APPENDIX D

Model Chemical/Watershed Data

1.0   MODEL CHEMICAL/WATERSHED DATA

1.1   Chemical Data

The chemical data that were used in the spreadsheet model are presented for each COPC in Tables D.1 through D.69. Rationale and references for the selection of each value is contained within the tables.

1.2   Watershed Data

The watershed data that were used in the spreadsheet model are presented for each watershed in Tables D.70 through D.83. Rationale and references used in the selection of each value is included in the tables.

Table D.1   Physical/Chemical Parameters for Anthracene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	6.50E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.55	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+04	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.998	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	53.3	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	53.3	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0971	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0971	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0971	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0971	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	4500	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1762.5	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	940	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	678	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	158.49	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.2   **Physical/Chemical Parameters for Benz(a)anthracene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	3.40E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.37	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	5.01E+05	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.483	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	19338	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	19338	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	60000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	26850	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	14320	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	5689	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	9.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.051	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.51E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.3   **Physical/Chemical Parameters for Benzo(a)fluorene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.66E-05	EpiSuite
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	3.37	Mackay et al., 2000, HHRAP A2-2.11, EpiSuite
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.51E+05	Mackay et al., 2000
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.992	Assumed (Fluoranthene)
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1184.61	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1184.61	HHRAP, A2-2.12.4
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.03	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.03	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.03	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.03	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	990.83	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	7431.24	Mackay et al., 2000, HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3963.33	Mackay et al., 2000, HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	3342.39	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	6.11E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.26E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.4   Physical/Chemical Parameters for Benzo(a)pyrene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.10E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.48	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.294	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	124742	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	124742	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0132	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0132	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0132	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0132	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	160000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	72675	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	38760	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	9684	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	9.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.043	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.5   Physical/Chemical Parameters for Benzo(b)fluoranthene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.11E-04	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.41	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.33E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.966	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1675	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1675	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0112	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0112	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0112	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0112	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1.05E+04	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	7.86E+04	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	4.19E+04	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	12065	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	6.67E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.6   Physical/Chemical Parameters for Benzo(b)fluorene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.63E-05	EpiSuite
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	3.3726	Mackay et al., 2000, HHRAP A2-2.11, EpiSuite
K_{ow}	Octanol-water partitioning coefficient	(unitless)	5.62E+05	Mackay et al., 2000
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.992	Assumed (Fluoranthene)
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	4560.59	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	4560.59	HHRAP, A2-2.12.4
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1016.25	Mackay et al., 2000, HHRAP A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	7621.87	Mackay et al., 2000, HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	4064.99	Mackay et al., 2000, HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	6216.65	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	6.11E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.82E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.7   Physical/Chemical Parameters for Benzo(e)pyrene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.97E-07	Mackay et al., 2000
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.44	Mackay et al., 2000, HHRAP A2-2.11
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.75E+06	EpiSuite, v3.20 (Feb 2007)
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.966	Assumed (Benz(a)pyrene)
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2.05E+06	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2.05E+06	HHRAP, A2-2.12.4
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	3981.07	Mackay et al., 2000, HHRAP A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	29858.04	Mackay et al., 2000, HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	15924.29	Mackay et al., 2000, HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	21127.92	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.51E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.38E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.8   Physical/Chemical Parameters for Benzo(g,h,i)perylene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	7.40E-07	Mackay et al., 2000
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.41	Mackay et al., 2000, HHRAP A2-2.11
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+06	Mackay et al., 2000
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed (Fluoranthene)
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	6.32E+05	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	6.32E+05	HHRAP, A2-2.12.4
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	4.51E+04	Mackay et al., 2000, HHRAP A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	3.38E+05	Mackay et al., 2000, HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1.80E+05	Mackay et al., 2000, HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	2.35E+04	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.19E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.04	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.9   Physical/Chemical Parameters for Benzo(k)fluoranthene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	8.30E-07	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.12	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.26E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.273	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	211264	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	211264	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	190000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	74411.7	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	39686.24	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	11562	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	6.31E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.10   **Physical/Chemical Parameters for Chrysene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	9.50E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.25	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	5.01E+05	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.744	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	692	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	692	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0197	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	60000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	30091.32	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	16048.7	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	5689	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.51E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.11   **Physical/Chemical Parameters for Dibenz(a,c)anthracene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	4.89E-07	EpiSuite
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	2.107875	Mackay et al., 2000, HHRAP A2-2.11, EpiSuite
K_{ow}	Octanol-water partitioning coefficient	(unitless)	5.01E+06	EpiSuite
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.055	Assumed (Dibenz(a,c)anthracene)
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1561887	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1561887	HHRAP, A2-2.12.4
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	19498.45	Mackay et al., 2000, HHRAP A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	146238.34	Mackay et al., 2000, HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	77993.78	Mackay et al., 2000, HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	33500.91	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.16E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.04	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.51E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.12   Physical/Chemical Parameters for Dibenz(a,h)anthracene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.50E-08	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.27	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.055	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	31175561	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	31175561	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	580000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	134250	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	71600	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	23499	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.13   Physical/Chemical Parameters for Fluoranthene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.60E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.57	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+05	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.992	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	738	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	738	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0499	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0499	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0499	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0499	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	11000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	3682.5	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1964	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	1644	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+02	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.14   **Physical/Chemical Parameters for Fluorene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	6.40E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	4.22	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.58E+04	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	26	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	26	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.145	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.145	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.145	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.145	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	2100	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	578.25	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	308.4	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	398	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	7.94E+01	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.15   Physical/Chemical Parameters for Indeno(1,2,3-cd)pyrene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.60E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.35	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.98E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.005	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	373495	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	373495	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00593	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00593	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00593	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00593	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	530000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	230749.76	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	123066.54	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	28057	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.00E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.16 **Physical/Chemical Parameters for Perylene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.96E-08	Mackay et al., 2000
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.36	Mackay et al., 2000, HHRAP A2-2.11
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.78E+06	Mackay et al., 2000
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.992	Assumed (Fluoranthene)
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	8.56E+06	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	8.56E+06	HHRAP, A2-2.12.4
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.01	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	8031	EpiSuite, v3.20 (Feb 2007), HHRAP A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	60232.5	EpiSuite, v3.20 (Feb 2007), HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	32124	EpiSuite, v3.20 (Feb 2007), HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	1.51E+04	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.51E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	8.91E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.17   Physical/Chemical Parameters for Phenanthrene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.30E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.26	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+04	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.999	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	151	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	151	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.097	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.097	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.097	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.097	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	3700	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1989.95	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1061.3	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	678	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58E+02	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.18   Physical/Chemical Parameters for Pyrene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.10E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.13	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	7.94E+04	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.994	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	840	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	840	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.057	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.057	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.057	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.057	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	9500	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	5100	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2720	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	1377	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	0.01	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	3.98E+02	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.19   **Physical/Chemical Parameters for Aroclor 1254 (Total PCBs)**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.83E-04	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1652	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1652	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	2.45E+04	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1.84E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	9.81E+04	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	23499	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	2	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.20   Physical/Chemical Parameters for 1,2,3,4,6,7,8-HpCDD

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.20E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+08	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.003	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	910000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	910000	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	616595	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	4.62E+06	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.47E+06	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	335781	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.09	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.005	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.21   Physical/Chemical Parameters for 1,2,3,4,6,7,8-HpCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.41E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.51E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.01	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	830000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	830000	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	154881.66	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1.16E+06	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	6.20E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	115892	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.26E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.005	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.22   Physical/Chemical Parameters for 1,2,3,4,7,8,9-HpCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.40E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.51E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.057	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	830000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	830000	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00205	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	154881.66	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1.16E+06	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	6.20E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	115892	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.26E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.005	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.23   Physical/Chemical Parameters for 1,2,3,4,7,8-HxCDD

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.07E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	6.31E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.024	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	520000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	520000	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0012	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0012	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0012	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0012	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	389045.14	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	2.92E+06	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1.56E+06	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	235535	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.09	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	3.16E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.24   Physical/Chemical Parameters for 1,2,3,4,7,8-HxCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.43E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.049	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	61659.5	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	4.62E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.47E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	57023	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.25   Physical/Chemical Parameters for 1,2,3,6,7,8-HxCDD

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.10E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.00E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.029	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	520000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	520000	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	123026.88	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	9.23E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	4.92E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	97063	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.09	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.00E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.26   **Physical/Chemical Parameters for 1,2,3,6,7,8-HxCDF**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	7.31E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.052	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	61659.5	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	4.62E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.47E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	57023	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.27   Physical/Chemical Parameters for 1,2,3,7,8,9-HxCDD

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.10E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.00E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.016	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	520000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	520000	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00234	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	123026.88	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	9.23E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	4.92E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	97063	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.09	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.00E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.28   Physical/Chemical Parameters for 1,2,3,7,8,9-HxCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.10E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.09	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	61659.5	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	4.62E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.47E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	57023	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.29   Physical/Chemical Parameters for 1,2,3,7,8-PeCDD

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.60E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	4.37E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.117	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	239000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	239000	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00562	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00562	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00562	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00562	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	26915.35	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	2.02E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1.08E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	30120	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.10	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.19E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.09	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.30   Physical/Chemical Parameters for 1,2,3,7,8-PeCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	5.00E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	6.17E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.268	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	97500	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	97500	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00461	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00461	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00461	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00461	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	38018.94	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	2.85E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1.52E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	39296	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	3.09E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.09	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.31   Physical/Chemical Parameters for 2,3,4,6,7,8-HxCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.10E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+07	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.055	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	162000	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00348	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	61659.5	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	4.62E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.47E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	57023	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.04	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.32   Physical/Chemical Parameters for 2,3,4,7,8-PeCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	4.98E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.221	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	97500	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	97500	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00678	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	19498.45	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1.46E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	7.80E+04	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	23499	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.09	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.33   **Physical/Chemical Parameters for 2,3,7,8-TCDD**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	3.29E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	6.31E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.664	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	65500	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	65500	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00455	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00455	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00455	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00455	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	38904.51	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	2.92E+05	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1.56E+05	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	39999	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.60E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.10	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	3.16E+04	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.09	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.34   Physical/Chemical Parameters for 2,3,7,8-TCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.44E-05	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.26E+06	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.77	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	45700	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	45700	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0115	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	7762.47	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	5.82E+04	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3.10E+04	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	11562	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	6.01E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	6.31E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.09	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.35   Physical/Chemical Parameters for OCDD

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	6.75E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.58E+08	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.002	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2360000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2360000	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.000705	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.000705	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.000705	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.000705	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	977237.22	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	7.33E+06	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3.91E+06	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	478692	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.09	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	7.94E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.0001	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.36   Physical/Chemical Parameters for OCDF

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.88E-06	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+08	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.002	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2280000	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2280000	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.00092	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	616595	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	4.62E+06	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.47E+06	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	478692	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.00E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.02	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E+05	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	0.0001	US EPA HHRAP, 2005
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.37   Physical/Chemical Parameters for 1,1,1-Trichloroethane

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.70E-02	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.93	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+02	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.00151	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.00151	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	0.22	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	10.125	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	5.4	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	19.5	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.80E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.078	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58E+00	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.38   Physical/Chemical Parameters for Bromoform

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	6.50E+00	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.41	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.34E+02	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2.87E-06	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2.87E-06	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	1.65	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	1.65	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	1.65	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	1.65	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1.26	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	9.45	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	5.04	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	15.5	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.03E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.0149	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.17E+00	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.39   **Physical/Chemical Parameters for Carbon Tetrachloride**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	3.00E-02	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.7	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	6.31E+02	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.00179	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.00179	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.932	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.932	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.932	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.932	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	0.35	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	11.4	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	6.08	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	33.3	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.80E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.078	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	3.16E+00	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.40   Physical/Chemical Parameters for Chloroform

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	3.70E-03	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.41	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.00E+02	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.00204	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.00204	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	2.7	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	2.7	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	2.7	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	2.7	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	0.08	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	3.94	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	2.1	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	8.05	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.104	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	5.01E-01	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.41   Physical/Chemical Parameters for Dichloromethane

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.20E-03	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	9.03	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.00E+01	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.000616	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.000616	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	6.86	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	6.86	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	6.86	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	6.86	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	0.024	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	0.75	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	0.4	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	8.64	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.17E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.101	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.00E-01	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.42   Physical/Chemical Parameters for O-Terphenyl

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	6.11E-05	EpiSuite
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	3.3726	Mackay et al., 2000, HHRAP A2-2.11, EpiSuite
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.31E+05	EpiSuite
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	692.18	HHRAP, A2-2.12.4
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	692.18	HHRAP, A2-2.12.4
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.02	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1840.77	Mackay et al., 2000, HHRAP A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	13805.79	Mackay et al., 2000, HHRAP A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	7363.09	Mackay et al., 2000, HHRAP A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	4134.82	HHRAP, A2-2.12.1
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.86E-06	HHRAP, A2-2.7
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	HHRAP, A2-2.7
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.66E+03	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.43   Physical/Chemical Parameters for Trichlorofluoromethane

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	9.70E-02	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.7	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	3.16E+02	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.000265	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.000265	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	1.39	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	0.24	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	8.57	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	4.57	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	19.5	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	9.70E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.087	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.58	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.44   **Physical/Chemical Parameters for 1,2,4,5-Tetrachlorobenzene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.60E-03	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.41	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	6.31E+04	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2.78	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	2.78	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0651	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0651	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	105	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0651	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0651	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	11	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	568.3	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	303.1	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	1153	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.00E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.001	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	9.91E+02	US EPA HHRAP, 2005
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.45   Physical/Chemical Parameters for 1,2,4-Trichlorobenzene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.40E-03	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.41	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.26E+04	Mackay et al., 2000
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.727	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.727	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.189	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.189	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	77.6	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.189	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.189	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	3.6	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	124.5	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	66.4	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	279	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	8.23E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.03	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.40E+02	US EPA HHRAP, 2005
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.46   Physical/Chemical Parameters for 1,2-Dichlorobenzene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.90E-03	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.41	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.40E+03	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.117	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	0.117	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.431	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.431	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	-	N/A
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.431	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.431	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	3.79	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	28.43	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	15.16	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	93	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	7.90E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.069	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.20E+01	Calculated using Kow, DiToro et al. (2000)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.47   Physical/Chemical Parameters for Hexachlorobenzene

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	1.30E-03	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.12	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	2.00E+05	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	19	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	19	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0335	HHRAP, equal to Brag
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0335	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	25	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.033	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0335	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	110	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	6000	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3200	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	2799	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.91E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.0542	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF$_{fish}$	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.40E+03	US EPA HHRAP, 2005
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.48 **Physical/Chemical Parameters for Pentachlorobenzene**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	7.10E-04	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	0.73	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.48E+05	US EPA HHRAP, 2005
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	25.2	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	25.2	US EPA HHRAP, 2005
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0398	HHRAP, equal to Brag
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0398	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	1.84	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0398	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0398	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1208.9	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	9066.74	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	4835.6	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	2223	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	6.30E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.057	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1.91E+03	US EPA HHRAP, 2005
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.49   Physical/Chemical Parameters for Pentachlorophenol

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	2.40E-08	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	1.42	US EPA HHRAP, 2005
K_{ow}	Octanol-water partitioning coefficient	(unitless)	1.12E+05	Mackay et al., 2000
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	1	Assumed
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	629063	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	629063	US EPA HHRAP, 2005
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0437	HHRAP, equal to Brag
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0437	HHRAP, equal to Brag
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	1636	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0437	HHRAP, equal to Brag
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0437	HHRAP, equal to Brag
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1.2	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	44.4	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	23.68	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	1963	US EPA HHRAP, 2005
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	6.10E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.056	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	3	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	6.71E+02	US EPA HHRAP, 2005
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.50   Physical/Chemical Parameters for Antimony

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0725	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.03	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.03	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.2	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.03	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	45	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	45	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	45	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	200	Canadian Standards Association 1987
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.51   Physical/Chemical Parameters for Arsenic

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0135	HHRAP, A2-2.12-3
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.006	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.008	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.036	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.004	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	29	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	29	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	29	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	50	US EPA, 2003. Report No. EPA-822-R-03-032 (Trophic level 3 fish)
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.52   **Physical/Chemical Parameters for Barium**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.04875	HHRAP, A2-2.12-3
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.015	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.015	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.15	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.015	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	41	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	41	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	41	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	10	Canadian Standards Association 1987
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.53   **Physical/Chemical Parameters for Beryllium**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.003625	HHRAP, A2-2.12-3
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0015	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.0015	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.01	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0015	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	790	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	790	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	790	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	100	IAEA 1994
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.54   Physical/Chemical Parameters for Boron

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	2.5	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	2	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	2	Baes et al., 1984 HHRAP, A2-2.12.2
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	4	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	2	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	3	Baes et al., 1984 HHRAP, A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	3	Baes et al., 1984 HHRAP, A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3	Baes et al., 1984 HHRAP, A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	Baes et al., 1984 HHRAP, A2-2.13
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	-	N/A
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.55   Physical/Chemical Parameters for Cadmium

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.2035	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.15	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.064	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.364	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.062	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	75	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	75	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	75	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.11	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1202.26	McGeer et al. (2003) Based on Baseline Water Concentration - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.56   Physical/Chemical Parameters for Chromium (Total)

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00525	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0045	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.0045	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0075	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0045	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	19	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	19	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	19	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	1.41E-05	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.1265	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	200	Canadian Standards Association 1987
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.57   Physical/Chemical Parameters for Chromium VI

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.00525	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0045	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.0045	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0075	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0045	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	19	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	19	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	19	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	36.95	Patton et al. (2007) Based on Baseline Water Concentration - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.58   Physical/Chemical Parameters for Cobalt

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.01025	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.007	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.007	Baes et al., 1984 HHRAP, A2-2.12.2
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.02	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.007	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	45	Baes et al., 1984 HHRAP, A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	45	Baes et al., 1984 HHRAP, A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	45	Baes et al., 1984 HHRAP, A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.02	Baes et al., 1984 HHRAP, A2-2.13
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	100	Canadian Standards Association 1987
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.59   Physical/Chemical Parameters for Lead

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.16125	HHRAP, A2-2.12-3
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.2	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.009	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.045	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.009	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	900	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	900	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	900	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	104.71	McGeer et al. (2003) Based on Baseline Water Concentration - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.60   Physical/Chemical Parameters for Mercury - Inorganic

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	0.85	US EPA HHRAP, 2005
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1800	US EPA HHRAP, 2005
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	1800	US EPA HHRAP, 2005
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.15	US EPA HHRAP, 2005
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.2	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.036	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	-	N/A
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0093	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	58000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	100000	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	50000	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	5.25E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2000	Canadian Standards Association 1987
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.61   Physical/Chemical Parameters for Methyl Mercury

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	4.70E-07	US EPA HHRAP, 2005
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.01425	US EPA HHRAP, 2005
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.019	US EPA HHRAP, 2005 (Assumed equal to Brgrain)
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.099	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	-	
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.019	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	7000	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	100000	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3000	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	6.11E-06	US EPA HHRAP, 2005
D_a	Diffusivity of COPC in air	(cm²/s)	0.05	US EPA HHRAP, 2005
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	2.40E+04	McGeer et al. (2003) Based on Baseline Water Concentration (Assumed) - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.62   **Physical/Chemical Parameters for Nickel**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.053	HHRAP, A2-2.12-3
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.06	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.008	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.032	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.006	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	65	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	65	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	65	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.01	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	156.02	McGeer et al. (2003) Based on Baseline Water Concentration - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.63   Physical/Chemical Parameters for Phosphorus

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\,(Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	3.5	HHRAP, A2-2.12-3
$Br_{ag\,(Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	3.5	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	3.5	Baes et al., 1984 HHRAP, A2-2.12.2
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	3.5	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	3.5	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	3.5	Baes et al., 1984 HHRAP, A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	3.5	Baes et al., 1984 HHRAP, A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	3.5	Baes et al., 1984 HHRAP, A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.06	Baes et al., 1984 HHRAP, A2-2.13
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.07	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	-	N/A
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.64   Physical/Chemical Parameters for Selenium

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.02275	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.025	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.022	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.016	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.002	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	5	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	5	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	5	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.01	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.19	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	1.13	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	1.13	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	170	Davis et al. 1993
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.65   Physical/Chemical Parameters for Silver

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.175	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.1	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.1	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.4	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.1	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	8.3	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	8.3	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	8.3	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.02	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	104.89	McGeer et al. (2003) Based on Baseline Water Concentration - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

APPENDIX D - Model Physical/Chemical Data

Table D.66   Physical/Chemical Parameters for Thallium

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.0013	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.0004	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.0004	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.004	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.0004	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	71	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	71	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	71	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.04	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.05	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.02	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	-	N/A
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.67   Physical/Chemical Parameters for Tin

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.012	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.006	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.006	Baes et al., 1984 HHRAP, A2-2.12.2
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.03	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.006	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	250	Baes et al., 1984 HHRAP, A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	250	Baes et al., 1984 HHRAP, A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	250	Baes et al., 1984 HHRAP, A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.08	Baes et al., 1984 HHRAP, A2-2.13
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.04	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.02	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.10	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.06	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.03	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	3000	Davis et al. 1993
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.68   Physical/Chemical Parameters for Vanadium

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag\ (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.003625	HHRAP, A2-2.12-3
$Br_{ag\ (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.003	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.003	Baes et al., 1984 HHRAP, A2-2.12.2
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.0055	"Bv" Baes et al., 1984 HHRAP, A2-2.12.3
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.003	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	1000	Baes et al., 1984 HHRAP, A2-2.10
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	1000	Baes et al., 1984 HHRAP, A2-2.10
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	1000	Baes et al., 1984 HHRAP, A2-2.10
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	Baes et al., 1984 HHRAP, A2-2.13
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1,2,3
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	160	Empirical measurements of Fish Tissue
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.69 **Physical/Chemical Parameters for Zinc**

Variable	Definition	Units	Value	Reference
H	Henry's Law constant	(atm-m³/mol)	-	N/A
ksg	Soil loss constant due to biotic and abiotic degradation	(1/yr)	-	N/A
K_{ow}	Octanol-water partitioning coefficient	(unitless)	-	N/A
F_v	Fraction of COPC air concentration in vapor phase	(unitless)	-	N/A
Bv_{ag}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
Bv_{forage}	Air-to-plant biotransfer factor	(mg COPC/g DW plant) / (mg COPC/g air)	-	N/A
$Br_{ag (Veg)}$	Plant-soil bioconcentration factor for produce	(Unitless - DW Basis)	0.7375	HHRAP, A2-2.12-3
$Br_{ag (Fruit)}$	Plant-soil bioconcentration factor for fruit	(Unitless - DW Basis)	0.9	"Br" Baes et al., 1984 HHRAP, A2-2.12.3
$Br_{rootveg}$	Plant-soil bioconcentration factor for belowground produce	(Unitless - DW Basis)	0.9	US EPA HHRAP, 2005
Br_{forage}	Plant-soil bioconcentration factor for forage	(Unitless - DW Basis)	0.25	US EPA HHRAP, 2005
Br_{grain}	Plant-soil bioconcentration factor for grain	(Unitless - DW Basis)	0.054	US EPA HHRAP, 2005
Kd_s	Soil-water partition coefficient	(L/kg);(cm³/g)	62	US EPA HHRAP, 2005
Kd_{sw}	Suspended sediments/surface water partition coefficient	(L water/kg suspended sediment)	62	US EPA HHRAP, 2005
Kd_{bs}	Bed sediment/sediment pore water partition coefficient	(L water/kg bottom sediment)	62	US EPA HHRAP, 2005
RCF	Root concentration factor	(Unitless - DW Basis)	-	N/A
Ba_{beef}	Biotransfer factor for beef	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
Ba_{game}	Biotransfer factor for game meat	(day/kg FW tissue)	0.00	HHRAP, A2-2.13.1, REF
Ba_{milk}	Biotransfer factor for milk	(day/kg WW tissue)	0.00	US EPA HHRAP, 2005
Ba_{pork}	Biotransfer factor for pork	(day/kg FW tissue)	0.00	US EPA HHRAP, 2005
$Ba_{chicken}$	Biotransfer factor for chicken	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
Ba_{egg}	Biotransfer factor for eggs	(day/kg FW tissue)	0.01	US EPA HHRAP, 2005
MF	Metabolic factor	(unitless)	1	US EPA HHRAP, 2005
D_w	Diffusivity of COPC in water	(cm²/s)	-	N/A
D_a	Diffusivity of COPC in air	(cm²/s)	-	N/A
ER	Soil enrichment ratio	(unitless)	1	US EPA HHRAP, 2005
BCF/BAF_{fish}	Bioconcentration factor/bioaccumulation factor for COPC in fish	(L/kg FW tissue)	1242.17	McGeer et al. (2003) Based on Baseline Water Concentration - Site Specific
BSAF	Biota-to-sediment accumulation factor	(unitless - FW Basis)	-	N/A
Bs	Soil bioavailability factor	(unitless)	1	US EPA HHRAP, 2005

Table D.70 **Site Input Parameters for Bennett Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	281.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	1.110	Current velocity	calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7*C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	2.25E+03	River surface area	Calculation based on measurements
A_I	(m²)	2.98E+05	Impervious watershed area receiving COPC deposition	4% considered impervious - estimate
A_L	(m²)	7.44E+06	Total watershed area receiving COPC deposition	Cloca
$d_{z \, (River)}$	(m)	0.15	Total water body depth (River)	Estimate
$d_{z \, (Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.25	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)NN Where: slope = slope steepness (%) = 0.5% slope length = length of slope (ft.) or (m) = 4000 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.4	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

Parameter	Units	Value	Description	Notes
b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\,(Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\,(River)}$	(m³/yr)	2.63E+06	Average volumetric flow rate through water body (River)	water balance model calculation
$d_{wc\,(Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\,(River)}$	(m)	0.15	Depth of water column (in River)	Estimate
$d_{bs\,(Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\,(River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\,Measured}$	(mg/L)	0	Total Suspended Solids	Not measured, therefore calculated using D_{SS}
$TSS_{(River)\,Measured}$	(mg/L)	2	Total Suspended Solids	CLOCA WQ monitoring of headwaters of black Creek
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.05	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Source
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.71 **Site Input Parameters for Bowmanville Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	281.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.474	Current velocity	Calculation based on HYDAT data
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	1.68E+05	River surface area	Calculation based on measurements
A_I	(m²)	1.19E+07	Impervious watershed area receiving COPC deposition	7% considered impervious - 80% rural, 20% residential/industrial
A_L	(m²)	1.69E+08	Total watershed area receiving COPC deposition	CLOCA, 2000. Bowmanville/Soper Creek Watershed Aquatic Resource Management Plan
$d_{z(River)}$	(m)	0.2	Total water body depth (River)	estimate based on pool/riffle ratio
$d_{z(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	1.15	USLE length-slope factor.	Calculated using the following equation: $LS = [0.065 + 0.0456(slope) + 0.006541(slope)^2] \times (slope\_length \div const)^{NN}$ Where: slope = slope steepness (%) = 1.3 % slope length = length of slope (ft.) or (m) = 18070 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.2	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

Parameter	Units	Value	Description	Notes
b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\ (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\ (River)}$	(m³/yr)	4.07E+07	Average volumetric flow rate through water body (River)	HYDAT
$d_{wc\ (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\ (River)}$	(m)	0.2	Depth of water column (in River)	estimate based on pool/riffle ratio
$d_{bs\ (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\ (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\ Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River)\ Measured}$	(mg/L)	20	Total Suspended Solids	PWQMN
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Notes
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.72   **Site Input Parameters for Darlington Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	282.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.261	Current velocity	Calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corremponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	5.32E+04	River surface area	Calulation
A_I	(m²)	6.54E+05	Impervious watershed area receiving COPC deposition	4% considered impervious - estimation
A_L	(m²)	1.64E+07	Total watershed area receiving COPC deposition	CLOCA
$d_{z (River)}$	(m)	0.5	Total water body depth (River)	Estimation
$d_{z (Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.65	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^{NN} Where: slope = slope steepness (%) = 1.1 % slope length = length of slope (ft.) or (m) = 5552 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.4	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
Vf$_{x (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
Vf$_{x (River)}$	(m³/yr)	5.77E+06	Average volumetric flow rate through water body (River)	Water Balance Equation
d$_{wc (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
d$_{wc (River)}$	(m)	0.5	Depth of water column (in River)	Estimation
d$_{bs (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
d$_{bs (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C$_{BS}$	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
D$_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
D$_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D$_{SS}$ was not required.
TSS$_{(Lake) Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
TSS$_{(River) Measured}$	(mg/L)	4	Total Suspended Solids	Estimate
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC$_{sed}$	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
Rp$_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
Rp$_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
Tp$_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
Tp$_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
Yp$_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
Yp$_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
Yp$_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
VG$_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
VG$_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
Tm$_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
Qp$_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
Qp$_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
Qp$_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
Qp$_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: Qp$_{(forage-game)}$ = (0.577 * BW $^{0.727}$)/1000 where Qp$_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
Qp$_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
Qp$_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
Qp$_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Qp(silage-pork)	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
Qp(grain-pork)	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
Qp(grain-chicken)	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
Qs(beef)	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
Qs(game)	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
Qs(milk)	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
Qs(pork)	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
Qs(chicken)	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
Qw(beef)	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
Qw(pork)	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
Qw(chicken)	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
Qw(game)	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
F(forage)	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
F(silage)	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
F(grain)	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
FL(beef)	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
FL(pork)	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
FL(chicken)	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
FL(game)	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
FR(beef)	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
FR(pork)	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
FR(chicken)	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
FR(game)	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
flipid	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.73   **Site Input Parameters for Darlington Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	281.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	1.771	Current velocity	Calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corresponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	6.00E+02	River surface area	Calculation based on measurements
A_I	(m²)	1.07E+06	Impervious watershed area receiving COPC deposition	30% considered impervious - estimation
A_L	(m²)	3.58E+06	Total watershed area receiving COPC deposition	Topo map (direct drainage)
$d_{z\,(River)}$	(m)	0.15	Total water body depth (River)	Estimation
$d_{z\,(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erosivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.49	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^{NN} Where: slope = slope steepness (%) = 1.0 % slope length = length of slope (ft.) or (m) = 2600 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.4	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
Vf$_{x (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
Vf$_{x (River)}$	(m³/yr)	2.51E+06	Average volumetric flow rate through water body (River)	water balance model calculation
d$_{wc (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
d$_{wc (River)}$	(m)	0.15	Depth of water column (in River)	Estimation
d$_{bs (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
d$_{bs (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C$_{BS}$	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
D$_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
D$_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D$_{SS}$ was not required.
TSS$_{(Lake) Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
TSS$_{(River) Measured}$	(mg/L)	2	Total Suspended Solids	CLOCA WQ monitoring of headwaters of black Creek
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC$_{sed}$	(unitless)	0.05	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
Rp$_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
Rp$_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
Tp$_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
Tp$_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
Yp$_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
Yp$_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
Yp$_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
VG$_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
VG$_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
Tm$_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
Qp$_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
Qp$_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
Qp$_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
Qp$_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where Qp$_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
Qp$_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
Qp$_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
Qp$_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Source/Notes
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.74   **Site Input Parameters for Farewell/Black Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	282.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.307	Current velocity	Calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7*C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	2.75E+05	River surface area	Calculation
A_I	(m²)	3.63E+06	Impervious watershed area receiving COPC deposition	6% considered impervious
A_L	(m²)	6.05E+07	Total watershed area receiving COPC deposition	Calculation
$d_{z\,(River)}$	(m)	0.92	Total water body depth (River)	HYDAT
$d_{z\,(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.95	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^{NN} Where: slope = slope steepness (%) = 1.2 % slope length = length of slope (ft.) or (m) = 16903 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.2	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\,(Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\,(River)}$	(m³/yr)	2.22E+07	Average volumetric flow rate through water body (River)	Calculation
$d_{wc\,(Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\,(River)}$	(m)	0.92	Depth of water column (in River)	HYDAT
$d_{bs\,(Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\,(River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\,Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River)\,Measured}$	(mg/L)	20	Total Suspended Solids	PWQMN
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.75 **Site Input Parameters for Harmony Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	285	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.417	Current velocity	Calculation based on HYDAT data
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	1.28E+05	River surface area	Calculation based on measurements
A_I	(m²)		Impervious watershed area receiving COPC deposition	
A_L	(m²)	4.68E+07	Total watershed area receiving COPC deposition	CLOCA
$d_{z(River)}$	(m)	1.008	Total water body depth (River)	HYDAT
$d_{z(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.92	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^NN Where: slope = slope steepness (%) = 1.4 % slope length = length of slope (ft.) or (m) = 11500 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.2	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

Parameter	Units	Value	Description	Comment
b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\,(Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\,(River)}$	(m³/yr)	1.48E+07	Average volumetric flow rate through water body (River)	Calculation
$d_{wc\,(Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\,(River)}$	(m)	1.008	Depth of water column (in River)	HYDAT
$d_{bs\,(Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\,(River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\,Measured}$	(mg/L)	0	Total Suspended Solids	Not measured, therefore calculated using D_{SS}
$TSS_{(River)\,Measured}$	(mg/L)	30	Total Suspended Solids	Estimate based on urban proportion and old PWQMN data (future interpolation)
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.1	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Notes
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.76   **Site Input Parameters for McLaughlin Bay**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	282	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0	Current velocity	Not applicable to equations for lakes
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corresponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000174	Viscosity of air corresponding to air temperature	Viscosity of air at 5 degC (Doherty and Franzini, 1987)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1270	Density of air	Density of air at 5 degC (Doherty and Franzini, 1987)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	2.90E+05	Lake surface area	Topo map (direct drainage)
$A_{W(River)}$	(m²)	0	River surface area	N/A for Lakes
A_I	(m²)	1.19E+05	Impervious watershed area receiving COPC deposition	6% considered impervious - estimate
A_L	(m²)	1.99E+06	Total watershed area receiving COPC deposition	Topo map (direct drainage)
$d_{z (River)}$	(m)	0	Total water body depth (River)	N/A for Lakes
$d_{z (Lake)}$	(m)	3.0	Total water body depth (Lake)	Calculated as per recommendations: $d_z = d_{wc} + d_{bs}$
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.47	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^NN Where: slope = slope steepness (%) = 1.7 % slope length = length of slope (ft.) or (m) = 800 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.9	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

Table D.76   **Site Input Parameters for McLaughlin Bay**

Parameter	Units	Value	Parameter Description	Rationale
b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\ (Lake)}$	(m³/yr)	2.87E+05	Average volumetric flow rate through water body (Lake)	Total volumetric flowrate is estimated as RO times the drainage area.
$Vf_{x\ (River)}$	(m³/yr)	0	Average volumetric flow rate through water body (River)	
$d_{wc\ (Lake)}$	(m)	3	Depth of water column (in Lake)	
$d_{wc\ (River)}$	(m)	0	Depth of water column (in River)	N/A for Lakes
$d_{bs\ (Lake)}$	(m)	0.03	Depth of upper benthic sediment layer (in Lake).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
$d_{bs\ (River)}$	(m)	0	Depth of upper benthic sediment layer (in River).	N/A for Lakes
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	1825	Suspended solids deposition rate	A default value of 1,825 for quiescent lakes or ponds is recommended (non-flowing water)
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Lakes
$TSS_{(Lake)\ Measured}$	(mg/L)	0	Total Suspended Solids	Not measured, therefore calculated using D_{SS}
$TSS_{(River)\ Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Lakes
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.053	Fraction of organic carbon in bottom sediment	Nriagu J. O. and Coker R.D. 1976. Emission of Sulfur from Lake Ontario Sediments. Liminology and Oceanography. Vol. 21, no. 4.
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Table D.76   Site Input Parameters for McLaughlin Bay

Parameter	Units	Value	Parameter Description	Rationale
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{L(pork)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{L(chicken)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{L(game)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
$F_{R(beef)}$	(unitless)	0	Fraction of contaminanted river water ingested by the cow	N/A for lakes
$F_{R(pork)}$	(unitless)	0	Fraction of contaminanted river water ingested by the swine	N/A for lakes
$F_{R(chicken)}$	(unitless)	0	Fraction of contaminanted river water ingested by the chicken	N/A for lakes
$F_{R(game)}$	(unitless)	0	Fraction of contaminanted river water ingested by the animal	N/A for lakes
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.77   **Site Input Parameters for Oshawa Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	285	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.263	Current velocity	Calculation based on HYDAT data
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corroponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	7.07E+05	River surface area	Calculation based on measurements
A_I	(m²)	1.81E+07	Impervious watershed area receiving COPC deposition	15% considered impervious - CLOCA, 2002. Oshawa Creek Watershed Management Plan
A_L	(m²)	1.20E+08	Total watershed area receiving COPC deposition	CLOCA
$d_{z(River)}$	(m)	2.6125	Total water body depth (River)	HYDAT-prorate
$d_{z(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.92	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^{NN} Where: slope = slope steepness (%) = 1.0 % slope length = length of slope (ft.) or (m) = 21400 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.2	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
Vf$_{x\ (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
Vf$_{x\ (River)}$	(m³/yr)	4.30E+07	Average volumetric flow rate through water body (River)	Calculation
d$_{wc\ (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
d$_{wc\ (River)}$	(m)	2.6125	Depth of water column (in River)	HYDAT-prorate
d$_{bs\ (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
d$_{bs\ (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C$_{BS}$	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
D$_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
D$_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D$_{SS}$ was not required.
TSS$_{(Lake)\ Measured}$	(mg/L)	0	Total Suspended Solids	Not measured, therefore calculated using D$_{SS}$
TSS$_{(River)\ Measured}$	(mg/L)	25	Total Suspended Solids	CLOCA, 2002. Oshawa Creek Watershed Management Plan
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC$_{sed}$	(unitless)	0.1	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
Rp$_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
Rp$_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
Tp$_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
Tp$_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
Yp$_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
Yp$_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
Yp$_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
VG$_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
VG$_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
Tm$_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
Qp$_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
Qp$_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
Qp$_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
Qp$_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: Qp$_{(forage-game)}$ = (0.577 * BW $^{0.727}$)/1000 where Qp$_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
Qp$_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
Qp$_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
Qp$_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Reference
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.78   **Site Input Parameters for Robinson Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	282.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.199	Current velocity	Calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corrreponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	1.30E+04	River surface area	Calculation based on measurements
A_I	(m²)	1.71E+05	Impervious watershed area receiving COPC deposition	3% considered impervious
A_L	(m²)	5.70E+06	Total watershed area receiving COPC deposition	CLOCA WQ monitoring of headwaters of black Creek
$d_{z (River)}$	(m)	0.3	Total water body depth (River)	Estimate
$d_{z (Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.64	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^{NN} Where: slope = slope steepness (%) = 1.36 % slope length = length of slope (ft.) or (m) = 3574 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.4	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\,(Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\,(River)}$	(m³/yr)	1.89E+06	Average volumetric flow rate through water body (River)	Water Balance Equation
$d_{wc\,(Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\,(River)}$	(m)	0.3	Depth of water column (in River)	Estimate
$d_{bs\,(Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\,(River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\,Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River)\,Measured}$	(mg/L)	2	Total Suspended Solids	CLOCA WQ monitoring of headwaters of black Creek
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Symbol	Units	Value	Description	Notes
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.79 **Site Input Parameters for Second Marsh**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	282	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0	Current velocity	Not applicable to equations for lakes
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000174	Viscosity of air corresponding to air temperature	Viscosity of air at 5 degC (Doherty and Franzini, 1987)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1270	Density of air	Density of air at 5 degC (Doherty and Franzini, 1987)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	1.23E+05	Lake surface area	Friends of Second Marsh website
$A_{W(River)}$	(m²)	0	River surface area	N/A for Lakes
A_I	(m²)	1.20E+05	Impervious watershed area receiving COPC deposition	5% considered impervious - estimate
A_L	(m²)	2.41E+06	Total watershed area receiving COPC deposition	Topo map (direct drainage)
$d_{z (River)}$	(m)	0	Total water body depth (River)	N/A for Lakes
$d_{z (Lake)}$	(m)	1.0	Total water body depth (Lake)	Calculated as per recommendations: $d_z = d_{wc} + d_{bs}$
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.26	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^{NN} Where: slope = slope steepness (%) = 0.9 % slope length = length of slope (ft.) or (m) = 1494 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.9	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

Table D.79   **Site Input Parameters for Second Marsh**

Parameter	Units	Value	Parameter Description	Rationale
b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x (Lake)}$	(m³/yr)	3.48E+05	Average volumetric flow rate through water body (Lake)	Total volumetric flowrate is estimated as RO times the drainage area.
$Vf_{x (River)}$	(m³/yr)	0	Average volumetric flow rate through water body (River)	N/A for Lakes
$d_{wc (Lake)}$	(m)	1	Depth of water column (in Lake)	Estimated for Marsh
$d_{wc (River)}$	(m)	0	Depth of water column (in River)	N/A for Lakes
$d_{bs (Lake)}$	(m)	0.03	Depth of upper benthic sediment layer (in Lake).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
$d_{bs (River)}$	(m)	0	Depth of upper benthic sediment layer (in River).	N/A for Lakes
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	1825	Suspended solids deposition rate	A default value of 1,825 for quiescent lakes or ponds is recommended (non-flowing water)
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Lakes
$TSS_{(Lake) Measured}$	(mg/L)	0	Total Suspended Solids	Not measured, therefore calculated using D_{SS}
$TSS_{(River) Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Lakes
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.1	Fraction of organic carbon in bottom sediment	Hill, A. and Cardaci, Mia., 2004. Denitrification and organic carbon availability in riparian wetland soils and subsurface sediments. Soil Science Society of America Journal vol. 68. no. 1 pp. 320-325.
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Table D.79   Site Input Parameters for Second Marsh

Parameter	Units	Value	Parameter Description	Rationale
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{L(pork)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{L(chicken)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{L(game)}$	(unitless)	1	Fraction of contaminanted lake water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
$F_{R(beef)}$	(unitless)	0	Fraction of contaminanted river water ingested by the cow	N/A for lakes
$F_{R(pork)}$	(unitless)	0	Fraction of contaminanted river water ingested by the swine	N/A for lakes
$F_{R(chicken)}$	(unitless)	0	Fraction of contaminanted river water ingested by the chicken	N/A for lakes
$F_{R(game)}$	(unitless)	0	Fraction of contaminanted river water ingested by the animal	N/A for lakes
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.80   **Site Input Parameters for Soper Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	281.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.404	Current velocity	Calculation based on HYDAT data
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corereponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	not measured, therefore calculated using DSS
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	8.20E+04	River surface area	Calculation based on measurements
A_I	(m²)	5.31E+06	Impervious watershed area receiving COPC deposition	7% considered impervious - 80% rural, 20% residential/industrial
A_L	(m²)	7.58E+07	Total watershed area receiving COPC deposition	CLOCA, 2000. Bowmanville/Soper Creek Watershed Aquatic Resource Management Plan
$d_{z\,(River)}$	(m)	0.3	Total water body depth (River)	Estimate based on pool/riffle ratio
$d_{z\,(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.94	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)^NN Where: slope = slope steepness (%) = 1.2 % slope length = length of slope (ft.) or (m) = 16350 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.2	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\ (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\ (River)}$	(m³/yr)	2.71E+07	Average volumetric flow rate through water body (River)	HYDAT
$d_{wc\ (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\ (River)}$	(m)	0.3	Depth of water column (in River)	Estimate based on pool/riffle ratio
$d_{bs\ (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\ (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\ Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River)\ Measured}$	(mg/L)	25	Total Suspended Solids	PWQMN
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Source
$Qp_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.81   **Site Input Parameters for Lower Tooley Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	281.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.261	Current velocity	Calculated
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7°C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham region is around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	5.00E+03	River surface area	Calculation
A_I	(m²)	5.56E+04	Impervious watershed area receiving COPC deposition	3% considered impervious - CLOCA Tooley creek surveying
A_L	(m²)	1.85E+06	Total watershed area receiving COPC deposition	CLOCA
$d_{z (River)}$	(m)	0.3	Total water body depth (River)	Estimate
$d_{z (Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.46	USLE length-slope factor.	Calculated using the following equation: LS = [0.065 + 0.0456(slope) + 0.006541(slope)²] x (slope_length ÷ const)NN Where: slope = slope steepness (%) = 1.3 % slope length = length of slope (ft.) or (m) = 1292 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.9	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m² ; 1 sq meter = 3.86102159 × 10-7 sq miles

Parameter	Units	Value	Description	Notes
b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x \,(Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x \,(River)}$	(m³/yr)	3.70E+06	Average volumetric flow rate through water body (River)	Water Balance Equation
$d_{wc \,(Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc \,(River)}$	(m)	0.3	Depth of water column (in River)	Estimate
$d_{bs \,(Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs \,(River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\,Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River)\,Measured}$	(mg/L)	2	Total Suspended Solids	CLOCA
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

Parameter	Units	Value	Description	Reference
Qp$_{(silage-pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
Qp$_{(grain-pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
Qp$_{(grain-chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
Qs$_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
Qs$_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
Qs$_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
Qs$_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
Qs$_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
Qw$_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): Qw = 0.099 * BW $^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
Qw$_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): Qw = 0.099 * BW $^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
Qw$_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): Qw = 0.059 * BW $^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
Qw$_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: Qw = 0.099 * BW $^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
F$_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
F$_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
F$_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
F$_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
F$_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
F$_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
F$_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
F$_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
F$_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
F$_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
F$_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f$_{lipid}$	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.82   **Site Input Parameters for Upper Tooley Creek Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	281.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.325	Current velocity	Calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water correponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7*C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	3.40E+04	River surface area	Calculation
A_I	(m²)	2.16E+05	Impervious watershed area receiving COPC deposition	2.5% considered impervious - CLOCA Tooley creek surveying
A_L	(m²)	8.65E+06	Total watershed area receiving COPC deposition	CLOCA Tooley creek surveying
$d_{z\,(River)}$	(m)	0.2	Total water body depth (River)	Estimate
$d_{z\,(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erositivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.59	USLE length-slope factor.	Calculated using the following equation: $LS = [0.065 + 0.0456(\text{slope}) + 0.006541(\text{slope})^2] \times (\text{slope\_length} \div \text{const})^{NN}$ Where: slope = slope steepness (%) = 1.176 % slope length = length of slope (ft.) or (m) = 3580 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.4	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x\ (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x\ (River)}$	(m³/yr)	3.07E+06	Average volumetric flow rate through water body (River)	water balance equation
$d_{wc\ (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc\ (River)}$	(m)	0.2	Depth of water column (in River)	estimate
$d_{bs\ (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs\ (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake)\ Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River)\ Measured}$	(mg/L)	2	Total Suspended Solids	CLOCA WQ monitoring of headwaters of black Creek
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumed to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

$Qp_{(silage\text{-}pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain\text{-}pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain\text{-}chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

Table D.83   **Site Input Parameters for Westside Watershed**

Parameter	Units	Value	Parameter Description	Rationale
GENERAL				
θ_{sw}	(mL water/ cm³ soil)	0.2	Soil volumetric water content	Default of 0.2 considered appropriate (USEPA 2005)
Z_s	(cm)	2	Soil mixing zone depth	Will depend on activities in overall watershed (2 (untilled) 20 - 20 default). A value of 2 cm was used in this risk assessment.
BD	(g soil/ cm³ soil)	1.5	Soil bulk density	Default of 1.5 considered appropriate (USEPA 2005)
Fw	(unitless)	0.6	Fraction of COPC wet deposition that adheres to plant surface	Recommended value for cations (such as metals) and organics (USEPA 2005)
T_{wk}	K	282.5	Water body temperature (Note Units)	OMAFRA, 1996. Best Management Practices: Fish and Wildlife Habitat Management
θ	(unitless)	1.026	Temperature correction factor	Default of 1.026 considered appropriate (USEPA 2005)
u	(m/s)	0.212	Current velocity	Calculation
C_d	(unitless)	0.0011	Drag coefficient	Default of 0.0011 considered appropriate (USEPA 2005)
W	(m/s)	3	Average annual wind speed	Environment Canada Climate Normals 1971 - 2000 - nearest wind station - Peterborough A (10.8 km/h yearly average)
ρ_w	(g/cm³)	1	Density of water	Default of 1 considered appropriate (USEPA 2005)
k	(unitless)	0.4	von Karman's constant	Default of 0.4 considered appropriate (USEPA 2005)
μ_w	(g/cm-s)	0.0169	Viscosity of water corresponding to water temperature	Default of 0.0169 considered appropriate (USEPA 2005)
μ_a	(g/cm-s)	0.000181	Viscosity of air corresponding to air temperature	Default of 1.81E-4 considered appropriate (USEPA 2005)
C	(Unitless)	0.02	USLE cover management factor.	Recommended value for pasture area in Ontario Region (p.98, RUSELFAC, 1997)
PF	(Unitless)	1	USLE supporting practice factor.	Recommended value for no suporting practice (p.37, RUSELFAC, 1997). Consistent with recommended default.
T_a	K	281.55	Ambient temperature (Note Units)	7.7*C from Environment Canada for Oshawa Station
ρ_{soil}	(g/cm³)	2.7	Solids particle density	Default of 2.7 considered appropriate (USEPA 2005)
Include Deposition?	(1 - ON, 0 - Off)	1		
Bkg Factor (Air)	(1 - ON, 0 - Off)	0		
Bkg Factor (Soil)	(1 - ON, 0 - Off)	0		
Bkg Factor (Water)	(1 - ON, 0 - Off)	0		
Bkg Factor (Sediment)	(1 - ON, 0 - Off)	0		
FACILITY PARAMETERS				
T_1	(yr)	0	Time period at the beginning of combustion	Combustion assumed to start at time 0
tD	(yr)	30	Time period over which deposition occurs (time period of combustion)	RFP states a 30 year period.
T_2	(yr)	30	Length of exposure duration	Assumed no averaging…. Most conservative.
CONSTANTS				
ρ_a	(g/m³)	1200	Density of air	Default of 1200 considered appropriate (USEPA 2005)
R	(atm-m³/ mol-K)	0.00008205	Universal gas constant	R is a constant
CLIMATE				
P	(cm/yr)	88.79	Average annual precipitation	Environment Canada climate normals Oshawa - 887.9 yearly precipatation
I	(cm/yr)	0	Average annual irrigation	Irrigation at a minimal based on type of farming in area
RO	(cm/yr)	14.4715	Average annual surface runoff from pervious areas	Calculated as GW = Groundwater recharge = 15% Precipitation (till soil) So: RO = P - (0.15) P - Ev = 0.85 P - Ev
E_v	(cm/yr)	61	Average annual evapotranspiration	National Atlas of Canada provides evapotranspiration (inches/year). Value for the Durham/York regions are around 24 inches or 61 cm/year. Reference http://atlas.nrcan.gc.ca/site/english/maps/archives/4thedition/environment/climate/049_50
HYDROLOGY/HYDROGEOLOGY				
$A_{W(Lake)}$	(m²)	0	Lake surface area	N/A for Rivers
$A_{W(River)}$	(m²)	9.00E+03	River surface area	Calculation based on measurements
A_I	(m²)	5.73E+05	Impervious watershed area receiving COPC deposition	10% considered impervious - 55% residential/industrial
A_L	(m²)	5.73E+06	Total watershed area receiving COPC deposition	CLOCA
$d_{z\,(River)}$	(m)	0.3	Total water body depth (River)	Estimate
$d_{z\,(Lake)}$	(m)	0	Total water body depth (Lake)	N/A for Rivers
λ_z	(unitless)	4	Dimensionless viscous sublayer thickness	Default of 4 considered appropriate for lakes (N/A to rivers and streams) (USEPA 2005)
K	ton/acre	0.26	USLE erodibility factor	Soils in watershed at consider Silty Clay in areas around site and sand to the north. For the purposes of this SSRA, silty clay and an average organic content was used to determine a K Factor of 0.26.
RF	1/yr	90	USLE rainfall (or erosivity) factor	R factor for Durham, Hastings, Northumberland, Peterborough, Victoria http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#tab1
LS	(Unitless)	0.50	USLE length-slope factor.	Calculated using the following equation: $$LS = [0.065 + 0.0456(slope) + 0.006541(slope)^2] \times (slope\_length \div const)^{NN}$$ Where: slope = slope steepness (%) = 1.1 % slope length = length of slope (ft.) or (m) = 2425 m constant = 72.5 Imperial or 22.1 metric NN = see Table below Table. NN Values <1 = 0.2 1 ≤ Slope < 3 = 0.3 3 ≤ Slope < 5 = 0.4 ≥ 5 = 0.5 Universal Soil Loss Equation (USLE) Factsheet. http://www.omafra.gov.on.ca/english/engineer/facts/00-001.htm#equation
a	(unitless)	1.4	Empirical intercept coefficient	Based on watershed area according to the following table (Do NOT interpolate) Watershed Area (sq. miles) a (unitless) 0.1 2.1 1 (>0.1 but <=1.0) 1.9 10 (>1.0 but <=10) 1.4 100 (>10 but <=100) 1.2 1000 (>100) 0.6 Note: 1 sq. mile = 2.59E+06 m²

b	(unitless)	0.125	Empirical slope coefficient	Default of 0.125 considered appropriate (USEPA 2005)
$Vf_{x (Lake)}$	(m³/yr)	0	Average volumetric flow rate through water body (Lake)	N/A for Rivers
$Vf_{x (River)}$	(m³/yr)	2.01E+06	Average volumetric flow rate through water body (River)	Water Balance Equation
$d_{wc (Lake)}$	(m)	0	Depth of water column (in Lake)	N/A for Rivers
$d_{wc (River)}$	(m)	0.3	Depth of water column (in River)	Estimate
$d_{bs (Lake)}$	(m)	0	Depth of upper benthic sediment layer (in Lake).	N/A for Rivers
$d_{bs (River)}$	(m)	0.03	Depth of upper benthic sediment layer (in River).	The US EPA recommended range is from 0.01 to 0.05 m, with a recommended value of 0.03 m.
C_{BS}	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
$D_{ss(Lake)}$	(m/yr)	0	Suspended solids deposition rate	N/A for Rivers
$D_{ss(River)}$	(m/yr)	0	Suspended solids deposition rate	Measured values of TSS available for streams therefore D_{SS} was not required.
$TSS_{(Lake) Measured}$	(mg/L)	0	Total Suspended Solids	N/A for Rivers
$TSS_{(River) Measured}$	(mg/L)	2	Total Suspended Solids	CLOCA WQ monitoring of headwaters of black Creek
ρ_s	(kg/L)	2.65	Bed sediment density	Default of 2.65 considered appropriate (USEPA 2005)
OC_{sed}	(unitless)	0.07	Fraction of organic carbon in bottom sediment	Assumption based on Lake Ontario sediments
VEGETATION UPTAKE FACTORS				
Rp (produce)	(unitless)	0.39	Interception fraction of the edible portion of plant	Default of 0.39 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Rp (veg)	(unitless)	0.982	Interception fraction of the edible portion of plant	Default of 0.982 considered appropriate if calculating veg separately NA if using weighted Rp (produce) (USEPA 2005)
Rp (fruit)	(unitless)	0.053	Interception fraction of the edible portion of plant	Default of 0.053 considered appropriate if calculating fruit separately NA if using weighted Rp (produce) (USEPA 2005)
$Rp_{(forage)}$	(unitless)	0.5	Interception fraction of the edible portion of plant	Default of 0.5 considered appropriate (USEPA 2005)
$Rp_{(silage)}$	(unitless)	0.46	Interception fraction of the edible portion of plant	Default of 0.46 considered appropriate (USEPA 2005)
kp	(1/yr)	18	Plant surface loss coefficient	Default of 18 considered appropriate (USEPA 2005)
Tp	(yr)	0.164	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.164 considered appropriate (USEPA 2005)
$Tp_{(forage)}$	(yr)	0.12	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.12 considered appropriate (USEPA 2005)
$Tp_{(silage)}$	(yr)	0.16	Length of plant exposure to deposition per harvest of the edible portion of the ith plant group	Default of 0.16 considered appropriate (USEPA 2005)
Yp (produce)	(kg DW/m²)	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 2.24 considered appropriate (weighted intake of fruit and veg based on human consumption) (USEPA 2005)
Yp (veg)	(kg DW/m²)	5.66	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 5.66 considered appropriate if calculating veg separately NA if using weighted Yp (produce) (USEPA 2005)
Yp (fruit)	(kg DW/m²)	0.252	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.252 considered appropriate if calculating fruit separately NA if using weighted Yp (produce) (USEPA 2005)
$Yp_{(grass)}$	(kg DW/m²)	0.15	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.15 considered appropriate (USEPA 2005)
$Yp_{(hay)}$	(kg DW/m²)	0.5	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.5 considered appropriate (USEPA 2005)
$Yp_{(silage)}$	(kg DW/m²)	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity)	Default of 0.8 considered appropriate (USEPA 2005)
$VG_{ag(forage)}$	(unitless)	1	Empirical correction factor for forage	Default of 1 considered appropriate (USEPA 2005)
$VG_{ag(silage)}$	(unitless)	0.5	Empirical correction factor for silage	Default of 0.5 considered appropriate (USEPA 2005)
TISSUE CONCENTRATION UPTAKE FACTORS				
$Tm_{pasture}$	(months)	6	Number of months per year a cow is set out to pasture and eating grass; the rest of the year is assumend to be eating hay	Considered appropriate for Durham Region
$Qp_{(forage-beef)}$	(kg DW plant/day)	8.8	Quantity of forage eaten by the animal per day	Default of 8.8 considered appropriate (USEPA 2005)
$Qp_{(silage-beef)}$	(kg DW plant/day)	2.5	Quantity of silage eaten by the animal per day	Default of 2.5 considered appropriate (USEPA 2005)
$Qp_{(grain-beef)}$	(kg DW plant/day)	0.47	Quantity of grain eaten by the animal per day	Default of 0.47 considered appropriate (USEPA 2005)
$Qp_{(forage-game)}$	(kg DW plant/day)	1.72	Quantity of forage eaten by the animal per day	Estimated using equation 3-9 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qp_{(forage-game)} = (0.577 * BW^{0.727})/1000$ where $Qp_{(forage-game)}$ = water ingestion rate (kg DW/day) BW = body weight (g) = 60,000 g (white-tail deer)
$Qp_{(forage-milk)}$	(kg DW/day)	13.2	Quantity of forage eaten by the dairy cattle per day	Default of 13.2 considered appropriate (USEPA 2005)
$Qp_{(silage-milk)}$	(kg DW/day)	4.1	Quantity of silage eaten by the dairy cattle per day	Default of 4.1 considered appropriate (USEPA 2005)
$Qp_{(grain-milk)}$	(kg DW/day)	3	Quantity of grain eaten by the dairy cattle per day	Default of 3.0 considered appropriate (USEPA 2005)

$Qp_{(silage\text{-}pork)}$	(kg DW/day)	1.4	Quantity of silage eaten by the swine per day	Default of 1.4 considered appropriate (USEPA 2005)
$Qp_{(grain\text{-}pork)}$	(kg DW/day)	3.3	Quantity of grain eaten by the swine per day	Default of 3.3 considered appropriate (USEPA 2005)
$Qp_{(grain\text{-}chicken)}$	(kg DW plant/day)	0.2	Quantity of grain eaten by the chicken per day	Default of 0.2 considered appropriate (USEPA 2005)
$Qs_{(beef)}$	(kg/day)	0.5	Quantity of soil eaten by the animal each day	Default of 0.5 considered appropriate (USEPA 2005)
$Qs_{(game)}$	(kg/day)	0.04	Quantity of soil eaten by the animal each day	White-tail deer from EcoRAM model
$Qs_{(milk)}$	(kg/day)	0.4	Quantity of soil eaten by the dairy cattle each day	Default of 0.4 considered appropriate (USEPA 2005)
$Qs_{(pork)}$	(kg/day)	0.37	Quantity of soil eaten by the swine day	Default of 0.37 considered appropriate (USEPA 2005)
$Qs_{(chicken)}$	(kg/day)	0.022	Quantity of soil eaten by the chicken each day	Default of 0.022 considered appropriate (USEPA 2005)
$Qw_{(beef)}$	(L/day)	38.53	Quantity of water ingested by the cow each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 755 kg (domestic cattle)
$Qw_{(pork)}$	(L/day)	5.08	Quantity of water ingested by the swine each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 79.4 kg (domestic hog)
$Qw_{(chicken)}$	(L/day)	0.14	Quantity of water ingested by the chicken each day	Estimated using equation 3-15 from the Wildlife Exposure Factors Handbook (USEPA, 1993): $Qw = 0.059 * BW^{0.67}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 3.17 kg (Canada goose)
$Qw_{(game)}$	(L/day)	3.94	Quantity of water ingested by the game animal each day	Estimated using equation 3-17 from the Wildlife Exposure Factors Handbook (USEPA, 1993) and Alberta Fish and Wildlife suggested weight for does: http://www.srd.gov.ab.ca/fishwildlife/livingwith/huntingalberta/whitetaileddeer.aspx: $Qw = 0.099 * BW^{0.90}$ where Qw = water ingestion rate (L/day) BW = body weight (kg) = 60 kg (white-tail deer)
$F_{(forage)}$	(unitless)	1	Fraction of forage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(silage)}$	(unitless)	1	Fraction of silage grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{(grain)}$	(unitless)	1	Fraction of grain grown on contaminated soil and ingested by the animal	Default of 1.0 considered appropriate (USEPA 2005)
$F_{L(beef)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the cow	N/A to rivers
$F_{L(pork)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the swine	N/A to rivers
$F_{L(chicken)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the chicken	N/A to rivers
$F_{L(game)}$	(unitless)	0	Fraction of contaminanted lake water ingested by the animal	N/A to rivers
$F_{R(beef)}$	(unitless)	1	Fraction of contaminanted river water ingested by the cow	Value of 1.0 considered conservative (Note: water ingestion by cow not considered in HHRAP)
$F_{R(pork)}$	(unitless)	1	Fraction of contaminanted river water ingested by the swine	Value of 1.0 considered conservative (Note: water ingestion by pork not considered in HHRAP)
$F_{R(chicken)}$	(unitless)	1	Fraction of contaminanted river water ingested by the chicken	Value of 1.0 considered conservative (Note: water ingestion by chicken not considered in HHRAP)
$F_{R(game)}$	(unitless)	1	Fraction of contaminanted river water ingested by the animal	Value of 1.0 considered conservative (Note: water ingestion by game not considered in HHRAP)
f_{lipid}	(unitless)	0.070	Fish Lipid Content	Default of 0.07 considered appropriate (USEPA 2005)

APPENDIX D - Model Physical/Chemical Data