TRIM.FaTE Reference Library Values
Background Document
(April 2004)

This document contains the following sets of tables listing and describing the input properties for which numerical values are provided in the April 2004 TRIM.FaTE Reference Library:

- chemical-independent parameters for abiotic compartment types;
- chemical-independent parameters for biotic compartment types;
- chemical-dependent (i.e., value varies by chemical) parameters independent of compartment type;
- chemical-dependent parameters for abiotic compartment types;
- chemical-dependent parameters for biotic compartment types; and
- source, meteorological, and other input parameters.

NOTE: These values are provided to assist new users in learning how to use TRIM.FaTE and set up TRIM.FaTE scenarios. It remains each user's responsibility to confirm or identify alternate values that are appropriate for their application and customize the library for their use accordingly.

For each property listed in the tables, the parameter name, input units, value used (except where values are "unset" in the Reference Library), and a reference are given. Full citations for each reference are provided at the end. There are two sets of the chemical-dependent tables, one for mercury and one for benzo(a)pyrene (BaP). Two attachments, referred to in the tables, provide additional detailed documentation.

Within the framework of the TRIM.FaTE computer model, several different kinds of "properties" are defined and used. The model inputs listed in this document fall into the following categories of TRIM.FaTE properties in the April 2004 Reference Library:

- compartment properties (includes by far the largest number of input parameters);
- volume element (VE) properties;
- link properties;
- chemical properties;
- source properties; and
- scenario properties.

In the following tables, the type of object (e.g., volume element, link) for which the property is defined is identified for all input parameters that are **not** compartment properties. Note that volume element, link, and scenario properties are not part of a TRIM.FaTE library. These properties are included in the tables for completeness, but no values are included.

This document includes only those properties for which the Reference Library value is a numerical constant. There are many other properties in the library, described in the TRIM.FaTE Technical Support Document Volume II: Description of Chemical Transport and Transformation

Algorithms (EPA 453/R-02-011b, September 2002), that are calculated from these inputs. These formula properties are not listed in the following tables.

Note that the units listed in these tables are the units in which model input values need to be expressed for the algorithms in the current library. In a few cases, these computer model input units do not match the units used for the same parameter in equations and derivations in the TRIM.FaTE Technical Support Document Volume II. In such cases, there are internal units conversions in the computer model that accoufnt for the differences.

Air Compartment Type

Parameter Name	Units	Value Used	Reference
Atmospheric dust particle load	kg[dust particles]/m^3[air compartment]	6.15E-08	Bidleman 1988
Density of air	g/cm^3	0.0012	EPA 1997
Density of dust particles	kg[dust particles]/m^3[dust particles]	1,400	Bidleman 1988
Fraction organic matter on particulates	unitless (wet wt)	0.2	Harner and Bidleman 1998
Height [VE property][a]	m	VE properties not part of library	n/a
Particulate washout ratio	m^3[air]/m^3[rain]	200,000	EPA 1997

[a]Set using the volume element properties named "top" and "bottom."

Soil Compartment Types

Parameter Name	Units	Value Used	Reference
Surface Soil Compartment Type			
Air content	volume[air]/volume[compartment]	0.43	average for New England in McKone et al. 2001
Average vertical velocity of water (percolation)	m^3[water]/m^2[surface area]-day (or m/day)	6.00E-04	assumed as 0.2 times average precipitation for New England in McKone et al. 2001
Boundary layer thickness above surface soil	m	0.005	Thibodeaux 1996
Density of soil solids (dry weight)	kg[soil]/m^3[soil]	2,600	Caltox value cited in McKone et al. 2001
Depth [VE property][a]	m	VE properties not part of library	n/a
Erosion fraction [Link property]	unitless	link properties not part of library	n/a
Fraction of area available for erosion	m^2[area available]/m^2[total]	1	professional judgment; area assumed rural
Fraction of area available for runoff	m^2[area available]/m^2[total]	1	professional judgment; area assumed rural
Fraction of area available for vertical diffusion	m^2[area available]/m^2[total]	1	professional judgment; area assumed rural
Organic carbon fraction	kg [organic carbon]/kg[soil wet wt]	unset	n/a
Runoff fraction [Link property]	unitless	link properties not part of library	n/a
Total erosion rate	kg[soil solids]/m^2[surface soil]-day	unset	n/a
Total runoff rate	m^3[water]/m^2[surface soil]-day	unset	n/a
Water content	volume[water]/volume[compartment]	0.15	average for New England in McKone et al. 2001
Root Zone Soil Compartment Type			
Air content	volume[air]/volume[compartment]	0.36	average for New England in McKone et al. 2001
Average vertical velocity of water (percolation)	m^3[water]/m^2[surface area]-day (or m/day)	6.00E-04	assumed as 0.2 times average precipitation for New England in McKone et al. 2001

Soil Compartment Types

Parameter Name	Units	Value Used	Reference
Density of soil solids (dry weight)	kg[soil]/m^3[soil]	2,600	Caltox value cited in McKone et al. 2001
Depth [VE property][a]	m	VE properties not part of library	n/a
Organic carbon fraction	kg[organic carbon]/kg[soil wet wt]	unset	n/a
Water content	volume[water]/volume[compartment]	0.15	average for New England in McKone et al. 2001
Vadose Zone Soil Compartment Type			
Air content	volume[air]/volume[compartment]	0.25	average for New England in McKone et al. 2001
Average vertical velocity of water (percolation)	m^3[water]/m^2[surface area]-day (or m/day)	6.00E-04	assumed as 0.2 times average precipitation for New England in McKone et al. 2001
Density of soil solids (dry weight)	kg[soil]/m^3[soil]	2,600	Caltox value cited in McKone et al. 2001
Depth [VE property][a]	m	VE properties not part of library	n/a
Organic carbon fraction	kg[organic carbon]/kg[soil wet wt]	unset	n/a
Water content	volume[water]/volume[compartment]	0.14	average for New England in McKone et al. 2001
Ground Water Compartment Type			
Depth [VE property][a]	m	VE properties not part of library	n/a
Organic carbon fraction	kg[organic carbon]/kg[soil wet wt]	0.01	Schwarzenbach et al. 1993
Porosity	volume[total pore space]/volume[compartment]	0.2	Caltox value cited in McKone et al. 2001
Recharge rate to surface water [Link property]	m^3[water]/m^2[area]-day	link properties not part of library	n/a
Solid material density in aquifer	kg[soil]/m^3[soil]	2,600	Caltox value cited in McKone et al. 2001

[a] Set using the volume element properties named "top" and "bottom."

Surface Water Compartment Type

Parameter Name	Units	Value Used	Reference
Algae carbon content (fraction)	g[carbon]/g[algae dry wt]	0.465	APHA 1995
Algae density in water column	g[algae wet wt]/L[water]	unset	n/a
Algae growth rate constant	1/day	0.7	Hudson et al. 1994 as cited in Mason et al. 1995b
Algae radius	um	2.5	Mason et al. 1995b
Algae water content (fraction)	unitless	0.9	APHA 1995
Average algae cell density (per vol cell, not water)	g[algae]/m^3[algae]	1,000,000	Mason et al. 1995b, Mason et al. 1996
Boundary layer thickness above sediment	m	0.02	Cal EPA 1993
Bulk water flow [Link property][a]	m^3[water]/day	link properties not part of library	n/a
Chloride concentration	mg[chloride]/L[water]	unset	n/a
Chlorophyll concentration	mg[chlorophyll]/L[water]	unset	n/a
Current velocity[b]	m/s	unset	n/a
Depth [VE property][c]	m	VE properties not part of library	n/a
Dispersion coefficient for exchange between surface water compartments [Link property][a]	m^2/day	link properties not part of library	n/a
Dimensionless viscous sublayer thickness	unitless	4	Ambrose et al. 1995
Distance between midpoints [Link property][a]	m	link properties not part of library	n/a
Drag coefficient for water body	unitless	0.0011	Ambrose et al. 1995
Flush rate[d]	1/year	unset	n/a

Surface Water Compartment Type

Parameter Name	Units	Value Used	Reference
Organic carbon fraction in suspended sediments	unitless	unset	n/a
pH	unitless	unset	n/a
Suspended sediment density	kg[suspended sediment particles]/m^3[suspended sediment particles]	2,650	EPA 1998b
Suspended sediment deposition velocity	m/day	2	EPA 1997
Total suspended sediment concentration	kg[suspended sediment particles]/m^3[water]	unset	n/a
Water temperature [VE property]	degrees K	VE properties not part of library	n/a

[a]Applies to all surface water compartments connected to other surface water compartments.
[b]Applies to flowing water bodies only (i.e., rivers, streams).
[c]Set using the volume element properties named "top" and "bottom."
[d]Applies to all surface water compartments connected to a flush rate sink (i.e., all or part of discharge modeled to a sink).

Sediment Compartment Type

Parameter Name	Units	Value Used	Reference
Depth [VE property][a]	m	VE properties not part of library	n/a
Organic carbon fraction	kg[organic carbon]/kg[soil wet wt]	unset	n/a
Porosity of the sediment zone	m^3[pore water]/m^3[sediment compartment]	0.6	EPA 1998a
Solid material density in sediment	kg[sediment particles]/m^3[sediment particles]	2,650	EPA 1998a

[a]Set using the volume element properties named "top" and "bottom."

Terrestrial Plant Compartment Types

		Deciduous		Coniferous		Grass/Herb		Agriculture	
Parameter Name	Units	Value Used	Reference	Value Used	Reference	Value Used	Reference	Value Used	Reference
Leaf Compartment Type									
Allow exchange[a]	1=yes, 0=no	unset	n/a	1	professional judgment	unset	n/a	unset	n/a
Average leaf area index	m^2[total leaf area]/m^2[underlying soil area]	3.4	Harvard Forest, dom. red oak and red maple, CDIAC website	5	rep. value for conifers, N. Nikolov, ORNL	5	mid-range of 4-6 for old fields, R.J. Luxmoore, ORNL	2	average for crops (growing season), GLEAMS, North Carolina State University
Calculate wet dep interception fraction (boolean)	true=yes, false=no	true	setting selected for Reference Library	true	setting selected for Reference Library	true	setting selected for Reference Library	true	setting selected for Reference Library
Correction exponent, octanol to lipid	unitless	0.76	from roots, Trapp 1995	0.76	from roots, Trapp 1995	0.76	from roots, Trapp 1995	0.76	from roots, Trapp 1995
Degree stomatal opening	unitless	1	set to 1 for daytime based on professional judgment (stomatal diffusion is turned off at night using a different property, IsDay)	1	set to 1 for daytime based on professional judgment (stomatal diffusion is turned off at night using a different property, IsDay)	1	set to 1 for daytime based on professional judgment (stomatal diffusion is turned off at night using a different property, IsDay)	1	set to 1 for daytime based on professional judgment (stomatal diffusion is turned off at night using a different property, IsDay)
Density of wet leaf	kg[leaf wet wt]/m^3[leaf]	820	Paterson et al. 1991	820	Paterson et al. 1991	820	Paterson et al. 1991	820	Paterson et al. 1991
Leaf wetting factor	m	3.00E-04	1E-04 to 6E-04 for different crops and elements, Muller and Prohl 1993	3.00E-04	1E-04 to 6E-04 for different crops and elements, Muller and Prohl 1993	3.00E-04	1E-04 to 6E-04 for different crops and elements, Muller and Prohl 1993	3.00E-04	1E-04 to 6E-04 for different crops and elements, Muller and Prohl 1993
Length of leaf	m	0.1	professional judgment	0.01	professional judgment	0.05	professional judgment	0.1	professional judgment
Lipid content of leaf	kg[lipid]/kg[leaf wet wt]	0.00224	European beech, Riederer 1995	0.00224	European beech, Riederer 1995	0.00224	European beech, Riederer 1995	0.00224	European beech, Riederer 1995
Litter fall rate[a]	1/day	unset	n/a	0.0021[b]	see note b	unset	n/a	unset	n/a
Stomatal area, normalized for effective diffusion path length	1/m	200	Wilmer and Fricker 1996	200	Wilmer and Fricker 1996	200	Wilmer and Fricker 1996	200	Wilmer and Fricker 1996
Vegetation attenuation factor	m^2/kg	2.9	grass/hay, Baes et al. 1984	2.9	grass/hay, Baes et al. 1984	2.9	grass/hay, Baes et al. 1984	2.9	grass/hay, Baes et al. 1984
Water content	kg[water]/kg[leaf wet wt]	0.8	Paterson et al. 1991	0.8	Paterson et al. 1991	0.8	Paterson et al. 1991	0.8	Paterson et al. 1991
Wet dep interception fraction (user supplied)	unitless	0.2	not used (model set to calculate value)	0.2	not used (model set to calculate value)	0.2	not used (model set to calculate value)	0.2	not used (model set to calculate value)
Wet mass of leaf per unit area	kg[leaf wet wt]/m^2[surface soil]	0.6	calculated from leaf area index, leaf thickness (Simonich & Hites 1994), density of wet foliage	2	calculated from leaf area index, leaf thickness (Simonich & Hites 1994), density of wet foliage	0.6	calculated from leaf area index and Leith 1975	0.4	calculated from leaf area index and Leith 1975
Particle on Leaf Compartment Type									
Allow exchange[a]	1=yes, 0=no	unset	n/a	1	professional judgment	unset	n/a	unset	n/a

Terrestrial Plant Compartment Types

		Deciduous		Coniferous		Grass/Herb		Agriculture	
Parameter Name	Units	Value Used	Reference	Value Used	Reference	Value Used	Reference	Value Used	Reference
Volume particle per area leaf	m^3[leaf particles]/m^2[leaf]	1.00E-09	based on particle density and size distribution for atmospheric particles measured on an adhesive surface, Coe and Lindberg 1987	1.00E-09	based on particle density and size distribution for atmospheric particles measured on an adhesive surface, Coe and Lindberg 1987	1.00E-09	based on particle density and size distribution for atmospheric particles measured on an adhesive surface, Coe and Lindberg 1987	1.00E-09	based on particle density and size distribution for atmospheric particles measured on an adhesive surface, Coe and Lindberg 1987
Root Compartment Type - Nonwoody Plants Only[c]									
Allow exchange[a]	1=yes, 0=no					unset	n/a	unset	n/a
Correction exponent, octanol to lipid	unitless					0.76	Trapp 1995	0.76	Trapp 1995
Lipid content of root	kg[lipid]/kg [root wet wt]					0.011	from bean root, Trapp 1995	0.011	from bean root, Trapp 1995
Water content of root	kg[water]/kg[root wet wt])					0.8	professional judgment	0.8	professional judgment
Wet density of root	kg[root wet wt]/m^3[root]					820	soybean, Paterson et al. 1991	820	soybean, Paterson et al. 1991
Wet mass per area	kg[root wet wt]/m^2[surface soil]					1.4	temperate grassland, Jackson et al. 1996	0.15	temperate grassland, Jackson et al. 1996
Stem Compartment Type - Nonwoody Plants Only[c]									
Allow exchange[a]	1=yes, 0=no					unset	n/a	unset	n/a
Correction exponent, octanol to lipid	unitless					0.76	from roots, Trapp 1995	0.76	from roots, Trapp 1995
Density of phloem fluid	kg[phloem]/m^3[phloem]					1,000	professional judgment	1,000	professional judgment
Density of xylem fluid	kg[xylem]/m^3[xylem]					900	professional judgment	900	professional judgment
Flow rate of transpired water per leaf area	m^3[water]/m^2 [leaf]-day					0.0048	Crank et al. 1981	0.0048	Crank et al. 1981
Fraction of transpiration flow rate that is phloem rate	unitless					0.05	Paterson et al. 1991	0.05	Paterson et al. 1991
Lipid content of stem	kg[lipid]/kg [stem wet wt]					0.00224	leaves of European beech, Riederer 1995	0.00224	leaves of European beech, Riederer 1995
Water content of stem	kg[water]/kg[stem wet wt]					0.8	Paterson et al. 1991	0.8	Paterson et al. 1991
Wet density of stem	kg[stem wet wt]/m^3[stem]					830	professional judgment	830	professional judgment
Wet mass per area	kg[stem wet wt]/m^2[surface soil]					0.24	calculated from leaf and root biomass density based on professional judgment	0.16	calculated from leaf and root biomass density based on professional judgment

[a]Can be made to vary seasonally.

[b]Value assumes first-order relationship and that 99 percent of leaves fall in six years.

[c]Roots and stems are not modeled for deciduous or coniferous forest in the current version of TRIM.FaTE.

Aquatic Plant Compartment Type

Parameter Name	Units	Value Used	Reference
Macrophyte Compartment Type			
Biomass per water area	kg/m^2	1.5	Bonar et al. 1993
Density of macrophytes	kg/L	1	professional judgment

Terrestrial Animal Compartment Types

Parameter Name	Units	Value Used	Reference
Soil Detritivore Compartment Type - Earthworm			
Density	kg[worm wet wt]/L[worm]	1	professional judgment
Density per soil area	kg[worm wet wt]/m^2[soil]	unset	n/a
Water content of worm	unitless	0.84	EPA 1993
Soil Detritivore Compartment Type - Soil Arthropod			
Biomass per soil area	kg[arthropod wet wt]/m^2[soil]	3.01E-04	grasshopper, Porter et al. 1996
Body weight (BW)	kg	1.31E-04	grasshopper, Porter et al. 1996

Terrestrial Animal Compartment Types

		Terrestrial Carnivore - Long-tailed Weasel		Terrestrial Carnivore - Red-tailed hawk		Terrestrial Ground-Invertebrate Feeder - Short-tailed Shrew		Terrestrial Ground-Invertebrate Feeder - Trowbridge Shrew		Terrestrial Herbivore - Long-tailed Vole	
Parameter Name	**Units**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**
All Other Terrestrial Animal Compartment Types											
Body weight (BW)	kg	0.147	Mumford and Whitaker 1982	1.13	North America, Dunning 1993	0.022	0.015-0.029 kg reported for Manitoba, Silva and Downing 1995	0.00449	Silva and Downing 1995	0.0467	Smolen and Keller 1987
Food ingestion rate[a]	kg[diet wet wt]/kg[body wet wt]-day	0.0735	calc from Brown and Lasiewski 1972, Golley 1961, EPA 1993	0.12	Preston and Beane 1993	0.47	Barrett and Stueck 1976	1.17	Rust 1978	0.097	mean Microtus spp., Dark et al. 1983, Burt and Grossenheider 1976, Dice 1922
Fraction diet - black-capped chickadee	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - mouse	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - terrestrial plants	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - short-tailed shrew	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - soil	unitless, dry wt basis	0	professional judgment	0	professional judgment	0	not used; user input available for soil ingestion rate	0.13	Talmage and Walton 1993	0.024	Beyer et al. 1994
Fraction diet - soil arthropod	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - vole	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - worm	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction excretion to soil	unitless	1	professional judgment	1	professional judgment	1	professional judgment	1	professional judgment	1	professional judgment
Fraction excretion to water	unitless	0	professional judgment	0	professional judgment	0	professional judgment	0	professional judgment	0	professional judgment
Population per soil area	$\#/m^2$	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Scaling constant A - inhalation rate	unitless	0.546	Stahl 1967	0.409	Lasiewski and Calder 1971	0.546	Stahl 1967	0.546	Stahl 1967	0.546	Stahl 1967
Scaling constant B - inhalation rate	unitless	0.8	Stahl 1967	0.8	Lasiewski and Calder 1971	0.8	Stahl 1967	0.8	Stahl 1967	0.8	Stahl 1967
Scaling constant A - water ingestion rate	unitless	0.099	Calder and Braun 1983	0.059	Calder and Braun 1983	0.099	Calder and Braun 1983	0.099	Calder and Braun 1983	0.099	Calder and Braun 1983
Scaling constant B - water ingestion rate	unitless	0.9	Calder and Braun 1983	0.67	Calder and Braun 1983	0.9	Calder and Braun 1983	0.9	Calder and Braun 1983	0.9	Calder and Braun 1983
Soil ingestion rate (user supplied)	kg[soil dry wt]/kg[body wet wt]-day	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0.0611	Talmage and Walton 1993	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)
Use calculated soil ingestion rate (boolean)	true=yes, false=no	true	set to calculate 0	true	set to calculate 0	false	user input available	true	user input not available	true	user input not available

[a]See Attachment 1 for documentation of food ingestion rate calculations.

Terrestrial Animal Compartment Types

		Terrestrial Herbivore - Meadow Vole		Terrestrial Herbivore - Mule Deer/Black-tailed Deer		Terrestrial Herbivore - White-tailed Deer		Terrestrial Insectivore - Black-capped Chickadee		Terrestrial Omnivore - Mouse	
Parameter Name	**Units**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**
All Other Terrestrial Animal Compartment Types											
Body weight (BW)	kg	0.0441	Reich 1981	66.2	Colorado, Alldredge et al. 1974	74.8	Silva and Downing 1995	0.0108	Dunning 1993	0.02	North America, Silva and Downing 1995
Food ingestion rate[a]	kg[diet wet wt]/kg[body wet wt]-day	0.097	spp., Dark et al. 1983, Burt and Grossenheider 1976, Dice 1922	0.11	estimated for mule deer from Alldredge et al. 1974	0.05	Mautz et al. 1976	0.74	calculated from Bell 1990, Dunning 1993	0.2	Green and Millar 1987
Fraction diet - black-capped chickadee	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - mouse	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - terrestrial plants	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - short-tailed shrew	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - soil	unitless, dry wt basis	0.024	Beyer et al. 1994	0.02	north central Colorado, Arthur and Alldredge 1979	0.01	Beyer et al. 1994	0	assumed, rarely observed on ground, Smith 1993	0.02	Beyer et al. 1994
Fraction diet - soil arthropod	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - vole	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - worm	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction excretion to soil	unitless	1	professional judgment	1	professional judgment	1	professional judgment	1	professional judgment	1	professional judgment
Fraction excretion to water	unitless	0	professional judgment	0	professional judgment	0	professional judgment	0	professional judgment	0	professional judgment
Population per soil area	$\#/m^2$	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Scaling constant A - inhalation rate	unitless	0.546	Stahl 1967	0.546	Stahl 1967	0.546	Stahl 1967	0.409	Lasiewski and Calder 1971	0.546	Stahl 1967
Scaling constant B - inhalation rate	unitless	0.8	Stahl 1967	0.8	Stahl 1967	0.8	Stahl 1967	0.8	Lasiewski and Calder 1971	0.8	Stahl 1967
Scaling constant A - water ingestion rate	unitless	0.099	Calder and Braun 1983	0.099	Calder and Braun 1983	0.099	Calder and Braun 1983	0.059	Calder and Braun 1983	0.099	Calder and Braun 1983
Scaling constant B - water ingestion rate	unitless	0.9	Calder and Braun 1983	0.9	Calder and Braun 1983	0.9	Calder and Braun 1983	0.67	Calder and Braun 1983	0.9	Calder and Braun 1983
Soil ingestion rate (user supplied)	kg[soil dry wt]/kg[body wet wt]-day	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)
Use calculated soil ingestion rate (boolean)	true=yes, false=no	true	user input not available	true	user input not available	true	user input not available	true	set to calculate 0	true	user input not available

[a]See Attachment 1 for documentation of food ingestion rate calculations.

Semi-aquatic Animal Compartment Types

		Semi-aquatic Carnivore - Bald Eagle		Semi-aquatic Carnivore - Mink		Semi-aquatic Insectivore - Tree Swallow		Semi-aquatic Omnivore - Mallard		Semi-aquatic Omnivore - Raccoon		Semi-aquatic Piscivore - Common Loon		Semi-aquatic Piscivore - Kingfisher	
Parameter Name	**Units**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**
All Compartment Types															
Body weight (BW)	kg	4.74	Dunning 1993	0.831	Mumford and Whitaker 1982	0.0201	Dunning 1993	1.13	Nelson and Martin 1953	6.35	Lotze and Anderson 1979	4.13	Dunning 1993	0.148	Dunning 1993
Food ingestion rate[a]	kg[diet wet wt]/kg[body wet wt]-day	0.12	Stalmaster and Gessaman 1984	0.14	mink in captivity, Bleavins and Aulerich 1981	0.198	calculated from Williams 1988, Quinney and Ankney 1985, and Bell 1990	0.1	Heinz et al. 1987	0.11	calculated based on allometric equation (Nagy et al.1999) and professional judgment	0.23	Barr 1996	0.35	calculated based on allometric equation (Nagy 1987) and professional judgment
Fraction diet - benthic carnivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - benthic invertebrates	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - benthic omnivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - black-capped chickadee	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - emerging benthic insect (benthic invertebrate)	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - mouse	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - soil	unitless, dry wt basis	0	professional judgment	0	professional judgment	0	professional judgment	0.033	Beyer et al. 1994	0.094	Beyer et al. 1994	0	professional judgment	0	professional judgment
Fraction diet - terrestrial plants	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - vole	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - water-column carnivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - water-column herbivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - water-column omnivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - worm	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction excretion to soil	unitless	0.5	professional judgment	0.5	professional judgment	1	professional judgment	0.5	professional judgment	0.5	professional judgment	0.5	professional judgment	0.5	professional judgment
Fraction excretion to water	unitless	0.5	professional judgment	0.5	professional judgment	0	professional judgment	0.5	professional judgment	0.5	professional judgment	0.5	professional judgment	0.5	professional judgment
Population per soil area	$\#/m^2$	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Scaling constant A - inhalation rate	unitless	0.409	Lasiewski and Calder 1971	0.546	Stahl 1967	0.409	Lasiewski and Calder 1971	0.409	Lasiewski and Calder 1971	0.546	Stahl 1967	0.409	Lasiewski and Calder 1971	0.409	Lasiewski and Calder 1971
Scaling constant B - inhalation rate	unitless	0.8	Lasiewski and Calder 1971	0.8	Stahl 1967	0.8	Lasiewski and Calder 1971	0.8	Lasiewski and Calder 1971	0.8	Stahl 1967	0.8	Lasiewski and Calder 1971	0.8	Lasiewski and Calder 1971
Scaling constant A - water ingestion rate	unitless	0.059	Calder and Braun 1983	0.099	Calder and Braun 1983	0.059	Calder and Braun 1983	0.059	Calder and Braun 1983	0.099	Calder and Braun 1983	0.059	Calder and Braun 1983	0.059	Calder and Braun 1983
Scaling constant B - water ingestion rate	unitless	0.67	Calder and Braun 1983	0.9	Calder and Braun 1983	0.67	Calder and Braun 1983	0.67	Calder and Braun 1983	0.9	Calder and Braun 1983	0.67	Calder and Braun 1983	0.67	Calder and Braun 1983

Semi-aquatic Animal Compartment Types

		Semi-aquatic Carnivore - Bald Eagle		Semi-aquatic Carnivore - Mink		Semi-aquatic Insectivore - Tree Swallow		Semi-aquatic Omnivore - Mallard		Semi-aquatic Omnivore - Raccoon		Semi-aquatic Piscivore - Common Loon		Semi-aquatic Piscivore - Kingfisher	
Parameter Name	**Units**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**
Soil ingestion rate (user supplied)	kg[soil dry wt]/kg[body wet wt]-day	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)	0	not used (model set to calculate value based on fraction diet-soil and food ingestion rate)
Use calculated soil ingestion rate (boolean)	true= yes, false= no	true	set to calculate 0	true	set to calculate 0	true	set to calculate 0	true	user input not available	true	user input not available	true	set to calculate 0	true	set to calculate 0

[a]See Attachment 1 for documentation of food ingestion rate calculations.

Aquatic Animal Compartment Types

		Water-column Carnivore		Water-column Herbivore		Water-column Omnivore		Benthic Carnivore		Benthic Omnivore	
Parameter Name	**Units**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**	**Value Used**	**Reference**
All Fish Compartment Types											
Body weight (BW)	kg[fish wet wt]	2	professional judgment	0.025	professional judgment	0.25	professional judgment	2	professional judgment	0.25	professional judgment
Fraction diet - algae	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - benthic invertebrates	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - benthic omnivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - water-column herbivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction diet - water-column omnivores	unitless	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a
Fraction lipid weight	kg[lipid]/kg[fish wet wt]	0.057	Thomann 1989	0.034	Thomann 1989	0.07	Thomann 1989	0.057	Thomann 1989	0.07	Thomann 1989
Population per water area	$\#/m^2$	unset	n/a	unset	n/a	unset	n/a	unset	n/a	unset	n/a

Parameter Name	Units	Value Used	Reference
Benthic Invertebrate Compartment Type			
Biomass per water area	kg/m^2	unset	n/a
Body weight (BW)	kg[inv wet wt]	2.55E-04	professional judgment

Chemical-Dependent / Independent of Compartment Type for Mercury -- Documentation for TRIM.FaTE Reference Library[a]

Parameter Name	Units	Value			Reference
		Hg(0)[b]	Hg(2)[b]	MHg[b]	
CAS number	unitless	7439-97-6	n/a	22967-92-6	n/a
Diffusion coefficient in pure air	m^2[air]/day	0.478	0.478	0.456	EPA 1997
Diffusion coefficient in pure water	m^2[water]/day	5.54E-05	5.54E-05	5.28E-05	EPA 1997
Henry's Law constant	Pa-m^3/mol	719	7.19E-05	0.0477	EPA 1997
Melting point	degrees K	234	550	443	CARB 1994
Molecular weight	g/mol	201	201	216	EPA 1997
Octanol-water partition coefficient (Kow)	L[water]/kg[octanol]	4.15	3.33	1.7	Mason et al. 1996
Vapor washout ratio	m^3[air]/m^3[rain]	1,200	1.6E+06	0	EPA 1997, based on Petersen et al. 1995

[a]All parameters in this table are TRIM.FaTE chemical properties.

[b]On this and all following tables for mercury: Hg(0) = elemental mercury, Hg(2) = divalent mercury, and MHg = methyl mercury.

Chemical-Dependent / Independent of Compartment Type for PAH -- Documentation for TRIM.FaTE Reference Library

Parameter Name	Units	Value	Reference
		BaP[a]	
CAS number	unitless	50-32-8	n/a
Diffusion coefficient in pure air	m^2[air]/day	0.188	U.S. EPA 1998a
Diffusion coefficient in pure water	m^2[water]/day	5.05E-05	U.S. EPA 1998a
Henry's Law constant	Pa-m^3/mol	0.085	U.S. EPA 1998a
Melting point	degrees K	452	Budavari 1996
Molecular weight	g/mol	252.32	Budavari 1996
Octanol-water partition coefficient (Kow)	L[water]/kg[octanol]	9.33E+05	Hansch et al. 1995
Vapor pressure	Pa	7.32E-07	Smith et al. 1978
Reference bird body weight	kg	0.25	U.S. EPA 1992, default rat body weight recommended by EPA for evaluation of toxicity studies in which rat body weight is not reported
Reference bird chemical degradation rate	1/day	2.04	Weyand and Bevan 1986, rat study; no data available for birds, use mammalian value
Reference bird elimination rate (i.e., total excretion rate)	1/day	0.6	ATSDR 1995, no avian data, values based on mammalian oral absorption/fecal excretion data
Reference mammal body weight	kg	0.25	U.S. EPA 1992, default rat body weight recommended by EPA for evaluation of toxicity studies in which rat body weight is not reported
Reference mammal chemical degradation rate	1/day	2.04	Weyand and Bevan 1986, rat study
Reference mammal elimination rate (i.e., total excretion rate)	1/day	0.6	ATSDR 1995, values based on mammalian oral absorption/fecal excretion data

[a]On this and all following tables for polycyclic aromatic hydrocarbons (PAH): BaP = benzo(a)pyrene.

Air Compartment Type

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Initial concentration	g/m^3	unset	unset	unset	n/a
Boundary concentration [VE property]	g/m^3	VE properties not part of library	VE properties not part of library	VE properties not part of library	n/a
Particle dry deposition velocity	m/day	500	500	500	Caltox value cited in McKone et al. 2001
Demethylation rate	1/day	n/a	n/a	0	professional judgment
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	0.00385	0	0	low end of half-life range (6 months to 2 years) in EPA 1997
Reduction rate	1/day	0	0	0	professional judgment

Air Compartment Type

Parameter Name	Units	Value	Reference
		BaP	
Initial concentration	g/m^3	unset	n/a
Boundary concentration [VE property][a]	g/m^3	VE properties not part of library	n/a
Particle Dry Deposition velocity	m/day	500	Caltox value cited in McKone et al. 2001
Half-life	day	0.046	Howard et al. 1991; upper bound measured or estimated value

Soil Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Surface Soil Compartment Type					
Initial concentration	g/m^3	unset	unset	unset	n/a
Input characteristic depth (user supplied)	m	0.08	0.08	0.08	not used (model set to calculate value)
Soil-water partition coefficient	L[water]/kg[soil wet wt]	1,000	58,000	7,000	EPA 1997
Use input characteristic depth (boolean)	0 = no, Else = yes	0	0	0	setting selected for Reference Library
Vapor dry deposition velocity	m/day	50	2,500	0	EPA 1997
Demethylation rate	1/day	n/a	n/a	0.06	range reported in Porvari and Verta 1995 is 3E-2 to 6E-2 /day; value is average maximum potential demethylation rate constant under anaerobic conditions
Methylation rate	1/day	0	0.001	0	range reported in Porvari and Verta 1995 is 2E-4 to 1E-3 /day; value is average maximum potential methylation rate constant under anaerobic conditions
Oxidation rate	1/day	0	0	0	value assumed in EPA 1997
Reduction rate	1/day	0	1.25E-05	0	value used for untilled surface soil (2cm), 10% moisture content, in EPA 1997; general range is (0.0013/day)*moisture content to (0.0001/day)*moisture content for forested region (Lindberg 1996; Carpi and Lindberg 1997)
Root Zone Soil Compartment Type					
Initial concentration	g/m^3	unset	unset	unset	n/a
Input characteristic depth (user supplied)	m	0.08	0.08	0.08	not used (model set to calculate value)
Soil-water partition coefficient	L[water]/kg[soil wet wt]	1,000	58,000	7,000	EPA 1997

Soil Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Use input characteristic depth (boolean)	0 = no, Else = yes	0	0	0	setting selected for Reference Library
Demethylation rate	1/day	n/a	n/a	0.06	range reported in Porvari and Verta 1995 is 3E-2 to 6E-2 /day; value is average maximum potential demethylation rate constant under anaerobic conditions
Methylation rate	1/day	0	0.001	0	range reported in Porvari and Verta 1995 is 2E-4 to 1E-3 /day; value is average maximum potential methylation rate constant under anaerobic conditions
Oxidation rate	1/day	0	0	0	value assumed in EPA 1997
Reduction rate	1/day	0	3.25E-06	0	value used for tilled surface soil (20cm), 10% moisture content, in EPA 1997 (Lindberg 1996; Carpi and Lindberg, 1997)
Vadose Zone Soil Compartment Type					
Initial concentration	g/m^3	unset	unset	unset	n/a
Input characteristic depth (user supplied)	m	0.08	0.08	0.08	not used (model set to calculate value)
Soil-water partition coefficient	L[water]/kg[soil wet wt]	1,000	58,000	7,000	EPA 1997
Use input characteristic depth (boolean)	0 = no, Else = yes	0	0	0	setting selected for Reference Library
Demethylation rate	1/day	n/a	n/a	0.06	range reported in Porvari and Verta 1995 is 3E-2 to 6E-2 /day; value is average maximum potential demethylation rate constant under anaerobic conditions
Methylation rate	1/day	0	0.001	0	range reported in Porvari and Verta 1995 is 2E-4 to 1E-3 /day; value is average maximum potential methylation rate constant under anaerobic conditions
Oxidation rate	1/day	0	0	0	value assumed in EPA 1997

Soil Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Reduction rate	1/day	0	3.25E-06	0	value used for tilled surface soil (20cm), 10% moisture content, in EPA 1997 (Lindberg 1996; Carpi and Lindberg, 1997)
Ground Water Compartment Type					
Initial concentration	g/L	unset	unset	unset	n/a
Soil-water partition coefficient	L[water]/kg[soil wet wt]	1,000	58,000	7,000	EPA 1997
Demethylation rate	1/day	n/a	n/a	0.06	range reported in Porvari and Verta 1995 is 3E-2 to 6E-2 /day; value is average maximum potential demethylation rate constant under anaerobic conditions
Methylation rate	1/day	0	0.001	0	range reported in Porvari and Verta 1995 is 2E-4 to 1E-3 /day; value is average maximum potential methylation rate constant under anaerobic conditions
Oxidation rate	1/day	1.00E-08	0	0	small default nonzero value (0 assumed in EPA 1997)
Reduction rate	1/day	0	3.25E-06	0	value used for tilled surface soil (20cm), 10% moisture content, in EPA 1997 (Lindberg 1996; Carpi and Lindberg, 1997)

Soil Compartment Types

Parameter Name	Units	Value	Reference
		BaP	
Surface Soil Compartment Type			
Initial concentration	g/m^3	unset	n/a
Input characteristic depth (user supplied)	m	n/a	not used (model set to calculate value)
Use input characteristic depth (boolean)	0 = no, Else = yes	0	setting selected for Reference Library
Half-life	day	530	Howard et al. 1991; upper bound measured or estimated value for soil
Root Zone Soil Compartment Type			
Initial concentration	g/m^3	unset	n/a
Input characteristic depth (user supplied)	m	n/a	not used (model set to calculate value)
Use input characteristic depth (boolean)	0 = no, Else = yes	0	setting selected for Reference Library
Half-life	day	530	Howard et al. 1991; upper bound measured or estimated value for soil
Vadose Zone Soil Compartment Type			
Initial concentration	g/m^3	unset	n/a
Input characteristic depth (user supplied)	m	n/a	not used (model set to calculate value)
Use input characteristic depth (boolean)	0 = no, Else = yes	0	setting selected for Reference Library
Half-life	day	1,060	Howard et al. 1991; upper bound measured or estimated value for soil
Ground Water Compartment Type			
Initial concentration	g/L	unset	n/a
Half-life	day	1,060	Howard et al. 1991; upper bound measured or estimated value for soil

Surface Water Compartment Type

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Initial concentration	g/L	unset	unset	unset	n/a
Algal surface area-specific uptake rate constant	nmol/[μm^2-day-nmol]	0	2.04E-10	3.60E-10	Mason et al. 1996; zero assumed for Hg(0)
Dow ("overall Kow")	L[water]/kg[octanol]	0	-[a]	-[b]	dervied from Figure 2 in Mason et al. 1996
Solids-water partition coefficient	L[water]/kg[solids wet wt]	1,000	100,000	100,000	EPA 1997
Vapor dry deposition velocity	m/day	n/a	2,500	n/a	EPA 1997
Demethylation rate	1/day	n/a	n/a	0.013	average of range of 1E-3 to 2.5E-2/day from Gilmour and Henry 1991
Methylation rate	1/day	0	0.001	0	value used in EPA 1997; range is from 1E-4 to 3E-4/day (Gilmour and Henry 1991)
Oxidation rate	1/day	0	0	0	professional judgment
Reduction rate	1/day	0	0.0075	0	value used in EPA 1997; reported values range from less than 5E-3/day for depths greater than 17m, up to 3.5/day (Xiao et al. 1995; Vandal et al. 1995; Mason et al. 1995a; Amyot et al. 1997)

[a]TRIM.FaTE Formula Property (calculated, not an input), which varies from 0.025 to 1.625 depending on pH and chloride concentration.
[b]TRIM.FaTE Formula Property (calculated, not an input), which varies from 0.075 to 1.7 depending on pH and chloride concentration.

Surface Water Compartment Type

Parameter Name	Units	Value	Reference
		BaP	
Initial concentration	g/L	unset	n/a
BCF-algae	L[water]/g[algae wet wt]	3.61	BCF data for green algae for BaP from Lu et al. 1977
Half-life	day	0.138	Howard et al. 1991; upper bound measured or estimated value

Sediment Compartment Type

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Initial concentration	g/m^3	unset	unset	unset	n/a
Solids-water partition coefficient	L[water]/kg[solids wet wt]	3,000	50,000	3,000	EPA 1997
Demethylation rate	1/day	n/a	n/a	0.0501	average of range of 2E-4 to 1E-1/day from Gilmour and Henry 1991
Methylation rate	1/day	0	1.00E-04	0	value used in EPA 1997; range is from 1E-5 to 1E-3/day (Gilmour and Henry 1991)
Oxidation rate	1/day	0	0	0	professional judgment
Reduction rate	1/day	0	1.00E-06	0	inferred value based on presence of Hg(0) in sediment porewater (EPA 1997; Vandal et al. 1995)

Sediment Compartment Type

Parameter Name	Units	Value	Reference
		BaP	
Initial concentration	g/m^3	unset	n/a
Half-life	day	2,290	Mackay et al. 1992; PAH values are the mean half-life of the log class that Mackay et al. assigned for sediment

Terrestrial Plant Compartment Types[a]

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Leaf Compartment Type					
Initial concentration	g/kg	unset	unset	unset	n/a
Transfer factor to leaf particle	1/day	0.002	0.002	0.002	professional judgment (assumed 1% of transfer factor from leaf particle to leaf)
Demethylation rate	1/day	n/a	n/a	0.03	calculated from Bache et al. 1973
Methylation rate	1/day	0	0	0	assumed from Gay 1975, Bache et al. 1973
Oxidation rate	1/day	1.0E+06	0	0	professional judgment; assumed close to instantaneous
Reduction rate	1/day	0	0	0	professional judgment
Particle on Leaf Compartment Type					
Initial concentration	g/kg	unset	unset	unset	n/a
Transfer factor to leaf	1/day	0.2	0.2	0.2	professional judgment
Demethylation rate	1/day	n/a	n/a	0	professional judgment
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	0	0	0	professional judgment
Reduction rate	1/day	0	0	0	professional judgment
Root Compartment Type - Nonwoody Plants Only[b]					
Initial concentration	g/kg	unset	unset	unset	n/a
Alpha for root-root zone bulk soil	unitless	0.95	0.95	0.95	selected value

Terrestrial Plant Compartment Types[a]

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Root/root-zone-soil-water partition coefficient	m^3[bulk root soil]/m^3[root]	0	0.18	1.2	Hg2- geometric mean Leonard et al. 1998, John 1972, Hogg et al. 1978; MHg- assumed, based on Hogg et al. 1978
t-alpha for root-root zone bulk soil	day	21	21	21	professional judgment
Demethylation rate	1/day	n/a	n/a	0	professional judgment
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	0	0	0	professional judgment
Reduction rate	1/day	0	0	0	professional judgment
Stem Compartment Type - Nonwoody Plants Only[b]					
Initial concentration	g/kg	unset	unset	unset	n/a
Transpiration stream concentration factor (TSCF)	m^3[soil pore water]/m^3[xylem fluid]	0	0.5	0.2	calculation from Norway spruce, Scots pine, Bishop et al. 1998
Demethylation rate	1/day	n/a	n/a	0.03	calculated from Bache et al. 1973
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	0	0	0	professional judgment
Reduction rate	1/day	0	0	0	professional judgment

[a]TRIM.FaTE currently includes four kinds of terrestrial plants: deciduous forest, coniferous forest, grasses/herbs, and agricultural.
[b]Roots and stems are not modeled for deciduous or coniferous forest in the current version of TRIM.FaTE.

Terrestrial Plant Compartment Types[a]

Parameter Name	Units	Value	Reference
		BaP	
Leaf Compartment Type			
Initial concentration	g/kg	unset	n/a
Transfer factor to leaf particle	1/day	1.00E-04	professional judgment
Half-life	day	3.5	approximated based on data from Edwards 1988 and unpublished research (McKone 1997)
Particle on Leaf Compartment Type			
Initial concentration	g/kg	unset	n/a
Transfer factor to leaf	1/day	1.00E-04	professional judgment
Half-life	day	2.31	calculated by multiplying by 2 the measured photolysis half-life for PAHs on soot particles and assuming 10 hours of sunlight per day; photolysis data are from Mackay et al. 1992
Root Compartment Type[b]			
Initial concentration	g/kg	unset	n/a
Alpha for root-soil water interaction	unitless	0.95	selected value
Half-life	day	34.6	approximated based on data from Edwards 1988 for bush beans in nutrient solution
Stem Compartment Type[b]			
Initial concentration	g/kg	unset	n/a
Half-life	day	3.5	approximated based on data from Edwards 1988 for bush beans in nutrient solution

[a]TRIM.FaTE currently includes four kinds of terrestrial plants: deciduous forest, coniferous forest, grasses/herbs, and agricultural.
[b]Roots and stems are not modeled for deciduous or coniferous forest in the current version of TRIM.FaTE.

Aquatic Plant Compartment Type

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Macrophyte Compartment Type					
Initial concentration	g/kg	unset	unset	unset	n/a
Alpha for macrophyte	unitless	0.95	0.95	0.95	selected value
Macrophyte/water partition coefficient	L[water]/kg[macrophyte wet wt]	0.883	0.883	4.4	*Elodea densa,* Ribeyre and Boudou 1994
Oxidation rate	1/day	1.00E+09	0	0	professional judgment
t-alpha	day	18	18	18	experiment duration from Ribeyre and Boudou 1994

Aquatic Plant Compartment Type

Parameter Name	Units	Value	Reference
		BaP	
Macrophyte Compartment Type			
Initial concentration	g/kg	unset	n/a
Half-life	day	3.5	Edwards 1988 (as cited in Efroymson 1997); calculated from metabolic rate constant

Terrestrial Animal Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Soil Detritivore - Earthworm					
Initial concentration	g/kg	unset	unset	unset	n/a
Alpha for worm-bulk soil	unitless	0.95	0.95	0.95	selected value
Earthworm/dry-soil partition coefficient	kg[soil dry wt]/kg[worm dry wt]	0.36	0.36	0.36	Bull et al. 1977
t-alpha for worm-bulk soil	day	21	21	21	assumed same as metals in earthworms, Janssen et al. 1997
Soil Detritivore - Soil Arthropod					
Initial concentration	g/kg	unset	unset	unset	n/a
Alpha for arthropod-soil	unitless	0.95	0.95	0.95	selected value
Arthropod/bulk-soil partition coefficient	kg[soil wet wt]/kg[arthropod wet wt])	0	0.46	2.9	Hg(2) - median from Talmage and Walton 1993; MHg - median from Nuorteva and Nuorteva 1982
t-alpha for arthropod-soil	day	21	21	21	assumed same as metals in earthworms, Janssen et al. 1997
All Other Terrestrial Animal Compartment Types[a]					
Initial concentration	g/kg	unset	unset	unset	n/a
Assimilation efficiency for inhalation	unitless	0.75	0.4	0.75	Hg(0) - based on human values, ATSDR 1997, Teisinger and Fiserova-Bergerova 1965; Hg(2) - based on dog value, EPA 1997; MHg - assumed same as Hg(0)
Assimilation efficiency from arthropods	unitless	1	1	1	set to 1[b]
Assimilation efficiency from food	unitless	1	1	1	set to 1[b]
Assimilation efficiency from terrestrial plants	unitless	1	1	1	set to 1[b]
Assimilation efficiency from soils	unitless	1	1	1	set to 1[b]

Terrestrial Animal Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Assimilation efficiency from water	unitless	1	1	1	set to 1[b]
Assimilation efficiency from worms	unitless	1	1	1	set to 1[b]
Total elimination rate	1/day	0.05	0.48	0.26[c]/0.086[d]	see Attachment 2 for documentation
Demethylation rate	1/day	n/a	n/a	0.09	for rats, Takeda and Ukita 1970
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	1	0	0	professional judgment
Reduction rate	1/day	0	0	0	professional judgment

[a]TRIM.FaTE Reference Library includes Terrestrial Carnivore - Long-tailed Weasel, Terrestrial Carnivore - Red-tailed Hawk, Terrestrial Ground - Invertebrate Feeder - Short-tailed Shrew, Terrestrial Ground-Invertebrate Feeder - Trowbridge Shrew, Terrestrial Herbivore - Long-tailed Vole, Terrestrial Herbivore - Meadow Vole, Terrestrial Herbivore - Mule Deer/Black-tailed Deer, Terrestrial Herbivore - White-tailed Deer, Terrestrial Insectivore - Black-capped Chickadee, and Terrestrial Omnivore - Mouse.

[b]All ingestion assimilation efficiencies set to 1 to be consistent with excretion rate calculations. Excretion rates are all based on ingested (not absorbed) dose, hence assimilation efficiency must equal 1.

[c]Value for all mammals.

[d]Value for all birds.

Terrestrial Animal Compartment Types

Parameter Name	Units	Value BaP	Reference
Soil Detritivore - Earthworm			
Initial concentration	g/kg	unset	n/a
Alpha for earthworm-soil pore water	unitless	0.95	selected value
t-alpha for earthworm-soil pore water	day	28	professional judgment
Half-life	day	61	Ma et al. 1995; estimated from fluoranthene bioaccumulation curve
Soil Detritivore - Soil Arthropod			
Initial concentration	g/kg	unset	n/a
Alpha for arthropod-soil	unitless	0.95	selected value
Arthropod-bulk soil partition coefficient	(kg[soil wet wt]/kg[arthropod wet wt])	1.26E-02	geometric mean of data for three isopod species BAFs in litter, fragmentation and humus soils in van Brummelen and van Straalen 1996
t-alpha for arthropod-soil	day	28	no data found; used phenanthrene accumulation data for earthworms in Ma et al. 1995
Half-life	day	0.6	van Brummelen and van Straalen 1996; model estimate from data in *Porcellio scaber*
All Other Terrestrial Animal Compartment Types[a]			
Initial concentration	g/kg	unset	n/a
Assimilation efficiency for inhalation	unitless	1	professional judgment, assuming inhalation rate in model is total rate, not alveolar rate
Assimilation efficiency from arthropods	unitless	1	set to 1[b]
Assimilation efficiency from food	unitless	1	set to 1[b]
Assimilation efficiency from terrestrial plants	unitless	1	set to 1[b]

Terrestrial Animal Compartment Types

Parameter Name	Units	Value	Reference
		BaP	
Assimilation efficiency from soils	unitless	1	set to 1[b]
Assimilation efficiency from water	unitless	1	set to 1[b]
Assimilation efficiency from worms	unitless	1	set to 1[b]

[a]TRIM.FaTE Reference Library includes Terrestrial Carnivore - Long-tailed Weasel, Terrestrial Carnivore - Red-tailed Hawk, Terrestrial Ground - Invertebrate Feeder - Short-tailed Shrew, Terrestrial Ground-Invertebrate Feeder - Trowbridge Shrew, Terrestrial Herbivore - Long-tailed Vole, Terrestrial Herbivore - Meadow Vole, Terrestrial Herbivore - Mule Deer/Black-tailed Deer, Terrestrial Herbivore - White-tailed Deer, Terrestrial Insectivore - Black-capped Chickadee, and Terrestrial Omnivore - Mouse.
[b]All ingestion assimilation efficiencies set to 1 to be consistent with excretion rate calculations. Excretion rates are all based on ingested (not absorbed) dose, hence assimilation efficiency must equal 1.

Semi-aquatic Animal Compartment Types[a]

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Initial concentration	g/kg	unset	unset	unset	n/a
Assimilation efficiency for inhalation	unitless	0.75	0.4	0.75	Hg(0) - based on human values, ATSDR 1997, Teisinger and Fiserova-Bergerova 1965; Hg(2) based on dog value, EPA 1997; MHg - assumed same as Hg(0)
Assimilation efficiency from arthropods	unitless	1	1	1	set to 1[b]
Assimilation efficiency from food	unitless	1	1	1	set to 1[b]
Assimilation efficiency from terrestrial plants	unitless	1	1	1	set to 1[b]
Assimilation efficiency from soils	unitless	1	1	1	set to 1[b]
Assimilation efficiency from water	unitless	1	1	1	set to 1[b]
Assimilation efficiency from worms	unitless	1	1	1	set to 1[b]
Total elimination rate	1/day	0.05	0.48	0.26[c]/0.086[d]	see Attachment 2 for documentation
Demethylation rate	1/day	N/A	N/A	0.09	for rats, Takeda and Ukita 1970
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	1	0	0	professional judgment
Reduction rate	1/day	0	0	0	professional judgment

[a]TRIM.FaTE Reference Library includes Semi-aquatic Carnivore - Bald Eagle, Semi-aquatic Carnivore - Mink, Semi-aquatic Insectivore - Tree Swallow, Semi-aquatic Omnivore - Mallard, Semi-aquatic Omnivore - Raccoon, Semi-aquatic Piscivore - Common Loon, and Semiaquatic Piscivore - Kingfisher.
[b]All ingestion assimilation efficiencies set to 1 to be consistent with excretion rate calculations. Excretion rates are all based on ingested (not absorbed) dose, hence assimilation efficiency must equal 1.
[c]Value for all mammals.
[d]Value for all birds.

Semiaquatic Animal Compartment Types[a]

Parameter Name	Units	Value	Reference
		BaP	
Initial concentration	g/kg	unset	n/a
Assimilation efficiency for inhalation	unitless	1.0	professional judgment, assuming inhalation rate in model is total rate, not alveolar rate
Assimilation efficiency from arthropods	unitless	1.0	set to 1[b]
Assimilation efficiency from food	unitless	1.0	set to 1[b]
Assimilation efficiency from terrestrial plants	unitless	1.0	set to 1[b]
Assimilation efficiency from soils	unitless	1.0	set to 1[b]
Assimilation efficiency from water	unitless	1.0	set to 1[b]
Assimilation efficiency from worms	unitless	1.0	set to 1[b]

[a]TRIM.FaTE Reference Library includes Semi-aquatic Carnivore - Bald Eagle, Semi-aquatic Carnivore - Mink, Semi-aquatic Insectivore - Tree Swallow, Semi-aquatic Omnivore - Mallard, Semi-aquatic Omnivore - Raccoon, Semi-aquatic Piscivore - Common Loon, and Semiaquatic Piscivore - Kingfisher.

[b]All ingestion assimilation efficiencies set to 1 to be consistent with excretion rate calculations. Excretion rates are all based on ingested (not absorbed) dose, hence assimilation efficiency must equal 1.

Aquatic Animal Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Benthic Invertebrate Compartment Type					
Initial concentration	g/kg	unset	unset	unset	n/a
Alpha of equilibrium for sediment partitioning	unitless	0.95	0.95	0.95	selected value
Benthic invertebrate-bulk sediment partition coefficient	kg[bulk sediment]/kg[invertebrate wet wt]	0.0824	0.0824	5.04	Hg(0) - assumed based on Hg(2) value; Hg(2) and MHg - Saouter et al. 1991
t-alpha for equilibrium for sediment partitioning	day	14	14	14	experiment duration from Saouter et al. 1991
All Fish Compartment Types[a]					
Initial concentration	g/kg	unset	unset	unset	n/a
Demethylation rate	1/day	n/a	n/a	0	professional judgment
Methylation rate	1/day	0	0	0	professional judgment
Oxidation rate	1/day	1.0E+06	0	0	professional judgment
Reduction rate	1/day	0	0	0	professional judgment
Water-column Carnivore Compartment Type					
Assimilation efficiency from food	unitless	0.04	0.04	0.2	Phillips and Gregory 1979
Elimination adjustment factor	unitless	3	3	1	Trudel and Rasmussen 1997
Water-column Herbivore Compartment Type					
Assimilation efficiency from food	unitless	0.04	0.04	0.2	Phillips and Gregory 1979
Elimination adjustment factor	unitless	3	3	1	Trudel and Rasmussen 1997

Aquatic Animal Compartment Types

Parameter Name	Units	Value			Reference
		Hg(0)	Hg(2)	MHg	
Water-column Omnivore Compartment Type					
Assimilation efficiency from food	unitless	0.04	0.04	0.2	Phillips and Gregory 1979
Elimination adjustment factor	unitless	3	3	1	Trudel and Rasmussen 1997
Benthic Carnivore Compartment Type					
Assimilation efficiency from food	unitless	0.04	0.04	0.2	Phillips and Gregory 1979
Elimination adjustment factor	unitless	3	3	1	Trudel and Rasmussen 1997
Benthic Omnivore Compartment Type					
Assimilation efficiency from food	unitless	0.04	0.04	0.2	Phillips and Gregory 1979
Elimination adjustment factor	unitless	3	3	1	Trudel and Rasmussen 1997

[a]TRIM.FaTE Reference Library includes Benthic Carnivore, Benthic Omnivore, Water-column Carnivore, Water-column Herbivore, and Water-column Omnivore.

Aquatic Animal Compartment Types

Parameter Name	Units	Value	Reference
		BaP	
Benthic Invertebrate Compartment Type			
Initial concentration	g/kg	unset	n/a
Clearance constant	unitless	157.6	Stehly et al. 1990; estimated for mayfly, 120-day-old nymphs
Alpha of equilibrium for sediment partitioning	unitless	0.95	selected value
t-alpha for equilibrium for sediment partitioning	day	14	professional judgment
Proportionality constant	L[water]/kg[invert wet wt]	7,235	Stehly et al. 1990; estimated for mayfly, 120-day-old nymphs
Half-life	day	1.5	Stehly et al. 1990; calculated from estimated elimination/depuration rate constant estimated for mayfly, 120-day-old nymphs
All Fish Compartment Types[a]			
Initial concentration	g/kg	unset	n/a
Gamma_fish	unitless	0.2	Thomann 1989
Water-column Carnivore Compartment Type			
Assimilation efficiency from food	unitless	1.0	professional judgment
Assimilation efficiency from plants	unitless	1.0	professional judgment
Half-life	day	2.4	Lemaire et al. 1990 (as cited in Mackay et al. 1992); calculated for sea bass (whole body)
Water-column Herbivore Compartment Type			
Assimilation efficiency from food	unitless	1.0	professional judgment
Assimilation efficiency from plants	unitless	1.0	professional judgment
Half-life	day	2.8	Spacie et al. 1983 (as cited in Mackay et al. 1992)

Aquatic Animal Compartment Types

Parameter Name	Units	Value	Reference
		BaP	
Water-column Omnivore Compartment Type			
Assimilation efficiency from food	unitless	1.0	professional judgment
Half-life	day	2.4	Lemaire et al. 1990 (as cited in Mackay et al. 1992); calculated for sea bass (whole body)
Benthic Carnivore Compartment Type			
Assimilation efficiency from food	unitless	1.0	professional judgment
Half-life	day	2.4	Lemaire et al. 1990 (as cited in Mackay et al. 1992); calculated for sea bass (whole body)
Benthic Omnivore Compartment Type			
Assimilation efficiency from food	unitless	1.0	professional judgment
Half-life	day	2.4	Lemaire et al. 1990 (as cited in Mackay et al. 1992); calculated for sea bass (whole body)

[a]TRIM.FaTE Reference Library includes Benthic Carnivore, Benthic Omnivore, Water-column Carnivore, Water-column Herbivore, Water-column Omnivore.

Source, Meteorological, and Other Input Data and Settings – Documentation for TRIM.FaTE Reference Library

Parameter Name	Units	Value Used	Reference
Source Inputs (all TRIM.FaTE source properties)			
Emission rate (chemical-specific)	g/day	unset	n/a
Source location	x and y spatial coordinates	unset	n/a
Source height	m	unset	n/a
Meteorological Inputs (all TRIM.FaTE scenario properties, except mixing height)			
Air temperature	degrees K	scenario properties not part of library	n/a
Horizontal wind speed	m/sec	scenario properties not part of library	n/a
Wind direction	degrees clockwise from N (blowing from)	scenario properties not part of library	n/a
Rainfall rate	m^3[rain]/m^2[surface area]-day	scenario properties not part of library	n/a
Cumulative Rain	m	scenario properties not part of library	n/a
Mixing height (used to set air VE property named “top”)	m	scenario properties not part of library	n/a
Day/night	1=day, 0=night	scenario properties not part of library	n/a
Other Settings (all TRIM.FaTE scenario properties)			
Start of simulation	date/time	scenario properties not part of library	n/a
End of simulation	date/time	scenario properties not part of library	n/a
Simulation time step	hr	scenario properties not part of library	n/a
Output time step[a]	hr	scenario properties not part of library	n/a

[a]Output time step is set in TRIM.FaTE using the scenario properties "simulationStepsPerOutputStep" and "simulationTimeStep."

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Attachment 1
Documentation of Food Ingestion Rate Values for Terrestrial and Semi-aquatic Animals

(1) Black-capped chickadee

Food ingestion rate: **0.74 kg[food wet wt]/kg[body weight (BW) wet]-day**

Smith (1993) reports that while no data on nutrition and food ingestion by black-capped chickadees are available, parids of comparable size require 10 kcal/day (41.8 kJ/day). Assuming that the chickadee diet consists 100 percent of insects, the chickadee wet body weight (BW) is 0.0108 kg (Dunning 1993), and energy and water content of insects are 22.1 kJ/g dry weight (5.28 kcal/g dry wt) and 76.3 percent, respectively (Bell 1990), daily food ingestion by chickadees would be 0.74 kg[food wet wt]/kg[BW wet]-day.

(2) Short-tailed shrew

Food ingestion rate: **0.47 kg[food wet wt]/kg[BW wet]-day**

The mean daily ingestion rate of shrews in Barrett and Stueck (1976) was 0.49 kg[food wet wt]/kg[BW wet]-day. The value of 0.47 that was included in the mercury test simulations is close to the value from Barrett and Stueck (1976). Caged shrews were fed mealworms, which have essentially the same water content as the natural prey of shrews.

(3) Meadow vole, Long-tailed vole

Food ingestion rate: **0.097 kg[food wet wt]/kg[BW wet]-day**

Food intake by meadow voles when exposed to 14-h days was 0.095 ± 0.002 (mean ± SE) kg[food wet wt]/kg[BW wet]-day; intake by individuals exposed to 10-h days was 0.085 ± 0.005 kg/kg-day (wet wt) (Dark et al. 1983). Mean food consumption by prairie voles (assumed to weigh 35 g; Burt and Grossenheider 1976) was 0.088 kg/kg-day (wet wt) and 0.12 kg/kg-day (wet wt) when ambient temperatures were 21 degrees and 28 degrees Celsius, respectively (Dice 1922).

(4) White-tailed deer

Food ingestion rate: **0.05 kg[food wet wt]/kg[BW wet]-day**

Mautz et al. (1976) reported a 1.74 kg/day diet for a 35 kg deer, which represents maintenance of the deer through the winter. There is no value adjustment for summer, because the energy required by females to thermoregulate and gestate in the winter might be roughly equivalent to the energy for late gestation and lactation.

(5) Tree swallow

Food ingestion rate: **0.198 kg[food wet wt]/kg[BW wet]-day**

Female tree swallows in New Brunswick, Canada in the summer were observed to require 5.73 ± 1.40 kJ/g-day (mean ± SD; n=10; Williams 1988). Using body weights reported in Williams (1988, 22.6 g), assuming that the diet consists exclusively of insects (Quinney and Ankney 1985), and that the energy and water content of insects are 22.09 kJ/g dry weight (5.28 kcal/g dry wt) and 76.3 percent, respectively (Bell 1990), daily food consumption by tree swallows is estimated to be 0.198 ± 0.048 kg[food wet wt]/kg[BW wet]-day. [Note: the calculation for food ingestion rate is incorrect; it should have been 0.34 kg/kg-day (wet wt).]

(6) White-footed mouse

Food ingestion rate: **0.20 kg[food wet wt]/kg[BW wet]-day**

Green and Millar (1987) observed an ingestion rate of 3.4 g/day, for laboratory mice fed Purina rat chow of an average weight of 21 g eating standard food, or a food ingestion rate of 0.16 kg[food dry wt]/kg[BW wet]-day. Body weight and gut dimensions of male and female mice did not differ, so data from both sexes were pooled (reported as g food consumed/individual-day). Food ingestion rate was normalized to body weight using body weights reported in study. The water content of Purina rat chow is approximately 0.10 (or 10 percent). The water content (WC) of the natural diet of white-footed mice is higher. Their diet includes seeds (WC of 0.09), vegetation (WC of 0.10 for mature dry grass, 0.7 to 0.88 for growing grasses), and soil arthropods (WC of 0.60 to 0.70) (US EPA 1993). We assumed that the diet consists primarily of seeds and dry grasses (80 percent), but includes also soil arthropods (20 percent), for an overall moisture content of approximately 0.20. The wet food ingestion rate = the dry food ingestion rate divided by (1-WC), or in this case, the wet food ingestion rate = 0.20 kg[food wet wt]/kg[BW]-day (i.e., 0.16 kg[food dry wt]/kg[BW]-day/(1-0.20)).

(7) Long-tailed weasel

Food ingestion rate: **0.0735 kg[food wet wt]/kg[BW wet]-day**

Brown and Lasiewski (1972) reported the mean metabolism of male and female long-tailed weasels to be 1.36 ± 0.2 and 0.84 ± 0.12 (SE) kcal/hr, respectively. Assuming that male and female weasels weigh 0.297 kg and 0.153 kg (Brown and Lasiewski 1972), respectively, that the diet consists exclusively of small mammals with an energy content of 5163 kcal/kg (or 5.163 kcal/g) dry weight (Golley 1961), and that the water content of small mammals is 68 percent (US EPA 1993), male and female weasels consume 0.067 and 0.080 kg[food wet wt]/kg[BW wet]-day, respectively.

(8) Red-tailed hawk

Food ingestion rate: **0.12 kg[food wet wt]/kg[BW wet]-day**

Preston and Beane (1993) cite a study (Craighead and Craighead 1956) in which males ate an average of 147 g/day (13 percent of body weight) and females an average of 136 g/day (11 percent of body weight) during fall-winter. Males ingested 82 g/day (7 percent of body weight), and females only 85 g/day (7 percent), during spring-summer. To be conservative, the fall-winter food ingestion rate (average of 12 percent) was used.

(9) Mallard

Food ingestion rate: **0.1 kg[food wet wt]/kg[BW wet]-day**

Heinz et al. (1987) report that mallards maintained in the laboratory consumed 0.1 kg[food dry wt]/kg[BW wet]-day. The water content of this diet (mostly seeds) ranged from 7-10 percent. Because the plant material consumed by mallards consists largely of seeds, and the mean water content of seeds is 9.3 percent (US EPA 1993), the food ingestion rate used by Heinz may be used to represent the wet weight food ingestion rate without adjusting for water content.

(10) Mink

Food ingestion rate: **0.14 kg[food wet wt]/kg[BW wet]-day**

Bleavins and Aulerich (1981) reported a food ingestion rate of 0.14 kg[food wet wt]/kg[BW wet]-day for male and female mink in captivity. The diet consisted of chicken (20 percent), commercial mink cereal (17 percent), fish scraps (13 percent), beef parts, cooked eggs, powdered milk, and added water. The water content of that diet as fed to the mink was 66.2 percent, which is roughly equivalent to the water content of a natural mink diet.

(11) Raccoon

Food ingestion rate: **0.11 kg[food wet wt]/kg[BW wet]-day**

Using a body weight of 6.35 kg for an adult raccoon from EPA (1993) and the allometric equation for omnivorous mammals from Nagy et al. (1999), it is estimated that a raccoon would need 548 kcal daily or 86 kcal/kg-day. Assuming 0.95 kcal/g as an average gross energy content of the diet (wet wt), and an assimilation efficiency of 0.85, a raccoon would need 678 g of the diet daily, or 0.11 kg[food wet wt]/kg[BW wet]-day.

(12) Common loon

Food ingestion rate: **0.23 kg[food wet wt]/kg[BW wet]-day**

Assuming a diet of 100 percent fish, a gross energy content of 1.2 kcal/g[fish wet wt], and an energy assimilation efficiency of 79 percent for seabirds eating fish and using Nagy et al.'s (1999) allometric equation for seabirds consuming fish, we calculated a food ingestion rate for loons of 0.23 kg[food wet wt]/kg[BW wet]-day.

(13) Bald eagle

Food ingestion rate: **0.12 kg[food wet wt]/kg[BW wet]-day**

The value of 0.12 kg[food wet wt]/kg[BW wet] is for adults with an assumed body weight of 4.5 kg eating 100 percent fish. It is based on a field study conducted in the winter by Stalmaster and Gessaman (1984) where the eagles were provisioned with fish of known weights.

(14) Trowbridge shrew

Food ingestion rate: **1.17 kg[food wet wt]/kg[BW wet]-day**

The value is the mean of the values reported by Rust (1978) for captive shrews during their breeding (i.e., 0.91 ± 0.03 (mean ± SE) kg/kg-day) and non-breeding (i.e., 1.43 ± 0.10 (mean ± SE) kg/kg-day) seasons. The animals were fed a diet of beef brains and Purina cat chow.

(15) Mule deer/black-tailed deer

Food ingestion rate: **0.11 kg[food wet wt]/kg[BW wet]-day**

A food ingestion rate of 0.0219 ± 0.0011 (mean ± SE) kg[food dry wt]/kg[BW wet]-day was estimated by Alldredge et al. (1974) for 87 mule deer based on known Cs-137 concentrations in deer and forage. Given that the value represents ingestion of air-dried food, the ingestion rate should be adjusted for water content for use in TRIM.FaTE, in which food ingestion rate units are on a wet-weight basis. The moisture content of grasses and leaves of dichotomous plants (e.g., shrubs, deciduous trees) is highly variable, depending on the level of hydration of the plant. Young fresh grasses and leaves of hydrated dichotomous plants are approximately 80 percent water (professional judgment based on moisture content of fresh grasses of 70 percent, Davis and Golley 1963; fresh grasses 88 percent, Drozdz 1968; and dicot

leaves 85 percent (± 3.5 percent SD, N = 3), Golley 1961). Thus, the food ingestion rate of 0.0219 kg[food *dry* wt]/kg[BW wet]-day is roughly equivalent to 0.11 kg[food *wet* wt]/kg[BW wet]-day for deer consuming fresh young grasses and leaves of deciduous trees.

(16) Kingfisher

Food ingestion rate: **0.35 kg[food wet wt]/kg[BW wet]-day**

Alexander (1977) estimated a food ingestion rate for belted kingfishers of 0.50 kg/kg-day in north central lower Michigan, but did not specify how he determined that value. Estimating the food ingestion rate based on Nagy's (1987) allometric equation for non-passerine birds (USEPA's 1993 *Wildlife Exposure Factors Handbook*, Equation 3-5) results in an intake estimate of 0.0867 kg[food dry wt]/kg[BW wet]-day. Assuming that their food (fish) is 75 percent water, the estimated wet food ingestion rate would be 0.35 kg[food wet wt]/kg[BW wet]-day. Without further information on how Alexander (1977) estimated the 0.50 kg/kg-day value, we have selected the 0.35 kg/kg-day value for the food ingestion rate value for the belted kingfisher compartment in the TRIM.FaTE library.

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Attachment 2
Documentation of Total Elimination Rate Values for Mercury for Terrestrial and Semi-aquatic Animals

First-order rate constants used to derive the mercury elimination rate constants for wildlife in the current TRIM.FaTE library are summarized in Table 1. Supporting information is presented in the subsections that follow.

Table 1
Mean First-order Rate Constants (day^{-1}) for Elimination of Mercury from Birds and Mammals

	Chemical Species	Urine and Feces (E_{uf})	Lactation (E_{lact})	Eggs (E_{egg})	Fur, Feathers, or Hair (E_{ff})
mammals	Hg(2)	0.48[a]	0.00001	NA	0.00001
	Hg(0)	0.0502[b]	0[b]	NA	0[b]
	organic Hg	0.26[a]	0.00001[c]	NA	0.00014[d]
birds	Hg(2)	0.48[e]	NA	0[f]	0.00011[g]
	Hg(0)	0.0502[b]	NA	0[b]	0[b]
	organic Hg	0.0282[a]	NA	0.0244	0.0559

[a] Averages of elimination rate constants for oral and dietary doses.
[b] Rate constant based on inhalation study for mammals; same value assumed for birds.
[c] Assume same as lactation rate constant for Hg(2).
[d] Averages of elimination rate constants for oral dose and injection.
[e] Assume same as elimination rate constant to mammalian urine and feces.
[f] No information available.
[g] Assume same as elimination rate constant to mammal fur.

For each mercury species, the total elimination rate constant for birds or mammals is equal to the sum of the excretion rate constants in Table 1 for urine and feces; lactation (mammals), and fur, hair (mammals), or feathers (birds). In the current TRIM.FaTE library, chemical excretion to eggs is assumed to remain within the bird population compartment, hence it is not included in the total bird elimination rate constant for organic mercury.

Elemental Mercury

Elemental mercury vapor is rapidly absorbed in the lungs (75 to 85 percent in humans), and to a much lesser extent (three percent), it can be absorbed dermally (ATSDR 1997, U.S. EPA 1997). Five human subjects inhaled from 107 to 202 μg[Hg]/m^3[air] and retained an average of 74 percent of the dose (Teisinger and Fiserova-Bergerova 1965). The inhaled vapor readily distributes throughout the body and can cross the blood-brain and placental barriers.

Rats exposed for 5 hours to 1.4 mg/m^3 radio-labeled mercury vapor retained an average body burden of 0.256 mg/kg BW (37 μg[Hg]/rat) and had excreted (urine and feces) 8.5 percent of the initial body burden in 1 day, 24.8 percent in 5 days, and 42.9 percent in 15 days (Hayes and Rothstein 1962). Cherian et al. (1978) exposed 5 human volunteers to approximately 1 μCi

of radio-labeled Hg vapor for approximately 19 minutes. Mean cumulative excretion over the first 7 days after exposure was 2.4 percent of the retained dose in urine and 9.2 percent in feces for a total excretion of 11.6 percent of the retained dose (Cherian et al. 1978).

Rates of excretion of elemental mercury by mammals (rats and humans) are summarized in Table 2 (mean value presented in Table 1). No information on excretion by avian species is available.

Table 2
Excretion of Inhaled Elemental Mercury (Hg^o) in Mammals

Test Species	Dose	Elimination Route	Percent of Dose	Days	Rate Constant (Day^{-1})	Source
Rat	0.256 mg/kg	urine + feces	8.5	1	0.08883	Hayes & Rothstein 1962
Rat	0.256 mg/kg	urine + feces	24.8	5	0.05700	Hayes & Rothstein 1962
Rat	0.256 mg/kg	urine + feces	42.9	15	0.03736	Hayes & Rothstein 1962
Human	1 µCi	urine + feces	11.6	7	0.01761	Cherian et al. 1978
			$\bar{x}$ ± SE		**0.05020 ± 0.01518**	

Divalent Mercury

Divalent mercury can be absorbed through oral, dermal, and inhalation routes; however, absorption is lower than for elemental mercury by all routes. In mice, only 20 percent of the administered dose is absorbed from the GI tract, 2-3 percent of the dose was absorbed dermally in exposed guinea pigs, and limited information on inhalation exposure indicates that 40 percent of the dose was absorbed in the lungs of dogs (U.S. EPA 1997). Additionally, the absorption of mercuric salts varies with the solubility of the specific salt. For example, the less soluble sulfide salt is more poorly absorbed as mercuric sulfide than the more soluble chloride salt as mercuric chloride (U.S. EPA 1997). Divalent mercury distributes widely throughout the body; however, it cannot cross the blood-brain or placental barriers.

The metabolism and distribution of mercuric chloride ($HgCl_2$) has been described in dairy cows and rats. Potter et al. (1972) orally administered 344 µCi of radio-labeled mercuric chloride by gelatin capsule using balling gum to 2 Holstein cows. After 6 days, 94.87 percent of the dose was excreted in feces, 0.044 percent in urine, and 0.0097 percent in milk, for a total excretion of 94.92 percent of the dose. The biological half-life was calculated as 28.5 hours. Rats dosed by intravenous injection with 1 mg[Hg]/kg[body weight] mercuric chloride excreted 15.2 percent of the dose in feces and 16.3 percent in urine over 4 days for a total excretion (fecal and urinary) of 31.5 percent of the administered dose in 4 days (Gregus and Klaassen 1986).

The metabolism and distribution of mercuric nitrate [$Hg(NO_3)_2$] have also been described for dairy cows and rats. Four Holstein dairy cows were given an oral dose of 1.7 mCi radio-labeled $Hg(NO_3)_2$ in a gelatin capsule via balling gum. Urine, feces, and milk were collected for 10 days and analyzed. Results indicated that 74.91 percent of the administered dose was excreted in feces, 0.08 percent in urine, and 0.01 percent in milk with a total excretion of

75 percent of the dose in 10 days (Mullen et al. 1975). Mullen et al. (1975) also reported a biological half-life for the transfer of orally ingested mercury to milk of 5 days. Transfer of mercury to feces was slightly more complicated with an initial half-life of 15 hr (probably reflecting the unabsorbed dose), then a decrease in elimination time which resulted in a 3 day half-life (probably representing excretion of the absorbed dose) (Mullen et al. 1975). Rothstein and Hayes (1960) dosed 7 Wistar rats with 50 μg (0.2 mg[Hg]/kg[body wt]) radio-labeled mercury as $Hg(NO_3)_2$ via intravenous injection. After 52 days the cumulative percent excretion was 25 percent of the administered dose in urine and 37 percent in feces for a total excretion of 62 percent of the injected dose over 52 days (Rothstein and Hayes 1960). In another study, 6 Holtzman rats were dosed by subcutaneous injection with 20 μCi of radio-labeled $Hg(NO_3)_2$, and 0.018 percent of the dose was recovered in the hair 20 days after administration (Mansour et al. 1973). For pregnant female rats, a clearance half-time of 16.2 days was also reported (18 measurements over a 3-week period).

Fitzhugh et al. (1950) exposed rats (20/dose group) to mercuric acetate in the diet at concentrations of 0.5, 2.5, 10, 40, and 160 ppm Hg. The average intake of Hg in a 24-hour period was 7.5, 37.5, 150, 600, and 2,400 μg per rat, and the 24-hour excretion was 52, 40, 43, 47, and 43 percent of those doses, respectively, in feces and 4.8, 1.0, 0.5, 0.37, and 1.7 percent, respectively, in urine (Fitzhugh et al. 1950).

Divalent mercury is poorly absorbed from the GI tract (20 percent, see above), therefore, elimination rates obtained from oral or dietary exposure may be misleading. Hayes and Rothstein (1962) reported an initial half-life for fecal elimination of inorganic mercury of 0.6 days in Holstein cows. Later, the half-life increased to 3 days, as in the study by Mullen et al. (1975) . This indicates that a large proportion of the dose is initially excreted via the feces due to lack of absorption. In the current TRIM.FaTE library, the elimination rate constant for terrestrial wildlife represents the elimination of both absorbed and unabsorbed mercury in feces (and urine). As long as the concentration of mercury in the tissues of the wildlife (birds and mammals) is not needed for the risk assessment, these elimination rates can be used for purposes of estimating the transfer of ingested mercury from wildlife to surface soil and water by setting the assimilation efficiency property in the wildlife compartment to 1.0. However, if the concentration of Hg in the animals tissues is needed for the risk assessment (e.g., to track risks to humans that consume meat from deer or cows in the modeling region), it would be necessary to determine a true assimilation efficiency to estimate the proportion of the ingested mercury that is absorbed by the animal. Then, separate rate constants and algorithms would be needed to track separately the elimination of the absorbed mercury and unabsorbed mercury.

Rates of excretion of divalent mercury by mammals (rats and cows) are summarized in Table 3 (mean values for excretion to urine and feces, lactation, and excretion to hair presented in Table 1). No information on excretion by avian species is available.

Table 3
Excretion of Divalent Mercury in Mammals

Test Species[a]	Form	Dose	Dose[b] Route	Elimination Route	Percent of Dose	Days	Rate (Day^{-1})	Dose Vehi-cle	Source
Cow-Holstein	$HgCl_2$	344 µCi	oral	urine + feces	94.91	6	0.49632	gel cap	Potter et al. 1972
Cow-Holstein	$Hg(NO_3)_2$	1.7 mCi	oral	urine + feces	74.99	10	0.13859	gel cap	Mullen et al. 1975
					$\bar{x}$ ± SE		**0.31745 ± 0.17886**		
Rat-SD	$HgCl_2$	1 mg/kg	iv	urine + feces	31.5	4	0.09458	saline sol	Gregus & Klaassen 1986
Rat-Wistar	$Hg(NO_3)_2$	50 µg	iv	urine + feces	62	52	0.01861	sodium chloride	Rothstein & Hayes 1960
					$\bar{x}$ ± SE		**0.05660 ± 0.03798**		
Rat	mercuric acetate	7.5 µg	diet	urine + feces	56.8	1	0.83933	food	Fitzhugh et al. 1950
Rat	mercuric acetate	37.5 µg	diet	urine + feces	41.0	1	0.52763	food	Fitzhugh et al. 1950
Rat	mercuric acetate	150 µg	diet	urine + feces	43.5	1	0.57093	food	Fitzhugh et al. 1950
Rat	mercuric acetate	600 µg	diet	urine + feces	47.37	1	0.64188	food	Fitzhugh et al. 1950
Rat	mercuric acetate	2400 µg	diet	urine + feces	44.7	1	0.59240	food	Fitzhugh et al. 1950
					$\bar{x}$ ± SE		**0.63443 ± 0.05443**		
Cow-Holstein	$HgCl_2$	344 µCi	oral	milk	0.0097	6	0.00002	gel cap	Potter et al. 1972
Cow-Holstein	$Hg(NO_3)_2$	1.7 mCi	oral	milk	0.01	10	0.00001	gel cap	Mullen et al. 1975
					$\bar{x}$ ± SE		**0.00001 ± 0.000003**		
Rat-Holtz-man	$Hg(NO_3)_2$	20 µg	sc inj	hair	0.018	20	0.00001	injec-tion	Mansour et al. 1973

[a] Rat-SD = Sprague Dawley rat
[b] iv = Intravenous injection and sc inj = subcutaneous injection.

Organic Mercury

Organic mercury is by far the most studied species of mercury. It is rapidly and extensively absorbed through the GI tract (95 percent of the dose in humans) and is distributed throughout the body via carrier-mediated transport (U.S. EPA 1997). Like elemental mercury, organic mercury can cross the blood-brain and placental barriers.

Radio-labeled methylmercuric chloride was intravenously injected into 6 pregnant Holtzman rats at a dose of 10 μCi; after 20 days, 0.21 percent of the administered dose was transferred to hair. The whole-body clearance half-life was reported to be 8.4 days (Mansour et al. 1973). Gregus and Klaassen (1986) also administered radio-labeled methylmercuric chloride via intravenous injection to Sprague-Dawley rats at a dose of 1 mg[Hg]/kg[body wt]. Within 4 days, 5.6 percent of the injected dose was excreted in feces and 0.5 percent in urine for a total excretion of 6.1 percent of the administered dose. Additionally, 2-hr biliary excretion was 0.7, 0.9, 0.7, and 0.5 percent of doses at 0.1, 0.3, 1.0, and 3.0 mg[Hg]/kg[body wt], respectively (Gregus and Klaassen 1986). Syrian Golden hamsters (N = 9) were given an oral dose of 0.32 mg[Hg]/kg[body wt] as radio-labeled methylmercury chloride, and the elimination rate was found to follow a first-order rate equation with a half-life of 6.9 days (Nordenhäll et al. 1995). Nordenhäll et al. (1995) estimated that approximately 5 percent of the oral dose administered to the dams was transferred to pups via milk over 21 days. Four days after oral administration of methylmercury chloride, 20 percent of the mercury in milk was inorganic (Nordenhäll et al. 1995). Sell and Davison (1975) dosed via intraruminal injection, 1 Nubian goat and 1 Guernsey cow with 100 and 500 μCi radio-labeled methylmercury chloride, respectively. After 13 days, 0.28, 31.18, and 1.45 percent of the dose administered to the goat were excreted in milk, feces, and urine, respectively. Conversely, *none of the dose* was excreted in cow milk, 25.32 percent was excreted in cow feces, and 1.28 percent was excreted in cow urine after 7 days.

Takeda and Ukita (1970) exposed Donryu rats to 20 μg[Hg]/kg[body wt] as radio-labeled ethyl-mercuric chloride dissolved in olive oil by subcutaneous injection. Cumulative excretion during 8 days post-exposure was 10.52 percent of dose in urine and 6.01 percent of dose in feces. In urine, 41.9 percent and 58.1 percent of the total mercury was organic and inorganic, respectively, on day 8. In contrast, 65 percent of fecal mercury was organic and 35 percent was inorganic on day 8 (Takeda and Ukita 1970). Fang and Fallin (1973) orally dosed 14 rats with 3 μmol radio-labeled ethyl-mercuric chloride in corn oil. Mercury content was measured in 1-2 rats on days 0.25, 1, 2, 3, 4, 5, 7, 10, and 14 after dosing. Fourteen days after dosing, 32.5 nmole/g hair had accumulated in the fur. Wistar rats have an estimated 3 g of fur (Talmage 1999), therefore, approximately 3.25 percent of the original dose was excreted in fur.

Fitzhugh et al. (1950) exposed rats (20/dose group) to phenyl mercuric acetate in the diet at doses of 0.5, 2.5, 10, 40, and 160 ppm [Hg]. The average intake of Hg in a 24-hour period was 7.5, 37.5, 150, 600, and 2,400 μg and the 24-hour excretion was 44, 35, 27, 35, and 30 percent of those doses, respectively, in feces and 9.2, 4.5, 6.2, 4.3, and 2.4 percent, respectively, in urine (Fitzhugh et al. 1950).

Humans also have been used as subjects for studying the metabolism of methylmercury. Three subjects were given an oral dose of 2.6 μCi radio-labeled methylmercuric nitrate (Aberg et al. 1969). Mean cumulative mercury excretion values 10 days post-exposure were 13.6 percent

(13.6, 13, and 14.2 percent) of the dose in feces and 0.24 percent (0.18, 0.26, and 0.27 percent) in urine. After 49 days, 34.1 percent (33.4 and 34.7 percent) of the initial dose was excreted via feces and 3.31 percent (3.29 and 3.33 percent) via urine (Aberg et al. 1969). Aberg et al. (1969) also reported the biological half-life of methylmercuric chloride to be 70.4, 74.2, and 73.7days ($\bar{x}$ = 72.8 days) for the three subjects and measured approximately 0.12 percent of the initial dose in hair approximately 45 days (range 40-50 days) after exposure.

Two papers contained data suitable for use in determining excretion rates for avian species. In the first study, Lewis and Furness (1991) orally dosed black-headed gulls with 200, 100, or 20 μL methylmercuric chloride using gelatin capsules. The cumulative excretion of mercury for the 200 μL group was 26.4 percent of the dose in urine/feces and 51.2 percent in feathers for a total of 77.5 percent eliminated from the body over 13 days. At the 100 μL dose, a total of 80.3 percent of the dose was eliminated (37.8 and 44.2 percent in urine/feces and feathers, respectively) in 13 days. Finally, only 56.3 percent of the low dose was measured in urine/feces and feathers, with 11 percent of the dose in urine/feces and 52.6 percent in feathers after 13 days (Lewis and Furness 1991).

In the second study, 4 white-leghorn chickens and 4 Japanese quail were administered 20 ppm Hg as methylmercuric chloride in the diet for 21 days (Sell 1977). During the first 7 days of this dosing period, chickens and quail were also given an oral dose of 2 μCi of radio-labeled methylmercuric chloride (Sell 1977). The rate calculations reported in Table A-18 assume that the author accounted for the total intake of radio-labeled mercury from both sources when reporting percent of dose excreted in feces and eggs. Chickens excreted 64 percent of the dose in urine/feces and 22 percent of the dose in eggs produced during the 21 days post-exposure, while quail excreted 41 and 54 percent of the dose in urine/feces and eggs, respective, during the same 21 day post-exposure period (Sell 1977).

Rates of excretion of organic mercury by mammals (humans, goats, cows, and rats) are summarized in Table 4, and rates of excretion by birds are summarized in Table 5 (mean values for excretion to urine and feces, fur, feathers, and eggs presented in Table 1). No information on excretion by avian species is available.

Table 4
Excretion of Organic Mercury in Mammals

Test Species[1]	Form	Dose	Dose[2] Route	Elimination Route	Percent of Dose	Days	Rate (Day^{-1})	Dose Vehicle	Source
Human	methylmercuric nitrate	2.6 µCi	oral	urine + feces	13.84	10	0.01490	aq sol	Aberg et al. 1969
Human	methylmercuric nitrate	2.6 µCi	oral	urine + feces	37.41	49	0.00956	aq sol	Aberg et al. 1969
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	urine + feces	0.67	1	0.00672	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	urine + feces	17.19	3	0.06287	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	urine + feces	22.62	5	0.05129	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	urine + feces	25.72	7	0.04248	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	urine + feces	31.63	13	0.02925	ethanol	Sell & Davison 1975
Cow-Guernsey	CH_3-HgCl	500 µCi	ir inj	urine + feces	4.80	1	0.04919	ethanol	Sell & Davison 1975
Cow-Guernsey	CH_3-HgCl	500 µCi	ir inj	urine + feces	18.86	3	0.06966	ethanol	Sell & Davison 1975
Cow-Guernsey	CH_3-HgCl	500 µCi	ir inj	urine + feces	23.05	5	0.05240	ethanol	Sell & Davison 1975
Cow-Guernsey	CH_3-HgCl	500 µCi	ir inj	urine + feces	26.60	7	0.04418	ethanol	Sell & Davison 1975
					$\bar{x}$ ± SE		**0.03932 ± 0.00644**		
Rat-SD	CH_3-HgCl	1 mg/kg	iv	urine + feces	6.1	4	0.01573	saline sol	Gregus & Klaassen 1986
Rat-Donryu	ethyl-$HgCl_2$	20 µg/kg	sc inj	urine + feces	16.53	8	0.02259	olive oil	Takeda & Ukita 1970
					$\bar{x}$ ± SE		**0.01916 ± 0.00343**		
Rat	phenyl mercuric acetate	7.5 µg	diet	urine + feces	53.2	1	0.75929	food	Fitzhugh et al. 1950
Rat	phenyl mercuric acetate	37.5 µg	diet	urine + feces	39.5	1	0.50253	food	Fitzhugh et al. 1950
Rat	phenyl mercuric acetate	150 µg	diet	urine + feces	33.2	1	0.40347	food	Fitzhugh et al. 1950
Rat	phenyl mercuric acetate	600 µg	diet	urine + feces	39.3	1	0.49923	food	Fitzhugh et al. 1950
Rat	phenyl mercuric acetate	2400 µg	diet	urine + feces	32.4	1	0.39156	food	Fitzhugh et al. 1950
					$\bar{x}$ ± SE		**0.51121 ± 0.06621**		

Table 4 (continued)
Excretion of Organic Mercury in Mammals

Test Species[1]	Form	Dose	Dose[2] Route	Elimination Route	Percent of Dose	Days	Rate (Day^{-1})	Dose Vehicle	Source
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	milk	0.08	3	0.00027	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	milk	0.14	5	0.00028	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	milk	0.19	7	0.00027	ethanol	Sell & Davison 1975
Goat-Nubian	CH_3-HgCl	100 µCi	ir inj	milk	0.28	13	0.00022	ethanol	Sell & Davison 1975
					$\bar{x} \pm$ SE		**0.00026 ± 0.00001**		
Human	methylmercuric nitrate	2.6 µCi	oral	hair	0.12	45	0.00003	aq sol	Aberg et al. 1969
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	0.05	0.25	0.00200	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	0.14	1	0.00140	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	0.18	2	0.00090	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	0.52	3	0.00174	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	0.59	4	0.00148	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	0.67	5	0.00134	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	1.08	7	0.00155	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	2.25	10	0.00228	corn oil	Fang & Fallin 1973
Rat-Wistar	ethyl-$HgCl_2$	3 µmole	oral	hair	5.50	14	0.00404	corn oil	Fang & Fallin 1973
					$\bar{x} \pm$ SE		**0.00168 ± 0.00033**		
Rat-Holtzman	CH_3-HgCl	10 µCi	iv	hair	0.21	20	0.00011		Mansour et al. 1973

[1] Rat-SD = Sprague Dawley rat
[2] ir = Intraruminal injection, iv = intravenous injection and sc inj = subcutaneous injection.

Table 5
Excretion of Organic Mercury in Birds

Test Species[a]	Form	Dose	Dose Route	Elimination Route	Percent of Dose	Days	Rate (Day^{-1})	Dose Vehi-cle	Source
Gull-BH	methyl-HgCl	200 µL	oral	feces	26.4	13	0.02358	gel cap	Lewis & Furness 1991
Gull-BH	methyl-HgCl	100 µL	oral	feces	37.7	13	0.03640	gel cap	Lewis & Furness 1991
Gull-BH	methyl-HgCl	20 µL	oral	feces	11	13	0.00896	gel cap	Lewis & Furness 1991
					$\bar{x}$ ± SE		**0.02298 ± 0.00793**		
Chicken-WL	methyl-HgCl	20 ppm + 2 µCi	diet/orl	feces	64	21	0.04865	food	Sell 1977
Quail-Japanese	methyl-HgCl	20 ppm + 2 µCi	diet/orl	feces	32	21	0.01836	food	Sell 1977
					$\bar{x}$ ± SE		**0.03351 ± 0.01514**		
Gull-BH	methyl-HgCl	200 µL	oral	feathers	51.2	13	0.05519	gel cap	Lewis & Furness 1991
Gull-BH	methyl-HgCl	100 µL	oral	feathers	44.2	13	0.04488	gel cap	Lewis & Furness 1991
Gull-BH	methyl-HgCl	20 µL	oral	feathers	52.6	13	0.05743	gel cap	Lewis & Furness 1991
					$\bar{x}$ ± SE		**0.05593 ± 0.00075**		
Chicken-WL	methyl-HgCl	20 ppm + 2 µCi	diet/orl	eggs	21.88	21	0.01176	food	Sell 1977
Quail-Japanese	methyl-HgCl	20 ppm + 2 µCi	diet/orl	eggs	54.08	21	0.03706	food	Sell 1977
					$\bar{x}$ ± SE		**0.02441 ± 0.01265**		

[a] Gull-BH = Black-headed gull, Chicken-WL = White- leghorn chicken.

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