Table 5-27

Reference Toxicity Values and Exposure Parameters for Birds, Bellows AFS

Bellows OU1 EE/CA, Bellows AFS, Hawaii

	Laboratory Animal Ingestion Reference Toxicity Values (RTVlab)								Normalization to NOAEL - Ingestion			
Chemical	Laboratory Species	Laboratory Species Body Weight (kg)	Laboratory Species Ingestion Rate (kg/kgbw-d)	Dosage (mg/kgbw-d)	Dietary Concentration (mg/kg)	Endpoint	Effect Measured/ Observed	Reference	Ingestion Uncertainty Factor[a]	Normalized Dosage NOAEL (mg/kgbw-d)	Normalized Dietary NOAEL (mg/kg)	Hawaiian Stilt Ingestion RTVwild (mg/kgbw-d)
INORGANICS												
Aluminum	na	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mallard	1.134	0.052	5.14	--	chronic NOAEL	mortality -0%	Heinz et al., 1989 in Sample et al., 1996	1.0	5.1	--	5.1
Barium	chicken	1.8	0.047	208	--	subchronic NOAEL	mortality	Johnson et al., 1960 in Sample et al., 1996	10	21	--	21
Chromium	black duck	1.25	0.051	--	200	chronic NOAEL	behavioral changes	Heinz and Hazeltine, 1981	1.0	--	200	10.2
Cobalt	na	--	--	--	--	--	--	--	1.0	--	--	--
Copper	chicken	1.134	0.047	47	--	chronic NOAEL	growth and mortality	Mehring et al., 1960 in Sample et al., 1996	1.0	47	--	47
Lead	coturnix quail	0.191	0.081	8.1	--	chronic NOAEL	anemia, growth	Morgan et al., 1975	1.0	8.1	--	8.1
Manganese	coturnix quail	0.072	0.081	977	--	chronic NOAEL	growth and behavior	Laskey and Edens, 1985 in Sample et al., 1996	1.0	977	--	977
Mercury	coturnix quail	0.191	0.081	--	4	chronic NOAEL	food consumption, growth, egg fertilization, egg hatchability, eggshell thickness	Hill and Shaffner, 1976	1.0	--	4.0	0.324
Nickel	mallard	1.043	0.057	77.4	--	chronic LOAEL	mortality, growth, behavior	Cain and Pafford, 1981 in Sample et al., 1996	5.0	15.48	--	15.48

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Bellows OU1 EE/CA, Bellows AFS, Hawaii

	Laboratory Animal Ingestion Reference Toxicity Values (RTVlab)								Normalization to NOAEL - Ingestion			
Chemical	Laboratory Species	Laboratory Species Body Weight (kg)	Laboratory Species Ingestion Rate (kg/kgbw-d)	Dosage (mg/kgbw-d)	Dietary Concentration (mg/kg)	Endpoint	Effect Measured/ Observed	Reference	Ingestion Uncertainty Factor[a]	Normalized Dosage NOAEL (mg/kgbw-d)	Normalized Dietary NOAEL (mg/kg)	Hawaiian Stilt Ingestion RTVwild (mg/kgbw-d)
Selenium	mallard	1.134	0.052	0.4	--	chronic NOAEL	impaired reproduction	Heinz et al., 1989 in Sample et al., 1996	1.0	0.40	--	0.40
Silver	chicken	1.8	0.047	--	900	subchronic LOAEL	depressed growth, increased heart weight to body weight ratio, mortality	Peterson and Jensen, 1975	20	--	45	2.1
Vanadium	mallard	1.134	0.052	11.4	--	chronic NOAEL	mortality, body weight, blood chemistry	White and Dieter, 1978 in Sample et al., 1996	1.0	11	--	11
Zinc	chicken	1.8	0.047	14.5	--	chronic NOAEL	no reduction in egg hatchability	Stahl et al., 1990 in Sample et al., 1996	1.0	15	--	15
ORGANICS												
4,4'-DDE	black duck	1.25	0.051	--	10	chronic LOAEL	eggshell thinning, egg cracking	Longcore et al., 1971	5.0	--	2.0	0.10
	brown pelican	3.5	0.131	--	1	chronic NOAEL	eggshell thinning	Beyer et al., 1996; EPA, April 1993	1.0	--	1.0	0.13
4,4'-DDT	mallard	1.134	0.052	--	2	chronic NOAEL	eggshell thickness, weight, calcium content	Davison and Sell, 1974	1.0	--	2.0	0.10
BHC-alpha	na	--	--	--	--	--	--	--	1.0	--	--	--
BHC-beta	na	--	--	--	--	--	--	--	10	--	--	--
BHC-delta	na	--	--	--	--	--	--	--	1.0	--	--	--

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Reference Toxicity Values and Exposure Parameters for Birds, Bellows AFS

Bellows OU1 EE/CA, Bellows AFS, Hawaii

	Laboratory Animal Ingestion Reference Toxicity Values (RTVlab)								Normalization to NOAEL - Ingestion			
Chemical	Laboratory Species	Laboratory Species Body Weight (kg)	Laboratory Species Ingestion Rate (kg/kgbw-d)	Dosage (mg/kgbw-d)	Dietary Concentration (mg/kg)	Endpoint	Effect Measured/ Observed	Reference	Ingestion Uncertainty Factor[a]	Normalized Dosage NOAEL (mg/kgbw-d)	Normalized Dietary NOAEL (mg/kg)	Hawaiian Stilt Ingestion RTVwild (mg/kgbw-d)
BHC-gamma (lindan	mallard	1.134	0.052	20	--	chronic LOAEL	eggshell thickness, number of eggs, laying intervals	Chakravarty and Lahiri 1986 in Sample et al., 1996	5.0	4.0	--	4.0
Chlordane - alpha	red-winged blackbird	0.064	0.214	2.14	--	chronic NOAEL	mortality	Stickel et al., 1983 in Sample et al., 1996	1.0	2.14	--	2.14
Chlordane - gamma	red-winged blackbird	0.064	0.214	2.14	--	chronic NOAEL	mortality	Stickel et al., 1983 in Sample et al., 1996	1.0	2.14	--	2.14
Dieldrin	barn owl	0.466	0.134	0.077	--	chronic NOAEL	eggshell thickness, number of eggs laid/hatched, %broken, embryo mortality	Mendenhall et al., 1983 in Sample et al., 1996	1.0	0.077	--	0.077
Endosulfan 1[b]	gray partridge	0.4	0.068	10	--	chronic NOAEL	no overt signs of toxicity, reproduction	Abiola, 1992 in Sample et al., 1996	1.0	10	--	10
Endosulfan 2[b]	gray partridge	0.4	0.068	10	--	chronic NOAEL	no overt signs of toxicity, reproduction	Abiola, 1992 in Sample et al., 1996	1.0	10	--	10
Endosulfan sulfate[b]	gray partridge	0.4	0.068	10	--	chronic NOAEL	no overt signs of toxicity, reproduction	Abiola, 1992 in Sample et al., 1996	1.0	10	--	10
Endrin	mallard	1.134	0.052	0.3	--	chronic NOAEL	reproductive performance	Spann et al., 1986 in Sample et al., 1996	1.0	0.30	--	0.30
Endrin aldehyde[b]	mallard	1.134	0.052	0.3	--	chronic NOAEL	reproductive performance	Spann et al., 1986 in Sample et al., 1996	1.0	0.30	--	0.30

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Reference Toxicity Values and Exposure Parameters for Birds, Bellows AFS

Bellows OU1 EE/CA, Bellows AFS, Hawaii

	Laboratory Animal Ingestion Reference Toxicity Values (RTVlab)								Normalization to NOAEL - Ingestion			
Chemical	Laboratory Species	Laboratory Species Body Weight (kg)	Laboratory Species Ingestion Rate (kg/kgbw-d)	Dosage (mg/kgbw-d)	Dietary Concentration (mg/kg)	Endpoint	Effect Measured/ Observed	Reference	Ingestion Uncertainty Factor[a]	Normalized Dosage NOAEL (mg/kgbw-d)	Normalized Dietary NOAEL (mg/kg)	Hawaiian Stilt Ingestion RTVwild (mg/kgbw-d)
Heptachlor	coturnix quail	0.191	0.081	--	50	subacute LOAEL	signs of toxicity, mortality	Hill et al., 1975	50	--	1.0	0.08
Heptachlor epoxide	woodcock	0.197	0.081	--	2.86	lethal	mortality	Beyer and Gish, 1980	100	--	0.029	0.0023
Methoxychlor	coturnix quail	0.191	0.081	22,000	--	LD50	mortality	Verschueren, 1983	100	220	--	220
PCB 1260	coturnix quail	0.191	0.081	--	2,195	LC50	mortality	Hill and Camardese, 1986	100	--	22	1.78

[a]Uncertainty factors applied (Wentsel et al., 1996):

Endpoint	*Uncertainty Factor*
chronic NOAEL	1
chronic LOAEL	5
subchronic NOAEL	10
subchronic LOAEL	20
acute/subacute NOA	30
acute/subacute LOA	50
LC50/LD50	100

[b]Effect level for similar chemical (surrogate) used:

Chemical	*Surrogate*
endosulfan 1	endosulfan
endosulfan 2	endosulfan
endosulfan sulfate	endosulfan
endrin aldehyde	endrin

Hawaiian Stilt - Exposure Fac		*Source*
body weight (kg)	0.203	Coleman, 1981
IR food (kg/kgbw-d)	0.109	allometric calculation based on Nagy, 1987 in EPA, 1993
Aquatic inverts.	18% [1]	Telfer, 1976

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	Laboratory Animal Ingestion Reference Toxicity Values (RTVlab)								Normalization to NOAEL - Ingestion			
Chemical	Laboratory Species	Laboratory Species Body Weight (kg)	Laboratory Species Ingestion Rate (kg/kgbw-d)	Dosage (mg/kgbw-d)	Dietary Concentration (mg/kg)	Endpoint	Effect Measured/ Observed	Reference	Ingestion Uncertainty Factor[a]	Normalized Dosage NOAEL (mg/kgbw-d)	Normalized Dietary NOAEL (mg/kg)	Hawaiian Stilt Ingestion RTVwild (mg/kgbw-d)
Fish	72% [1]	Telfer, 1976										
Sediment	10%	adapted from Beyer et al., 1994										

[1] Assumed 90% diet fish for exposure model since no invertebrate tissue available. Compared to regional studies of fish and invertebrate tissue concentrations, this appears to be conservative assumption.

-- = not applicable
na = not available
RTV = reference toxicity value
LD50 = lethal dose at which 50% of the test organisms died
Ldlo = lowest lethal dose
LOAEL = lowest observed adverse effects level
NOAEL = no observed adverse effects level
NOEL = no observed effects level
kg = kilogram
kg/kgbw-d = kilograms per kilogram of body weight per day
mg/kg = milligrams per kilogram