

Appendix A: Summary of Non-Carcinogenic Daily Doses of Arsenic Resulting from Various Pathways

Appendix A. Non-Carcinogenic CoCs

Summary of Hazard Quotients and Daily Doses of Arsenic Resulting from Combined Exposure Through Various Pathways to a Given Residential Soil Arsenic Concentration:

Param1	CoC Concentration in Soil (mg As/kg soil) (Soil As Conc. of 44.0845 mg/kg gives hazard quotient of 1.000000)	Conc_{Soil}	46.0000	mg As/kg soil
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Item #	Result for Exposure Pathway	Term	Value	Units
HQ - 3.2	Hazard Quotient for Soil Ingestion	Soil HQ_{Ing-NC}	0.784170	-
HQ - 7.2	Hazard Quotient for HG AbgVeg Ingestion	AbgVeg HQ_{Ing-NC}	0.099382	-
HQ - 7.4	Hazard Quotient for HG BgVeg Ingestion	BgVeg HQ_{Ing-NC}	0.030496	-
HQ - 2.2	Hazard Quotient for Soil Dermal Contact	Soil HQ_{Derm-NC}	0.129388	-
HQ - 1.2	Hazard Quotient for Air/Dust Inhalation	Air HQ_{Inh-NC}	0.000015	-
HQ - Tot	Total HQ from Soil & Vege Ingestion, Dust Inhalation, and Dermal Contact =		1.043451	-

Item #	Result for Exposure Pathway	Term	Value	Units
DD - 3.2	Daily Dose of As from Soil Ingestion	Soil Dose_{Ing-NC}	2.353E-04	mg As/kg BW/day
DD - 7.2	Daily Dose of As from HG AbgVeg Ingestion	AbgVeg Dose_{Ing-NC}	2.981E-05	mg As/kg BW/day
DD - 7.4	Daily Dose of As from HG BgVeg Ingestion	BgVeg Dose_{Ing-NC}	9.149E-06	mg As/kg BW/day
DD - 2.2	Daily Dose of As from Soil Dermal Contact	Soil Dose_{Derm-NC}	3.882E-05	mg As/kg BW/day
DD - 1.2	Daily Dose of As from Soil Dermal Contact	Air Dose_{Inh-NC}	4.445E-09	mg As/kg BW/day
DD - Tot	Total DD from Soil & Vege Ingestion, Dust Inhalation, and Dermal Contact =		3.130E-04	mg As/kg BW/day

HQ - 3.2 Ingestion of NonCarcinogenic CoCs in Soil - Soil HQ Ing.NC

Item #	Exposure Factor	Term	Value	Units
1	CoC Concentration in Soil (mg As/kg soil)	Conc _{Soil}	46.00	mg As/kg soil
2	Soil Ingestion Rate - Child - Residential (mg/day)	IR _{Soil.Ch.Res}	200	mg soil/day
3	Conversion Factor (mg to kg)	CF _{mg:kg}	1.00E-06	kg soil/mg soil
4	Exposure frequency - Child - Residential (days/yr)	EF _{Ch.Res}	350	days/yr
5	Exposure Duration - Child - Residential (yr)	ED _{Ch.Res}	6	yr
6	Relative Bioavailability Factor (unitless)	RBAF	0.4	-
7	Oral Reference Dose (mg/kg/day)	RfD _{Or}	0.0003	mg As/kg BW/day
8	Average Body Weight - Child 0-6 (kg)	AvgBW _{Ch 0-6}	15	kg BW
9	Averaging Time - NonCarcinogens - Child - Residential (yr)	AT _{NC.Ch.Res}	6	yr
10	Days per Year	DpY	365	days/yr
HQ - 3.2	Hazard Quotient for Soil Ingestion	Soil HQ_{Ing.NC}	0.784170	-
DD - 3.2	Daily Dose of As from Soil Ingestion	Soil Dose_{Ing.NC}	2.353E-04	mg As/kg BW/day

Appendix A. Non-Carcinogenic CoCs

HQ - 7.2 Ingestion of NonCarcinogenic CoCs in Home-Grown Above-Ground Vegetables - AbgVeg HQ Ing.NC

Item #	Exposure Factor	Term	Value	Units
1	CoC Concentration in Soil (mg As/kg soil)	ConC _{Soil}	46.00	mg As/kg soil
2	Partition coefficient for As in Abg vege vs soil (g soil/g DW)	PC _{Abg:Soil}	0.01	g soil/g DW
3	Vege Ingestion Rate - Child - HG AbgVege (g As Consumed/day)	IR _{Abg,Ch.Res}	14.567	g AC/day
4	Conversion Factor (g As Consumed to g Dry Weight)	CF _{AC:DW}	17.4%	g DW/g AC
5	Conversion Factor (g to kg)	CF _{g:kg}	1.000E-03	kg soil/g soil
6	Exposure Frequency - Child - Residential (days/yr)	EF _{Ch.Res}	350	days/yr
7	Exposure Duration - Child - Residential (yr)	ED _{Ch.Res}	6	yr
8	Relative Bioavailability Factor (unitless)	RBAF	0.4	-
9	Oral Reference Dose (mg/kg/day)	RfD _{Or}	0.0003	mg As/kg BW/day
10	Average Body Weight - Child 0-6 (kg)	AvgBW _{Ch 0-6}	15	kg BW
11	Days per Year	DpY	365	days/yr
12	Averaging Time - NonCarcinogens - Child - Residential (yr)	AT _{NC,Ch.Res}	6	yr
HQ - 7.2	Hazard Quotient for HG AbgVeg Ingestion	AbgVegHQ_{Ing.NC}	0.099382	-
DD - 7.2	Daily Dose of As from HG AbgVeg Ingestion	AbgVegDose_{Ing.NC}	2.981E-05	mg As/kg BW/day

HQ - 7.4 Ingestion of NonCarcinogenic CoCs in Home-Grown Below-Ground Vegetables - BgVeg HQ Ing.NC

Item #	Exposure Factor	Term	Value	Units
1	CoC Concentration in Soil (mg As/kg soil)	ConC _{Soil}	46.00	mg As/kg soil
2	Partition coefficient for As in Abg vege vs soil (g soil/g DW)	PC _{Abg:Soil}	0.008	g soil/g DW
3	Vegetable Ingestion Rate - Child - BelowGround Vegetables	IR _{Bg,Ch.Res}	4.379	g AC/day
4	Conversion Factor (As Consumed to Dry Weight)	CF _{AC:DW}	22.2%	g DW/g AC
5	Conversion Factor (g to kg)	CF _{g:kg}	1.000E-03	kg soil/g soil
6	Exposure Frequency (days/yr)	EF _{Ch.Res}	350	days/yr
7	Exposure Duration - Child	ED _{Ch.Res}	6	yr
8	Relative Bioavailability Factor (unitless)	RBAF	0.4	-
9	Oral Reference Dose (mg/kg/day)	RfD _o	0.0003	mg As/kg BW/day
10	Average Body Weight - Child 0-6 (kg)	AvgBW _{Ch 0-6}	15	kg BW
11	Days per Year	DpY	365	days/yr
12	Averaging Time - NonCarcinogens - Child - Residential (yr)	AT _{NC,Ch.Res}	6	yr
HQ - 7.4	Hazard Quotient for HG BgVeg Ingestion	BgVegHQ_{Ing.NC}	0.030496	-
DD - 7.4	Daily Dose of As from HG BgVeg Ingestion	BgVegDose_{Ing.NC}	9.149E-06	mg As/kg BW/day

Appendix A. Non-Carcinogenic CoCs

HQ - 2.2 Dermal Contact with NonCarcinogenic CoCs in Soil - Soil HQ Derm-NC

Item #	Exposure Factor	Term	Value	Units
1	CoC Concentration in Soil (mg As/kg soil)	Conc _{Soil}	46.00	mg As/kg soil
2	Soil-to-Skin Adherence Factor - Child - Res (mg soil/cm ² /day)	AF _{Ch,Res}	0.2	mg soil/cm ² /day
3	Dermal Absorption Fraction (unitless)	ABS _d	0.03	-
4	Skin Surface Area - Child - Residential (cm ²)	SA _{C,Res}	2200	cm ²
5	Conversion Factor (mg to kg)	CF _{mg:kg}	1.00E-06	kg soil/mg soil
6	Exposure Duration - Child - Residential (yr)	ED _{Ch,Res}	6	yr
7	Exposure frequency - Residential	EF _{Res}	350	days/yr
8	Reference Dose Dermal (mg/kg-day)	RfD _d	0.0003	mg As/kg BW/day
9	Average Body Weight - Child 0-6 (kg)	AvgBW _{Ch 0-6}	15	kg BW
10	Averaging Time - NonCarcinogens - Child - Residential (yr)	AT _{NC,Ch,Res}	6	yr
11	Days per Year	DpY	365	days/yr
HQ - 2.2	Hazard Quotient for Soil Dermal Contact	SoilHQ _{Derm,NC}	0.129388	-
DD - 2.2	Daily Dose of As from Soil Dermal Contact	SoilDose _{Derm,NC}	3.882E-05	mg As/kg BW/day

HQ - 1.2 Inhalation of NonCarcinogenic CoCs in Air - Air HQ Inh-NC

Item #	Exposure Factor	Term	Value	Units
1	CoC Concentration in Soil (mg As/kg soil)	Conc _{Soil}	46.00	mg As/kg soil
2	Suspended Particulate Level (kg soil/m ³)	SPL	2.160E-10	kg soil/m ³
3	Conversion Factor (mg:µg)	CF _{mg:µg}	1000	µg As/mg As
4	Exposure Frequency - Child - Residential (days/yr)	EF _{Ch,Res}	350	days/yr
5	Exposure Duration - Child - Residential (yr)	ED _{Ch,Res}	6	yr
6	Reference Concentration (µg As/m ³) (RAB Estimate)	RfC	0.64286	µg As/m ³
7	Days per Year	DpY	365	days/yr
8	Averaging Time - NonCarcinogens - Child - Residential (yr)	AT _{NC,Ch,Res}	6	yr
HQ - 1.2	Hazard Quotient for Air/Dust Inhalation	AirHQ _{Inh,NC}	1.482E-05	-
9	Average Respiratory Daily Volume 0-6 (m ³ /day)	AvgRDV ₀₋₆	7.00	m ³ /day
10	Average Body Weight - Child 0-6 (kg)	AvgBW _{Ch 0-6}	15.0	kg BW
11	Conversion Factor (mg:µg)	CF _{mg:µg}	1000	µg/mg
DD - 1.2	Daily Dose of As from Soil Dermal Contact	AirDose _{Inh,NC}	4.4453E-09	mg As/kg BW/day

Appendix A. Non-Carcinogenic CoCs

HQ - 1.2b Calculation of Particulate Emission Factor (PEF) and Suspended Particulate Level (SPL)

Item #	Parameter Description	Term	Value	Units
1	Width of Contaminated Area (m)	LS	45	m
2	Wind Speed in Mixing Zone (m/sec)	V	2.25	m/sec
3	Diffusion Height (m)	DH	2	m
4	Conversion Factor (hr to sec)	CF _{hr:sec}	3600	sec/hr
5	Conversion Factor (kg to g)	CF _{kg:g}	1000	g soil/kg soil
6	Area of Contamination (2023.5 m ² = 0.5 acre) (m ²)	A	2025	m ²
7	Respirable Fraction (g/m ² -hr)	RF	0.036	g/m ² -hr
8	Fraction of Vegetative Cover (unitless)	G	0	-
9	Mean Annual Wind Speed (m/sec)	U _m	4.5	m/sec
10	Equivalent Threshold Value of Wind Speed at 10 m (m/sec)	U _t	12.8	m/sec
11	Function Dependent on U _m /U _t (unitless)	F(x)	0.0497	-
12	Particulate Emission Factor (m³/kg soil)	PEF	4.631E+09	m³/kg soil
13	Suspended Particulate Level (kg soil/m³)	SPL	2.160E-10	kg soil/m³