C4559 - St. Mary's Park, Limerick

Site Specific Assessment Criteria Calculations for Exposure frequency

Exposure Scenario 1 - Adjacent residential receptors

Exposure frequency for direct ingestion

Assumes approximately half of directly ingested soil is from soil dust (EA 2009)

$$EFDI = \left(\frac{IR_{dust} + IR_{soil}}{S_{ti}} \right) X \quad 365$$

$$IR_{dust} = \left(\frac{S_{ti} \times S_d \times D_{site} \times DER_d}{365} \right)$$

$$IR_{soil} = \left(\frac{S_{ti} \times S_c \times C_{site} \times DER_s}{365} \right)$$

EFDI	Time weighted effective exposure frequency for direct ingestion of soil
IR_{dust}	Annual ingestion rate for directly ingested soil from site dust
IR_{soil}	Annual ingestion rate for directly ingested soil due to site soil contact
S_{ti}	Total annual soil ingestion rate
S_d	Fraction of annual ingested soil comprising dust
D_{site}	Fraction of site derived soil in household dust
S_c	Fraction of annual ingested soil due to direct soil contact
C_{site}	Fraction of total daily direct soil contact due to landfill soils
DER_d	Average frequency of contact with dust
DER_s	Average frequency of contact with on site soils

Input Parameters used in calculation

	Value	Unit	Justification
S_{ti}	36.5	g	Default ingestion rate of 0.1g x 365 days/year
S_d	0.5	fraction	Environment Agency 2009, conservative assumption
D_{site}	0.33	fraction	Assumption based on up to 1/3 of household dust landfill derived
S_c	0.5	fraction	Environment Agency 2009, conservative assumption
C_{site}	0.5	fraction	Conservative assumption based on conceptual model
DER_d	365	day/yr	Assuming 365 days/yr for adjacent resident
DER_s	104	day/yr	Assuming days / week based on site specific assumption

Therefore

$$IR_{dust} = \left(\frac{36.5 \times 0.5 \times 0.33 \times 365}{365} \right)$$

$$= 6.0g$$

$$IR_{soil} = \left(\frac{36.5 \times 0.5 \times 0.5 \times 104}{365} \right)$$

$$= 2.6g$$

$$EFDI = \left(\frac{6.0 + 2.6}{36.5} \right) X \quad 365$$

$$= 86 \text{ days/year}$$

Exposure frequency for receptor class 1 (0-1 year old children) has been halved to reflect lower soil exposure within this group. This approach is consistent with the CLEA v1.06 default model.

Exposure frequency for dermal contact (Outdoors)

$$EFD = DER_s \times C_{site}$$

EFD	Exposure frequency for dermal contact
DER_s	Average frequency of dermal contact with on site soils
C_{site}	Fraction of total daily direct soil contact due to on site soils

	Value	Unit	Justification
DER_s	182.5	day/yr	Assuming 3 to 4 days / week based on site specific data
C_{site}	0.25	fraction	Conservative assumption based on conceptual model

$$EFD = 104 \times 0.5$$

$$= 52 \text{days/year}$$