

APPENDIX D

Equations for Intake of Soil Contaminants

$$\text{Incidental Ingestion Intake (mg/kg-day)} = \frac{C_s \times \text{IngR} \times \text{EF} \times \text{ED} \times \text{CF}_1}{\text{BW} \times \text{AT}}$$

Where,

- C_s = Maximum reported COPC soil concentration, mg/kg
- IngR = Adult soil ingestion rate, 100 mg/day (DTSC 1999)
= Child ingestion rate, 200 mg/day (DTSC 1999)
- EF = Residential exposure frequency, 350 days/year (DTSC 1999)
- ED = Adult exposure duration, 24 years (DTSC 1999)
= Child exposure duration, 6 years (DTSC 1999)
- CF_1 = Conversion factor, 1×10^{-6} kg/mg
- BW = Adult body weight, 70 kg
= Child body weight, 15 kg
- AT = Averaging time, days
= $\text{ED} \times 365$ days/year for noncarcinogens
= 70 years \times 365 days/year for carcinogens

$$\text{Dermal Contact Intake (mg/kg-day)} = \frac{C_s \times SA \times AF \times CF_1 \times EF \times ED}{BW \times AT}$$

Where,

- C_s = Maximum reported COPC soil concentration, mg/kg
- SA = Adult skin surface area for exposure, 5700 cm² (DTSC 2000)
= Child skin surface area for exposure, 2900 cm² (DTSC 2000)
- AF = Adult soil-to-skin adherence factor, 0.07 mg/cm² (DTSC 2000)
= Child soil-to-skin adherence factor, 0.2 mg/cm² (DTSC 2000)
- CF_1 = Conversion factor, 1 x 10⁻⁶ kg/mg
- EF = Adult exposure frequency, 100 days/year (DTSC 2000)
= Child exposure frequency, 350 days/year (DTSC 2000)
- ED = Adult exposure duration, 24 years (DTSC 1999)
= Child exposure duration, 6 years (DTSC 1999)
- BW = Adult body weight, 70 kg
= Child body weight, 15 kg
- AT = Averaging time, days
= ED * 365 days/year for noncarcinogens
= 70 years * 365 days/year for carcinogens

$$\text{Inhalation Intake (mg/kg-day)} = \frac{C_a \times \text{InhR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where,

- C_a = Estimated COPC concentration in air, mg/m³
- InhR = Adult inhalation rate, 20 m³/day (DTSC 1999)
= Child inhalation rate, 10 m³/day (DTSC 1999)
- EF = Residential exposure frequency, 350 days/year (DTSC 1999)
- ED = Adult exposure duration, 24 years (DTSC 1999)
= Child exposure duration, 6 years (DTSC 1999)
- BW = Adult body weight, 70 kg
= Child body weight, 15 kg
- AT = Averaging time, days
= ED * 365 days/year for noncarcinogens
= 70 years * 365 days/year for carcinogens

For inhalation of soil particulates, air concentrations were estimated using the EPA Particulate Emission Factor (PEF) approach, as documented in EPA's Soil Screening Guidance. The PEF is defined by the following equation:

$$\text{PEF(m}^3\text{/kg)} = \text{Q/C} \times \left(\frac{3,600\text{s/h}}{0.036 \times (1 - V) \times (\text{Um}/\text{Ut})^3 \times \text{F(x)}} \right)$$

Where,

- Q/C = Inverse of mean concentration at the center of a 0.5-acre square source, 68.81 g/m²-s per kg/m³ (for the Los Angeles Area)
- V = Fraction of vegetative cover (0.5 (50%), default value)
- Um = Mean annual wind speed, 4.69 m/s, default
- Ut = Equivalent threshold value of windspeed at 7 m, 11.32 m/s, default
- F(x) = Function dependent on Um/Ut, 0.194 default

Based on the regional-specific Q/C for the Los Angeles area, the PEF was estimated to be 1.0E+09 m³/kg. Then, the air concentration of suspended soil COPCs (mg/m³) is equal to the maximum reported soil concentration (mg/kg) divided by the PEF (m³/kg).