

Scenario: Estimated cancer risks from ingestion of chrysene in soil to an individual exposed for 30 years, starting at birth, the standard scenario for an RME resident.

Note, this example uses the USEPA (1991) recommended standard default exposure parameters for a RME resident.

General Equation:

$$Risk_i = \frac{C * IR_i * CF * EF_i * ED_i * SF * ADAF_i * RPF}{BW_i * AT}$$

Inputs:

EXPOSURE PARAMETERS (by age interval, i)					
Parameter	Units	0-<2	2-<6	6-<16	16-<30
C	(mg/kg)	500	500	500	500
IR	(mg/day)	200	200	100	100
CF	(kg/mg)	1.0E-06	1.0E-06	1.0E-06	1.0E-06
BW	(kg)	15	15	70	70
EF	(days/year)	350	350	350	350
ED	(years)	2	4	10	14
AT	(days)	25,550	25,550	25,550	25,550
SF _{oral} [1]	(mg/kg-day) ⁻¹	7.3E+00	7.3E+00	7.3E+00	7.3E+00
ADAF	(unitless)	10	3	3	1
RPF	(unitless)	0.001	0.001	0.001	0.001

RPF = Relative potency factor for chrysene (USEPA 1993).

Note: Alternate age bins may be considered to address site-specific exposure scenarios.

Cancer Risk Calculations:

$$Risk_{(0-<2)} = [500 * (200 * 0.000001 / 15) * (350 / 365) * (2 / 70) * 7.3E+00 * 10 * 0.001] = 1.3E-05$$

$$Risk_{(2-<6)} = [500 * (200 * 0.000001 / 15) * (350 / 365) * (4 / 70) * 7.3E+00 * 3 * 0.001] = 8.0E-06$$

$$Risk_{(6-<16)} = [500 * (100 * 0.000001 / 70) * (350 / 365) * (10 / 70) * 7.3E+00 * 3 * 0.001] = 2.1E-06$$

$$Risk_{(16-<30)} = [500 * (100 * 0.000001 / 70) * (350 / 365) * (14 / 70) * 7.3E+00 * 1 * 0.001] = 1.0E-06$$

$$Total Risk_{(0-<30)} = 1.3E-05 + 8.0E-06 + 2.1E-06 + 1.0E-06 = 2.4E-05$$

Summary of Results:

Age Interval (i)	Estimated Risk
0-<2	1.3E-05
2-<6	8.0E-06
6-<16	2.1E-06
16-<30	1.0E-06
Total Risk (0-<30)	2.4E-05

References:

USEPA 1991. Standard Default Exposure Factors. OSWER Directive 9285.6-03
USEPA 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/R-93/089 July 1993. Table 8.

Notes:

[1] IRIS 2006. <http://www.epa.gov/iris/> Accessed June 2006.

Scenario: Estimated cancer risks from ingestion of chrysene in drinking water to an individual exposed for 30 years, starting at birth, the standard scenario for an RME resident.

Note, this example uses the USEPA (1991) recommended standard default exposure parameters for a RME resident.

General Equation:

$$Risk_i = \frac{C * IR_i * EF_i * ED_i}{BW_i * AT} * SF * ADAF_i * RPF$$

Inputs:

EXPOSURE PARAMTERS (by age interval, i)					
Parameter	Units	0-<2	2-<6	6-<16	16-<30
C	(mg/L)	0.05	0.05	0.05	0.05
IR	(L/day)	1	1	2	2
BW	(kg)	15	15	70	70
EF	(days/year)	350	350	350	350
ED	(years)	2	4	10	14
AT	(days)	25,550	25,550	25,550	25,550
SF _{oral} [1]	(mg/kg-day) ⁻¹	7.3E+00	7.3E+00	7.3E+00	7.3E+00
ADAF	(unitless)	10	3	3	1
RPF	(unitless)	0.001	0.001	0.001	0.001

RPF = Relative potency factor for chrysene (USEPA 1993).

Note: Alternate age bins may be considered to address site-specific exposure scenarios.

Cancer Risk Calculations:

$$Risk_{(0-<2)} = [0.05 * (1/15) * (350/365) * (2/70) * 7.3E+00 * 10 * 0.001] = 6.7E-06$$

$$Risk_{(2-<6)} = [0.05 * (1/15) * (350/365) * (4/70) * 7.3E+00 * 3 * 0.001] = 4.0E-06$$

$$Risk_{(6-<16)} = [0.05 * (2/70) * (350/365) * (10/70) * 7.3E+00 * 3 * 0.001] = 4.3E-06$$

$$Risk_{(16-<30)} = [0.05 * (2/70) * (350/365) * (14/70) * 7.3E+00 * 1 * 0.001] = 2.0E-06$$

$$Total Risk_{(0-<30)} = 6.7E-06 + 4.0E-06 + 4.3E-06 + 2.0E-06 = 1.7E-05$$

Summary of Results:

Age Interval (i)	Estimated Risk
0-<2	6.7E-06
2-<6	4.0E-06
6-<16	4.3E-06
16-<30	2.0E-06
Total Risk (0-<30)	1.7E-05

References:

USEPA 1991. Standard Default Exposure Factors. OSWER Directive 9285.6-03
USEPA 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/R-93/089 July 1993. Table 8.

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[1] IRIS 2006. <http://www.epa.gov/iris/> Accessed June 2006.