 2	0.5
Year 3	0.1
Year 4	0.0
Year 5-25	0.4
DPM Subtotal	2.1

SCAQMD RT: CoGen1	0.149
SCAQMD RT: CoGen2	0.149
SCAQMD RT: Boiler 1	0.0049
SCAQMD RT: Boiler 2	0.0049

Total	2.4
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Appendix H3.3: Health Risks

El Camino Project HRA

Unmitigated Cancer Health Risk Calculations (DPM) - Daycare/Preschool (Student)

METHODOLOGY

$$\text{Dose (Air)} = \text{Cair} \times \text{DBR} \times \text{A} \times \text{EF} \times \text{CF}$$

Where:

- Cair: Chemical concentration in air ($\mu\text{g}/\text{m}^3$)
- DBR: Daily breathing rate (L/kg-day)
- A: Inhalation adsorption factor (unitless)
- EF: Exposure Frequency, days at home / days in year (unitless)
- CF: 10^{-6} Conversion Factor (m^3/L and $\text{mg}/\mu\text{g}$)

$$\text{Cancer Risk (per million)} = \text{Dose (Air)} \times \text{CPF} \times \text{ASF} \times (\text{ED}/\text{AT}) \times \text{FAH} \times 1,000,000$$

Where:

- Dose: Dose of chemical in the air ($\mu\text{g}/\text{m}^3$)
- CPF: Cancer Potency Factor ($\text{mg}/\text{kg}\cdot\text{day}$)⁻¹
- ASF: Age Sensitivity Factor
- ED: Exposure Duration (years)
- AT: Averaging Time for lifetime cancer risks
- FAH: Fraction of daily time spent at home / school

Risk Parameter Values by Age Bin

Variable	School 2-9 Years	
DBR	640	
A	1	
EF	0.71	Assumes receptor would be at preschool 260 days out of 365 days/year (Monday through Friday).
CF	1.00E-06	
CPF	1.1	
ASF	3	
ED	7	
AT	70	
FAH	0.5	Assumes students are at school for 12 hrs/day.

AERMOD Modeled DPM Concentrations (Student Receptor)

	Conc.	<u>Student</u>	
		X	Y
P1Y1 (Con; Year 1)	0.17361	447372	3771830
P1Y2 (Con; Year 2)	0.12983	447372	3371830
Ops (Year 3 - 30)	0.00704	447372	3371830
P2Y1 (Con; Year 3)	0.02335	447372	3371830
P2Y2 (Con; Year 4)	0.00042	447372	3371830

Combined DPM Concentrations for HRA

	Conc.	<u>Student</u>		
		X	Y	
Year 1 (P1Y1)	0.17361	447372.00	3771830.00	
Year 2 (P1Y2)	0.12983	447372.00	3371830.00	
Year 3 (P2Y1+Ops)	0.03039	447372.00	3371830.00	0.02335
Year 4 (P2Y2+Ops)	0.00746	447372.00	3371830.00	0.00042
Year 5-30 (Ops)	0.00704	447372.00	3371830.00	

Risk Assessment at Student

Scenario	Student Receptor	
	AERMOD DPM Conc.	Chronic Hazard Quotient
Year 1 (P1Y1)	0.17361	0.03472
Year 2 (P1Y2)	0.12983	0.02597
Year 3 (P2Y1+Ops)	0.03039	0.00608
Year 4 (P2Y2+Ops)	0.00746	0.00149
Year 5-30 (Ops)	0.00704	0.00141

Year 1 Dose @ Student

Age Group	Cair x	BR	A	EF	CF	=	Dose
2-9 Years	0.17361	640	1	0.71	1.00E-06	=	7.94E-05

Year 1 Excess Risk at Student

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-9 Years	7.94E-05	1.10	3	1.00	70	0.5	1,000,000	1.9

Year 2 Dose @ Student

Age Group	Cair x	BR	A	EF	CF	=	Dose
2-9 Years	0.12983	640	1	0.71	1.00E-06	=	5.94E-05

Year 2 Excess Risk at Student

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-9 Years	5.94E-05	1.10	3	1.00	70	0.5	1,000,000	1.4

Year 3 Dose @ Student

Age Group	Cair x	BR	A	EF	CF	=	Dose
2-9 Years	0.03039	640	1	0.71	1.00E-06	=	1.39E-05

Year 3 Excess Risk at Student

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-9 Years	1.39E-05	1.10	3	1.00	70	0.5	1,000,000	0.3

Year 4 Dose @ Student

Age Group	Cair x	BR	A	EF	CF	=	Dose
2-9 Years	0.00746	640	1	0.71	1.00E-06	=	3.41E-06

Year 4 Excess Risk at Student

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-9 Years	3.41E-06	1.10	3	1.00	70	0.5	1,000,000	0.1

Year 5 Dose @ Student

Age Group	Cair x	BR	A	EF	CF	=	Dose
2-9 Years	0.00704	640	1	0.71	1.00E-06	=	3.22E-06

Year 5 Excess Risk at Student

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
2-9 Years	3.22E-06	1.10	3	1.00	70	0.5	1,000,000	0.1

Total Excess Risk at Student Receptor (Cumulative, Based on Age at Start of Construction)

Year of Exposure	Child 2≤x<16 School
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Year 1	1.871
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Year 2	1.399
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Year 3	0.327
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Year 4	0.080
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Year 5	0.076
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DPM Subtotal	3.753
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SCAQMD RT: CoGer	0.0938 per year	0.469 Total 5 Years
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SCAQMD RT: CoGer	0.0938 per year	0.469 Total 5 Years
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SCAQMD RT: Boiler	0.0198 per year	0.099 Total 5 Years
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SCAQMD RT: Boiler	0.0198 per year	0.099 Total 5 Years
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Subtotal 2027	0.0198	
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Subtotal 2028 and 20	0.2272	
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Subtotal 2029	0.2272	
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Stational Subtotal	0.4742	
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Total	4.2	
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Appendix H3.3: Health Risks

El Camino Project HRA

Unmitigated Non-Cancer Health Risk Calculations (DPM) - Residential, Worker, and Student

Table 1. Unmitigated Non-Cancer Risk from One (1) CHP Generator

Pollutant	Chronic			8-Hour Chronic			Acute		
	MEIR	MEIW	MESR	MEIR	MEIW	MESR	MEIR	MEIW	MESR
Acetaldehyde (75070)	1.61E-05	1.11E-04	4.99E-05	7.53E-06	5.17E-05	2.33E-05	4.83E-05	3.58E-04	1.37E-04
Acrolein (107028)	3.96E-03	2.72E-02	1.23E-02	1.98E-03	1.36E-02	6.13E-03	5.58E-03	4.13E-02	1.58E-02
Ammonia (7664417)	1.20E-05	8.27E-05	3.72E-05				7.57E-06	5.61E-05	2.14E-05
Formaldehyde (50000)	1.59E-03	1.09E-02	4.90E-03	1.59E-03	1.09E-02	4.90E-03	2.61E-03	1.93E-02	7.39E-03
Naphthalene (91203)	2.23E-06	1.53E-05	6.90E-06						
Styrene (100425)							3.05E-09	2.26E-08	8.65E-09
Toluene (108883)							2.21E-07	1.64E-06	6.27E-07
Vinyl chloride (75014)							2.25E-10	1.67E-09	6.37E-10
Xylenes (mixed) (1330207)	7.11E-08	4.88E-07	2.20E-07				2.27E-08	1.69E-07	6.44E-08
CHP Generator Subtotal	5.6E-03	3.8E-02	1.7E-02	3.6E-03	2.5E-02	1.1E-02	8.2E-03	6.1E-02	2.3E-02

Table 2. Unmitigated Non-Cancer Risks from One (1) Boiler

Pollutant	Chronic			8-Hour Chronic			Acute		
	MEIR	MEIW	MESR	MEIR	MEIW	MESR	MEIR	MEIW	MESR
Acetaldehyde (75070)	1.93E-07	5.48E-07	3.97E-07	9.00E-08	2.56E-07	1.85E-07	3.96E-07	1.07E-06	6.98E-07
Acrolein (107028)	6.72E-05	1.91E-04	1.38E-04	3.36E-05	9.55E-05	6.92E-05	6.48E-05	1.75E-04	1.14E-04
Ammonia (7664417)	7.84E-04	2.23E-03	1.61E-03				3.38E-04	9.10E-04	5.96E-04
Formaldehyde (50000)	1.19E-05	3.38E-05	2.45E-05	1.19E-05	3.38E-05	2.45E-05	1.34E-05	3.62E-05	2.37E-05
Naphthalene (91203)	2.90E-07	8.25E-07	5.98E-07						
Toluene (108883)							3.18E-07	8.58E-07	5.61E-07
Xylenes (mixed) (1330207)	2.45E-07	6.97E-07	5.05E-07				5.38E-08	1.45E-07	9.48E-08
Boiler Subtotal	8.6E-04	2.5E-03	1.8E-03	4.6E-05	1.3E-04	9.4E-05	4.2E-04	1.1E-03	7.3E-04

Table 3. Unmitigated Non-Cancer Risks from Construction / Operational DPM Emissions

Pollutant	Chronic			8-Hour Chronic			Acute		
	MEIR	MEIW	MESR	MEIR	MEIW	MESR	MEIR	MEIW	MESR
Diesel Particulate Matter	3.9E-03	8.9E-02	3.5E-02	N/A	N/A	N/A	N/A	N/A	N/A

Table 4. Unmitigated Non-Cancer Risks from All Sources

Source	Chronic			8-Hour Chronic			Acute		
	MEIR	MEIW	MESR	MEIR	MEIW	MESR	MEIR	MEIW	MESR
CHP Generator 1	5.6E-03	3.8E-02	1.7E-02	3.6E-03	2.5E-02	1.1E-02	8.2E-03	6.1E-02	2.3E-02
CHP Generator 2	5.6E-03	3.8E-02	1.7E-02	3.6E-03	2.5E-02	1.1E-02	8.2E-03	6.1E-02	2.3E-02
Boiler 1	8.6E-04	2.5E-03	1.8E-03	4.6E-05	1.3E-04	9.4E-05	4.2E-04	1.1E-03	7.3E-04
Boiler 2	8.6E-04	2.5E-03	1.8E-03	4.6E-05	1.3E-04	9.4E-05	4.2E-04	1.1E-03	7.3E-04
Diesel Particulate Matter	3.9E-03	8.9E-02	3.5E-02	N/A	N/A	N/A	N/A	N/A	N/A
Total	0.02	0.17	0.07	0.01	0.05	0.02	0.02	0.12	0.05
Threshold	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Threshold Exceeded?	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE