

HEALTH RISK ASSESSMENT MODELING

Inhalation cancer risk = $(C_{air} * DBR * A * EF * ED * 1 \times 10^{-6}) / AT$ * Inhalation Cancer Potency factor

DBR	303	Daily breathing rate	(L/kg-day)
A	1	Inhalation absorption factor	
EF	350	Exposure frequency	(days/yr)
ED	0.25	Exposure duration	(years)
AT	25,550	Avg. time period of exposure	(days) (70 years = 25,550 days)
For diesel PM ₁₀	1.1	Inhalation Cancer Potency factor	(mg/kg-d) ⁻¹
For diesel PM ₁₀	5.0	Chronic Inhalation REL	(ug/m ³)

Distance from Construction to Residence in Meters (Feet)	Carcinogenic Inhalation Health Risk	Chronic Inhalation Health Index
25 (85)	4.34	0.7605
30 (105)	4.27	0.747396
35 (115)	4.2	0.735228
40 (135)	4.06	0.71136
45 (155)	3.88	0.680004
50 (165)	3.7	0.648648
55 (185)	3.5	0.614016
60 (205)	3.37	0.590148
65 (215)	3.2	0.560196
70 (235)	3	0.5265
75 (255)	2.87	0.502164
80 (265)	2.79	0.488124
85 (285)	2.68	0.47034
90 (305)	2.57	0.451105
95 (315)	2.46	0.430888
100 (335)	2.34	0.410436

Screening Health Risk From Diesel Exhaust Particulate Worksheet

$$\text{Inhalation cancer risk} = (\text{Cair} * \text{DBR} * \text{A} * \text{EF} * \text{ED} * 1 \times 10^{-6}) / \text{AT}) * \text{Inhalation Cancer Potency factor}$$

SCREEN3 Input parameters:

SIMPLE TERRAIN INPUTS:		
SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	1.0
SOURCE HEIGHT (M)	=	2.0
LENGTH OF LARGER SIDE (M)	=	50
LENGTH OF SMALLER SIDE (M)	=	20
RECEPTOR HEIGHT (M)	=	0.0
URBAN/RURAL OPTION	=	URBAN

Health Risk Parameters

Adult DBR	303	Daily breathing rate	(L/kg-day)
Child DBR	452	Daily breathing rate	(L/kg-day)
A	1	Inhalation absorption factor	
EF	250	Exposure frequency	(days/yr)
Adult ED	70	Exposure duration	(years)
Child ED	9	Exposure duration	(years)
AT	25,550	Avg. time period of exposure	(days)
Diesel PM ₁₀	1.1	Inhalation Cancer Potency factor	(mg/kg-d) ⁻¹
Diesel PM ₁₀	5.0	Inhalation Chronic REL	(ug/m ³)

1hr-An Scaler 0.08 (from ARB)

	Total ADT	% MD trucks	% HD trucks	Average speed (MPH)	Total PM ₁₀ Emissions gms/mile	Emissions Rate per source gm/sec/source
Existing	24,400	5.0%	5.0%	45	151.7	0.057
No Build	79,000	5.0%	5.0%	45	491.2	0.183
Alternative 4	93,600	5.0%	5.0%	65	933.7	0.348
Alternative 5	93,400	5.0%	5.0%	65	931.7	0.347
Alternative 9	93,800	5.0%	5.0%	65	935.7	0.348

1609.872

(5 sources in a line, 20 meters wide and 50 meters long, total road length modeled = 250m)
 MD trucks 75% % that are diesel
 HD trucks 90% % that are diesel

Alternative	Peak Volume ADT	Scaled PM ₁₀ Concentrations		Inhalation Cancer Risk for Adults # in 1 Million	Inhalation Cancer Risk for Children # in 1 Million	Inhalation Chronic Risk Factor
		1 hour (µg/m ³)	Annual (µg/m ³)			
Existing	24,400	0.0041	0.00033	0.07	0.014	0.00007
No Build	79,000	0.0132	0.00106	0.24	0.046	0.00021
Alternative 4	93,600	0.0252	0.00201	0.46	0.088	0.00040
Alternative 5	93,400	0.0251	0.00201	0.46	0.088	0.00040
Alternative 9	93,800	0.0252	0.00202	0.46	0.088	0.00040

Source: LSA Associates, Inc., September 2011

Notes:

Risk levels calculated at 20 meters from the roadway centerline