Annex D: Input Parameter Tables

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Alpha Cypermethrin (67375-30-8)					
Henry's law constant (atm-cu m/mol)			9.50E-06	HSDB, 2005	
Melting Point (K)			3.50E+02	IPCS, 2005	
Molecular Weight (g/mol)			4.16E+02	IPCS, 2005	
Octanol-water partition coefficient (LOG) (unitless)			5.16E+00	IPCS, 2005	
Reaction half-life in air (d)			7.50E-01	HSDB, 2005	hydroxyl radicals
Reaction half-life in air (d)			4.90E+01	HSDB, 2005	ozone
Reaction half-life in soil (d)	7.00E+00	1.40E+01		HSDB, 2005	
Reaction half-life in water (d)			8.00E+00	HSDB, 2005	model river
Reaction half-life in water (d)			6.50E+01	HSDB, 2005	model lake
Solubility (mg/L)	5.00E-03	1.00E-02		IPCS, 2005	
Vapor pressure (atm)			1.70E-12	IPCS, 2005	at 20 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Bendiocarb (22781-23-3)					
Henry's law constant (atm-cu m/mol)			3.90E-08	HSDB, 2005	
Melting Point (K)			4.00E+02	HSDB, 2005	
Molecular Weight (g/mol)			2.23E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			1.70E+00	HSDB, 2005	
Reaction half-life in air (d)			5.00E+00	HSDB, 2005	
Reaction half-life in soil (d)	1.00E+00	3.50E+00		U.S. EPA, 1999b	aerobic
Reaction half-life in water (d)			3.30E-01	U.S. EPA, 1999b	at pH 9
Reaction half-life in water (d)			2.00E+00	U.S. EPA, 1999b	at pH 7
Reaction half-life in water (d)			4.65E+01	U.S. EPA, 1999b	at pH 5
Solubility (mg/L)			2.60E+02	HSDB, 2005	at 25 oC
Vapor pressure (atm)			6.60E-09	U.S. EPA, 1999b	at 25 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Bifenthrin (82657-04-3)					
Henry's law constant (atm-cu m/mol)			1.00E-06	HSDB, 2005	
Melting Point (K)			3.40E+02	EXTOXNET, 2005	
Molecular Weight (g/mol)			4.23E+02	EXTOXNET, 2005	
Octanol-water partition coefficient (LOG) (unitless)			6.00E+00	EXTOXNET, 2005	
Reaction half-life in air (d)			5.42E-01	HSDB, 2005	hydroxyl radicals
Reaction half-life in air (d)			7.00E+00	HSDB, 2005	ozone
Reaction half-life in soil (d)	6.50E+01	1.25E+02		HSDB, 2005	
Reaction half-life in water (d)			5.55E+02	HSDB, 2005	model lake
Reaction half-life in water (d)			5.00E+01	HSDB, 2005	model river
Solubility (mg/l)			1.00E-01	HSDB, 2005	temperature not specified
Vapor pressure (atm)			2.40E-10	HSDB, 2005	

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Cyfluthrin (baythroid) (68359-37-5)					
Henry's law constant (atm-cu m/mol)			5.80E-10	HSDB, 2005	
Melting Point (K)			3.30E+02	HSDB, 2005	
Molecular Weight (g/mol)			4.34E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			5.94E+00	HSDB, 2005	
Reaction Half-life in air ()			NF		
Reaction half-life in soil (d)			5.95E+01	PAN, 2005	aerobic
Reaction half-life in soil (d)			3.36E+01	PAN, 2005	anaerobic
Reaction half-life in water ()			NF		
Solubility (mg/L)			2.00E+00	HSDB, 2005	at 20 oC
Vapor Pressure (atm)			2.67E-12	HSDB, 2005	at 25 oC
DDT (50-29-3)					
Henry's law constant (atm-cu m/mol)			8.30E-06	ATSDR, 2003a	temperature not reported
Melting Point (K)			3.82E+02	EXTOXNET, 2005	
Molecular Weight (g/mol)			3.54E+02	EXTOXNET, 2005	
Octanol-water partition coefficient (LOG) (unitless)			6.91E+00	HSDB, 2005	
Reaction half-life in air (d)			5.00E+00	HSDB, 2005	at 25 oC
Reaction half-life in soil (d)	7.30E+02	5.48E+03		EXTOXNET, 2005	
Reaction half-life in water (d)			5.60E+01	EXTOXNET, 2005	lake water
Reaction half-life in water (d)			2.80E+01	EXTOXNET, 2005	river water
Solubility (mg/L)			2.50E-02	ATSDR, 2003a	at 25 oC, pH not reported
Vapor pressure (atm)			2.48E-10	EXTOXNET, 2005	at 25 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Deltamethrin (52918-63-5)					
Henry's law constant (atm-cu m/mol)			5.00E-06	HSDB, 2005	
Melting Point (K)			3.70E+02	IPCS, 2005	
Molecular Weight (g/mol)			5.05E+02	IPCS, 2005	
Octanol-water partition coefficient (LOG) (unitless)			5.43E+00	IPCS, 2005	
Reaction half-life in air (d)			NF		
Reaction half-life in soil (d)	3.43E+01	4.83E+01		HSDB, 2005	
Reaction half-life in water (d)			1.25E+00	HSDB, 2005	model river
Reaction half-life in water (d)			2.08E+01	HSDB, 2005	model lake
Solubility (mg/L)		2.00E-03		IPCS, 2005	at 20 oC, Reported as < value
Vapor pressure (atm)			2.00E-11	IPCS, 2005	
Etofenprox (80844-07-1)					
Henry's law constant (atm-cu m/mol)			2.26E-08	Chemfinder (SRC), 2005	
Melting Point (K)			3.10E+02	Chemfinder (SRC), 2005	
Molecular Weight (g/mol)			3.77E+02	Chemfinder (SRC), 2005	
Octanol-water partition coefficient (LOG) (unitless)			7.05E+00	Chemfinder (SRC), 2005	
Reaction Half-life in air ()			NF		
Reaction half-life in soil (d)	6.00E+00	9.00E+00		FAO, 1993	lab
Reaction half-life in soil (d)	9.00E+00	7.90E+01		FAO, 1993	field
Reaction half-life in water ()			NF		
Solubility (mg/L)			1.00E-03	Chemfinder (SRC), 2005	at 25 oC
Vapor Pressure (atm)			8.93E-12	Chemfinder (SRC), 2005	at 25 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Fenitrothion (122-14-5)					
Henry's law constant (atm-cu m/mol)			9.30E-07	HSDB, 2005	
Melting Point (K)			2.70E+02	IPCS, 2005	
Molecular Weight (g/mol)			2.77E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			3.16E+00	IPCS, 2005	
Reaction half-life in air (d)			2.67E-01	HSDB, 2005	hydroxyl radicals
Reaction half-life in soil (d)	4.40E+00	1.54E+02		HSDB, 2005	aerobic
Reaction half-life in soil (d)	3.90E+00	1.09E+01		HSDB, 2005	anaerobic
Reaction half-life in water (d)	4.00E+00	8.00E+00		IPCS, 2005	at pH of 5-9 , at 45 oC
Reaction half-life in water (d)	2.00E+02	6.30E+02		IPCS, 2005	at pH of 5-9 (normally found in natural water), at 15 oC
Reaction half-life in water (d)	1.70E+01	6.10E+01		IPCS, 2005	at pH of 5-9, at 30 °C
Solubility (mg/L)	5.00E+00	1.40E+01		U.S. EPA, 1995	min at 20 oC; max at 30 oC
Vapor pressure (atm)			2.80E-07	U.S. EPA, 1995	at 25 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Lambda-Cyhalothrin (91465-08-6)					
Henry's law constant (atm-cu m/mol)			9.09E-06	HSDB, 2005	at 20 oC
Melting Point (K)			3.22E+02	IPCS, 2005	
Molecular Weight (g/mol)			4.50E+02	IPCS, 2005	
Octanol-water partition coefficient (LOG) (unitless)			7.00E+00	IPCS, 2005	
Reaction half-life in air (d)					
Reaction half-life in soil (d)			3.00E+01	NPIC, 2005	
Reaction half-life in water (d)			7.00E+00	NPIC, 2005	
Solubility (mg/L)			5.00E-03	IPCS, 2005	pH not reported
Vapor pressure (atm)			2.96E-08	IPCS, 2005	at 80 oC
Vapor pressure (atm)			1.97E-12	IPCS, 2005	at 20 oC
Malathion (121-75-5)					
Henry's law constant (atm-cu m/mol)			4.90E-09	ATSDR, 2003a	at 25 oC
Melting Point (K)			2.76E+02	EXTOXNET, 2005	
Molecular Weight (g/mol)			3.30E+02	EXTOXNET, 2005	
Octanol-water partition coefficient (LOG) (unitless)			2.75E+00	EXTOXNET, 2005	
Reaction half-life in air (d)			1.50E+00	EXTOXNET, 2005	
Reaction half-life in soil (d)	1.00E+00	2.50E+01		EXTOXNET, 2005	
Reaction half-life in water (d)		7.00E+00		EXTOXNET, 2005	raw river water, reported as < number
Reaction half-life in water (d)			2.10E+01	EXTOXNET, 2005	distilled water
Solubility (mg/L)			1.30E+02	EXTOXNET, 2005	pH not reported
Vapor pressure (atm)			5.25E-08	EXTOXNET, 2005	at 30 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Methoprene (40596-69-8)					
Henry's law constant (atm-cu m/mol)			6.90E-06	HSDB, 2005	
Molecular Weight (g/mol)			3.10E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			5.50E+00	HSDB, 2005	
Reaction Half-life in air (d)	3.33E-02	6.25E-02		HSDB, 2005	
Reaction half-life in soil (d)			1.00E+01	HSDB, 2005	
Reaction half-life in water (d)			1.30E+01	HSDB, 2005	
Solubility (mg/L)			1.40E+00	HSDB, 2005	room temperature
Vapor Pressure (atm)			3.11E-08	HSDB, 2005	at 25 oC
Permethrin (52645-53-1)					
Henry's law constant (atm-cu m/mol)			1.90E-06	HSDB, 2005	temperature not reported
Melting Point (K)	3.07E+02	3.08E+02		HSDB, 2005	
Molecular Weight (g/mol)			3.91E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			6.50E+00	HSDB, 2005	
Reaction half-life in air (d)			4.08E-01	HSDB, 2005	hydroxy radical
Reaction half-life in air (d)			4.90E+01	HSDB, 2005	ozone
Reaction half-life in soil (d)			3.00E+01	HSDB, 2005	
Reaction half-life in water (d)			3.30E+01	HSDB, 2005	
Solubility (mg/L)			6.00E-03	HSDB, 2005	at 20 oC, pH not reported
Vapor pressure (atm)			2.87E-11	HSDB, 2005	at 25 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Pirimiphos-methyl (29232-93-7)					
Henry's law constant (atm-cu m/mol)			7.00E-07	HSDB, 2005	
Melting Point (K)			2.90E+02	HSDB, 2005	
Molecular Weight (g/mol)			3.05E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			4.12E+00	HSDB, 2005	
Reaction Half-life in air (d)			1.00E-01	HSDB, 2005	
Reaction half-life in soil (d)	5.20E+00	5.90E+00		HSDB, 2005	
Reaction half-life in water ()			NF		varies too much depending on condition
Solubility (mg/L)			8.60E+00	HSDB, 2005	at 20 oC
Vapor Pressure (atm)			1.97E-08	HSDB, 2005	at 20 oC

Table D-1: Chemical/Physical Properties

Parameter	Minimum Value	Maximum Value	Mean Value	Reference	Comments
Propoxur (114-26-1)					
Henry's law constant (atm-cu m/mol)			1.43E-09	HSDB, 2005	
Melting Point (K)			3.60E+02	WHO, 2005	
Molecular Weight (g/mol)			2.09E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			1.56E+00	WHO, 2005	at 20 oC
Reaction half-life in air (d)			5.00E-01	HSDB, 2005	hydroxyl radicals
Reaction half-life in soil (d)	8.00E+01	2.10E+02		HSDB, 2005	min is silt loam, max is sandy loam
Reaction half-life in water (d)			>365	WHO, 2005	at pH 4, at 22 oC
Reaction half-life in water (d)			1.25E+00	WHO, 2005	at pH 9, at 22 oC
Reaction half-life in water (d)			9.32E+01	WHO, 2005	at pH 7, at 22 oC
Solubility (mg/L)			1.75E+03	WHO, 2005	at 20 oC
Vapor pressure (atm)			2.50E-05	WHO, 2005	at 20 oC
Temephos (3383-96-8)					
Henry's law constant (atm-cu m/mol)			1.96E-09	HSDB, 2005	at 25 oC
Melting Point (K)			3.04E+02	HSDB, 2005	
Molecular Weight (g/mol)			4.66E+02	HSDB, 2005	
Octanol-water partition coefficient (LOG) (unitless)			5.96E+00	HSDB, 2005	
Reaction half-life in air (d)			1.17E-01	HSDB, 2005	
Reaction half-life in soil (d)			3.00E+01	EXTOXNET, 2005	
Reaction half-life in water (d)	4.00E+03			HSDB, 2005	river water, reported as > number
Solubility (mg/L)			2.70E-01	HSDB, 2005	at 20 oC, pH not reported
Vapor pressure (atm)			1.13E-12	HSDB, 2005	at 25 oC

Table D-2: Pesticide Use Data

Vector Management Practice	Pesticide Formulation	Parameter	Minimum Value	Maximum Value	Mean Value	Comments	Reference
Alpha-cypermethrin (67375-30-8)							
IRS	Wettable powder	Application (kg ai/m2)	2.00E-05	3.00E-05			Najera and Ziam, 2002
ITNs	Suspension concentrate	Application (kg ai/m2)			4.00E-05	SC 10%	WHO, 2002b
IRS	Wettable powder	Application frequency (times/year)	2	3		Duration of effective action 4-6 months	Najera and Ziam, 2002
Bendiocarb (22781-23-3)							
IRS	Wettable powder	Application (kg ai/m2)	1.00E-04	4.00E-04			Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/ year)	2	6		Duration of effective action 2-6 months	Najera and Ziam, 2002
Bifenthrin (82657-04-3)							
IRS	Wettable powder	Application (kg ai/m2)	2.50E-05	5.00E-05			Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/year)	2	4		Duration of effective action 3-6 months	Najera and Ziam, 2002
Cyfluthrin (baythroid) (68359-37-5)							
IRS	Wettable powder	Application (kg ai/m2)	2.00E-05	5.00E-05			Najera and Ziam, 2002
ITNs	Emulsion	Application (kg ai/m2)			5.00E-05		WHO, 2002b
IRS	Wettable powder	Application frequency (times/year)	2.00E+00	4.00E+00		Duration of effective action 3-6 months	Najera and Ziam, 2002
DDT (50-29-3)							
IRS	Wettable powder	Application (kg ai/m2)	1.00E-03	2.00E-03			Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/year)	2.00E+00			Duration of effective action 6 months	Najera and Ziam, 2002
Deltamethrin (52918-63-5)							
IRS	Wettable powder	Application frequency (times/year)	2	4		Duration of effective action 3-6 months	Najera and Ziam, 2002

Table D-2: Pesticide Use Data

Vector Management Practice	Pesticide Formulation	Parameter	Minimum Value	Maximum Value	Mean Value	Comments	Reference
			Deltramethrin (52918-63-5)				
IRS	wettable powder and water dispersible granules	Application (kg ai/m2)	2.00E-05	2.50E-05			Najera and Ziam, 2002
ITNs	Suspension concentrate	Application (kg ai/m2)			2.50E-05	SC 1%	WHO, 2002b
ITNs	Water dispensible tablet	Application (kg ai/m2)			2.50E-05	WT 25%	WHO, 2002b
			Etofenprox (80844-07-1)				
IRS	Wettable powder	Application (kg ai/m2)	1.00E-04	3.00E-04			Najera and Ziam, 2002
ITNs	Emulsion	Application (kg ai/m2)			2.00E-04		WHO, 2002b
IRS	Wettable powder	Application frequency (times/year)	2.00E+00	4.00E+00		Duration of effective action 3-6 months	Najera and Ziam, 2002
			Fenitrothion (122-14-5)				
IRS	Wettable powder	Application (kg ai/m2)			2.00E-03		Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/year)	2	4		Duration of effective action 3-6 months	Najera and Ziam, 2002
			Lambda-Cyhalothrin (91465-08-6)				
ITNs	Capsule suspension	Application (kg ai/m2)	1.00E-05	1.50E-05			Najera and Ziam, 2002
IRS	Wettable powder	Application (kg ai/m2)	2.00E-05	3.00E-05			Najera and Ziam, 2002
ITNs	Capsule suspension	Application frequency (times/year)	3.00E+00	4.00E+00		Duration of effective action 3-4 months	Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/year)	2.00E+00	4.00E+00		Duration of effective action 3-6 months	Najera and Ziam, 2002
ITNs	Capsule suspension	Percent ai	2.50E+00			Percent active ingredient in the insecticide formulation. For a liter.	WHO, 2004b

Table D-2: Pesticide Use Data

Vector Management Practice	Pesticide Formulation	Parameter	Minimum Value	Maximum Value	Mean Value	Comments	Reference
			Malathion (121-75-5)				
IRS	Wettable powder	Application (kg ai/m2)			2.00E-03		Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/year)	4.00E+00	6.00E+00		Duration of effective action 2-3 months	Najera and Ziam, 2002
IRS	Wettable powder	Percent ai	5.00E+01			Percent active ingredient in the insecticide formulation	WHO, 2004b
			Methoprene (40596-69-8)				
Growth Regulator	Emulsifiable concentrate	Application (kg ai/m2)	2.00E-06	4.00E-06			Najera and Ziam, 2002
Growth Regulator	Emulsifiable concentrate	Application frequency (times/year)					Najera and Ziam, 2002
			Permethrin (52645-53-1)				
ITNs	Emulisfiable	Application (kg ai/m2)	2.00E-04	5.00E-04			Najera and Ziam, 2002
ITNs	Emulisfiable	Application frequency (times/year)	3.00E+00	4.00E+00		Duration of effective action 3-4 months	WHO, 2004a
ITNs	Emulisfiable	Percent ai	1.00E+01			Percent active ingredient in the insecticide formulation	WHO, 2004b
			Pirimiphos-methyl (29232-93-7)				
IRS	Wettable powder and Emulsifiable concentrate	Application (kg ai/m2)	1.00E-03	2.00E-03			Najera and Ziam, 2002
IRS		Application frequency (times/year)	4.00E+00	6.00E+00		Duration of effection action 2-3 months	Najera and Ziam, 2002

Table D-2: Pesticide Use Data

Vector Management Practice	Pesticide Formulation	Parameter	Minimum Value	Maximum Value	Mean Value	Comments	Reference
			Propoxur (114-26-1)				
IRS	Wettable powder	Application (kg ai/m2)	1.00E-03	2.00E-03			Najera and Ziam, 2002
IRS	Wettable powder	Application frequency (times/year)	2	4		Duration of effective action 3-6 months	Najera and Ziam, 2002
			Temephos (3383-96-8)				
Larviciding	Emulsifiable concentrate, granule	Application (kg ai/m2)	5.60E-06	1.12E-05			Najera and Ziam, 2002

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Alpha-cypermethrin (67375-30-8)							
dermal	acute	noncancer		5.0E+00	mg/kg/d	IPCS, 1992	
dermal	chronic	noncancer		5.0E+00	mg/kg/d	IPCS, 1992	
dermal	intermediate	noncancer		5.0E+00	mg/kg/d	IPCS, 1992	
inhalation	acute	noncancer		4.0E+00	mg/kg/d	IPCS, 1992	
inhalation	chronic	noncancer		4.0E+00	mg/kg/d	IPCS, 1992	
inhalation	intermediate	noncancer		4.0E+00	mg/kg/d	IPCS, 1992	
oral	acute	noncancer		2.0E-02	mg/kg/d	ATSDR, 2003b	
oral	chronic	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2005d	
oral	intermediate	noncancer		1.0E-02	mg/kg/d		chronic RfD

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Bendiocarb (22781-23-3)							
dermal	acute	noncancer		5.0E-01	mg/kg/d	U.S. EPA, 1999b	
dermal	chronic	noncancer		1.3E-03	mg/kg/d	U.S. EPA, 1999b	
dermal	intermediate	noncancer		2.0E-01	mg/kg/d	U.S. EPA, 1999b	
inhalation	acute	noncancer		2.0E-03	mg/kg/d	U.S. EPA, 1999b	
inhalation	chronic	noncancer		2.0E-03	mg/kg/d	U.S. EPA, 1999b	
inhalation	intermediate	noncancer		2.0E-03	mg/kg/d	U.S. EPA, 1999b	
oral	acute	noncancer		1.3E-03	mg/kg/d	U.S. EPA, 1999b	
oral	chronic	noncancer		1.3E-03	mg/kg/d	U.S. EPA, 1999b	
oral	intermediate	noncancer		1.3E-03	mg/kg/d	U.S. EPA, 1999b	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Bifenthrin (82657-04-3)							
dermal	acute	noncancer		2.0E-01	mg/kg/d	U.S. EPA, 2003	
dermal	chronic	noncancer		2.0E-01	mg/kg/d	U.S. EPA, 2003	
dermal	intermediate	noncancer		2.0E-01	mg/kg/d	U.S. EPA, 2003	
inhalation	acute	noncancer		7.0E-03	mg/kg/d	U.S. EPA, 2003	
inhalation	chronic	noncancer		4.0E-03	mg/kg/d	U.S. EPA, 2003	
inhalation	intermediate	noncancer		7.0E-03	mg/kg/d	U.S. EPA, 2003	
oral	acute	noncancer		3.3E-02	mg/kg/d	U.S. EPA, 2003	
oral	chronic	noncancer		4.0E-03	mg/kg/d	U.S. EPA, 2003	
oral	intermediate	noncancer		7.0E-03	mg/kg/d	U.S. EPA, 2003	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Cyfluthrin (68359-37-5)							
dermal	acute	noncancer		3.0E+00	mg/kg/d	IPCS, 1997	
dermal	chronic	noncancer		3.0E+00	mg/kg/d	IPCS, 1997	
dermal	intermediate	noncancer		3.0E+00	mg/kg/d	IPCS, 1997	
inhalation	acute	noncancer		7.0E-04	mg/kg/d	U.S. EPA, 2005e	
inhalation	chronic	noncancer		2.0E-04	mg/kg/d	U.S. EPA, 2005e	
inhalation	intermediate	noncancer		2.0E-04	mg/kg/d	U.S. EPA, 2005e	
oral	acute	noncancer		2.0E-02	mg/kg/d	U.S. EPA, 2005e	
oral	chronic	noncancer		2.4E-02	mg/kg/d	U.S. EPA, 2005e	
oral	intermediate	noncancer		2.4E-02	mg/kg/d		chronic RfD

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
DDT (50-29-3)							
oral	acute	noncancer		5.0E-04	mg/kg/d	ATSDR, 2002	
oral	intermediate	noncancer		5.0E-04	mg/kg/d	ATSDR, 2002	
oral	chronic	noncancer		5.0E-04	mg/kg/d	U.S. EPA, 2005a	
inhalation	acute	noncancer		5.0E-04	mg/kg/d		oral benchmark
inhalation	intermediate	noncancer		5.0E-04	mg/kg/d		oral benchmark
inhalation	chronic	noncancer		5.0E-04	mg/kg/d		oral benchmark
dermal	acute	noncancer		5.0E-04	mg/kg/d		oral benchmark
dermal	intermediate	noncancer		5.0E-04	mg/kg/d		oral benchmark
dermal	chronic	noncancer		5.0E-04	mg/kg/d		oral benchmark
oral	chronic	cancer		3.4E-01	per mg/kg/d	U.S. EPA, 2005a	
inhalation	chronic	cancer		3.4E-01	per mg/kg/d	U.S. EPA, 1997	
dermal	chronic	cancer		3.4E-01	per mg/kg/d		oral benchmark

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Deltamethrin (52918-63-5)							
dermal	acute	noncancer		1.0E+01	mg/kg/d	Barlow et al., 2001	
dermal	chronic	noncancer		1.0E+01	mg/kg/d	Barlow et al., 2001	
dermal	intermediate	noncancer		1.0E+01	mg/kg/d	Barlow et al., 2001	
inhalation	acute	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2004b	
inhalation	chronic	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2004b	
inhalation	intermediate	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2004b	
oral	acute	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2004b	
oral	chronic	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2004b	
oral	intermediate	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 2004b	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Etofenprox (80844-07-1)							
dermal	acute	noncancer		4.0E-01	mg/kg/d	NYSDEC, 2005	
dermal	chronic	noncancer		3.7E-02	mg/kg/d	NYSDEC, 2005	
dermal	intermediate	noncancer		4.0E-01	mg/kg/d	NYSDEC, 2005	
inhalation	acute	noncancer		1.0E-01	mg/kg/d	NYSDEC, 2005	
inhalation	chronic	noncancer		1.0E-01	mg/kg/d	NYSDEC, 2005	
inhalation	intermediate	noncancer		1.0E-01	mg/kg/d	NYSDEC, 2005	
oral	acute	noncancer		3.7E-02	mg/kg/d	NYSDEC, 2005	
oral	chronic	noncancer		3.7E-02	mg/kg/d	NYSDEC, 2005	
oral	intermediate	noncancer		3.7E-02	mg/kg/d	NYSDEC, 2005	
oral, inhalation, dermal	chronic	cancer		5.1E-03	per mg/kg/d	NYSDEC, 2005	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Fenitrothion (122-14-5)							
dermal	acute	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 1999c	
dermal	chronic	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 1999c	
dermal	intermediate	noncancer		1.0E-02	mg/kg/d	U.S. EPA, 1999c	
inhalation	acute	noncancer		4.0E-04	mg/kg/d	U.S. EPA, 1999c	
inhalation	chronic	noncancer		4.0E-04	mg/kg/d	U.S. EPA, 1999c	
inhalation	intermediate	noncancer		4.0E-04	mg/kg/d	U.S. EPA, 1999c	
oral	acute	noncancer		1.3E-01	mg/kg/d	U.S. EPA, 1999c	
oral	chronic	noncancer		1.3E-03	mg/kg/d	U.S. EPA, 1999c	
oral	intermediate	noncancer		1.3E-03	mg/kg/d	U.S. EPA, 1999c	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Lambda-Cyhalothrin (91465-08-6)							
oral	acute	noncancer		5.0E-03	mg/kg/d	U.S. EPA, 2002a	
oral	intermediate	noncancer		1.0E-03	mg/kg/d		chronic RfD
oral	chronic	noncancer		1.0E-03	mg/kg/d	U.S. EPA, 2002a	
inhalation	acute	noncancer		8.0E-04	mg/kg/d	U.S. EPA, 2002a	
inhalation	intermediate	noncancer		8.0E-04	mg/kg/d	U.S. EPA, 2002a	
inhalation	chronic	noncancer		8.0E-04	mg/kg/d	U.S. EPA, 2002a	
dermal	acute	noncancer		1.0E-01	mg/kg/d	U.S. EPA, 2002a	
dermal	intermediate	noncancer		1.0E-01	mg/kg/d	U.S. EPA, 2002a	
dermal	chronic	noncancer		1.0E-01	mg/kg/d	U.S. EPA, 2002a	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Malathion (121-75-5)							
oral	acute	noncancer		1.4E-01	mg/kg/d	U.S. EPA, 2005b	
oral	intermediate	noncancer		3.0E-02	mg/kg/d		chronic RfD
oral	chronic	noncancer		3.0E-02	mg/kg/d	U.S. EPA, 2005b	
inhalation	acute	noncancer		2.6E-02	mg/kg/d	U.S. EPA, 2005b	
inhalation	intermediate	noncancer		2.6E-02	mg/kg/d	U.S. EPA, 2005b	
inhalation	chronic	noncancer		2.6E-02	mg/kg/d	U.S. EPA, 2005b	
dermal	acute	noncancer	adult	5.0E-01	mg/kg/d	U.S. EPA, 2005b	
dermal	acute	noncancer	child	5.0E-02	mg/kg/d	U.S. EPA, 2005b	
dermal	intermediate	noncancer	adult	5.0E-01	mg/kg/d	U.S. EPA, 2005b	
dermal	intermediate	noncancer	child	5.0E-02	mg/kg/d	U.S. EPA, 2005b	
dermal	chronic	noncancer	child	5.0E-02	mg/kg/d	U.S. EPA, 2005b	
dermal	chronic	noncancer	adult	5.0E-01	mg/kg/d	U.S. EPA, 2005b	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Methoprene (40596-69-8)							
dermal	acute	noncancer		1.0E+00	mg/kg/d	ATSDR, 2005	
dermal	chronic	noncancer		1.0E+00	mg/kg/d	ATSDR, 2005	
dermal	intermediate	noncancer		1.0E+00	mg/kg/d	ATSDR, 2005	
inhalation	acute	noncancer		2.5E+01	mg/kg/d	ATSDR, 2005	
inhalation	chronic	noncancer		2.5E+01	mg/kg/d	ATSDR, 2005	
inhalation	intermediate	noncancer		2.5E+01	mg/kg/d	ATSDR, 2005	
oral	acute	noncancer		4.0E-01	mg/kg/d	U.S. EPA, 1991	
oral	chronic	noncancer		4.0E-01	mg/kg/d	U.S. EPA, 1991	
oral	intermediate	noncancer		4.0E-01	mg/kg/d	U.S. EPA, 1991	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Permethrin (52645-53-1)							
oral	acute	noncancer		2.5E-01	mg/kg/d	U.S. EPA, 2005c	
oral	intermediate	noncancer		2.5E-01	mg/kg/d	U.S. EPA, 2005c	
oral	chronic	noncancer		2.5E-01	mg/kg/d	U.S. EPA, 2005c	
inhalation	acute	noncancer		1.1E-01	mg/kg/d	U.S. EPA, 2005c	
inhalation	intermediate	noncancer		1.1E-01	mg/kg/d	U.S. EPA, 2005c	
inhalation	chronic	noncancer		1.1E-01	mg/kg/d	U.S. EPA, 2005c	
dermal	acute	noncancer		5.0E+00	mg/kg/d	U.S. EPA, 2005c	
dermal	intermediate	noncancer		5.0E+00	mg/kg/d	U.S. EPA, 2005c	
dermal	chronic	noncancer		5.0E+00	mg/kg/d	U.S. EPA, 2005c	
oral	chronic	cancer		9.6E-03	per mg/kg/d	U.S. EPA, 2005c	
inhalation	chronic	cancer		9.6E-03	per mg/kg/d	U.S. EPA, 2005c	
dermal	chronic	cancer		9.6E-03	per mg/kg/d	U.S. EPA, 2005c	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Pirimiphos-methyl (29232-93-7)							
dermal	acute	noncancer		1.5E-02	mg/kg/d	U.S. EPA, 2001	
dermal	chronic	noncancer		7.0E-04	mg/kg/d	U.S. EPA, 2001	
dermal	intermediate	noncancer		7.0E-04	mg/kg/d	U.S. EPA, 2001	
inhalation	acute	noncancer		1.5E-02	mg/kg/d	U.S. EPA, 2001	
inhalation	chronic	noncancer		7.0E-04	mg/kg/d	U.S. EPA, 2001	
inhalation	intermediate	noncancer		7.0E-04	mg/kg/d	U.S. EPA, 2001	
oral	acute	noncancer		1.5E-02	mg/kg/d	U.S. EPA, 2001	
oral	chronic	noncancer		2.0E-04	mg/kg/d	U.S. EPA, 2001	
oral	intermediate	noncancer		2.0E-04	mg/kg/d	U.S. EPA, 2001	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Propoxur (114-26-1)							
dermal	acute	noncancer		1.0E+01	mg/kg/d	U.S. EPA, 1997c	
dermal	chronic	noncancer		1.0E+01	mg/kg/d	U.S. EPA, 1997c	
dermal	intermediate	noncancer		1.0E+01	mg/kg/d	U.S. EPA, 1997c	
inhalation	acute	noncancer		4.0E-03	mg/kg/d	U.S. EPA, 1997c	
inhalation	chronic	noncancer		4.0E-03	mg/kg/d	U.S. EPA, 1997c	
inhalation	intermediate	noncancer		4.0E-03	mg/kg/d	U.S. EPA, 1997c	
oral	acute	noncancer		5.0E-03	mg/kg/d	U.S. EPA, 1997c	
oral	chronic	noncancer		5.0E-03	mg/kg/d	U.S. EPA, 1997c	
oral	intermediate	noncancer		5.0E-03	mg/kg/d	U.S. EPA, 1997c	
oral, inhalation, dermal	chronic	cancer		3.7E-03	per mg/kg/d	U.S. EPA, 1997c	

Table D-3. Benchmarks*

Exposure Pathway	Duration	Endpoint	Receptor	Value	Units	Reference	Comments
Temephos (3383-96-8)							
oral	acute	noncancer		2.0E-01	mg/kg/d	U.S. EPA, 1997	subchronic HEAST (no adjustment for exposure)
oral	intermediate	noncancer		2.0E-01	mg/kg/d	U.S. EPA, 1997	
oral	chronic	noncancer		2.0E-02	mg/kg/d	U.S. EPA, 1997	
inhalation	acute	noncancer		3.0E-03	mg/kg/d	U.S. EPA, 2000d	based on oral data
inhalation	intermediate	noncancer		3.0E-03	mg/kg/d	U.S. EPA, 2000d	based on oral data
inhalation	chronic	noncancer		3.0E-03	mg/kg/d	U.S. EPA, 2000d	based on oral data
dermal	acute	noncancer		3.0E-03	mg/kg/d	U.S. EPA, 2000d	based on oral data
dermal	intermediate	noncancer		3.0E-03	mg/kg/d	U.S. EPA, 2000d	based on oral data
dermal	chronic	noncancer		3.0E-03	mg/kg/d	U.S. EPA, 2000d	based on oral data

*These values are shown to 2 significant figures

Appendix A References

Short Reference	Reference
ATSDR, 2002	ATSDR (Agency for Toxic Substances and Disease Registry). 2002. "Toxicological Profile for DDT, DDE, DDD." Atlanta, GA: U.S. Department of Health and Human Services. Available at: http://www.atsdr.cdc.gov/toxprofiles/tp35.html
ATSDR, 2003a	ATSDR (Agency for Toxic Substances and Disease Registry). 2003a. Toxicological Profile for Pyrethrin and Pyrethroids. Atlanta, GA: U.S. Department of Health and Human Services. Available at: http://www.atsdr.cdc.gov/toxprofiles/tp155.html
ATSDR, 2003b	ATSDR (Agency for Toxic Substances and Disease Registry). 2003b. Toxicological Profile for Pyrethrin and Pyrethroids. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Available at http://www.atsdr.cdc .gov/toxprofiles/ tp155.html.
ATSDR, 2005	ATSDR (Agency for Toxic Substances and Disease Registry). 2005. Toxicologic Information About Insecticides Used for Eradicating Mosquitoes (West Nile Virus Control): Methoprene. April, 2005. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Available at http://www.atsdr.cdc.gov/consultations/ west_nile_virus/methoprene.html.
Barlow et al., 2001	Barlow, S.M., F.M. Sullivan, and J. Lines. 2001. Risk assessment of the use of deltamethrin on bed nets for prevention of malaria. Food and Chemical Toxicology 39:407-422.
Chemfinder (SRC), 2005	Chemfinder. 2005. A group of free and subscription scientific databases. Available at: http://chemfinder.cambridgesoft.com/reference/chemfinder.asp (Last Accessed December 2005).
EXTOXNET, 2005	EXTOXNET (Extension Toxicology Network). 2005. The index page of Pesticide Information Profiles (PIPs). Available at: http://extoxnet.orst.edu/pips/ghindex.html. (last accessed July 2005).
FAO, 1993	Food and Agriculture Organization of the UNITED NATIONS. 1993. Available at: http://www.fao.org/ag/AGP/AGPP/Pesticid/JMPR/Download/93_rep/Report1993.pdf, pg 68.
HSDB, 2005	Hazardous Substances Data Bank (HSDB). 2005. The index page of Hazardous Substances Data Bank (HSDB). National Library of Medicine. Available at: http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB. Peer reviewed information (last accessed August 2005)
IPCS, 1992	IPCS (International Programme on Chemical Safety). 1992. Environmental Health Criteria 142. Alpha-Cypermethrin. Geneva: World Health Organization. Available at http://www.inchem.org/documents/ehc/ehc/ehc142.htm.
IPCS, 1997	IPCS (International Programme on Chemical Safety). 1997. Toxicological evaluation of certain veterinary drug residues in food. WHO Food Additives Series 39: Cyfluthrin. Geneva: World Health Organization. Available at http://www.inchem .org/ documents/jecfa/jecmono/v39je08.htm.
IPCS, 2005	IPCS (International Programme for Chemical Safety). 2005. Chemical Safety Information from Intergovernmental Organizations, www.inchem.org (last accessed July 2005)
Najera and Ziam, 2002	Najera and Ziam. 2002. "Malaria Vector Control: Decision making criteria and procedures for judicious use of insecticides". WHO/CDS/WHOPES/2002.5 Rev 1
NPIC, 2005	NPIC (National Pesticide Information Center). 2005. National Pesticide Telecommunications Network Technical Fact Sheet, http://npic.orst.edu/index.html (last accessed July 2005)

Appendix A References

Short Reference	Reference
NYSDEC, 2005	NYSDEC (New York State Department of Environmental Conservation). 2005. Letter to Mitsui Chemicals. Feb. 11, 2005. Division of Solid Waste and Hazardous Materials, Bureau of Pesticides Management. Available at: http://pmep.cce.cornell.edu/profiles/insect-mite/ddt-famphur/ethofenprox/ethofenprox_let_205.pdf.
PAN, 2005	PAN (Pesticide Action Network). 2005. Pesticides Database. (Updated April 8, 2005) Available at http://pesticideinfo.org/Search_Chemicals.jsp. (last accessed August 2, 2005)
U.S. EPA, 1991	U.S. EPA (Environmental Protection Agency). 1991. Registration Eligibility Document Isopropyl (2E, 4E)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate (Referred to as Methoprene). Washington, DC: Office of Prevention, Pesticides, and Toxic Substances. March 1991. Available at http://www.epa.gov/oppsrrd1/REDs/old_reds/methoprene.pdf.
U.S. EPA, 1995	U.S. EPA (Environmental Protection Agency). 1995. "Reregistration Eligibility Decision (RED) Fenitrothion." Office of Prevention, Pesticides, and Toxic Substances. EPA 738-R-95-018. July.
U.S. EPA, 1997	U.S. EPA (Environmental Protection Agency). 1997. Health Effects Assessment Summary Tables (HEAST). FY 1997 Update. EPA-540-R-97-036.
U.S. EPA, 1997c	U.S. EPA (Environmental Protection Agency). 1997c. Propoxur: Reregistration Eligibility Decision (RED) Document. Washington, DC: Office of Prevention, Pesticides and Toxic Substances. August 1997. Available at http://www.epa.gov/oppsrrd1/REDs/2555red.pdf.
U.S. EPA, 1999b	U.S. EPA (Environmental Protection Agency). 1999b. Bendiocarb: Revised HED Chapter for the Reregistration Eligibility Decision (RED) Document. Washington, DC: Office of Prevention, Pesticides and Toxic Substances. June 23. Available at http://www.epa.gov/oppsrrd1/reregistration/bendiocarb/BendiocarbHEDRED.pdf.
U.S. EPA, 1999c	U.S. EPA (Environmental Protection Agency). 1999c. Fenitrothion HED RED Chapter: Review Risk Assessment. Office of Prevention, Pesticides, and Toxic Substances. http://www.epa.gov/pesticides/op/fenitrothion/risk.pdf
U.S. EPA, 2000d	U.S. EPA (Environmental Protection Agency). 2000d. "Temephos Reregistration Eligibility Decision (RED) Document." Office of Prevention, Pesticides, and Toxic Substances. September, 2000.
U.S. EPA, 2002a	U.S. EPA (Environmental Protection Agency). 2002a. "Lambda-cyhalothrin; Pesticide Tolerance; Final rule". Federal Register 67FR60902-915. Sept 27, 2002.
U.S. EPA, 2003	U.S. EPA (Environmental Protection Agency). 2003. Bifenthrin; Pesticide Tolerance. Final Rule. 68 FR 23056-68. April 30.
U.S. EPA, 2004b	U.S. EPA (Environmental Protection Agency). 2004b. Deltamethrin; Pesticide Tolerance. Final Rule. 69 FR 62602-15. October 27.
U.S. EPA, 2005a	U.S. EPA (Environmental Protection Agency). 2005a. "Integrated Risk Information System (IRIS): p,p'-Dichlorodiphenyltrichloroethane (DDT)." National Center for Environmental Assessment, Office of Research and Development, Washington, DC. Available online at http://www.epa.gov/iris/subst/0147.htm

Appendix A References

Short Reference	Reference
U.S. EPA, 2005b	U.S. EPA (Environmental Protection Agency). 2005b. "Malathion: Updated Human Health Risk Assessment for the Reregistration Eligibility Decision (RED) Document." Office of Prevention, Pesticides, and Toxic Substances. Available in e-docket.
U.S. EPA, 2005c	U.S. EPA (Environmental Protection Agency). 2005c. "Permethrin: Health Effects Division's Chapter of the Reregistration Eligibility Decision (RED) Document." Draft. Office of Prevention, Pesticides, and Toxic Substances. July 19, 2005. Available in e-docket.
U.S. EPA, 2005d	U.S. EPA (Environmental Protection Agency). 2005d. Integrated Risk Information System (IRIS): Cypermethrin. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. Available at http://www.epa.gov/iris/subst/0380.htm.
U.S. EPA, 2005e	U.S. EPA (Environmental Protection Agency). 2005e. Cyfluthrin; Pesticide Tolerance; Final rule. Federal Register 70 FR 53944-953. September 13.
WHO, 2002b	Roll Back Malaria. 2002b. "Insecticide-treated mosquito net interventions" Chapter 4: Sourcing and procurement. WHO/CDS/RBM/2002(b).45
WHO, 2004a	WHO (World Health Organization). 2004a. "A Generic Risk Assessment Model for Insecticide Treatment and Subsequent Use of Mosquito Nets." Communicable Disease Control, Prevention and Eradication WHO Pesticide Evaluation Scheme.
WHO, 2004b	Joint WHO, RBM, UNICEF, UNAIDS, PSI, MSH project. 2004b. "Sources and prices of selected products for the prevention, diagnosis and treatment of malaria." WHO library ISBN 92 4 159250 8. September
WHO, 2005	WHO. 2005. "WHO Specifications and Evaluations for Public Health Pesticides, Propoxur."