Alt Text for the Equations in the PHAST 508-Compliant Word Downloads

What follows are the equations used by PHAST to calculate site doses and air concentrations. We've provided the alt text in case you report these equations in your document. The alt text provided for each equation meets the 508 character limitation of 120 characters (including spaces).

Drinking Water Ingestion

Equation 1: $D_{noncancer} = (C \times IR \times EF_{noncancer}) \div BW$

Alt text: Noncancer dose equals concentration times intake rate times noncancer exposure factor divided by body weight

Equation 2: $HQ = D_{noncancer} \div HG$

Alt text: The hazard quotient equals the noncancer dose divided by the health guideline

Equation 3: $CR = (D_{noncancer} \times CSF) \times (ED \div LY)$ for each exposure group

Alt text: Cancer risk equals noncancer dose times cancer slope factor times exposure duration divided by lifetime years

Equation 4: ADAF-adjusted $CR = (D_{noncancer} \times CSF) \times (ED \div LY) \times ADAF$ for each exposure group

Alt text: ADAF cancer risk equals noncancer dose times CSF times exposure duration divided by lifetime years times ADAF

Equation 5: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation in Exposure Factors Table: $EF_{cancer} = EF_{noncancer} \times (ED_{age\text{-}specific\ (yrs)} \div 78\ years)$.

Alt text: Cancer exposure factor equals noncancer exposure factor times age-specific exposure duration divided by 78 years

Surface Water Ingestion and Dermal Contact

Equation 1: $D_{noncancer} = (C \times IR \times t_{event} \times EV \times EF_{noncancer}) \div BW$

Alt text: Noncancer dose equals concentration times IR times event duration times event frequency times noncancer EF divided by BW

Equation 2: $ADD_{noncancer} = (DA_{event} \times SA \times EV \times EF_{noncancer}) \div (BW \times ABS_{GI})$

Alt text: Noncancer ADD equals DA event times SA times EV times noncancer EF divided by BW times ABS GI

Equation 3: $HQ = D_{noncancer} \div HG$

Alt text: The hazard quotient equals the noncancer dose divided by the health guideline

Equation 4: CR = ($D_{noncancer}$ x CSF) x (ED ÷ LY) for each exposure group

Alt text: Cancer risk equals noncancer dose times cancer slope factor times exposure duration divided by lifetime years

Equation 5: ADAF-adjusted CR = ($D_{noncancer}$ x CSF) x (ED ÷ LY) x ADAF for each exposure group

Alt text: ADAF cancer risk equals noncancer dose times CSF times exposure duration divided by lifetime years times ADAF

Equation 6: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation in Exposure Factors Table: EF_{cancer} = $EF_{noncancer}$ x ($ED_{age\text{-}specific\ (yrs)}$ ÷ 78 years).

Alt text: Cancer exposure factor equals noncancer exposure factor times age-specific exposure duration divided by 78 years

Soil/Sediment Ingestion and Dermal Contact

Equation 1: $D_{noncancer}$ = (C x IR x $EF_{noncancer}$ x CF) ÷ BW

Alt text: Noncancer dose equals concentration times intake rate times noncancer EF times conversion factor divided by body weight

Equation 2: $ADD_{noncancer}$ = (C x $EF_{noncancer}$ x CF x AF x ABS_d x SA) ÷ (BW x ABS_{GI})

Alt text: Noncancer ADD equals C times noncancer EF times CF times AF times ABS D times SA divided by BW times ABS GI

Equation 3: HQ = $D_{noncancer}$ ÷ HG

Alt text: The hazard quotient equals the noncancer dose divided by the health guideline

Equation 4: CR = ($D_{noncancer}$ x CSF) x (ED ÷ LY) for each exposure group

Alt text: Cancer risk equals noncancer dose times cancer slope factor times exposure duration divided by lifetime years

Equation 5: ADAF-adjusted CR = ($D_{noncancer}$ x CSF) x (ED ÷ LY) x ADAF for each exposure group

Alt text: ADAF cancer risk equals noncancer dose times CSF times exposure duration divided by lifetime years times ADAF

Equation 6: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation in Exposure Factors Table: EF_{cancer} = $EF_{noncancer}$ x ($ED_{age\text{-}specific\ (yrs)}$ ÷ 78 years).

Alt text: Cancer exposure factor equals noncancer exposure factor times age-specific exposure duration divided by 78 years

Air Inhalation

Equation 1: Adjusted EPC = EPC x $EF_{noncancer}$

Alt text: The adjusted exposure point concentration equals the exposure point concentration times the noncancer exposure factor

Equation 2: HQ = Adjusted EPC ÷ HG

Alt text: The hazard quotient equals the adjusted exposure point concentration divided by the health guideline

Equation 3: CR = (Adjusted EPC x IUR) x (ED ÷ LY) for each exposure group

Alt text: Cancer risk equals adjusted EPC times inhalation unit risk times exposure duration divided by lifetime years

Equation 4: ADAF-adjusted CR = (Adjusted EPC x IUR) x (ED ÷ LY) x ADAF for each exposure group

Alt text: ADAF cancer risk equals adjusted EPC times IUR times exposure duration divided by lifetime years times ADAF

Equation 5: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation in Exposure Factors Table: EF_{cancer} = $EF_{noncancer}$ x ($ED_{age\text{-}specific\ (yrs)}$ ÷ 78 years).

Alt text: Cancer exposure factor equals noncancer exposure factor times age-specific exposure duration divided by 78 years

Food Ingestion (Solid and Liquid)

Equation 1: $D_{noncancer}$ = (C x IR x $EF_{noncancer}$) ÷ BW

Alt text: Noncancer dose equals concentration times intake rate times noncancer exposure factor divided by body weight

Equation 2: HQ = $D_{noncancer}$ ÷ HG

Alt text: The hazard quotient equals the noncancer dose divided by the health guideline

Equation 3: CR = ($D_{noncancer}$ x CSF) x (ED ÷ LY) for each exposure group

Alt text: Cancer risk equals noncancer dose times cancer slope factor times exposure duration divided by lifetime years

Equation 4: ADAF-adjusted CR = ($D_{noncancer}$ x CSF) x (ED ÷ LY) x ADAF for each exposure group

Alt text: ADAF cancer risk equals noncancer dose times CSF times exposure duration divided by lifetime years times ADAF

Equation 5: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation in Exposure Factors Table: EF_{cancer} = $EF_{noncancer}$ x ($ED_{age\text{-}specific\ (yrs)}$ ÷ 78 years).

Alt text: Cancer exposure factor equals noncancer exposure factor times age-specific exposure duration divided by 78 years

SHOWER Model Inhalation & Dermal with PHAST Ingestion

Equation 1: Adjusted EPC = EPC x $EF_{noncancer}$

Alt text: The adjusted exposure point concentration equals the exposure point concentration times the noncancer exposure factor

Equation 2: $D_{noncancer} = ADD \times EF_{noncancer}$

Alt text: The noncancer dose equals the administered dermal dose times the noncancer exposure factor

Equation 3: $D_{noncancer} = (C \times IR \times EF_{noncancer}) \div BW$

Alt text: Noncancer dose equals concentration times intake rate times noncancer exposure factor divided by body weight

Equation 4: $HQ_{inhalation}$ = Inhalation Adjusted EPC ÷ inhalation HG

Alt text: The inhalation hazard quotient equals the inhalation adjusted EPC divided by the inhalation health guideline

Equation 5: HQ_{dermal} = Dermal $D_{noncancer}$ ÷ oral HG

Alt text: The dermal hazard quotient equals the dermal noncancer dose divided by the oral health guideline

Equation 6: HQ_{oral} = Drinking Water $D_{noncancer}$ ÷ oral HG

Alt text: The oral hazard quotient equals the drinking water noncancer dose divided by the oral health guideline

Equation 7: CR = Drinking Water $D_{noncancer}$ x CSF x (ED ÷ LY)

Alt text: Cancer risk equals noncancer drinking water dose times CSF times exposure duration divided by lifetime years

Equation 8: ADAF-adjusted CR = (Drinking Water $D_{noncancer}$ x CSF) x (ED ÷ LY) x ADAF

Alt text: ADAF cancer risk equals noncancer DW dose times CSF times exposure duration divided by lifetime years times ADAF

Equation 9: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation 10: CR = Inhalation Adjusted EPC x IUR x (ED ÷ LY)

Alt text: Cancer risk equals inhalation adjusted EPC times inhalation unit risk times exposure duration divided by lifetime years

Equation 11: ADAF-adjusted CR = (Inhalation Adjusted EPC x IUR) x (ED ÷ LY) x ADAF

Alt text: ADAF cancer risk equals inhalation adjusted EPC times IUR times exposure duration divided by lifetime years times ADAF

Equation 12: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation 13: CR = (CR = Dermal $D_{noncancer}$ x CSF x (ED ÷ LY)

Alt text: Cancer risk equals noncancer dermal dose times cancer slope factor times exposure duration divided by lifetime years

Equation 14: ADAF-adjusted CR = (Dermal $D_{noncancer}$ x CSF) x (ED ÷ LY) x ADAF

Alt text: ADAF cancer risk equals noncancer dermal dose times CSF times exposure duration divided by lifetime years times ADAF

Equation 15: Total CR = Sum of the CR for all exposure groups

Alt text: Total cancer risk equals the sum of all the cancer risks for all exposure groups

Equation in Exposure Factors Table: $EF_{cancer} = EF_{noncancer}$ x ($ED_{age\text{-}specific\ (yrs)}$ ÷ 78 years).

Alt text: Cancer exposure factor equals noncancer exposure factor times age-specific exposure duration divided by 78 years