Attachment A

Ecological Screening Evaluation
Support Documentation

Table A1. Calculation of NOAEL-Based Screening Benchmarks for American Robin and Northern Cardinal - Category 1 Leach Study Analytes

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		TRV		Soil	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts					
					kg/BW-day	unitless	unitless	unitless	unitless		unitless		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg	unitless	mg/kg
Arsenic	--	--	-	Cardinal	0.225	0.02	0.6	0.38	0.03752	a	eq	a-1	5.91	8.59	2.24	a	158	1.0	158
	--	--	-	Robin	0.193	0.05	0.045	0.905	0.03752	a	eq	a-1	4.08	6.62	2.24	a	109	1.0	109
Boron				Dove	0.19	0.139	1		4	b	0		146.5	0	28.8		36.6	1.0	36.6
				Woodcock	0.214	0.164		1	4	b	0			0	28.8		820.6	1.0	821
				Hawk	0.0353	0.057			4	b	0			0	28.8		14313.4	1.0	14313
Boron	--	--	-	Cardinal	0.225	0.02	0.6	0.38	4	b	0	e	212	0	28.8	j	52.9	1.0	52.9
	--	--	-	Robin	0.193	0.05	0.045	0.905	4	b	0	e	2598	0	28.8	j	649	1.0	649
Chromium VI	--	--	-	Cardinal	0.225	0.02	0.6	0.38	0.0075	b	0.06	b	7.76	62.1	11	b	1034	1.0	1034
	--	--	-	Robin	0.193	0.05	0.045	0.905	0.0075	b	0.06	b	4.09	32.7	11	b	545	1.0	545
Cyanide				Dove	0.19	0.139	1		1				33.2701816		7.2		33.3	1.0	33.3
				Woodcock	0.214	0.164		1			0			0	7.2		205.2	1.0	205.2
				Hawk	0.0353	0.057									7.2		3578	1.0	3578
Cyanide	--	--	-	Cardinal	0.225	0.02	0.6	0.38	1	b	0	h	52	0	7.2	i	52	1.0	51.6
	--	--	-	Robin	0.193	0.05	0.045	0.905	1	b	0	h	393	0	7.2	i	393	1.0	393
Lithium				Cardinal	0.225	0.02	0.61	0.39					0	0	no info		398	--	398
				Robin	0.193	0.05	0.07	0.93					0	0	no info		381	--	381
Selenium	--	--	-	Cardinal	0.225	0.02	0.6	0.38	eq	a-2	eq	a-3	1.10	1.55	0.29	a	2.01	1.0	2.01
	--	--	-	Robin	0.193	0.05	0.045	0.905	eq	a-2	eq	a-3	1.05	1.50	0.29	a	1.93	1.0	1.93
Strontium				Cardinal	0.225	0.02	0.61	0.39					0	0	no info		398	--	398
				Robin	0.193	0.05	0.07	0.93					0	0	no info		381	--	381
Zinc				Dove	0.19	0.139	1		eq	a	eq	a	216		66.1		950	1.0	950
				Woodcock	0.214	0.164		1	eq	a	eq	a		300	66.1		46.0	1.0	46.0
				Hawk	0.0353	0.057			eq	a	eq	a			66.1		30000	1.0	30000
				Cardinal	0.225	0.02	0.61	0.39	eq	a	eq	a	115	559	66.1		305	1.0	305
				Robin	0.193	0.05	0.07	0.93	eq	a	eq	a	55	360	66.1		80.1	1.0	80.1
Hexachlorobenzene	5.73	3981	f	Cardinal	0.225	0.02	0.6	0.38	0.286	c	152	d	0.1	58	5	b	0.384	1.0	0.384
	5.73	3981	f	Robin	0.193	0.05	0.045	0.905	0.286	c	152	d	0.1	28.6	5	b	0.189	1.0	0.189
Hexachlorobutadiene				Dove	0.19	0.139	1		0.695				14.0		3.185		20.1	1.0	20.1
				Woodcock	0.214	0.164		1			17.9			14.7	3.185		0.82	1.0	0.82
				Hawk	0.0353	0.057			0.695		17.9		153	3952	3.185		220.3	1.0	220
Hexachlorobutadiene	4.78	5020	f	Cardinal	0.225	0.02	0.6	0.38	0.695	c	17.9	d	1.4	35	3.185	l	1.95	1.0	1.95
	4.78	5020	f	Robin	0.193	0.05	0.045	0.905	0.695	c	17.9	d	0.70	18	3.185	l	1.01	1.0	1.013
LMW PAHs				Dove	0.19	0.139	1		2.09				1096		222		524	1.0	524
				Woodcock	0.214	0.164		1			3.04			984	222		324	1.0	324
				Hawk	0.0353	0.057									222		110332	1.0	110332
Fluoranthene	--	--	-	Cardinal	0.225	0.02	0.6	0.38	2.09	a	3.04	a	849	1236	222	k	406	1.0	406
	--	--	-	Robin	0.193	0.05	0.045	0.905	2.09	a	3.04	a	831	1209	222	k	398	1.0	398

Table A1. Calculation of NOAEL-Based Screening Benchmarks for American Robin and Northern Cardinal - Category 1 Leach Study Analytes

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		TRV		Soil	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts					
					kg/BW-day	unitless	unitless	unitless	unitless		unitless		mg/kg dw	mg/kg dw	mg/kgBW/day	source	mg/kg	unitless	mg/kg
Methylene Chloride				Cardinal	0.225	0.02	0.61	0.39					--	--	no info		NA	--	NA
				Robin	0.193	0.05	0.07	0.93					--	--	no info		NA	--	NA
Pentachlorophenol	--	--	-	Cardinal	0.225	0.02	0.6	0.38	5.93	a	14.63	a	19.4	47.9	6.73	a	3.28	1.0	3.28
	--	--	-	Robin	0.193	0.05	0.045	0.905	5.93	a	14.63	a	15.3	37.7	6.73	a	2.57	1.0	2.57
Toluene	2.73			Cardinal	0.225	0.02	0.61	0.39					--	--	no info		NA	--	NA
				Robin	0.193	0.05	0.07	0.93					--	--	no info		NA	--	NA
Total Xylenes	3.12	382.9	f, g	Cardinal	0.225	0.02	0.6	0.38	eq	c	eq	d	3.28	1239	107	b	147	1.0	147
	3.12	382.9	f, g	Robin	0.193	0.05	0.045	0.905	eq	c	eq	d	3.28	609	107	b	72.0	1.0	72

Sources:

[a] EcoSSLs (USEPA 2003-2010)

[b] LANL (LANL 2012)

[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)

[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)

Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

[e] Uptake for boron not considered significant (ATSDR 2010)

[f] Hazardous Substances Databank

[g] USEPA Regional Screening Level Tables (USEPA 2013)

[h] assumed negligible

[i] Calculated from Gomez et al. (1988) as reported in Eisler (1991)

[j] Sample et al. (1998)

[k] Patton and Dieter (1980) exposed mallards (*Anas platyrhynchos*) to a diet containing 4,000 µg PAHs/g (222 mg/kgBW/day) (mostly as naphthalenes, naphthenes, and phenanthrene) for 7 months. No visible signs of toxicity were evident during the exposure. Although food consumption was not measured, it was believed the toxicant effect was mediated through a decrease in the voluntary intake by the birds because of reduced food palatability. http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/index.html; Ministry of Environment, Lands and Parks, Province of British Columbia, N. K. Nagpal, Ph.D., Water Quality Branch, Water Management Division. Results for these low molecular weight PAHs were selected as a surrogate for fluoranthene.

[l] USEPA (1999)

a-1 =EXP(0.706*LN(Csoil)-1.421) from EcoSSLs

a-2 =EXP(1.104*LN(Csoil)-0.677) From EcoSSLs

a-3 =EXP(0.733*LN(Csoil)-0.075) from EcoSSLs

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Table A2. Calculation of Category 1 LOAEL-Based Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		LOAEL TRV		Soil	LOAEL HQ	ESLB (LOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts					
					kg/BW-day	unitless	unitless	unitless	unitless		unitless		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg	unitless	mg/kg
Barium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.16	a	0.091	a	613	358	131	b	3932	1.0	3932
	--	--		Robin	0.193	0.05	0.045	0.905	0.16	a	0.091	a	779	443	131	b	4869	1.0	4869
Hexachlorobutadiene	4.78	5020	f	Cardinal	0.225	0.02	0.6	0.38	0.695	c	17.9	d	6.8	175	15.9	e	9.76	1.0	9.76
	4.78	5020	f	Robin	0.193	0.05	0.045	0.905	0.695	c	17.9	d	3.5	90.8	15.9	e	5.06	1.0	5.06
Cobalt	--	--		Cardinal	0.225	0.02	0.6	0.38	0.0075	a	0.122	a	5.4	88	11.5	k	722	1.0	722
	--	--		Robin	0.193	0.05	0.045	0.905	0.0075	a	0.122	a	2.8	45	11.5	k	371	1.0	371
Chromium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.041	a	0.306	a	3.2	24	2.78	l	76.8	1.0	76.8
	--	--		Robin	0.193	0.05	0.045	0.905	0.041	a	0.306	a	1.8	13	2.78	l	43.9	1.0	43.9
Boron	--	--		Cardinal	0.225	0.02	0.6	0.38	4.00	b	0.0	g	688	0	93.6	h	172	1.0	172
	--	--		Robin	0.193	0.05	0.045	0.905	4.00	b	0.0	g	8443	0	93.6	h	2111	1.0	2111
Fluoranthene	--	--		Cardinal	0.225	0.02	0.6	0.38	2.09	a	3.04	a	4247	6178	1110	i	2032	1.0	2032
	--	--		Robin	0.193	0.05	0.045	0.905	2.09	a	3.04	a	4156	6045	1110	i	1989	1.0	1989
Selenium	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	a-1	eq	a-2	2.47	2.65	0.579	m	4	1.0	4.19
	--	--		Robin	0.193	0.05	0.045	0.905	eq	a-1	eq	a-2	2.85	2.91	0.579	m	4.8	1.0	4.76
Silver	--	--		Cardinal	0.225	0.02	0.6	0.38	0.014	a	2.045	a	1.56	228	20.2	b	112	1.0	112
	--	--		Robin	0.193	0.05	0.045	0.905	0.014	a	2.045	a	0.8	113	20.2	b	55	1.0	55.1
Arsenic	--	--		Cardinal	0.225	0.02	0.6	0.38	0.03752	a	eq	a-3	9.81	12.3	3.55	n	262	1.0	262
	--	--		Robin	0.193	0.05	0.045	0.905	0.03752	a	eq	a-3	7.00	9.69	3.55	n	187	1.0	187
Chromium IV	--	--		Cardinal	0.225	0.02	0.6	0.38	0.0075	b	0.06	b	77.6	621	110	b	10343	1.0	10343
	--	--		Robin	0.193	0.05	0.045	0.905	0.0075	b	0.06	b	40.9	327	110	b	5453	1.0	5453
Pentachlorophenol	--	--		Cardinal	0.225	0.02	0.6	0.38	5.93	a	14.63	a	194	479	67.3	b	32.8	1.0	32.8
	--	--		Robin	0.193	0.05	0.045	0.905	5.93	a	14.63	a	153	377	67.3	b	25.7	1.0	25.7
Xylenes, Total	3.12	382.9	f, j	Cardinal	0.225	0.02	0.6	0.38	eq	c	eq	d	3.28	12440	1070	b	1471	1.0	1471
	3.12	382.9	f, j	Robin	0.193	0.05	0.045	0.905	eq	c	eq	d	3.28	6092	1070	b	720	1.0	720

ESLB Ecologiacl Screening Level Benchmark
HQ Hazard quotient
LOAEL Lowest observed adverse effect level
TRV Toxicity Reference Value
UF Uptake factor

Equations:
a-1 =Exp(1.104*LN(Csoil)-0.677) From USEPA (2007a)
a-2 =Exp(0.733*LN(Csoil)-0.075) from USEPA (2007a)
a-3 =Exp(0.706*LN(Csoil)-1.421) from USEPA (2007a)

Sources:
[a] USEPA (2007)
[b] LANL (LANL 2012)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007a)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007a)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)
[e] LOAEL estimated as NOAEL for hexabutadiene from USEPA (1999) multiplied by 5^o.
[f] Hazardous Substances Databank
[g] Uptake for boron not considered significant (ATSDR 2010)
[h] Sample et al. (1998)

Table A2. Calculation of Category 1 LOAEL-Based Screening Level Benchmarks for American Robin and Northern Cardinal

[i] Patton and Dieter (1980) exposed mallards (*Anas platyrhynchos*) to a diet containing 4,000 µg PAHs/g (222 mg/kgBW/day) (mostly as naphthalenes, naphthenes, and phenanthrene) for 7 months. No visible signs of toxicity were evident during the exposure. Although food consumption was not measured, it was believed the toxicant effect was mediated through a decrease in the voluntary intake by the birds because of reduced food palatability. http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/index.html; Ministry of Environment, Lands and Parks, Province of British Columbia, N. K. Nagpal, Ph.D., Water Quality Branch, Water Management Division. NOAEL results for these low molecular weight PAHs were selected as a surrogate for fluoranthene. The NOAEL multiplied by 5 was selected as a LOAEL TRV[o].

[j] USEPA Regional Screening Level Tables (USEPA 2013)

[k] The USEPA EcoSSL document for cobalt (USEPA 2005)a calculated a geometric mean of NOAELs at 7.61 mg/kgBW/day. The TRV selected was the lowest LOAEL greater than this value reported as 11.5 mg/kgBW/day from a study on chickens in which mortality was observed in juvenile chickens were fed cobalt chloride in feed for 5 weeks (Hill 1974).

[l] The NOAEL used for derivation of the chromium III USEPA EcoSSL (USEPA 2008)for birds was a geometric mean of NOAELs for growth and reproduction equivalent to 2.66 mg/kgBW/day. The LOAEL TRV selected was the lowest LOAEL greater than this value (2.78 mg/kgBW/day) based on reproductive success in black ducks fed chrome alum docehydrate in their feed (Haseltine, unpublished; as cited in Eisler 1986).

[m] In the USEPA EcoSSL for selenium (USEPA 2007b), the NOAEL selected was equal to 0.29 mg selenium/kgBW/day based on a 2-week study on survival in chickens (El-Begearmi and Combs, 1982). In the same study, no reduction in survival was observed at 0.579 mg/kgBW/day, which was selected as the LOAEL TRV.

[n] The USEPA EcoSSL TRV for arsenic (USEPA 2005b) was equal to 2.24 mg arsenic/kg bw/day which was based on a study of chickens in which changes in progeny numbers were not observed when hens were fed arsenic oxide for 19 days (Holcman and Stibilj

[o] Uncertainty factors of five (USACHPPM 2000) to 10 (Sample et al. 1998; USEPA 1999) are often used as a ratio between effect and no-effect TRVs. A value of 10 is the more conservative approach when estimating a NOAEL from a LOAEL. Due to the great degree of uncertainty, an uncertainty factor is often not applied in estimating a LOAEL from a LOAEL. However, in the absence of an identified LOAEL, and recognizing the high uncertainty, a value of 5 was used to estimate a LOAEL from a NOAEL.

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Table A3. Calculations of NOAEL Screening Benchmark for American Robin and Northern Cardinal - Category 4 Analytes

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		NOAEL TRV	Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts					
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Chlorpyrifos	4.96	7283	a,b	Cardinal	0.225	0.02	0.6	0.38	0.59	c	17.7	d	0.17	5.0	0.45	0.28	0.5	1.0	0.281
	4.96	7283	a,b	Robin	0.193	0.05	0.045	0.905	0.59	c	17.7	d	0.08	2.6	0.45	0.14	0.5	1.0	0.145
Disulfoton	4.02	838	a,b	Cardinal	0.225	0.02	0.6	0.38	1.41	c	23.4	d	0.027	0.45	0.042	0.019	0.04	1.0	0.019
	4.02	838	a,b	Robin	0.193	0.05	0.045	0.905	1.41	c	23.4	d	0.014	0.24	0.042	0.010	0.04	1.0	0.010

mg milligrams
kg kilograms
dw dry weight

Sources:
[a] Hazardous Substances Databank
[b] USEPA Regional Screening Level Tables (USEPA 2013)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
UF Uptake factor
NOAEL No-observed-adverse-effects level
TRV Toxicity reference value
HQ Hazard quotient
ESLB Ecological Screening-Level Benchmark

Shading indicates the lowest value

References: LANL. 2012. EcoRIsk Database (Release 3.1). Los Alamos National Laboratory. LA-UR-12-24548. Los Alamos, New Mexico. (LANL 2012, 226667).
USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-93/187a
USEPA. 1999. Hazardous Waste Combustion Rule. Screening-Level Ecological Risk Assessment Protocol. AppendixEC. Toxicity Reference Values. August.
USEPA. 2007. Ecological Soil Screening Level Guidance. Appendix 4-1. Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSL. OSWER Directive 9285.7-55. First issued 2003. Revised April 2007.
USEPA. 2013. Regional Screening Levels. U.S. Environmental Protection Agency, Regions 3 and 9. On-line at: http://www.epa.gov/region9/superfund/prg/. Last updated May 2013.

Table A4. Calculations of LOAEL Screening Benchmark for American Robin and Northern Cardinal - Category 4 Analytes

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		LOAEL TRV	Soil	Dose	LOAEL HQ	ESLB (LOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts					
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Chlorpyrifos	4.96	7283	a,b	Cardinal	0.225	0.02	0.6	0.38	0.59	c	17.7	d	1.65	49.9	4.5	2.81	4.5	1.0	2.81
	4.96	7283	a,b	Robin	0.193	0.05	0.045	0.905	0.59	c	17.7	d	0.85	25.7	4.5	1.45	4.5	1.0	1.45
Disulfoton	4.02	838	a,b	Cardinal	0.225	0.02	0.6	0.38	1.41	c	23.4	d	0.270	4.48	0.42	0.191	0.42	1.0	0.191
	4.02	838	a,b	Robin	0.193	0.05	0.045	0.905	1.41	c	23.4	d	0.144	2.39	0.42	0.102	0.42	1.0	0.102

mg milligrams
kg kilograms
dw dry weight

Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
UF Uptake factor
NOAEL No-observed-adverse-effects level
TRV Toxicity reference value
HQ Hazard quotient
ESLB Ecological Screening-Level Benchmark

Shading indicates the lowest value

Sources:
[a] Hazardous Substances Databank
[b] USEPA Regional Screening Level Tables (USEPA 2013)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

References: LANL. 2012. EcoRIsk Database (Release 3.1). Los Alamos National Laboratory. LA-UR-12-24548. Los Alamos, New Mexico. (LANL 2012, 226667).
USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-93/187a
USEPA. 1999. Hazardous Waste Combustion Rule. Screening-Level Ecological Risk Assessment Protocol. AppendixEC. Toxicity Reference Values. August.
USEPA. 2007. Ecological Soil Screening Level Guidance. Appendix 4-1. Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSL. OSWER Directive 9285.7-55. First issued 2003. Revised April 2007.
USEPA. 2013. Regional Screening Levels. U.S. Environmental Protection Agency, Regions 3 and 9. On-line at: http://www.epa.gov/region9/superfund/prg/. Last updated May 2013.

Chlorpyrifos Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Pheasant		LD50	Single oral dose (gavage)	L	Mortality		8.41	Cornell (1993)
Mallard		LD50	Single oral dose (gavage)	L	Mortality		112	Cornell (1993)
House Sparrow		LD50	Single oral dose (gavage)	L	Mortality		21	Cornell (1993)
Chicken		LD50	Single oral dose (gavage)	L	Mortality		32	Cornell (1993)
Red-winged Blackbird		LD50	Single oral dose (gavage)	L	Mortality		13	Schafer 1983
Bobwhite Quail	0.177	LC50	5-day		Mortality	647	68.9*	Bennett (1989)
Mallard	1.134	LOAEL	Breeding period	C	Reproductive: (# hatchlings, duckling survival)	80	4.5*	Meyers and Gill (1986) in HSDB (2014)
Mallard	1.134	NOAEL	Breeding period	C	Reproductive: (# hatchlings, duckling survival)	8	0.45*	Meyers and Gill (1986) in HSDB (2014)

Selected:

One study was identified measuring reproduction in mallard ducks; it is considered chronic because dosing occurred during a sensitive life-stage. The LOAEL in this study was 4.5 mg/kgBW/day; the NOAEL in this study was 0.45 mg/kgBW/day.

DURATION CODE:

L = LD_{50}	LD50 - Lethal dose at which 50% of test animals die
A = Acute	LC50 - Lethal concentration in feed at which 50% of test animals die
S = Subchronic	LOAEL - Lowest-observed-adverse-effects level
C = Chronic	NOAEL - No-observed-adverse-effects level

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993
Adult mallard body weight (male and female) = 1.134 kg; Nelson & Martin (1953) average throughout North America, as reported in USEPA (1993).
Adult bobwhite quail weight (male and female) = 0.177 kg; Roseberry and Klimstra (1971) average throughout North America, as reported in USEPA (1993).

References:

Bennett, R.S. 1989. Role of dietary choices in the ability of bobwhite to discriminate between insecticide-treated food. Env. Toxicol. Chem. 8(8):731-738.

Cornell. 1993. Chlorpyrifos. Pesticide Management Education Program, Cornell Cooperative Extension. Available at: http://pmep.cce.cornell.edu/

HSDB. 2014. Chlorpyrifos. Hazardous Substances Data Bank, Toxicology Data Network, U.S. National Library of Medicine. Last updated 24 April 2014.

Meyers , S.M. and Gile, J.D. 1986. Arch Environ Contam Toxicol 15 (6): 757-61 (As cited in HSDB 2014)

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Disulfoton Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Mallard		LD50	Single oral dose	L	Mortality		7	Cornell (1988)
Bobwhite Quail (Male)		LD50	Single oral dose	L	Mortality		12	Cornell (1988)
Starling		LD50	Single oral dose (gavage)	L	Mortality		133	INCHEM (1988)
Mallard		LD50	Single oral dose (gavage)	L	Mortality		6.54	INCHEM (1988)
Bobwhite Quail (Male)		LD50	Single oral dose (gavage)	L	Mortality		31	INCHEM (1988)
Bobwhite Quail (Female)		LD50	Single oral dose (gavage)	L	Mortality		28	INCHEM (1988)
Pheasants		EMLD	30-day	L	Mortality		4.2	HSDB (2014)
Pheasants		EMLD (w/no effect)	30-day	L	Mortality		3.0	HSDB (2014)
Bobwhite Quail		LC50	5-day	SL	Mortality	715	76.2*	INCHEM (1988)
Japanese Quail		LC50	5-day	L	Mortality	333	37.6*	INCHEM (1988)
Ring-necked Pheasant		LC50	5-day	L	Mortality	634	35.3*	INCHEM (1988)

Disulfoton Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Mallard		LC50	5-day	C	Mortality	510	28.4*	INCHEM (1988)

Selected:

Limited information was found in the literature search with an oral toxicity value for disulfotoan for birds. The selected study is based on a EMLD of 4.2 in pheasants, based on length of study and at low end of the range of values identified. (An additional EMLD was not seleted because the study reported no effect). A chronic LOAEL and NOAEL are selected by adjusting the EMDL by an uncertainty factor of 10 and 100, respectively.

DURATION CODE:

L = LD_{50} — LD50 - Lethal single dose at which 50% of test animals die
A = Acute — LC50 - Lethal concentration in feed at which 50% of test animals die
S = Subchronic — LOAEL - Lowest-observed-adverse-effects level
C = Chronic — NOAEL - No-observed-adverse-effects level
EMLD - estimated minimum lethal dose

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993
Ring-necked pheasant Body Weight (average male & female) = 1.135 kg, Dunning 1993
Adult mallard body weight (male and female) = 1.134 kg; Nelson & Martin (1953) average throughout North America, as reported in USEPA (1993).
Adult bobwhite quail weight (male and female) = 0.177 kg; Roseberry and Klimstra (1971) average throughout North America, as reported in USEPA (1993).
Japanese quail body weight 0.15 kg (Vos et al. 1971, as reported in Sample et al. 1996)

References:

HSDB. 2014. Disulfoton. Hazardous Substances Data Bank, Toxicology Data Network, U.S. National Library of Medicine. Last updated 24 April 2014.

INCHEM. 1988. DATA SHEETS ON PESTICIDES No. 68, Disulfoton. World Health Organization, Food and Agriculture Organization. Online at: http://www.inchem.org/documents/pds/pds/pest68_e.htm

Table A5. Calculations of NOAEL Screening Benchmark for American Robin and Northern Cardinal - Category 5 Analytes

Constituent				Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		BAFs for Dietary Items				Conc. Dietary Items		NOAEL TRV	Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants		Inverts		Plants	Inverts					
	log Kow	Koc	source		kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)	source	(mg/kg tissue dw/ mg/kg soil dw)	source	mg/kg dw	mg/kg dw	mg/kgBW/ day	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
2-Chlorotoluene	3.42	383	f,g	Cardinal	0.225	0.02	0.6	0.38	2.47	c	15.4	d	40	252	27.1	16.4	27.1	1.0	16.4
	3.42	383	f,g	Robin	0.193	0.05	0.045	0.905	2.47	c	15.4	d	25	154	27.1	10.0	27.1	1.0	10.0
Propachlor	2.18	205	f,g	Cardinal	0.225	0.02	0.6	0.38	7.88	c	2.41	d	5	2	0.88	0.69	0.88	1.0	0.69
	2.18	205	f,g	Robin	0.193	0.05	0.045	0.905	7.88	c	2.41	d	14	4	0.88	1.8	0.88	1.0	1.8
Mirex	6.89	356600	f,g	Cardinal	0.225	0.02	0.6	0.38	0.0968	c	17.3	d	0.013	2	0.2	0.134	0	1.0	0.134
	6.89	356600	f,g	Robin	0.193	0.05	0.045	0.905	0.0968	c	17.3	d	0.006	1.1	0.2	0.066	0	1.0	0.066
Azobenzene	3.82	3759	f,g	Cardinal	0.225	0.02	0.6	0.38	1.70	c	3.50	d	3.2	6.6	1	1.87	1	1.0	1.87
	3.82	3759	f,g	Robin	0.193	0.05	0.045	0.905	1.70	c	3.50	d	2.7	5.5	1	1.57	1	1.0	1.57
1,2,4-Trimethylbenzene	3.63	614	f,g	Cardinal	0.225	0.02	0.6	0.38	2.03	c	14.6	d	30	215	22.5	14.7	23	1.0	14.7
	3.63	614	f,g	Robin	0.193	0.05	0.045	0.905	2.03	c	14.6	d	18	128	22.5	8.71	23	1.0	8.71
1,3,5-Trimethylbenzene[a]	3.42	602	f,g	Cardinal	0.225	0.02	0.6	0.38	2.47	c	9.8	d	47	188	22.5	19.1	23	1.0	19.1
	3.42	602	f,g	Robin	0.193	0.05	0.045	0.905	2.47	c	9.8	d	32	127	22.5	12.9	23	1.0	12.9
1,2,3-Trimethylbenzene[a]	3.66	627	f,g	Cardinal	0.225	0.02	0.6	0.38	1.98	c	15.2	d	28	218	22.5	14.3	23	1.0	14.3
	3.66	627	f,g	Robin	0.193	0.05	0.045	0.905	1.98	c	15.2	d	17	128	22.5	8.38	23	1.0	8.38
o-Phenylphenol	3.09	6722	f,g	Cardinal	0.225	0.02	0.6	0.38	3.37	c	0.454	d	1523	205	225	452	225	1.0	452
	3.09	6722	f,g	Robin	0.193	0.05	0.045	0.905	3.37	c	0.454	d	6422	865	225	1907	225	1.0	1907
Benzoic Acid	1.87	16.55	f,g	Cardinal	0.225	0.02	0.6	0.38	10.5	c	16.0	d	95	144	25.1	8.99	25	1.0	8.99
	1.87	16.55	f,g	Robin	0.193	0.05	0.045	0.905	10.5	c	16.0	d	91	139	25.1	8.68	25	1.0	8.68
Isopropyl Benzene	3.66	697.80	f,g	Cardinal	0.225	0.02	0.6	0.38	1.98	c	13.7	d	1.3	9.3	0.98	0.680	1.0	1.0	0.680
	3.66	697.80	f,g	Robin	0.193	0.05	0.045	0.905	1.98	c	13.7	d	0.80	5.6	0.98	0.406	1.0	1.0	0.406
Tetrahydrofuran	0.46	10.75	f,g	Cardinal	0.225	0.02	0.6	0.38	39.3	c	1.46	d	7.1	0.26	0.98	0.180	1.0	1.0	0.180
	0.46	10.75	f,g	Robin	0.193	0.05	0.045	0.905	39.3	c	1.46	d	64	2.4	0.98	1.62	1.0	1.0	1.62
Cresols	1.94	300.40	f,g	Cardinal	0.225	0.02	0.6	0.38	9.86	c	1.01	d	6.7	0.68	0.96	0.675	1.0	1.0	0.675
	1.94	300.40	f,g	Robin	0.193	0.05	0.045	0.905	9.86	c	1.01	d	35	3.6	0.96	3.53	1.0	1.0	3.53
Dibenzofuran	4.12	9161.00	f,g	Cardinal	0.225	0.02	0.6	0.38	1.29	c	2.62	d	3.3	6.6	1.02	2.54	1.0	1.0	2.54
	4.12	9161.00	f,g	Robin	0.193	0.05	0.045	0.905	1.29	c	2.62	d	2.7	5.6	1.02	2.13	1.0	1.0	2.13
Molybdenum	--	--		Cardinal	0.225	0.02	0.6	0.38	0.400	b	0.480	b	28	34	7.07	71.1	7.07	1.0	71.1
	--	--		Robin	0.193	0.05	0.045	0.905	0.400	b	0.480	b	29	35	7.07	73.0	7.07	1.0	73.0
Lithium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.025	b	0.0460	b	1	3	0.691	58.6	0.691	1.0	58.6
	--	--		Robin	0.193	0.05	0.045	0.905	0.025	b	0.0460	b	1.0	2	0.691	38.6	0.691	1.0	38.6
1,1-Dichloropropene[e]	1.82	72.17		Cardinal	0.225	0.02	0.6	0.38	11.0	c	3.32	d	35	10	5.57	3.14	5.57	1.0	3.14
	1.82	72.17		Robin	0.193	0.05	0.045	0.905	11.0	c	3.32	d	90	27	5.57	8.14	5.57	1.0	8.14
p-Isopropyltoluene	4.1	1120.00	g	Cardinal	0.225	0.02	0.6	0.38	1.31	c	20.6	d	2.1	34	3.16	1.6	3.2	1.0	1.6
	4.1	1120.00	g	Robin	0.193	0.05	0.045	0.905	1.31	c	20.6	d	1.1	18	3.16	0.87	3.2	1.0	0.87
Titanium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.00550	b	1.00	b	0.045	8.3	0.75	8.27	0.75	1.0	8.27
	--	--		Robin	0.193	0.05	0.045	0.905	0.00550	b	1.00	b	0.022	4.1	0.75	4.07	0.75	1.0	4.07

Table A5. Calculations of NOAEL Screening Benchmark for American Robin and Northern Cardinal - Category 5 Analytes

Sources:

[a] Toxicity reference value for 1,2,4-Trimethylbenzene used as a surrogate
[b] LANL (LANL 2012)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)
[e] Toxicity reference value for 1,3-dichloropropene used as a surrogate
[f] Hazardous Substances Databank
[g] USEPA Regional Screening Level Tables (USEPA 2013)

mg milligrams
kg kilograms
dw dry weight
bw body weight

Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
UF Uptake factor
NOAEL No-observed-adverse-effects level
TRV Toxicity reference value
HQ Hazard quotient
ESLB Ecological Screening-Level Benchmark
Shading indicates the lowest value

References: LANL. 2012. EcoRIsk Database (Release 3.1). Los Alamos National Laboratory. LA-UR-12-24548. Los Alamos, New Mexico. (LANL 2012, 226667).
USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-93/187a
USEPA. 1999. Hazardous Waste Combustion Rule. Screening-Level Ecological Risk Assessment Protocol. AppendixEC. Toxicity Reference Values. August.
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USEPA. 2013. Regional Screening Levels. U.S. Environmental Protection Agency, Regions 3 and 9. On-line at: http://www.epa.gov/region9/superfund/prg/. Last updated May 2013.

Table A6. Calculations of LOAEL Screening Benchmark for American Robin and Northern Cardinal - Category 5 Analytes

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR) kg (dw)/BW-day	Soil Ingestion as a proportion of diet (P_s) Decimal Fraction	Fraction Diet: Plants Decimal Fraction	Fraction Diet: Inverts Decimal Fraction	BAFs for Dietary Items: Plants (mg/kg tissue dw/ mg/kg soil dw)	source	BAFs for Dietary Items: Inverts (mg/kg tissue dw/ mg/kg soil dw)	source	Conc. Dietary Items: Plants mg/kg dw	Conc. Dietary Items: Inverts mg/kg dw	LOAEL TRV mg/kgBW/ day	Soil mg/kg dw	Dose mg/kgBW/ day	LOAEL HQ unitless	ESLB (LOAEL) mg/kg dw
2-Chlorotoluene	3.42	383	f,g	Cardinal	0.225	0.02	0.6	0.38	2.47	c	15.4	d	405	2524	271	164	271	1.0	164
	3.42	383	f,g	Robin	0.193	0.05	0.045	0.905	2.47	c	15.4	d	246	1535	271	99.5	271	1.0	100
Propachlor	2.18	205	f,g	Cardinal	0.225	0.02	0.6	0.38	7.88	c	2.41	d	54	17	8.8	6.91	8.8	1.0	6.91
	2.18	205	f,g	Robin	0.193	0.05	0.045	0.905	7.88	c	2.41	d	139	43	8.8	17.7	8.8	1.0	17.7
Mirex	6.89	356600	f,g	Cardinal	0.225	0.02	0.6	0.38	0.0968	c	17.3	d	0.065	12	1	0.669	1	1.0	0.669
	6.89	356600	f,g	Robin	0.193	0.05	0.045	0.905	0.0968	c	17.3	d	0.032	5.7	1	0.330	1	1.0	0.330
Azobenzene	3.82	3759	f,g	Cardinal	0.225	0.02	0.6	0.38	1.70	c	3.50	d	31.9	65.6	10	18.7	10	1.0	18.7
	3.82	3759	f,g	Robin	0.193	0.05	0.045	0.905	1.70	c	3.50	d	26.8	55.1	10	15.7	10	1.0	15.7
1,2,4-Trimethylbenzene	3.63	614	f,g	Cardinal	0.225	0.02	0.6	0.38	2.03	c	14.6	d	299	2153	225	147	225	1.0	147
	3.63	614	f,g	Robin	0.193	0.05	0.045	0.905	2.03	c	14.6	d	177	1276	225	87.1	225	1.0	87.1
1,3,5-Trimethylbenzene[a]	3.42	602	f,g	Cardinal	0.225	0.02	0.6	0.38	2.47	c	9.8	d	473	1876	225	191	225	1.0	191
	3.42	602	f,g	Robin	0.193	0.05	0.045	0.905	2.47	c	9.8	d	320	1266	225	129.1	225	1.0	129
1,2,3-Trimethylbenzene[a]	3.66	627	f,g	Cardinal	0.225	0.02	0.6	0.38	1.98	c	15.2	d	283	2179	225	143	225	1.0	143
	3.66	627	f,g	Robin	0.193	0.05	0.045	0.905	1.98	c	15.2	d	166	1277	225	83.8	225	1.0	83.8
o-Phenylphenol	3.09	6722	f,g	Cardinal	0.225	0.02	0.6	0.38	3.37	c	0.454	d	7614	1025	1125	2261	1125	1.0	2261
	3.09	6722	f,g	Robin	0.193	0.05	0.045	0.905	3.37	c	0.454	d	32109	4324	1125	9533	1125	1.0	9533
Benzoic Acid	1.87	16.55	f,g	Cardinal	0.225	0.02	0.6	0.38	10.5	c	16.0	d	947	1438	251	89.9	251	1.0	89.9
	1.87	16.55	f,g	Robin	0.193	0.05	0.045	0.905	10.5	c	16.0	d	914	1388	251	86.8	251	1.0	86.8
Isopropyl Benzene	3.66	697.80	f,g	Cardinal	0.225	0.02	0.6	0.38	1.98	c	13.7	d	13.5	93.1	9.8	6.80	9.8	1.0	6.80
	3.66	697.80	f,g	Robin	0.193	0.05	0.045	0.905	1.98	c	13.7	d	8.02	55.5	9.8	4.06	9.8	1.0	4.06
Tetrahydrofuran	0.46	10.75	f,g	Cardinal	0.225	0.02	0.6	0.38	39.3	c	1.46	d	70.9	2.64	9.8	1.80	9.8	1.0	1.80
	0.46	10.75	f,g	Robin	0.193	0.05	0.045	0.905	39.3	c	1.46	d	636	23.6	9.8	16.2	9.8	1.0	16.2
Cresols	1.94	300.40	f,g	Cardinal	0.225	0.02	0.6	0.38	9.86	c	1.01	d	66.6	6.85	9.6	6.75	9.6	1.0	6.75
	1.94	300.40	f,g	Robin	0.193	0.05	0.045	0.905	9.86	c	1.01	d	348	35.8	9.6	35.3	9.6	1.0	35.3
Dibenzofuran	4.12	9161.00	f,g	Cardinal	0.225	0.02	0.6	0.38	1.29	c	2.62	d	32.7	66.5	10.2	25.4	10.2	1.0	25.4
	4.12	9161.00	f,g	Robin	0.193	0.05	0.045	0.905	1.29	c	2.62	d	27.5	55.9	10.2	21.3	10.2	1.0	21.3
Molybdenum	--	--		Cardinal	0.225	0.02	0.6	0.38	0.400	b	0.480	b	142	170	35.33	355	35.33	1.0	355
	--	--		Robin	0.193	0.05	0.045	0.905	0.400	b	0.480	b	146	175	35.33	365	35.33	1.0	365
Lithium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.025	b	0.0460	b	15	27	6.91	586	6.91	1.0	586
	--	--		Robin	0.193	0.05	0.045	0.905	0.025	b	0.0460	b	9.7	18	6.91	386	6.91	1.0	386
1,1-Dichloropropene[e]	1.82	72.17		Cardinal	0.225	0.02	0.6	0.38	11.0	c	3.32	d	346	104	55.7	31.4	55.7	1.0	31.4
	1.82	72.17		Robin	0.193	0.05	0.045	0.905	11.0	c	3.32	d	898	270	55.7	81.4	55.7	1.0	81.4
p-Isopropyltoluene	4.1	1120.00	g	Cardinal	0.225	0.02	0.6	0.38	1.31	c	20.6	d	21.3	335	31.6	16.3	31.6	1.0	16.3
	4.1	1120.00	g	Robin	0.193	0.05	0.045	0.905	1.31	c	20.6	d	11.5	180	31.6	8.74	31.6	1.0	8.74
Titanium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.00550	b	1.00	b	0.455	82.7	7.5	82.7	7.5	1.0	82.7
	--	--		Robin	0.193	0.05	0.045	0.905	0.00550	b	1.00	b	0.224	40.7	7.5	40.7	7.5	1.0	40.7

Table A6. Calculations of LOAEL Screening Benchmark for American Robin and Northern Cardinal - Category 5 Analytes

Sources:

[a] Toxicity reference value for 1,2,4-Trimethylbenzene used as a surrogate

[b] LANL (LANL 2012)

[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)

[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)

Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

[e] Toxicity reference value for 1,3-dichloropropene used as a surrogate

[f] Hazardous Substances Databank

[g] USEPA Regional Screening Level Tables (USEPA 2013)

mg	milligrams
kg	kilograms
dw	dry weight
bw	body weight

Kow	Octanol-water partitioning coefficient
Koc	Organic carbon-water partitioning coefficeint
UF	Uptake factor
LOAEL	Lowest-observed-adverse-effects level
TRV	Toxicity reference value
HQ	Hazard quotient
ESLB	Ecological Screening-Level Benchmarks
	Shading indicates the lowest value

References: LANL. 2012. EcoRIsk Database (Release 3.1). Los Alamos National Laboratory. LA-UR-12-24548. Los Alamos, New Mexico. (LANL 2012, 226667).

USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-93/187a

USEPA. 1999. Hazardous Waste Combustion Rule. Screening-Level Ecological Risk Assessment Protocol. AppendixEC. Toxicity Reference Values. August.

USEPA. 2007. Ecological Soil Screening Level Guidance. Appendix 4-1. Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSL. OSWER Directive 9285.7-55. First issued 2003. Revised April 2007.

USEPA. 2013. Regional Screening Levels. U.S. Environmental Protection Agency, Regions 3 and 9. On-line at: http://www.epa.gov/region9/superfund/prg/. Last updated May 2013.

2-Chlorotoluene Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Chicken (*Gallus domesticus)*		LD_0	14 days (single dose)	A	Mortality		2710	Arthur et aI. (1974) as reported in OECD (2000).
Chicken (*Gallus domesticus)*		LD_{50}	14 days (single dose)	A	Mortality		5410	Arthur et aI. (1974) as reported in OECD (2000).
Mallard (*Anas platyrhynchos*)		LD_0	14 days (single dose)	A	Mortality		5410	Arthur et aI. (1974) as reported in OECD (2000).
Northern Bobwhite (*Colinus virginianus*)		LD_0	14 days (single dose)	A	Mortality		5410	Arthur et aI. (1974) as reported in OECD (2000).

Selected:

Limited information was found in the literature search with an oral toxicity value for 2-chlorotoluene for birds. The selected study is an LD0 in chickens of 2710 mg/kg showing no mortality after 14 days. A chronic LOAEL and NOAEL are selected by adjusting the LD0 by an uncertainty factor of 10 and 100 respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Arthur B.H., W.R. Gibson W.J. Griffing and C.C. Kehr CC. 1974. The effects on laboratory animals from single exposure to bchlorotoluene, unpublished report. Toxicology Division, Lilly Research Laboratories.

OECD 2000. 2-Chlorotoluene. Screening Information Data Set (SIDS) program operated under the auspices of the Organization for Economic Cooperation and Development (OECD). SIDS Initial Assessment Report for 11th SIAM.

Propachlor Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail		LC50	8 days		Mortality	>5000	533*	USEPA (2013)
Northern Bobwhite Quail		LC50	8 days		Mortality	>5423	578*	USEPA (2013)
Mallard Duck		LC50	8 days		Mortality	>5000	279*	USEPA (2013)
Mallard Duck		LC50	8 days		Mortality	>5423	302*	USEPA (2013)
Northern Bobwhite Quail		LD50	14 days		Mortality		88	USEPA (2013)

Selected:

Limited information was found in the literature search with an oral toxicity value for propachlor for birds. The selected study is an LD50 of 88 mg/kgBW/day in northern bobwhite quail in a 14-day study. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by an uncertainty factor of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993
Adult mallard body weight (male and female) = 1.134 kg; Nelson & Martin (1953) average throughout North America, as reported in USEPA (1993).
Adult bobwhite quail weight (male and female) = 0.177 kg; Roseberry and Klimstra (1971) average throughout North America, as reported in USEPA (1993).

References:

USEPA. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). U.S. Environmental Protection Agency, and Office of Pesticide Programs. As reported in USEPA ECOTOX Database, accessed April 2014.

Nelson, A. L.; Martin, A. C. (1953) Gamebird weights. J. Wildl. Manage. 17: 36-42.

Roseberry, J. L.; Klimstra, W. D. (1971) Annual weight cycles in male and female bobwhitequail. Auk 88: 116-123.
U.S. EPA. 1993. Wildlife Exposure Factors Handbook. EPA/600/P-93/187a.

Mirex Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Starling		LD50	Single oral dose (gavage)	A	Mortality		>100	Schafer et al. 1972
Red-winged blackbird		LD50	Single oral dose (gavage)	A	Mortality		>100	Schafer et al. 1972
Common Grackle		LC50	5-38 days		Mortality	250		Stickel,W.H., J.A. Galyen, R.A. Dyrland, and D.L. Hughes (1973)
Common Grackle		LC50	5-38 days		Mortality	750		Stickel,W.H., J.A. Galyen, R.A. Dyrland, and D.L. Hughes (1973)
Common Grackle		LC50	5-38 days		Mortality	2250		Stickel,W.H., J.A. Galyen, R.A. Dyrland, and D.L. Hughes (1973)
Japanese Quail		LC50	5 days		Mortality	>5000		Hill,E.F., and M.B. Camardese (1986)
Northern Bobwhite Quail		LC50	5 days		Mortality	2511		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams (1975)
Ring-Necked Pheasant		LC50	5 days		Mortality	1540		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams (1975)
Mallard Duck		LC50	5 days		Mortality	>5000		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams (1975)
Japanese Quail		LC50	5 days		Mortality	>5000		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams (1975)
Northern Bobwhite Quail		LC50	5 days		Mortality	2511		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer (1972)
Ring-Necked Pheasant		LC50	5 days		Mortality	1540		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer (1972)
Mallard Duck		LC50	5 days		Mortality	>5000		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer (1972)

Mirex Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Japanese Quail		LC50	5 days		Mortality	>5000		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer (1972)
Mallard Duck		LD50	14 days		Mortality		>2400	Hudson,R.H., R.K. Tucker, and M.A. Haegele (1984)
Japanese Quail		LD50	14 days		Mortality		>2000	Hudson,R.H., R.K. Tucker, and M.A. Haegele (1984)
Mallard Duck		LOEL	152.2 days		Reproduction		1	Heath,R.G., and J.W. Spann (1973)
Japanese Quail		NR-ZERO	5 days		Mortality	2236		Hill,E.F., and M.B. Camardese (1986)
Mallard Duck		NR-ZERO	5 days		Mortality	5000		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer (1972)

Selected:

One chronic study was identified measuring reproduction in mallard ducks, which is a preferred endpoint. The LOEL in this study was 1 mg/kgBW/day, which is selected as the study LOAEL. A chronic NOAEL is selected by adjusting the LOAEL by an uncertainty factor of 5.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

*Heath,R.G., and J.W. Spann (1973). Reproduction and Related Residues in Birds fed Mirex. Pestic.Environ.Contin.Controversy Pap.Inter.AM Conf.Toxicol.Occup.Med.8th2:421-435

*Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer (1972). Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Departme

*Hill,E.F., and M.B. Camardese (1986). Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.

*Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams (1975). Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.

*Hudson,R.H., R.K. Tucker, and M.A. Haegele (1984). Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.

Schafer, E.W.1972. The Acute Oral Toxicity of 369 Pesticidal, Pharmaceutical and Other Chemicals to Wild Birds.J. Wildl. Manage. 17: 36-42.Toxicology and Applied Pharmacology 21:315-330.

*Stickel,W.H., J.A. Galyen, R.A. Dyrland, and D.L. Hughes (1973). Toxicity and Persistence of Mirex in Birds. In: W.B.Deichmann (Ed.), Pesticides and the Environment: A Continuing Controversy:437-467

USEPA. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). U.S. Environmental Protection Agency, and Office of Pesticide Programs. As reported in USEPA ECOTOX Database, accessed April 2014.

*as reported in USEPA (2013)

Azobenzene Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Red-winged blackbird		LD50	Single oral dose (gavage)	A	Mortality		>100	Schafer et al. 1983

Selected:

Limited information was found in the literature search with an oral toxicity value for azobenzene for birds. The selected studies are based on an LD50 of >100 mg/kg in unspecified birs (red-winged blackbird, starling, or bobwhite quail). A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

1,2,4-Trimethylbenzene Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail		LD50		A	Mortality		>2250	Exxon Biomedical Sciences, Inc. (1992).

Selected:

Limited information was found in the literature search with an oral toxicity value for 1,2,4-trimethylbenzene for birds. The selected study is based on an LD50 of >2250 mg/kg in bobwhite quail. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Exxon Biomedical Sciences, Inc. (1992). An Acute Oral Toxicity Study with the Northern Bobwhite (Solvesso 100). EBSI Report # 92MRL 148. As reported in European Chemicals Agency website, available at: http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d8c70d0-3262-58fd-e044-00144f67d249/AGGR-cdf8760a-8700-4da6-899f-c6229a6ada03_DISS-9d8c70d0-3262-58fd-e044-00144f67d249.html#AGGR-cdf8760a-8700-4da6-899f-c6229a6ada03. Accessed 5May2014.

o-Phenylphenol Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Mallard Duck		LC50	8 days	L	Mortality	>5620	>313*	USEPA (2013)
Northern Bobwhite Quail		LC50	8 days	L	Mortality	>5620	>599*	USEPA (2013)
Mallard Duck		LD50	14 days	L	Mortality		>2250	USEPA (2013)
Mallard Duck		NOEL	14 days	A	Mortality		>2250	USEPA (2013)
Northern Bobwhite Quail		NOEL	8 days	A	Mortality	>5620	>313*	USEPA (2013)
Mallard Duck		NOEL	8 days	A	Mortality	>5620	>599*	USEPA (2013)

Selected:

Limited information was found in the literature search with an oral toxicity value for o-phenylphenol for birds. The selected study is based on a NOEL of >2250 mg/kg in mallards, based on length of study and no effects observed at lower doses in other birds. Because the NOEL is based on mortality and due to the short duration of the study, a chronic NOEL is selected by adjusting the acute NOEL by an uncertainty factor of 10. A chronic LOAEL is estimated by multiplying the chronic NOAEL by a factor of 5.

DURATION CODE: L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993
Adult mallard body weight (male and female) = 1.134 kg; Nelson & Martin (1953) average throughout North America, as reported in USEPA (1993).
Adult bobwhite quail weight (male and female) = 0.177 kg; Roseberry and Klimstra (1971) average throughout North America, as reported in USEPA (1993).

References:

USEPA. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). U.S. Environmental Protection Agency, and Office of Pesticide Programs. As reported in USEPA ECOTOX Database, accessed April 2014.

Benzoic Acid Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Mallard Duck		LC50	8 days	L	Mortality	>5620	>313*	USEPA (2013)
Northern Bobwhite Quail		LC50	8 days	L	Mortality	>5620	>599*	USEPA (2013)
Mallard Duck		LD50	14 days	L	Mortality		>2510	USEPA (2013)
Starling		LD50	Single oral dose (gavage)	L	Mortality		>100	Schafer et al. 1983

Selected:

Limited information was found in the literature search with an oral toxicity value for benzoic acid for birds. The selected study is based on an LD50 of >2510 in mallards, based on length of study and no effects observed at lower doses in other birds. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:
L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993
Adult mallard body weight (male and female) = 1.134 kg; Nelson & Martin (1953) average throughout North America, as reported in USEPA (1993).
Adult bobwhite quail weight (male and female) = 0.177 kg; Roseberry and Klimstra (1971) average throughout North America, as reported in USEPA (1993).

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

USEPA. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). U.S. Environmental Protection Agency, and Office of Pesticide Programs. As reported in USEPA ECOTOX Database, accessed April 2014.

Isopropylbenzene (cumene) Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Red-winged blackbird		LD50	Single oral dose (gavage)	A	Mortality		>98	Schafer et al. 1983

Selected:

Only one study was found in the literature search with an oral toxicity value for isopropylbenzene (cumene) for birds (Schafer et al. 1983). This study is selected. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Tetrahydrofuran Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird		LD50	Single oral dose (gavage)	A	Mortality		>98	Schafer et al. 1983

Selected:

Limited information was found in the literature search with an oral toxicity value for tetrahydrofuran for birds. The selected study is based on an LD50 of >98 mg/kg in red-winged blackbirds. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Methylphenols (Cresols) Oral Toxicity

Test Species		Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird	m-cresol (3-methylphenol)		LD_{50}	Single Dose	L	Mortality		113	Schafer et al. 1983
Red-winged Blackbird	p-cresol (4-methylphenol)		LD_{50}	Single Dose	L	Mortality		96	Schafer et al. 1983

Selected:

A value for total cresols is selected based on a single study with an oral toxicity value was found in the literature search based on p-cresol and that study is selected for avian risk assessment. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Dibenzofuran Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird	0.065	LD_{50}	Single dose	L	Mortality	gavage	102	Schafer et al. 1983

Selected:

Only one study was found in the literature search with an oral toxicity value for dibenzofuran for birds (Schafer et al. 1983). This study is selected. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:
L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Molybdenum Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration Total	Concentration as Molybdenum	Dose (mg/kg-BW/day)	Reference
Chicken (B)	1.5	LOAEL	21 days through reproduction	C	Reproduction (no viable embryoes)		500 mg Mo/L (water)	35.33[(2)]	Sample et al. 1996 (Lepore and Miller 1965)

Selected:

The only available LOAEL found for oral (in water) exposure is a 21-day through reproduction study (chronic) with chickens by Lepore and Miller (1965). The chronic LOAEL is 35.33 mg/kg-BW/day, which resulted in embryonic viability reduced to zero. The chronic NOAEL is derived by adjustment of the chronic LOAEL by an uncertainty factor of 5 (7.07 mg/kg-BW/day).

DURATION CODE:
L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

CHEMICAL CODE:
(A) = Molybdate (MoO_4)
(B) = Sodium molybdate

(2) - Dose based on actual water consumption and body weights provided by Lepore and Miller (1965).

References:

Lepore, PD and RF Miller. 1965. Embryonic viability as influenced by excess molybdenum in chicken breeder diets. Proc Soc Exp Biol Med 118:155-157.

Sample, B.E., D.M. Opresko, G.W. Suter II. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Risk Assessment Program, Health Sciences Research Division, Oak Ridge, TN.

Lithium Chloride Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail		LD50	Single oral dose (gavage)	A	Mortality		422 (69.1 as Li)	Schafer et al. 1983

Selected:

Limited information was found in the literature search with an oral toxicity value for lithium chloride for birds. The selected study is based on an LD50 of 422 mg/kg in bobwhite quail. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

1,3-dichloropropene Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Mallard (*Anas platyrhynchos*)		LD_{50}	8 days	L	Mortality	>10000	>557*	DOW Agrosciences (1996).
Northern Bobwhite (*Colinus virginianus*)		LD_{50}	8 days	L	Mortality	>10000	>1065*	DOW Agrosciences (1996).

Selected:

Limited information was found in the literature search with an oral toxicity value for 1,3-dichloropropene for birds. The selected study is based on an LD50 of >557 mg/kgBW in mallards. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:
L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993
Adult mallard body weight (male and female) = 1.134 kg; Nelson & Martin (1953) average throughout North America, as reported in USEPA (1993).
Adult bobwhite quail weight (male and female) = 0.177 kg; Roseberry and Klimstra (1971) average throughout North America, as reported in USEPA (1993).

References:

DOW Agrosciences (1996). 1,3-Dichloropropene a Profile. Dow AgroSciences LLC. February.

p-Isopropyltoluene (cymene) Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird		LD50	Single oral dose (gavage)	A	Mortality		>316	Schafer et al. 1983

Selected:

Limited information was found in the literature search with an oral toxicity value for p-isopropyltoluene for birds. The selected study is based on an LD50 of >316 mg/kg in red-winged blackbirds. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Titanium Dioxide Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration (mg/kg)	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird		LD50	Single oral dose (gavage)	L	Mortality	--	100 (75 Ti)	Schafer et al. 1983

Selected:

Limited information was found in the literature search with an oral toxicity value for titanium dioxide for birds. The selected study is based on an LD50 of 100 mg/kg in red-winged blackbirds (75 mg/kg as Ti). A chronic LOAEL and NOAEL are selected by adjusting the LD50 by uncertainty factors of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

References:

Schafer, E.W., Jr., W.A. Bowles, Jr., and J. Hurlbut. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Environ. Contam. Toxicol. 12:355-382.

Table A7. Calculations of Category 9 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		NOAEL TRV		Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Carbon Disulfide	1.94	21.73	a,b	No avian toxicity data were identified																
	1.94	21.73	a,b																	
Acetonitrile	-0.34	4.67	a,b	No avian toxicity data were identified																
	-0.34	4.67	a,b																	
Parathion, Methyl	2.86	1516	a	Cardinal	0.225	0.02	0.6	0.38	4.175	c	1.27	d	4.63	1.41	0.75	g	1.11	0.75	1.0	1.11
	2.86	1516	a	Robin	0.193	0.05	0.045	0.905	4.175	c	1.27	d	11.7	3.56	0.75	g	2.81	0.75	1.0	2.81
Dinoseb	3.33	4294	e,b	Cardinal	0.225	0.02	0.6	0.38	2.692	c	1.15	d	0.57	0.24	0.099	h	0.21	0.099	1.0	0.21
	3.33	4294	e,b	Robin	0.193	0.05	0.045	0.905	2.692	c	1.15	d	1.1	0.49	0.099	h	0.42	0.099	1.0	0.42
Heptachlor	6.1	41260	a,b	Cardinal	0.225	0.02	0.6	0.38	0.202	c	30.7	d	0.070	11	0.92	k	0.35	0.92	1.0	0.35
	6.1	41260	a,b	Robin	0.193	0.05	0.045	0.905	0.202	c	30.7	d	0.035	5.3	0.92	k	0.17	0.92	1.0	0.17
2,6-Dinitrotoluene	2.1	587.4	a,b	Cardinal	0.225	0.02	0.6	0.38	8.492	c	0.714	d	35.1	2.95	5	l	4.13	5.0	1.0	4.13
	2.1	587.4	a,b	Robin	0.193	0.05	0.045	0.905	8.492	c	0.714	d	204	17.2	5	l	24.0	5.0	1.0	24.0
Aniline	0.9	70.23	a,b	Cardinal	0.225	0.02	0.6	0.38	26.054	c	0.540	d	41.1	0.85	5.62	m	1.6	5.62	1.0	1.6
	0.9	70.23	a,b	Robin	0.193	0.05	0.045	0.905	26.054	c	0.540	d	443.8	9.2	5.62	m	17	5.62	1.0	17
2,4-Dimethylphenol	2.3	491.8	a,b	No avian toxicity data were identified																
	2.3	491.8	a,b																	
2-Chloronaphthalene	3.9	2478	a,b	No avian toxicity data were identified																
	3.9	2478	a,b																	
2-Chlorophenol	2.15	306.5	a,b	Cardinal	0.225	0.02	0.6	0.380	8.10	c	1.5	d	7.5	1.4	1.13	k	0.92	1.1	1.0	0.92
	2.15	306.5	a,b	Robin	0.193	0.05	0.045	0.905	8.10	c	1.5	d	26.6	5.0	1.13	k	3.3	1.1	1.0	3.3
2,4-Dinitrophenol	1.67	460.8	a,b	Cardinal	0.225	0.02	0.6	0.380	12.7	c	0.385	d	0.9	0.029	0.13	n	0.074	0.13	1.0	0.074
	1.67	460.8	a,b	Robin	0.193	0.05	0.045	0.905	12.7	c	0.385	d	8.8	0.27	0.13	n	0.70	0.13	1.0	0.70
4,6-Dinitro-2-methylphenol	2.13	754.4	a,b	Cardinal	0.225	0.02	0.6	0.380	8.26	c	0.6	d	1.6	0.11	0.227	o	0.19	0.23	1.0	0.19
	2.13	754.4	a,b	Robin	0.193	0.05	0.045	0.905	8.26	c	0.6	d	10.2	0.73	0.227	o	1.2	0.23	1.0	1.2
Toxaphene	5.9	77200	a,b	Cardinal	0.225	0.02	0.6	0.38	0.244	c	11.0	d	2.5	113	10	k	10	10	1.0	10
	5.9	77200	a,b	Robin	0.193	0.05	0.045	0.905	0.244	c	11.0	d	1.3	57	10	k	5.2	10	1.0	5.2
1,1,2,2-Tetrachloroethane	2.39	94.94	a,b	No avian toxicity data were identified																
	2.39	94.94	a,b																	
Hexachlorocyclopentadiene	5.04	1404	a,b	No avian toxicity data were identified																
	5.04	1404	a,b																	

Table A7. Calculations of Category 9 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		NOAEL TRV		Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Sym-Trinitrobenzene	1.18	602.1	a,b	No avian toxicity data were identified																
	1.18	602.1	a,b																	
Hexachlorophene	7.54	91000	a	Cardinal	0.225	0.02	0.6	0.38	0.053	c	249.3	d	0.014	67	5.75	p	0.27	5.75	1.0	0.27
	7.54	91000	a	Robin	0.193	0.05	0.045	0.905	0.053	c	249.3	d	0.007	33	5.75	p	0.13	5.75	1.0	0.13
Isodrin	6.75	110000	a	Cardinal	0.225	0.02	0.6	0.38	0.110	c	42.4	d	0.0127	4.87	0.418	q	0.115	0.418	1.0	0.115
	6.75	110000	a	Robin	0.193	0.05	0.045	0.905	0.110	c	42.4	d	0.0062	2.39	0.418	q	0.056	0.418	1.0	0.056
Parathion, Ethyl (Parathion)	3.83	2422	a,b	Cardinal	0.225	0.02	0.6	0.38	1.687	c	5.54	d	0.380	1.25	0.159	r	0.225	0.159	1.0	0.225
	3.83	2422	a,b	Robin	0.193	0.05	0.045	0.905	1.687	c	5.54	d	0.271	0.89	0.159	r	0.160	0.159	1.0	0.160
Pronamide	3.43	800	a	Cardinal	0.225	0.02	0.6	0.38	2.452	c	7.53	d	50	154	20	s	20	20	1.0	20
	3.43	800	a	Robin	0.193	0.05	0.045	0.905	2.452	c	7.53	d	36	112	20	s	15	20	1.0	15
Alpha, Alpha Dimethylphenethylamine	1.9	260	a	No avian toxicity data were identified																
	1.9	260	a																	
Phorate	3.56	459.8	a,b	Cardinal	0.225	0.02	0.6	0.38	2.171	c	17.0	d	0.35	2.7	0.28	r	0.16	0.28	1.0	0.16
	3.56	459.8	a,b	Robin	0.193	0.05	0.045	0.905	2.171	c	17.0	d	0.20	1.6	0.28	r	0.09	0.28	1.0	0.09
Endrin Ketone	5.2	20090	f	Cardinal	0.225	0.02	0.6	0.38	0.469	c	10.4	d	0.0049	0.11	0.01	t	0.010	0.010	1.0	0.010
	5.2	20090	f	Robin	0.193	0.05	0.045	0.905	0.469	c	10.4	d	0.0026	0.057	0.01	t	0.005	0.010	1.0	0.005

Notes:

[a] Hazardous Substances Databank (2014)
[b] RSL Chemical Parameters Table USEPA (2014)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007a)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007a)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)
[e] Dinoseb logKow from Extoxnet (2014)
[f] Log Kow and Koc for Endrin used as a surrogate values
[g] Bennett, et al (1990)
[h] Hill et al. (1957); based on a 5 day LC50 of 9.88 mg/kgBW/d for the northern bobwhite divided by an uncertainty factor of 100
[k] LANL (2012)
[l] Johnson et al. (2007); based on a subchronic NOAEL of 50 mg/kgBW for a 14d study on the northern bobwhite divided by an uncertainty factor of 10.
[m] Schafer (1972); based on an LD50 of 562 mg/kgBW in red-winged blackbirds divided by an uncertainty factor of 100
[n] Schafer (1972); based on an LD50 of 13 mg/kgBW in red-winged blackbirds divided by an uncertainty factor of 100
[o] Hudson et al. (1975); based on an LD50 of 22.7 mg/kgBW for mallards divided by an uncertainty factor of 100
[p] HSDB (2014); based on an LD50 of 575 mg/kgBW for bobwhite divided by an uncertainty factor of 100
[q] Rudd and Genely (1956)
[r] USEPA (2013)
[s] USEPA (2013); based on an LD50 of 2250 mg/kgBW for the Northern bobwhite divided by an uncertainty factor of 100
[t] Endrin used as a surrogate (see Category 10 Table)

dw dry weight
ESLB Ecological Screening-Level Benchmark
HQ Hazard quotient
kg kilograms
Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
NOAEL No-observed-adverse-effects level
LOAEL Lowest observed adverse effect level
mg milligrams
TRV Toxicity reference value
UF Uptake factor

Shading indicates the lowest value

Table A7. Calculations of Category 9 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

References:

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Table A8. Calculations of Category 9 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		LOAEL TRV		Soil	Dose	LOAEL HQ	ESLB (LOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Carbon Disulfide	1.94	21.73	a,b	No avian toxicity data were identified																
	1.94	21.73	a,b																	
Acetonitrile	-0.34	4.67	a,b	No avian toxicity data were identified																
	-0.34	4.67	a,b																	
Parathion, Methyl	2.86	1516	a	Cardinal	0.225	0.02	0.6	0.38	4.175	c	1.27	d	6.61	2.01	1.07	g	1.58	1.07	1.0	1.58
	2.86	1516	a	Robin	0.193	0.05	0.045	0.905	4.175	c	1.27	d	16.7	5.08	1.07	g	4.00	1.07	1.0	4.00
Dinoseb	3.33	4294	e,b	Cardinal	0.225	0.02	0.6	0.38	2.692	c	1.15	d	5.71	2.44	0.988	h	2.12	0.988	1.0	2.12
	3.33	4294	e,b	Robin	0.193	0.05	0.045	0.905	2.692	c	1.15	d	11.4	4.86	0.988	h	4.23	0.988	1.0	4.23
Heptachlor	6.1	41260	a,b	Cardinal	0.225	0.02	0.6	0.38	0.202	c	30.7	d	0.701	106	9.2	k	3.46	9.20	1.0	3.46
	6.1	41260	a,b	Robin	0.193	0.05	0.045	0.905	0.202	c	30.7	d	0.347	52.6	9.2	k	1.71	9.20	1.0	1.71
2,6-Dinitrotoluene	2.1	587.4	a,b	Cardinal	0.225	0.02	0.6	0.38	8.492	c	0.714	d	70.1	5.90	10	l	8.26	10.0	1.0	8.26
	2.1	587.4	a,b	Robin	0.193	0.05	0.045	0.905	8.492	c	0.714	d	408	34.4	10	l	48.1	10.0	1.0	48.1
Aniline	0.9	70.23	a,b	Cardinal	0.225	0.02	0.6	0.38	26.054	c	0.540	d	410.7	8.51	56.2	m	15.8	56.2	1.0	15.8
	0.9	70.23	a,b	Robin	0.193	0.05	0.045	0.905	26.054	c	0.540	d	4438.4	92.0	56.2	m	170	56.2	1.0	170
2,4-Dimethylphenol	2.3	491.8	a,b	No avian toxicity data were identified																
	2.3	491.8	a,b																	
2-Chloronaphthalene	3.9	2478	a,b	No avian toxicity data were identified																
	3.9	2478	a,b																	
2-Chlorophenol	2.15	306.5	a,b	Cardinal	0.225	0.02	0.6	0.380	8.10	c	1.5	d	74.6	13.9	11.3	k	9.21	11.3	1.0	9.21
	2.15	306.5	a,b	Robin	0.193	0.05	0.045	0.905	8.10	c	1.5	d	266.2	49.7	11.3	k	32.8	11.3	1.0	32.8
2,4-Dinitrophenol	1.67	460.8	a,b	Cardinal	0.225	0.02	0.6	0.380	12.7	c	0.385	d	9.4	0.286	1.3	n	0.743	1.30	1.0	0.743
	1.67	460.8	a,b	Robin	0.193	0.05	0.045	0.905	12.7	c	0.385	d	88.3	2.68	1.3	n	6.96	1.30	1.0	6.96
4,6-Dinitro-2-methylphenol	2.13	754.4	a,b	Cardinal	0.225	0.02	0.6	0.380	8.26	c	0.6	d	16.0	1.15	2.27	o	1.94	2.27	1.0	1.94
	2.13	754.4	a,b	Robin	0.193	0.05	0.045	0.905	8.26	c	0.6	d	101.7	7.27	2.27	o	12.3	2.27	1.0	12.3
Toxaphene	5.9	77200	a,b	Cardinal	0.225	0.02	0.6	0.38	0.244	c	11.0	d	25.0	1126	100	k	102	100	1.0	102
	5.9	77200	a,b	Robin	0.193	0.05	0.045	0.905	0.244	c	11.0	d	12.6	570	100	k	51.8	100	1.0	51.8
1,1,2,2-Tetrachloroethane	2.39	94.94	a,b	No avian toxicity data were identified																
	2.39	94.94	a,b																	

Table A8. Calculations of Category 9 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		LOAEL TRV		Soil	Dose	LOAEL HQ	ESLB (LOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Hexachlorocyclopentadiene	5.04	1404	a,b	No avian toxicity data were identified																
	5.04	1404	a,b																	
Sym-Trinitrobenzene	1.18	602.1	a,b	No avian toxicity data were identified																
	1.18	602.1	a,b																	
Hexachlorophene	7.54	91000	a	Cardinal	0.225	0.02	0.6	0.38	0.053	c	249.3	d	0.142	673	57.5	p	2.70	57.50	1.0	2.70
	7.54	91000	a	Robin	0.193	0.05	0.045	0.905	0.053	c	249.3	d	0.070	329	57.5	p	1.32	57.50	1.0	1.32
Isodrin	6.75	110000	a	Cardinal	0.225	0.02	0.6	0.38	0.110	c	42.4	d	0.0254	9.74	0.837	q	0.230	0.837	1.0	0.230
	6.75	110000	a	Robin	0.193	0.05	0.045	0.905	0.110	c	42.4	d	0.0125	4.79	0.837	q	0.113	0.837	1.0	0.113
Parathion, Ethyl (Parathion)	3.83	2422	a,b	Cardinal	0.225	0.02	0.6	0.38	1.687	c	5.54	d	0.944	3.10	0.395	r	0.560	0.395	1.0	0.560
	3.83	2422	a,b	Robin	0.193	0.05	0.045	0.905	1.687	c	5.54	d	0.672	2.21	0.395	r	0.398	0.395	1.0	0.398
Pronamide	3.43	800	a	Cardinal	0.225	0.02	0.6	0.38	2.452	c	7.53	d	501	1539	200	s	204	200	1.0	204
	3.43	800	a	Robin	0.193	0.05	0.045	0.905	2.452	c	7.53	d	365	1120	200	s	149	200	1.0	149
Alpha, Alpha Dimethylphenethylamine	1.9	260	a	No avian toxicity data were identified																
	1.9	260	a																	
Phorate	3.56	459.8	a,b	Cardinal	0.225	0.02	0.6	0.38	2.171	c	17.0	d	4.14	32.4	3.34	r	1.91	3.34	1.0	1.91
	3.56	459.8	a,b	Robin	0.193	0.05	0.045	0.905	2.171	c	17.0	d	2.42	19.0	3.34	r	1.12	3.34	1.0	1.12
Endrin Ketone	5.2	20090	f	Cardinal	0.225	0.02	0.6	0.38	0.469	c	10.4	d	0.0491	1.09	0.1	t	0.105	0.100	1.0	0.105
	5.2	20090	f	Robin	0.193	0.05	0.045	0.905	0.469	c	10.4	d	0.0257	0.569	0.1	t	0.055	0.100	1.0	0.055

Notes:

[a] Hazardous Substances Databank (2014)
[b] RSL Chemical Parameters Table USEPA (2014)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007a)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007a)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)
[e] Dinoseb logKow from Extoxnet (2014)
[f] Log Kow and Koc for Endrin used as a surrogate values
[g] Bennett, et al (1990)
[h] Hill et al. (1957); based on a 5 day LC50 of 9.88 mg/kgBW/d for the northern bobwhite divided by an uncertainty factor of 10
[k] LANL (2012)
[l] Johnson et al. (2007); based on a subchronic LOAEL of 100 mg/kgBW for a 14d study on the northern bobwhite divided by an uncertainty factor of 10
[m] Schafer (1972); based on an LD50 of 562 mg/kgBW in red-winged blackbirds divided by an uncertainty factor of 10
[n] Schafer (1972); based on an LD50 of 13 mg/kgBW in red-winged blackbirds divided by an uncertainty factor of 10
[o] Hudson et al. (1975); based on an LD50 of 22.7 mg/kgBW for mallards divided by an uncertainty factor of 10
[p] HSDB (2014); based on an LD50 of 575 mg/kgBW for bobwhite divided by an uncertainty factor of 10
[q] Rudd and Genely (1956)
[r] USEPA (2013)
[s] USEPA (2013); based on an LD50 of 2250 mg/kgBW for the Northern bobwhite divided by an uncertainty factor of 10
[t] Endrin used as a surrogate (see Category 10 Table)

dw dry weight
ESLB Ecological Screening-Level Benchmark
HQ Hazard quotient
kg kilograms
Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
NOAEL No-observed-adverse-effects level
LOAEL Lowest observed adverse effect level
mg milligrams
TRV Toxicity reference value
UF Uptake factor

Shading indicates the lowest value

Table A8. Calculations of Category 9 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

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Table A9. Calculations of Category 10 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		NOAEL TRV		Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Endrin Aldehyde	4.8	4300	a	Cardinal	0.225	0.02	0.6	0.38	0.682	c	21.8	d	0.0035	0.11	0.01	e	0.005	0.010	1.0	0.005
	4.8	4300	a	Robin	0.193	0.05	0.045	0.905	0.682	c	21.8	d	0.0018	0.057	0.01	e	0.003	0.010	1.0	0.003
Endrin	5.2	20090	a,b	Cardinal	0.225	0.02	0.6	0.38	0.469	c	10.4	d	0.0049	0.11	0.01	f	0.010	0.010	1.0	0.010
	5.2	20090	a,b	Robin	0.193	0.05	0.045	0.905	0.469	c	10.4	d	0.0026	0.057	0.01	f	0.005	0.010	1.0	0.005
Gamma BHC (Lindane)	3.72	2807	a,b	Cardinal	0.225	0.02	0.6	0.38	1.870	c	3.84	d	1.79	3.7	0.56	f	0.96	0.56	1.0	0.96
	3.72	2807	a,b	Robin	0.193	0.05	0.045	0.905	1.870	c	3.84	d	1.51	3.1	0.56	f	0.81	0.56	1.0	0.81
Beta BHC	3.78	2807	a,b	Cardinal	0.225	0.02	0.6	0.38	1.768	c	4.33	d	110.5	270	38.3	f	63	38	1.0	63
	3.78	2807	a,b	Robin	0.193	0.05	0.045	0.905	1.768	c	4.33	d	86.8	212	38.3	f	49	38	1.0	49
Aldrin	6.5	82020	a,b	Cardinal	0.225	0.02	0.6	0.38	0.139	c	34.4	d	0.003	0.8	0.0709	g	0.02	0.07	1.0	0.02
	6.5	82020	a,b	Robin	0.193	0.05	0.045	0.905	0.139	c	34.4	d	0.0016	0.4	0.0709	g	0.012	0.07	1.0	0.012
Acrylonitrile	0.25	8.511	a,b	No avian toxicity data were identified																
	0.25	8.511	a,b																	
Propionitrile, Ethyl Cyanide	0.16	29	a	No avian toxicity data were identified																
	0.16	29	a																	

Notes:

[a] Hazardous Substances Databank (2014)

[b] USEPA (2014)

[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)

[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)

Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

[e] No TRV available; used Endrin as a surrogate

[f] LANL (2012)

[g] Dieldrin used as a surrogate (from LANL (2012).

dw dry weight
ESLB Ecological Screening-Level Benchmark
HQ Hazard quotient
kg kilograms
Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
NOAEL No-observed-adverse-effects level
LOAEL Lowest observed adverse effect level
mg milligrams
TRV Toxicity reference value
UF Uptake factor

Shading indicates the lowest value

References: HSDB. 2014. Hazardous Substances Database. U.S. National Library of Medicine, TOXNET Toxiccology Network. Last update June 3, 2014. On-line at:http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

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Table A10. Calculations of Category 10 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		LOAEL TRV		Soil	Dose	LOAEL HQ	ESLB (LOAEL)
							Plants	Inverts	Plants		Inverts		Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)	source	(mg/kg tissue dw/ mg/kg soil dw)	source	mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Endrin Aldehyde	4.8	4300	a	Cardinal	0.225	0.02	0.6	0.38	0.682	c	21.8	d	0.0348	1.11	0.1	e	0.051	0.100	1.0	0.051
	4.8	4300	a	Robin	0.193	0.05	0.045	0.905	0.682	c	21.8	d	0.0179	0.571	0.1	e	0.026	0.100	1.0	0.026
Endrin	5.2	20090	a,b	Cardinal	0.225	0.02	0.6	0.38	0.469	c	10.4	d	0.0491	1.09	0.1	f	0.105	0.100	1.0	0.105
	5.2	20090	a,b	Robin	0.193	0.05	0.045	0.905	0.469	c	10.4	d	0.0257	0.569	0.1	f	0.055	0.100	1.0	0.055
Gamma BHC (Lindane)	3.72	2807	a,b	Cardinal	0.225	0.02	0.6	0.38	1.870	c	3.84	d	7.20	14.8	2.25	f	3.85	2.25	1.0	3.85
	3.72	2807	a,b	Robin	0.193	0.05	0.045	0.905	1.870	c	3.84	d	6.05	12.4	2.25	f	3.24	2.25	1.0	3.24
Beta BHC	3.78	2807	a,b	Cardinal	0.225	0.02	0.6	0.38	1.768	c	4.33	d	1105.0	2705	383	f	625	383	1.0	625
	3.78	2807	a,b	Robin	0.193	0.05	0.045	0.905	1.768	c	4.33	d	868.0	2125	383	f	491	383	1.0	491
Aldrin	6.5	82020	a,b	Cardinal	0.225	0.02	0.6	0.38	0.139	c	34.4	d	0.178	43.9	3.78	g	1.27	3.78	1.0	1.27
	6.5	82020	a,b	Robin	0.193	0.05	0.045	0.905	0.139	c	34.4	d	0.0875	21.6	3.78	g	0.628	3.78	1.0	0.628
Acrylonitrile	0.25	8.511	a,b	No avian toxicity data were identified																
	0.25	8.511	a,b																	
Propionitrile, Ethyl Cyanide	0.16	29	a	No avian toxicity data were identified																
	0.16	29	a																	

Notes:

[a] Hazardous Substances Databank (2014)
[b] USEPA (2014)
[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007)
[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)
[e] No TRV available; used Endrin as a surrogate
[f] LANL (2012)
[g] Dieldrin used as a surrogate (from LANL (2012).

dw dry weight
ESLB Ecological Screening-Level Benchmark
HQ Hazard quotient
kg kilograms
Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
NOAEL No-observed-adverse-effects level
LOAEL Lowest observed adverse effect level
mg milligrams
TRV Toxicity reference value
UF Uptake factor

Shading indicates the lowest value

References: HSDB. 2014. Hazardous Substances Database. U.S. National Library of Medicine, TOXNET Toxiccology Network. Last update June 3, 2014. On-line at:http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
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Table A11. Calculations of Category 11 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		NOAEL TRV		Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Tin	--	--		No avian toxicity data were identified																
	--	--																		
Chlordane, Total	6.16	33780	a,b	Cardinal	0.225	0.02	0.6	0.38	0.191	c	42.3	d	0.112	25	2.14	L	0.59	2.1	1.0	0.59
	6.16	33780	a,b	Robin	0.193	0.05	0.045	0.905	0.191	c	42.3	d	0.055	12.2	2.14	L	0.29	2.1	1.0	0.29
4,4'-DDE	6.51	117500	a,b	Cardinal	0.225	0.02	0.6	0.38	eq	f-1	11.2	a	0.048	5.5	0.48	L	0.49	0.48	1.0	0.49
	6.51	117500	a,b	Robin	0.193	0.05	0.045	0.905	eq	f-1	11.2	a	0.028	2.7	0.48	L	0.24	0.48	1.0	0.24
2,3,4,6-Tetrachlorophenol	4.45	2969	a,b	No avian toxicity data were identified																
	4.45	2969	a,b																	
Benzo(a)pyrene	6.13	587400	a,b	Cardinal	0.225	0.02	0.6	0.38	eq	f-2	2.60	a	1.3	21	2.0	g	8.0	2.0	1.0	8.0
	6.13	587400	a,b	Robin	0.193	0.05	0.045	0.905	eq	f-2	2.60	a	0.73	11	2.0	g	4.3	2.0	1.0	4.3
Dieldrin	5.4	20090	a,b	Cardinal	0.225	0.02	0.6	0.38	0.410	c	14.7	d	0.02	0.8	0.0709	L	0.05	0.07	1.0	0.05
	5.4	20090	a,b	Robin	0.193	0.05	0.045	0.905	0.410	c	14.7	d	0.011	0.4	0.0709	L	0.03	0.07	1.0	0.03
Sulfide	--	--		No avian toxicity data were identified																
	--	--																		
2,4-D (Dichlorophenoxyacetic Acid)	2.81	29.63	a,b	Cardinal	0.225	0.02	0.6	0.38	4.375	c	58.7	d	0	4	0.349	h	0.062	0.349	1.0	0.062
	2.81	29.63	a,b	Robin	0.193	0.05	0.045	0.905	4.375	c	58.7	d	0	2	0.349	h	0.034	0.349	1.0	0.034
Antimony	--	--		No avian toxicity data were identified																
	--	--																		
bis(2-ethylhexyl) phthalate	7.6	119600	a,b	Cardinal	0.225	0.02	0.6	0.38	0.057	n	0	o	5.14	0	1.1	L	90.3	1.1	1.0	90.3
	7.6	119600	a,b	Robin	0.193	0.05	0.045	0.905	0.057	n	0	o	6.19	0	1.1	L	109	1.1	1.0	109
Thallium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.004	b	1.00	b	0.02	3.9	0.35	L	4	0.3	1.0	4
	--	--		Robin	0.193	0.05	0.045	0.905	0.004	b	1.00	b	0.008	1.90	0.35	L	2	0.3	1.0	2
Naphthalene	3.3	1544	a,b	Cardinal	0.225	0.02	0.6	0.38	2.09	a	3.04	a	849	1236	222	i	406	222	1.0	406
	3.3	1544	a,b	Robin	0.193	0.05	0.045	0.905	2.09	a	3.04	a	831	1209	222	i	398	222	1.0	398
Copper	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	f-3	0.515	a	9.6	29	4.05	L	57	4.1	1.0	57
	--	--		Robin	0.193	0.05	0.045	0.905	eq	f-3	0.515	a	8.3	20.6	4.05	L	40	4.1	1.0	40
Zinc	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	f-4	eq	f-5	119	569	66.1	j	323	66.1	1.0	323
	--	--		Robin	0.193	0.05	0.045	0.905	eq	f-4	eq	f-5	57.6	371	66.1	j	88	66.1	1.0	88

Table A11. Calculations of Category 11 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		NOAEL TRV		Soil	Dose	NOAEL HQ	ESLB (NOAEL)
							Plants	Inverts	Plants	source	Inverts	source	Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
4,4'-DDT	6.91	168600	a,b	Cardinal	0.225	0.02	0.6	0.38	eq	f-1	11.2	a	0.027	3	0.227	k	0.23	0.23	1.0	0.23
	6.91	168600	a,b	Robin	0.193	0.05	0.045	0.905	eq	f-1	11.2	a	0.016	1	0.227	k	0.12	0.23	1.0	0.12
PCBs, Total	6.3	130500	a,b,e	Cardinal	0.225	0.02	0.6	0.38	0.168	c	6.80	b	0.028	1.1	0.1	m	0.16	0.10	1.0	0.16
	6.3	130500	a,b,e	Robin	0.193	0.05	0.045	0.905	0.168	c	6.80	b	0.014	0.57	0.1	m	0.084	0.10	1.0	0.084
Lead	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	f-6	eq	f-7	1.95	14.2	1.63	L	35.0	1.63	1.0	35.0
	--	--		Robin	0.193	0.05	0.045	0.905	eq	f-6	eq	f-7	1.34	8.3	1.63	L	18.0	1.63	1.0	18.0
Vanadium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.00485	L	0.042	L	0.191	1.65	0.344	L	39.4	0.344	1.0	39.4
	--	--		Robin	0.193	0.05	0.045	0.905	0.00485	L	0.042	L	0.098	0.85	0.344	L	20.2	0.344	1.0	20.2

dw dry weight
ESLB Ecological Screening-Level Benchmark
HQ Hazard quotient
kg kilograms
Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
NOAEL No-observed-adverse-effects level
LOAEL Lowest observed adverse effect level

mg milligrams
TRV Toxicity reference value
UF Uptake factor

Equations:
f-1 =Exp(0.7524*LN(Csoil)-2.5119) From USEPA (2007a)
f-2 =Exp(0.9469*LN(Csoil)-1.7026) from USEPA (2007a)
f-3 =Exp(0.394*LN(Csoil)+0.668) from USEPA (2007a)
f-4 =Exp(0.554*LN(Csoil)+1.575) from USEPA (2007a)
f-5 =Exp(0.328*LN(Csoil)+4.449) from USEPA (2007a)
f-6 =Exp(0.561*LN(Csoil)-1.328) from USEPA (2007a)
f-7 =Exp(0.807*LN(Csoil)-0.218) from USEPA (2007a)

Shading indicates the lowest value

Notes:

[a] Hazardous Substances Databank (HSDB 2014)

[b] USEPA (2014)

[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007a)

[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007a)

Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

[e] Based on Aroclor 1254

[f] USEPA (2007a)

[g] As presented in USEPA (2007b), there were insufficient data to derive a HMW PAH ESSL for birds. However, the data compiled by USEPA was reviewed and a NOAEL was selected from the ESSL document which was based on a study performed on 10-15 day old starlings exposed to 7,12-dimethylbenz(a)anthracene in a subchronic study (Trust et al. 1994). Other studies on individual HMW PAHs were either acute or used injections for administering the PAH. The Trust et al. study found growth to be depressed at 20 mg/kgBW/day 7,12-dimethylbenz(a)anthracene while no such effects were observed at 2 mg/kgBW/day (Trust et al. 1994). 7,12-dimethylbenz(a)anthracene was assumed to be an appropriate surrogate for HMW PAHs. The LOAEL TRV of 20 mg/kgBW/day was selected for benzo(a)pyrene.

[h] The selected study is based on growth in chickens exposed to 2,4-D in food for 56 days (Whitehead 1973). There was no effect on growth at 5 ppm (an estimated dose of 0.349 mg/kgBW/day; NOAEL). There was a significant decrease in growth at 10 ppm (an estimated dose of 0.697 mg/kgBW/day). This study was selected based on the length of exposure and method of administration.

[i] Patton and Dieter (1980) exposed mallards (*Anas platyrhynchos*) to a diet containing 4,000 µg PAHs/g (222 mg/kgBW/day) (mostly as naphthalenes, naphthenes, and phenanthrene) for 7 months. No visible signs of toxicity were evident during the exposure. Although food consumption was not measured, it was believed the toxicant effect was mediated through a decrease in the voluntary intake by the birds because of reduced food palatability. http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/index.html; Ministry of Environment, Lands and Parks, Province of British Columbia, N. K. Nagpal, Ph.D., Water Quality Branch, Water Management Division. NOAEL results for these low molecular weight PAHs were selected as a surrogate for naphthalene The NOAEL multiplied by 5 was selected as a LOAEL TRV .

[j] For avian receptors, the ESSL NOAEL TRV for zinc (USEPA 2007c) was calculated as a geometric mean of 66.1 mg/kgBW/day. The avian TRV database in the ESSL document (ESSL Table 5-1) was reviewed to select a LOAEL TRV for zinc. The Stevenson et al (1987) study on chickens was selected because it had a NOAEL TRV comparable to the ESSL TRV (63.9 mg/kgBW/day), a bounding LOAEL TRV of 76.7 mg/kgBW/day with a preferred endpoint (reproduction), and a study duration of 140 days (chronic).For avian receptors, the ESSL NOAEL TRV for zinc (USEPA 2007c) was calculated as a geometric mean of 66.1 mg/kgBW/day. The avian TRV database in the ESSL document (ESSL Table 5-1) was reviewed to select a LOAEL TRV for zinc. The Stevenson et al (1987) study on chickens was selected because it had a NOAEL TRV comparable to the ESSL TRV (63.9 mg/kgBW/day), a bounding LOAEL TRV of 76.7 mg/kgBW/day with a preferred endpoint (reproduction), and a study duration of 140 days (chronic).

[k] The NOAEL selected for derivation of the ESSL for DDT and its (USEPA 2007d) metabolites was based on no effects on growth in a study on sexually mature male chickens fed 0.227 mg DDT/kgBW/day for 30 days in their diet (Cecil et al. 1978). The same study reported a reduction in growth rate when the chickens were fed 2.27 mg DDT/kgBW/day for 30 days (Cecil et al. 1978). Therefore, the LOAEL TRV selected for DDT and metabolites was 2.27 mg/kgBW/day.

[L] LANL (2012)

[m] LANL (2012) - based on Aroclor 1248, 1254

[n] Selected based on an uptake factor of "most values <0.1" based on ww plant: dw soil, from Staples et al. (1997). Adjusted to dw plant: dw soil assuming average moisture content of77% fruit and 9.3% in seeds (43%), resulting in an adjusted uptake factor of 0.057 mg/kg tissue dw/ mg/kg soil dw.

[o] Staples et al. (1997)

Table A11. Calculations of Category 11 NOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

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Cecil, H. C., Harris, S. J., and Bitman, J. 1978. Liver Mixed Function Oxidases in Chickens: Induction by Polychlorinated Biphenyls and Lack of Induction by DDT. Arch. Environ. Contam. Toxicol. 7(3): 283-90. As cited in USEPA 2007d.

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USEPA. 2007b. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs). U.S. Environmental Protection Agency. OSWER Directive 9285.7-78.

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Table A12. Calculations of Category 11 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet		UFs for Dietary Items				Conc. Dietary Items		LOAEL TRV		Soil	Dose	LOAEL HQ	ESLB (LOAEL)
							Plants	Inverts	Plants		Inverts		Plants	Inverts						
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)	source	(mg/kg tissue dw/ mg/kg soil dw)	source	mg/kg dw	mg/kg dw	mg/kgBW/ day	source	mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
Tin	--	--		No avian toxicity data were identified																
	--	--																		
Chlordane, Total	6.16	33780	a,b	Cardinal	0.225	0.02	0.6	0.38	0.191	c	42.3	d	0.562	124	10.7	L	2.94	10.7	1.0	2.94
	6.16	33780	a,b	Robin	0.193	0.05	0.045	0.905	0.191	c	42.3	d	0.277	61.2	10.7	L	1.45	10.7	1.0	1.45
4,4'-DDE	6.51	117500	a,b	Cardinal	0.225	0.02	0.6	0.38	eq	f-1	11.2	a	0.160	27.7	2.40	L	2.47	2.40	1.0	2.47
	6.51	117500	a,b	Robin	0.193	0.05	0.045	0.905	eq	f-1	11.2	a	0.094	13.7	2.40	L	1.22	2.40	1.0	1.22
2,3,4,6-Tetrachlorophenol	4.45	2969	a,b	No avian toxicity data were identified																
	4.45	2969	a,b																	
Benzo(a)pyrene	6.13	587400	a,b	Cardinal	0.225	0.02	0.6	0.38	eq	f-2	2.60	a	11.7	211	20.0	g	81.2	20.0	1.0	81.2
	6.13	587400	a,b	Robin	0.193	0.05	0.045	0.905	eq	f-2	2.60	a	6.42	112	20.0	g	43.0	20.0	1.0	43.0
Dieldrin	5.4	20090	a,b	Cardinal	0.225	0.02	0.6	0.38	0.410	c	14.7	d	1.18	42.2	3.78	L	2.87	3.78	1.0	2.87
	5.4	20090	a,b	Robin	0.193	0.05	0.045	0.905	0.410	c	14.7	d	0.601	21.6	3.78	L	1.47	3.78	1.0	1.47
Sulfide	--	--		No avian toxicity data were identified																
	--	--																		
2,4-D (Dichlorophenoxyacetic Acid)	2.81	29.63	a,b	Cardinal	0.225	0.02	0.6	0.38	4.375	c	58.7	d	1	7	0.697	h	0.124	0.697	1.0	0.124
	2.81	29.63	a,b	Robin	0.193	0.05	0.045	0.905	4.375	c	58.7	d	0	4	0.697	h	0.068	0.697	1.0	0.068
Antimony	--	--		No avian toxicity data were identified																
	--	--																		
bis(2-ethylhexyl) phthalate	7.6	119600	a,b	Cardinal	0.225	0.02	0.6	0.38	0.057	n	0	o	51.4	0	11	L	903	11.0	1.0	903
	7.6	119600	a,b	Robin	0.193	0.05	0.045	0.905	0.057	n	0	o	61.9	0	11	L	1085	11.0	1.0	1085
Thallium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.004	b	1.00	b	1.55	386.8	35	L	387	35.0	1.0	387
	--	--		Robin	0.193	0.05	0.045	0.905	0.004	b	1.00	b	0.760	190.05	35	L	190	35.0	1.0	190
Naphthalene	3.3	1544	a,b	Cardinal	0.225	0.02	0.6	0.38	2.09	a	3.04	a	4247	6178	1110	i	2032	1110	1.0	2032
	3.3	1544	a,b	Robin	0.193	0.05	0.045	0.905	2.09	a	3.04	a	4156	6045	1110	i	1989	1110	1.0	1989
Copper	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	f-3	0.515	a	15.9	106	12.1	L	205	12.1	1.0	205
	--	--		Robin	0.193	0.05	0.045	0.905	eq	f-3	0.515	a	12.9	62.0	12.1	L	120	12.1	1.0	120
Zinc	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	f-4	eq	f-5	146	643	76.7	j	468	76.7	1.0	468
	--	--		Robin	0.193	0.05	0.045	0.905	eq	f-4	eq	f-5	73.5	429	76.7	j	136	76.7	1.0	136

Table A12. Calculations of Category 11 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

Constituent	log Kow	Koc	source	Receptor	Food Intake Rate (FIR)	Soil Ingestion as a proportion of diet (P_s)	Fraction Diet: Plants	Fraction Diet: Inverts	UFs for Dietary Items: Plants	source	UFs for Dietary Items: Inverts	source	Conc. Dietary Items: Plants	Conc. Dietary Items: Inverts	LOAEL TRV	source	Soil	Dose	LOAEL HQ	ESLB (LOAEL)
					kg (dw)/BW-day	Decimal Fraction	Decimal Fraction	Decimal Fraction	(mg/kg tissue dw/ mg/kg soil dw)		(mg/kg tissue dw/ mg/kg soil dw)		mg/kg dw	mg/kg dw	mg/kgBW/ day		mg/kg dw	mg/kgBW/ day	unitless	mg/kg dw
4,4'-DDT	6.91	168600	a,b	Cardinal	0.225	0.02	0.6	0.38	eq	f-1	11.2	a	0.154	26	2.27	k	2.34	2.27	1.0	2.34
	6.91	168600	a,b	Robin	0.193	0.05	0.045	0.905	eq	f-1	11.2	a	0.090	13	2.27	k	1.16	2.27	1.0	1.16
PCBs, Total	6.3	130500	a,b,e	Cardinal	0.225	0.02	0.6	0.38	0.168	c	6.80	b	0.276	11.2	1.0	m	1.64	1.00	1.0	1.64
	6.3	130500	a,b,e	Robin	0.193	0.05	0.045	0.905	0.168	c	6.80	b	0.140	5.68	1.0	m	0.835	1.00	1.0	0.835
Lead	--	--		Cardinal	0.225	0.02	0.6	0.38	eq	f-6	eq	f-7	3.18	28.7	3.26	L	84.0	3.26	1.0	84.0
	--	--		Robin	0.193	0.05	0.045	0.905	eq	f-6	eq	f-7	2.15	16.3	3.26	L	41.6	3.26	1.0	41.6
Vanadium	--	--		Cardinal	0.225	0.02	0.6	0.38	0.00485	L	0.042	L	0.382	3.31	0.688	L	78.7	0.688	1.0	78.7
	--	--		Robin	0.193	0.05	0.045	0.905	0.00485	L	0.042	L	0.196	1.70	0.688	L	40.4	0.688	1.0	40.4

dw dry weight
ESLB Ecological Screening-Level Benchmark
HQ Hazard quotient
kg kilograms
Kow Octanol-water partitioning coefficient
Koc Organic carbon-water partitioning coefficeint
NOAEL No-observed-adverse-effects level
LOAEL Lowest observed adverse effect level

mg milligrams
TRV Toxicity reference value
UF Uptake factor

Equations:
f-1 =Exp(0.7524*LN(Csoil)-2.5119) From USEPA (2007a)
f-2 =Exp(0.9469*LN(Csoil)-1.7026) from USEPA (2007a)
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f-4 =Exp(0.554*LN(Csoil)+1.575) from USEPA (2007a)
f-5 =Exp(0.328*LN(Csoil)+4.449) from USEPA (2007a)
f-6 =Exp(0.561*LN(Csoil)-1.328) from USEPA (2007a)
f-7 =Exp(0.807*LN(Csoil)-0.218) from USEPA (2007a)

Shading indicates the lowest value

Notes:

[a] Hazardous Substances Databank (HSDB 2014)

[b] USEPA (2014)

[c] logBAF = 1.781 - 0.4057(logKow) (USEPA 2007a)

[d] Cworm = [(10^(0.87*(log Kow) – 2.0) * Cs)/(foc * Koc)]/0.16 (USEPA 2007a)
Note 0.16 factor is for converting wet weight to dry weight for earthworms (16% solids) (USEPA 1993)

[e] Based on Aroclor 1254

[f] USEPA (2007a)

[g] As presented in USEPA (2007b), there were insufficient data to derive a HMW PAH ESSL for birds. However, the data compiled by USEPA was reviewed and a NOAEL was selected from the ESSL document which was based on a study performed on 10-15 day old starlings exposed to 7,12-dimethylbenz(a)anthracene in a subchronic study (Trust et al. 1994). Other studies on individual HMW PAHs were either acute or used injections for administering the PAH. The Trust et al. study found growth to be depressed at 20 mg/kgBW/day 7,12-dimethylbenz(a)anthracene while no such effects were observed at 2 mg/kgBW/day (Trust et al. 1994). 7,12-dimethylbenz(a)anthracene was assumed to be an appropriate surrogate for HMW PAHs. The LOAEL TRV of 20 mg/kgBW/day was selected for benzo(a)pyrene.

[h] The selected study is based on growth in chickens exposed to 2,4-D in food for 56 days (Whitehead 1973). There was no effect on growth at 5 ppm (an estimated dose of 0.349 mg/kgBW/day; NOAEL). There was a significant decrease in growth at 10 ppm (an estimated dose of 0.697 mg/kgBW/day). This study was selected based on the length of exposure and method of administration.

[i] Patton and Dieter (1980) exposed mallards (*Anas platyrhynchos*) to a diet containing 4,000 µg PAHs/g (222 mg/kgBW/day) (mostly as naphthalenes, naphthenes, and phenanthrene) for 7 months. No visible signs of toxicity were evident during the exposure. Although food consumption was not measured, it was believed the toxicant effect was mediated through a decrease in the voluntary intake by the birds because of reduced food palatability. http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/index.html; Ministry of Environment, Lands and Parks, Province of British Columbia, N. K. Nagpal, Ph.D., Water Quality Branch, Water Management Division. NOAEL results for these low molecular weight PAHs were selected as a surrogate for naphthalene The NOAEL multiplied by 5 was selected as a LOAEL TRV .

[j] For avian receptors, the ESSL NOAEL TRV for zinc (USEPA 2007c) was calculated as a geometric mean of 66.1 mg/kgBW/day. The lowest LOAEL greater than this NOAEL was 76.7 mg/kgBW/day and is based on a study in which progeny numbers decreased in chickens fed zinc for 12 weeks (Stevenson et al., 1987).

[k] The NOAEL selected for derivation of the ESSL for DDT and its (USEPA 2007d) metabolites was based on no effects on growth in a study on sexually mature male chickens fed 0.227 mg DDT/kgBW/day for 30 days in their diet (Cecil et al. 1978). The same study reported a reduction in growth rate when the chickens were fed 2.27 mg DDT/kgBW/day for 30 days (Cecil et al. 1978). Therefore, the LOAEL TRV selected for DDT and metabolites was 2.27 mg/kgBW/day.

[L] LANL (2012)

[m] LANL (2012) - based on Aroclor 1248, 1254

[n] Selected based on an uptake factor of "most values <0.1" based on ww plant: dw soil, from (Staples et al. 1997). Adjusted to dw plant: dw soil assuming average moisture content of77% fruit and 9.3% in seeds (43%), resulting in an adjusted uptake factor of 0.057 mg/kg tissue dw/ mg/kg soil dw.

[o] Staples et al. (1997)

Table A12. Calculations of Category 11 LOAEL Ecological Screening Level Benchmarks for American Robin and Northern Cardinal

References:

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Parathion Oral Toxicity (Bird)

56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	1739 ppm		Ludke,J.L., E.F. Hill, and M.P. Dieter. 1975. (CHE) Reponse and Related Mortality Among Birds Fed CHE Inhibitors. Arch. Environ. Contam. Toxicol.3(1): 1-21. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	109 ppm		Ludke,J.L., E.F. Hill, and M.P. Dieter. 1975. (CHE) Reponse and Related Mortality Among Birds Fed CHE Inhibitors. Arch. Environ. Contam. Toxicol.3(1): 1-21. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	197 ppm		Ludke,J.L., E.F. Hill, and M.P. Dieter. 1975. (CHE) Reponse and Related Mortality Among Birds Fed CHE Inhibitors. Arch. Environ. Contam. Toxicol.3(1): 1-21. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	295 ppm		Ludke,J.L., E.F. Hill, and M.P. Dieter. 1975. (CHE) Reponse and Related Mortality Among Birds Fed CHE Inhibitors. Arch. Environ. Contam. Toxicol.3(1): 1-21. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	238 ai ppm		Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	238 ai ppm		Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	44 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)		LC50	5 d FD		Mortality	365 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	150 ppm		Ludke,J.L., E.F. Hill, and M.P. Dieter. 1975. (CHE) Reponse and Related Mortality Among Birds Fed CHE Inhibitors. Arch. Environ. Contam. Toxicol.3(1): 1-21. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LC50	5 d FD		Mortality	194 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Parathion Oral Toxicity (Bird)

56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)		LC50	5 d FD		Mortality	275 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LC50	5 d OR		Mortality	275 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d OR		Mortality	197 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LC50	5 d OR		Mortality	194 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)		LC50	5 d OR		Mortality	336 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LC50	5 d OR		Mortality	76 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Chukar (Alectoris chukar)		LD50	14 d OR		Mortality	24 ppm		Tucker,R.K., and M.A. Haegele. 1971. Comparative Acute Oral Toxicity of Pesticides to Six Species of Birds. Toxicol. Appl. Pharmacol.20(1): 57-65. (as reported in USEPA ECOTOX Database accessed 10June2014)
House Sparrow (Passer domesticus)		LD50	14 d OR		Mortality	3.36 ppm		Tucker,R.K., and M.A. Haegele. 1971. Comparative Acute Oral Toxicity of Pesticides to Six Species of Birds. Toxicol. Appl. Pharmacol.20(1): 57-65. (as reported in USEPA ECOTOX Database accessed 10June2014)
Sharp-Tailed Grouse (Tympanuchus phasianellus)		LD50	14 d OR		Mortality		5.66 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
California Quail (Callipepla californica)		LD50	14 d OR		Mortality		16.9 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Fulvous Whistling-Duck (Dendrocygna bicolor)		LD50	14 d OR		Mortality		0.188 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Parathion Oral Toxicity (Bird)

56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Gray Partridge (Perdix perdix)		LD50	14 d OR		Mortality		16 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
House Sparrow (Passer domesticus)		LD50	14 d OR		Mortality		3.36 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Chukar (Alectoris chukar)		LD50	14 d OR		Mortality		24 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Rock Dove (Columba livia)		LD50	14 d OR		Mortality	2.52 ppm		Tucker,R.K., and M.A. Haegele. 1971. Comparative Acute Oral Toxicity of Pesticides to Six Species of Birds. Toxicol. Appl. Pharmacol.20(1): 57-65. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LD50	14 d OR		Mortality	5.95 ppm		Tucker,R.K., and M.A. Haegele. 1971. Comparative Acute Oral Toxicity of Pesticides to Six Species of Birds. Toxicol. Appl. Pharmacol.20(1): 57-65. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)		LD50	14 d OR		Mortality	12.4 ppm		Tucker,R.K., and M.A. Haegele. 1971. Comparative Acute Oral Toxicity of Pesticides to Six Species of Birds. Toxicol. Appl. Pharmacol.20(1): 57-65. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	2.13 ppm		Tucker,R.K., and M.A. Haegele. 1971. Comparative Acute Oral Toxicity of Pesticides to Six Species of Birds. Toxicol. Appl. Pharmacol.20(1): 57-65. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		2.13 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		2.34 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Rock Dove (Columba livia)		LD50	14 d OR		Mortality		2.52 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		1.44 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Parathion Oral Toxicity (Bird)
56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		2.4 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)		LD50	14 d OR		Mortality		24 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		0.898 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		1.9 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality		1.44 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)		LD50	14 d OR		Mortality		12.4 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LD50	14 d OR		Mortality		5.95 mg/kg bdwt	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	1.65 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1972. Effect of Age on Sensitivity: Acute Oral Toxicity of 14 Pesticides to Mallard Ducks of Several Ages. Toxicol. Appl. Pharmacol.22:556-561. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	1.44 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1972. Effect of Age on Sensitivity: Acute Oral Toxicity of 14 Pesticides to Mallard Ducks of Several Ages. Toxicol. Appl. Pharmacol.22:556-561. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	2.34 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1972. Effect of Age on Sensitivity: Acute Oral Toxicity of 14 Pesticides to Mallard Ducks of Several Ages. Toxicol. Appl. Pharmacol.22:556-561. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	1.65 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1972. Effect of Age on Sensitivity: Acute Oral Toxicity of 14 Pesticides to Mallard Ducks of Several Ages. Toxicol. Appl. Pharmacol.22:556-561. (as reported in USEPA ECOTOX Database accessed 10June2014)

Parathion Oral Toxicity (Bird)

56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)		LD50	2 d OR		Mortality	5.86 mg/kg		Dieter,M.P., and J.L. Ludke. 1975. Studies on Combined Effects of Organophosphates and Heavy Metals in Birds. I. Plasma and Brain Cholinesterase in Coturnix Quail fed Methyl Mercury and Orally Dosed with Parathion. Bull. Environ. Contam. Toxicol.13(3): 257-262. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	30 d OR		Mortality	2.34 mg/kg		Hudson,R.H., M.A. Haegele, and R.K. Tucker. 1979. Acute Oral and Percutaneous Toxicity of Pesticides to Mallards: Correlations with Mammalian Toxicity Data. Toxicol. Appl. Pharmacol.47:451-460. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LD50	4 d GV		Mortality		0.75 mg/kg/d	Watkins,M.S., K.E. Solomon, and R.J. Robel. 1978. Effects of Parathion and Dieldrin on Energetics of Bobwhites. J. Wildl. Manag.42(3): 494-499. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ringed Turtle-Dove (Streptopelia risoria)		LD50	7 d OR		Mortality		12 AI mg/kg bdwt	Hill,E.F., and M.B. Camardese. 1984. Toxicity of Anticholinesterase Insecticides to Birds: Technical Grade Versus Granular Formulations. Ecotoxicol. Environ. Saf.8(6): 551-563. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LD50	7 d OR		Mortality	6 AI mg/kg		Hill,E.F., and M.B. Camardese. 1984. Toxicity of Anticholinesterase Insecticides to Birds: Technical Grade Versus Granular Formulations. Ecotoxicol. Environ. Saf.8(6): 551-563. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LD50	7 d OR		Mortality	13 AI mg/kg		Hill,E.F., and M.B. Camardese. 1984. Toxicity of Anticholinesterase Insecticides to Birds: Technical Grade Versus Granular Formulations. Ecotoxicol. Environ. Saf.8(6): 551-563. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	133 d FD	C	Growth	7.1 ppm	0.395	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	133 d FD	C	Reproduction (Hatch)	7.1 ppm	0.395	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	133 d FD	C	Mortality/Survival	7.1 ppm	0.395	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	133 d FD	C	Reproductive Viability	7.1 ppm	0.395	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	140 d FD	C	Reproduction	20 ppm	2.15	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Parathion Oral Toxicity (Bird)

56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)	0.15	LOEL	2 d OR		Mortality/Survival	6 mg/kg	0.677	Dieter,M.P., and J.L. Ludke. 1975. Studies on Combined Effects of Organophosphates and Heavy Metals in Birds. I. Plasma and Brain Cholinesterase in Coturnix Quail fed Methyl Mercury and Orally Dosed with Parathion. Bull. Environ. Contam. Toxicol.13(3): 257-262. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	22 d FD		Mortality	1 ppm	0.056	Friend,M., and J.H.,Jr. Abel. 1976. Inhibition of Mallard Salt Gland Function by DDE and Organophosphates. In: L.A.Page (Ed.), International Wildlife Disease Conference, Wildlife Diseases:261-269. (as reported in USEPA ECOTOX Database accessed 10June2014)
Gray Partridge (Perdix perdix)	0.4	LOEL	273 d FD	C	Reproduction	8 ppm	0.64	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Gray Partridge (Perdix perdix)	0.4	LOEL	273 d FD	C	Reproductive Progeny Count	8 ppm	0.64	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Gray Partridge (Perdix perdix)	0.4	LOEL	273 d FD	C	Mortality/Survival	8 ppm	0.64	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Fulvous Whistling-Duck (Dendrocygna bicolor)		LOEL	30 d OR		Mortality		0.015 mg/kg bdwt/d	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	84 d FD	C	Egg cracking	10 ppm	0.557	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	90 d OR	C	Mortality (hatch)	10 ppm	0.557	Muller,H.D., and D.C. Lockman. 1972. Fecundity and Progeny Growth Following Subacute Insecticide Ingestion by the Mallard. Poult. Sci.51:239-241. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	133 d FD	C	Growth	2.85 ppm	0.159	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	133 d FD	C	Reproduction (hatch)	2.85 ppm	0.159	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Parathion Oral Toxicity (Bird)
56-38-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	133 d FD	C	Mortality/Survival	2.85 ppm	0.159	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	133 d FD	C	Reproductive Viability	2.85 ppm	0.159	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	140 d FD	C	Reproduction	8 ppm	0.859	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	NOEL	2 d OR		Mortality/Survival	4 mg/kg	0.451	Dieter,M.P., and J.L. Ludke. 1975. Studies on Combined Effects of Organophosphates and Heavy Metals in Birds. I. Plasma and Brain Cholinesterase in Coturnix Quail fed Methyl Mercury and Orally Dosed with Parathion. Bull. Environ. Contam. Toxicol.13(3): 257-262. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	84 d FD	C	Egg cracking	10 ppm	0.557	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were available for the mallard duck, gray partridge and northern bobwhite quail. The selected LOAEL is from a 133-day study in mallards dosed at 0.395 mg/kgBW/day with effects on reproduction, growth and survival. The NOAEL was 0.159 mg/kgBW/day.

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE: L = LD_{50} | A = Acute | S = Subchronic | C = Chronic

LD50 = Lethal dose at which 50% of test subjects die
LC50 = Lethal concentration at which 50% of test subjects die
FD = Administered in food
OR = Dose Administered orally
GV = Gavage

ai = Active ingredient

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); USEPA 1993
Mature Bobwhite body weight = 0.173 kg, average of adults (all seasons); USEPA 1993
Adult Japanese quail body weight: 0.15 kg; Vos et al. 1971
Mature mallard body weight = 1.082 kg, USEPA 1993
Ring-necked Pheasant Body Weight (average male & female) = 1.135 kg, Dunning 1993

References:

Dunning, John B., Jr. 1993. CRC Handbook of Avian Body Masses. CRC Press, Inc. Boca Raton, FL.

USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.

Vos, J. G., H. L. Van Der Maas, A. Musch, and E. Ram. 1971. Toxicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicol. Appl. Pharmacol. 18: 944-957. (As cited in Sample et al. 1996)

Dinoseb Oral Toxicity (Bird)

88-85-7

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD	L	Mortality	99 ai ppm	11.17	Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d OR	L	Mortality	93 ppm	10.49	Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d OR	L	Mortality	92 ppm	9.88	Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LC50	5 d OR	L	Mortality	224 ppm	12.47	Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d OR	L	Mortality	480 ppm	26.74	Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d FD	L	Mortality	480 ppm food	26.74	Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LC50	5 d FD	L	Mortality	224 ppm food	12.47	Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d FD	L	Mortality	92 ppm food	51.53	Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD	L	Mortality	93 ppm food	10.49	Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Dinoseb Oral Toxicity (Bird)

88-85-7

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	LD50	OR	L	Mortality		27	U.S. Fish and Wildlife Service (USFWS). 1984. Handbook of Toxicity of Pesticides to Wildlife, Second Edition. U.S. Department of the Interior, Washington, DC.
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LD50	OR	L	Mortality		26.4	U.S. Fish and Wildlife Service (USFWS). 1984. Handbook of Toxicity of Pesticides to Wildlife, Second Edition. U.S. Department of the Interior, Washington, DC.
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR	L	Mortality		2080	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were unavailable for birds. The selected LOAEL is based on a 5-day study in northern bobwhite dosed at 9.88 mg/kgBW/day with lethal effects; the LC50 was divided by an uncertainty factor of 10 for a LOAEL of 0.988 mg/kgBW/day; and by 100 for a NOAEL of 0.099 mg/kgBW/day.

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE:			
	L = LD_{50}	LD50 = Lethal dose at which 50% of test subjects die	ai = Active ingredient
	A = Acute	LC50 = Lethal concentration at which 50% of test subjects die	
	S = Subchronic	FD = Administered in food	
	C = Chronic	OR = Dose Administered orally	

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); USEPA 1993
Mature Bobwhite body weight = 0.173 kg, average of adults (all seasons); USEPA 1993
Adult Japanese quail body weight: 0.15 kg; Vos et al. 1971
Mature mallard body weight = 1.082 kg; USEPA 1993
Ring-necked Pheasant Body Weight (average male & female) = 1.135 kg; Dunning 1993

References:

Dunning, John B., Jr. 1993. CRC Handbook of Avian Body Masses. CRC Press, Inc. Boca Raton, FL.
USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.
Vos, J. G., H. L. Van Der Maas, A. Musch, and E. Ram. 1971. Toxicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicol. Appl. Pharmacol. 18: 944-957. (As cited in

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Common Grackle (Quiscalus quiscula)	0.128	LC50	5 d OR	L	Mortality	240 ppm		Grue,C.E.. 1982. Response of Common Grackles to Dietary Concentrations of Four Organophosphate Pesticides. Arch. Environ. Contam. Toxicol.11:617-626. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	8 d FD		Mortality	898 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	8 d FD		Mortality	3850 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	8 d FD		Mortality	28.2 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	8 d FD		Mortality	33.3 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	8 d FD		Mortality	2500 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD		Mortality	69 ai ppm		Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d FD		Mortality	91 ppm		Bennett,R.S.. 1989. Role of Dietary Choices in the Ability of Bobwhite to Discriminate Between Insecticide-Treated and Untreated food. Environ. Toxicol. Chem.8(8): 731-738. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d OR		Mortality	90 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d OR		Mortality	682 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d OR		Mortality	336 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d OR		Mortality	79 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LC50	5 d OR		Mortality	91 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LC50	5 d FD		Mortality	116 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d FD		Mortality	682 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d FD		Mortality	90 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD		Mortality	46 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
American Kestrel (Falco sparverius)	0.111	LD50	14 d OR		Mortality		3.08 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Red-Winged Blackbird (Agelaius phoeniceus)	0.0526	LD50	14 d OR		Mortality			Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	30 d OR		Mortality	60.5 mg/kg		Hudson,R.H., M.A. Haegele, and R.K. Tucker. 1979. Acute Oral and Percutaneous Toxicity of Pesticides to Mallards: Correlations with Mammalian Toxicity Data. Toxicol. Appl. Pharmacol.47:451-460. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	14 d OR		Mortality		114.7 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LD50	7 d FD		Mortality	57 ppm		Shellenberger,T.E., B.J. Gough, and L.A. Escuriex. 1970. The Comparative Toxicity of Organophosphate Pesticides in Wildlife. In: W.B.Deichmann, (Ed.), Pesticides Symposia, Inter-Am.Conf.Toxicol.Occup.Med., Univ.of Miami Schl.of Med., Miami, FL:205-210. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	7 d FD		Mortality	51 ppm		Shellenberger,T.E., B.J. Gough, and L.A. Escuriex. 1970. The Comparative Toxicity of Organophosphate Pesticides in Wildlife. In: W.B.Deichmann, (Ed.), Pesticides Symposia, Inter-Am.Conf.Toxicol.Occup.Med., Univ.of Miami Schl.of Med., Miami, FL:205-210. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	7 d FD		Mortality	138 ppm		Shellenberger,T.E., B.J. Gough, and L.A. Escuriex. 1970. The Comparative Toxicity of Organophosphate Pesticides in Wildlife. In: W.B.Deichmann, (Ed.), Pesticides Symposia, Inter-Am.Conf.Toxicol.Occup.Med., Univ.of Miami Schl.of Med., Miami, FL:205-210. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality		10	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality		60.5	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	14 d OR		Mortality		7.56	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality		6.60	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LD50	14 d OR		Mortality		8.21	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Common Grackle (Quiscalus quiscula)	0.128	LOEL	5 d OR		Mortality	63 ppm	7.51	Grue,C.E.. 1982. Response of Common Grackles to Dietary Concentrations of Four Organophosphate Pesticides. Arch. Environ. Contam. Toxicol.11:617-626. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	1 ge FD		Growth	15.5 ppm	1.52	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	1 ge FD		General reproduction	14.7 ppm	0.819	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	21 d FD		Progeny number	10 ppm food	0.978	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	14 d FD		Progeny number	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	14 d FD		Progeny number	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	175 d FD		Progeny number	10 ppm food	1.07	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LOEL	42 d FD		Progeny number	48 ppm food	5.42	Solecki,R., A.S. Faqi, R. Pfeil, and V. Hilbig. 1996. Effects of Methyl Parathion on Reproduction in the Japanese Quail. Bull. Environ. Contam. Toxicol.57(6): 902-908. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	21 d FD		Eggshell strength	10 ppm food	0.978	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	8 d FD		Eggshell strength	28 ppm	3.01	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LOEL	42 d FD		Eggshell thickness	48 ppm food	5.42	Solecki,R., A.S. Faqi, R. Pfeil, and V. Hilbig. 1996. Effects of Methyl Parathion on Reproduction in the Japanese Quail. Bull. Environ. Contam. Toxicol.57(6): 902-908. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	21 d FD		Eggshell thickness	10 ppm food	1.07	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LOEL	42 d FD		Egg weight	48 ppm food	5.42	Solecki,R., A.S. Faqi, R. Pfeil, and V. Hilbig. 1996. Effects of Methyl Parathion on Reproduction in the Japanese Quail. Bull. Environ. Contam. Toxicol.57(6): 902-908. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	21 d FD		Egg weight	10 ppm food	1.07	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	175 d FD		Egg weight	10 ppm food	1.07	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)
298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Common Grackle (Quiscalus quiscula)	0.128	NOEL	5 d OR		Mortality	25 ppm	2.98	Grue,C.E.. 1982. Response of Common Grackles to Dietary Concentrations of Four Organophosphate Pesticides. Arch. Environ. Contam. Toxicol.11:617-626. (as reported in USEPA ECOTOX Database accessed 10June2014)
White-Breasted Nuthatch (Sitta carolinensis)	0.02	NOEL	14 d FD		Growth Weight	3.5 mg/kg	0.798	Herbert,G.B., T.J. Peterle, and T.C. Grubb. 1989. Chronic Dose Effects of Methyl Parathion on Nuthatches: Cholinesterase and Ptilochronology. Bull. Environ. Contam. Toxicol.42:471-475. (as reported in USEPA ECOTOX Database accessed 10June2014)
White-Breasted Nuthatch (Sitta carolinensis)	0.02	NOEL	14 d FD		Growth Weight	3.5 mg/kg	0.798	Herbert,G.B., T.J. Peterle, and T.C. Grubb. 1989. Chronic Dose Effects of Methyl Parathion on Nuthatches: Cholinesterase and Ptilochronology. Bull. Environ. Contam. Toxicol.42:471-475. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD		Egg fertility	20 ppm food	2.15	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	21 d FD		Egg fertility	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Egg fertility	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Egg fertility	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Egg fertility	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Egg fertility	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	Throughout gestation FD	C	General reproduction	6.27 ppm	0.673	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	Throughout gestation FD	C	General reproduction	14.7 ppm	0.819	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)
298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD	C	Survival to hatching	20 ppm food	2.15	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	24 d FD	S	Survival to hatching	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	12 d FD		Survival to hatching	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	21 d FD		Survival to hatching	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD	S	Survival to hatching	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Survival to hatching	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	23 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	24 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	28 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		NOEL	12 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		NOEL	12 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	24 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	28 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	12 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	27 d FD		Mortality	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	8 d FD		Mortality	30 ppm	1.67	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Mortality	20 ppm	2.15	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Mortality	20 ppm	2.15	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	14 d OR		Mortality		4 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	28 d FD		Progeny number	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	24 d FD		Progeny number	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	12 d FD		Progeny number	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	28 d FD		Progeny number	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD		Progeny number	7 ppm food	0.75	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Progeny number	376 ppm	20.94	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	NOEL	42 d FD		Progeny number	12 ppm food	1.35	Solecki,R., A.S. Faqi, R. Pfeil, and V. Hilbig. 1996. Effects of Methyl Parathion on Reproduction in the Japanese Quail. Bull. Environ. Contam. Toxicol.57(6): 902-908. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Progeny number	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Progeny number	40 ppm	4.29	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Eggshell strength	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD		Eggshell strength	20 ppm food	2.15	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Eggshell strength	20 ppm	2.15	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	29 d FD		Survival	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	17 d FD		Survival	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	33 d FD		Survival	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD		Survival	20 ppm food	2.15	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Eggshell thickness	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Eggshell thickness	40 ppm	4.29	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.1191	NOEL	175 d FD		Eggshell thickness	20 ppm food	2.15	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Egg weight	40 ppm	4.29	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.173	NOEL	42 d FD		Egg weight	12 ppm food	1.35	Solecki,R., A.S. Faqi, R. Pfeil, and V. Hilbig. 1996. Effects of Methyl Parathion on Reproduction in the Japanese Quail. Bull. Environ. Contam. Toxicol.57(6): 902-908. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	56 d FD		Growth and Development	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	17 d FD		Growth	376 ppm	20.94	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Growth and Development	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	29 d FD		Growth	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	33 d FD		Growth	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Growth	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Growth	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Growth	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Growth	40 ppm	4.29	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Growth	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD		Growth	20 ppm food	2.15	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	14 d FD		Growth	376 ppm	20.9	Bennett,R.S., B.A. Williams, D.W. Schmedding, and J.K. Bennett. 1991. Effects of Dietary Exposure to Methyl Parathion on Egg Laying and Incubation in Mallards. Environ. Toxicol. Chem.10:501-507. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	42 d FD		Egg weight	40 ppm food	4.29	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Egg weight	40 ppm	4.29	Bennett,J.K., and R.S. Bennett. 1990. Effects of Dietary Methyl Parathion on Northern Bobwhite Egg Production and Eggshell Quality. Environ. Toxicol. Chem.9:1481-1485. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	175 d FD		Egg weight	7 ppm food	0.75	Bennett,R.S., R. Bentley, T. Shiroyama, and J.K. Bennett. 1990. Effects of the Duration and Timing of Dietary Methyl Parathion Exposure on Bobwhite Reproduction. Environ. Toxicol. Chem.9:1473-1480. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were available for the northern bobwhite quail. The selected LOAEL is from a 175-day study in which the bobwhite was dosed at 1.07 mg/kgBW/day with effects on egg weight, egg strength and progeny number (Bennett et al. 1990). A NOAEL from the same study was observed at 0.75 mg/kgBW/day for egg weight and progeny number.

Methyl Parathion Oral Toxicity (Bird)

298-00-0

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE: L = LD_{50} LD50 = Lethal dose at which 50% of test subjects die ai = Active ingredient
A = Acute LC50 = Lethal concentration at which 50% of test subjects die
S = Subchronic FD = Administered in food
C = Chronic OR = Dose Administered orally

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)
Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); USEPA 1993
Red Winged Blackbird Body Weight = 0.0526 kg; Dunning 1993
Mature Bobwhite body weight = 0.173 kg, average of adults (all seasons); USEPA 1993
Adult Japanese quail body weight: 0.15 kg; Vos et al. 1971
Mature mallard body weight = 1.082 kg; USEPA 1993
Ring-necked Pheasant Body Weight (average male & female) = 1.135 kg; Dunning 1993
Common Grackle Body Weight = 0.128 kg; Alsop 2001
American Kestrel Body Weight = 0.111 kg; Sample et al. 1996
White-breasted Nuthatch Body Weight = 0.02 kg; Alsop 2001

References:

Alsop, F.J. 2001. Birds of North America. Covent Garden Books, NY, NY.
Dunning, John B., Jr. 1993. CRC Handbook of Avian Body Masses. CRC Press, Inc. Boca Raton, FL.
Sample, B.E., D. Opresko and G.W. Sutter. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. U.S. Department of Energy, Oak Ridge. ES/TR/TM-86/R3
USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.
Vos, J. G., H. L. Van Der Maas, A. Musch, and E. Ram. 1971. Toxicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicol. Appl. Pharmacol. 18: 944-957. (As cited in Sample et al. 1996)

Phorate Oral Toxicity (Bird)

298-02-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD		Mortality	575 ai ppm		Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LC50	5 d OR		Mortality	441 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d OR		Mortality	200 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d OR		Mortality	373 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d OR		Mortality	248 ppm		Hill,E.F., R.G. Heath, J.W. Spann, and J.D. Williams. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds. U.S.Fish and Wildl.Serv.No.191, Special Scientific Report-Wildlife:61 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LC50	5 d FD		Mortality	441 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD		Mortality	200 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	5 d FD		Mortality	373 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	5 d FD		Mortality	248 ppm food		Heath,R.G., J.W. Spann, E.F. Hill, and J.F. Kreitzer. 1972. Comparative Dietary Toxicities of Pesticides to Birds. Special Scientific Report ? Wildlife 152, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Washington, DC:57 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Common Grackle (Quiscalus quiscula)	0.128	LD50	4 d OR		Mortality	1.3 mg/kg org		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Red-Winged Blackbird (Agelaius phoeniceus)	0.0526	LD50	14 d OR		Mortality	1 mg/kg org		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Phorate Oral Toxicity (Bird)

298-02-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Chukar (Alectoris chukar)	0.635	LD50	14 d OR		Mortality	12.8 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Chukar (Alectoris chukar)	0.635	LD50	14 d OR		Mortality		12.8	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ringed Turtle-Dove (Streptopelia risoria)		LD50	1 d OR		Mortality		17	Hill,E.F., and M.B. Camardese. 1984. Toxicity of Anticholinesterase Insecticides to Birds: Technical Grade Versus Granular Formulations. Ecotoxicol. Environ. Saf.8(6): 551-563. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	30 d OR		Mortality	2.55 mg/kg		Hudson,R.H., M.A. Haegele, and R.K. Tucker. 1979. Acute Oral and Percutaneous Toxicity of Pesticides to Mallards: Correlations with Mammalian Toxicity Data. Toxicol. Appl. Pharmacol.47:451-460. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	14 d OR		Mortality	7 mg/kg org		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	1 d OR		Mortality	203 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality		0.616	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality		2.55	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality	2.55 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LD50	14 d OR		Mortality	7.12 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR		Mortality	0.616 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Phorate Oral Toxicity (Bird)
298-02-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LD50	14 d OR		Mortality		7.12	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	1 d OR		Mortality		7	Hill,E.F., and M.B. Camardese. 1984. Toxicity of Anticholinesterase Insecticides to Birds: Technical Grade Versus Granular Formulations. Ecotoxicol. Environ. Saf.8(6): 551-563. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	1 d OR		Mortality		21	Hill,E.F., and M.B. Camardese. 1984. Toxicity of Anticholinesterase Insecticides to Birds: Technical Grade Versus Granular Formulations. Ecotoxicol. Environ. Saf.8(6): 551-563. (as reported in USEPA ECOTOX Database accessed 10June2014)
European Starling (Sturnus vulgaris)	0.0823	LD50	4 d OR		MOR MORT		7.5	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	147 d FD		General Reproduction	60 ppm	6.44	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	147 d FD		Survival	60 ppm	6.44	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LOEL	133 d FD		Survival	60 ppm	3.34	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	147 d FD		General Reproduction	60 ppm	6.44	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	133 d FD		Survival	5 ppm	0.28	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were available for the mallard and northern bobwhite quail. The selected LOAEL is from a 133-day study in mallards dosed at 3.34 mg/kgBW/day with effects on survival. (USEPA 2013); a NOAEL from the same study was reported at 0.28 mg/kgBW/day.

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE: L = LD_{50} | A = Acute | S = Subchronic | C = Chronic

LD50 = Lethal dose at which 50% of the test subjects die
LC50 = Lethal concentration at which 50% of the test subjects die
FD = Administered in food
OR = Dose Administered orally
ai = Active ingredient

Phorate Oral Toxicity (Bird)

298-02-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)

Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); USEPA 1993

Mature Bobwhite body weight = 0.173 kg, average of adults (all seasons); USEPA 1993

Adult Japanese quail body weight: 0.15 kg; Vos et al. 1971

Mature mallard body weight = 1.082 kg; USEPA 1993

Ring-necked Pheasant Body Weight (average male & female) = 1.135 kg; Dunning 1993

References:

Dunning, John B., Jr. 1993. CRC Handbook of Avian Body Masses. CRC Press, Inc. Boca Raton, FL.

U.S. EPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.

Vos, J. G., H. L. Van Der Maas, A. Musch, and E. Ram. 1971. Toxicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicol. Appl. Pharmacol. 18: 944-957. (As cited in Sample et al. 1996)

4,6-Dinitro-2-methylphenol Oral Toxicity (Bird)

534-52-1

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Japanese Quail (Coturnix japonica)	0.15	LC50	5 d FD	A	Mortality	5000 ai ppm	564.2	Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)	1.135	LD50	14 d OR	L	Mortality		31.8	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	14 d OR	L	Mortality		22.7	Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were not available for avian receptors. Therefore, the LOAEL was derived from an LD50 of 22.7 mg/kgBW for mallards (Hudson et al. 1984) divided by an uncertainty factor of 10. An uncertainty factor of 100 was applied for a NOAEL of 0.227 mg/kgBW/day.

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE:

L = LD_{50}	LD50 = Lethal dose at which 50% of test subjects die	ai = Active ingredient
A = Acute	LC50 = Lethal concentration at which 50% of test subjects die	
S = Subchronic	FD = Administered in food	
C = Chronic	OR = Dose Administered orally	

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)

Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); USEPA 1993

Adult Japanese quail body weight: 0.15 kg; Vos et al. 1971

Mature mallard body weight = 1.082 kg; USEPA 1993

Ring-necked Pheasant Body Weight (average male & female) = 1.135 kg; Dunning 1993

References:

Dunning, John B., Jr. 1993. CRC Handbook of Avian Body Masses. CRC Press, Inc. Boca Raton, FL.

U.S. EPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.

Vos, J. G., H. L. Van Der Maas, A. Musch, and E. Ram. 1971. Toxicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicol. Appl. Pharmacol. 18: 944-957. (As cited in Sample et al. 1996)

2,6-Dinitrotoluene Oral Toxicity (Bird)

606-20-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail (Colinus virginianus)		LD50	14 d OR	L	Mortality	320 mg/kg		Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LOEL	14 d GV	A	Organ weight in relation to body weight		190	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LOEL	14 d GV	A	Organ weight in relation to body weight		100	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LOEL	14 d GV	A	Time to death		190	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		LOEL	14 d GV	A	Growth		350	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Organ weight in relation to body weigth		350	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Organ weight in relation to body weigth		100	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Organ weight in relation to body weigth		350	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)

2,6-Dinitrotoluene Oral Toxicity (Bird)

606-20-2

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Organ weight in relation to body weigth		50	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Organ weight in relation to body weigth		350	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Growth		350	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Growth		190	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Growth		100	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)		NOEL	14 d GV	A	Growth		100	Johnson,M.S., M.J. Quinn, M.A. Bazar, K.A. Gust, B.L. Escalon, and E.J. Perkins. 2007. Subacute Toxicity of Oral 2,6-Dinitrotoluene and 1,3,5-Trinitro-1,3,5-Triazine (RDX) Exposure to the Northern Bobwhite (Colinus virginianus). Environ. Toxicol. Chem.26(7): 1481-1487. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were not available for avian receptors. The LOAEL TRV was based on a 14-day study of the northern bobwhite resulting in a LOEL of 100 mg/kgBW/day 2.6-DNT from effects on organ weight (Johnson et al. 2007). Because of the short duration of the study the result was divided by an uncertainty factor of 10 to derive a LOAEL of 10 mg/kgBW/day. Although NOAELs were reported, they were also of short duration. The 14-day NOAEL of 50 mg/kgBW/day was divided by a factor of 10 to derived a NOAEL TRV of 5 mg/kgBW/day.

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE: L = LD_{50} — LD50 = Lethal dose at which 50% of the test subjects die — ai = Active ingredient

A = Acute — LC50 = Lethal concentration at which 50% of the test subjects die

S = Subchronic — FD = Administered in food

C = Chronic — OR = Dose Administered orally

GV = Gavage

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)

Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); USEPA 1993

References:

USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.

Pronamide Oral Toxicity (Bird)
23950-58-5

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Island Canary (Serinus canaria)		LD50	14 d OR	L	Mortality		>2000 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Island Canary (Serinus canaria)		NOEL	14 d OR	S	Mortality		1200 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	8 d FD		Mortality	>10000 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LC50	7 d FD		Mortality	>4000 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LC50	8 d FD		Mortality	>10000 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	LD50	1 d OR		Mortality		>20000 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LD50	14 d OR		Mortality		>2250 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	LD50	1 d OR		Mortality		8770 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)	0.15	NOEL	1 d OR		Mortality		4000 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Pronamide Oral Toxicity (Bird)

23950-58-5

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	7 d FD		Mortality	>4000 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	14 d OR		Mortality		2250 mg/kg org	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	8 d FD		Mortality	10000 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

Chronic studies were unavailable for pronamide. The selected study is from a 14-day exposure (LD50) reported as >2000 mg/kg org (interpretted as mg/kg BW). A LOAEL was calculated by applying an uncertainty factor of 10, resulting in a value of 200 mg/kgBW/day. An uncertainty factor of 100 was applied for a NOAEL of 20 mg/kgBW/day.

mg/kg bdwt or mg/kg-BW/d = milligrams per killograms of body weight per day

DURATION CODE: L = LD_{50} — LD50 = Lethal dose at which 50% of the test subjects die — ai = Active ingredient
A = Acute — LC50 = Lethal concentration at which 50% of the test subjects die
S = Subchronic — FD = Administered in food
C = Chronic — OR = Dose Administered orally

References:

USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.
Vos, J. G., H. L. Van Der Maas, A. Musch, and E. Ram. 1971. Toxicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicol. Appl. Pharmacol. 18: 944-957. (As cited in Sample et al. 1996)

Isodrin Oral Toxicity (Bird)
465-73-6

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Chicken (7-day old)		LD50		L	Mortality	2.7 mg/kg		Rudd, R.L. and R.E. Genelly. Pesticides: Their Use and Toxicity in Relation to Wildlife. 1956. State of California Department of Fish and Game, Game Management Branch, Game Bulletin No. 7.
Chicken		LOAEL	7 weeks	S	Mortality	12 ppm	0.837	Rudd, R.L. and R.E. Genelly. Pesticides: Their Use and Toxicity in Relation to Wildlife. 1956. State of California Department of Fish and Game, Game Management Branch, Game Bulletin No. 7.
Chicken		NOAEL	7 weeks	S	Mortality	6 ppm	0.418	Rudd, R.L. and R.E. Genelly. Pesticides: Their Use and Toxicity in Relation to Wildlife. 1956. State of California Department of Fish and Game, Game Management Branch, Game Bulletin No. 7.

Selected:

Subchronic studies were available for the chicken. The only reported LOAEL is from a 7-wk study at an estimated dose of 0.837 mg/kgBW/day with mortality as an endpoint. The NOAEL in the same study was 0.418 mg/kgBW/day. Although the study was subchronic, and subchronic-to-chronic adjustment factor was not applied since it occurred during a critical lifestage.

DURATION CODE:

L = LD_{50}	LD50 = Lethal dose at which 50% of the test subjects die
A = Acute	LC50 = Lethal concentration at which 50% of the test subjects die
S = Subchronic	LOAEL = Lowest-observed-aedverse-effects level
C = Chronic	NOAEL = No-observed-aedverse-effects level

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)

Chicken food ingestion (kg/day) = 0.075 x $BW^{0.8449}$(kg); USEPA 1988

Chicken body weight (1 to 63 days weighted average Ross Boilers) = 1.6 kg; USEPA 1988

References:

USEPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. Environmental Criteria and Assessment Office. Cincinnati, OH. EPA/600/6-87/008.

Analine Oral Toxicity (Bird)

62-53-3

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird		LD50		L	Mortality		562	Schafer et al. 1972
Bobwhite Quail		LD50		L	Mortality		>1000	Schafer et al. 1972
Starling		LD50		L	Mortality		750	Schafer et al. 1972
House Sparrow		LD50		L	Mortality		562	Schafer et al. 1972

Selected:

Limited information was found in the literature search with an oral toxicity value for analine for birds. The selected studies are based on an LD50 of 562 mg/kgBW in red-winged blackbird and house sparrow. A chronic LOAEL and NOAEL were selected by adjusting the LD50 by an uncertainty factor of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

LD50 = Lethal dose at which 50% of the test subjects die
LC50 = Lethal concentration at which 50% of the test subjects die

References:

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. Environmental Criteria and Assessment Office. Cincinnati, OH. EPA/600/6-87/008.
Schafer, E.W.1972. The Acute Oral Toxicity of 369 Pesticidal, Pharmaceutical and Other Chemicals to Wild Birds.J. Wildl. Manage. 17: 36-42.Toxicology and Applied Pharmacology 21:315-330.

2,4-Dinitrophenol Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Red-winged Blackbird		LD50		L	Mortality		13	Schafer et al. 1972
Starling		LD50		L	Mortality		42	Schafer et al. 1972
House Sparrow		LD50		L	Mortality		>9	Schafer et al. 1972

Selected:

Limited information was found in the literature search with an oral toxicity value for 2,4-dinitrophenol for birds. The selected study is based on an LD50 of 13 mg/kgBW in red-winged blackbirds. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by an uncertainty factor of 10 and 100, respectively.

DURATION CODE:

L = LD_{50} LD50 = Lethal dose at which 50% of the test subjects die
A = Acute
S = Subchronic
C = Chronic

References:

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. Environmental Criteria and Assessment Office. Cincinnati, OH. EPA/600/6-87/008.
Schafer, E.W.1972. The Acute Oral Toxicity of 369 Pesticidal, Pharmaceutical and Other Chemicals to Wild Birds.J. Wildl. Manage. 17: 36-42.Toxicology and Applied Pharmacology 21:315-330.

Hexachlorophene Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Bobwhite Quail		LD50		L	Mortality		575	Farm Chemicals Handbook 88. Willoughby, Ohio: Meister Publishing Co., 1988., p. C-126. As reported in Hazardous Substance Data Bank, accessed July 16, 2014.
Mallard		LD50		L	Mortality		1450	Farm Chemicals Handbook 88. Willoughby, Ohio: Meister Publishing Co., 1988., p. C-126. As reported in Hazardous Substance Data Bank, accessed July 16, 2014.

Selected:

Limited information was found in the literature search with an oral toxicity value for hexachlorophene for birds. The selected study is based on an LD50 of 575 mg/kgBW in bobwhite quail. A chronic LOAEL and NOAEL are selected by adjusting the LD50 by an uncertainty factor of 10 and 100, respectively.

DURATION CODE:

L = LD_{50}
A = Acute
S = Subchronic
C = Chronic

LD50 = Lethal dose at which 50% of the test subjects die

2,4-D Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Northern Bobwhite Quail (Colinus virginianus)		LC50	8 d FD		Mortality	>5620 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LC50	8 d FD		Mortality	>5620 ppm		U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LC50	5 d FD		Mortality	>5000 ai ppm		Hill,E.F., and M.B. Camardese. 1986. Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. Fish and Wildlife Technical Report 2, Fish and Wildlife Service, U.S. Department of the Interior:147 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	>1000 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)		LD50	14 d OR		Mortality	>2000 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Ring-Necked Pheasant (Phasianus colchicus)		LD50	14 d OR		Mortality	472 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Rock Dove (Columba livia)		LD50	14 d OR		Mortality	668 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Japanese Quail (Coturnix japonica)		LD50	14 d OR		Mortality	668 mg/kg		Hudson,R.H., R.K. Tucker, and M.A. Haegele. 1984. Handbook of Toxicity of Pesticides to Wildlife. Resource Publication 153, Fish and Wildlife Service, U.S. Department of the Interior:90 p.. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	LOEL	56 d FD		Growth (weight)	100 mg/kg	6.973	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	LOEL	28 d FD		Growth (weight)	100 mg/kg	6.973	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	LOEL	56 d FD		Growth (weight)	10 mg/kg	0.697	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	LOEL	28 d FD		Growth (weight)	10 mg/kg	0.697	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	LOEL	147 d FD		Reproduction	>962 ppm	>103	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	NOEL	56 d FD		Growth (weight)	10 mg/kg	0.697	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)

2,4-D Oral Toxicity (Bird)

Test Species	Wt. (kg)	Endpoint	Duration	CODE	Effect	Concentration	Dose (mg/kg-BW/day)	Reference
Domestic Chicken (Gallus domesticus)	1.6	NOEL	28 d FD		Growth (weight)	10 mg/kg	0.697	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	NOEL	56 d FD		Growth (weight)	5 mg/kg	0.349	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	NOEL	28 d FD		Growth (weight)	5 mg/kg	3.486	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Domestic Chicken (Gallus domesticus)	1.6	NOEL	28 d FD		Growth (weight)	50 mg/kg	3.486	Whitehead,C.C.. 1973. Growth Depression of Broilers Fed on Low Levels of 2,4-Dichlorophenoxyacetic Acid. Br. Poult. Sci.14:425-427. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	147 d FD		Reproduction	962 ppm	103	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Mallard Duck (Anas platyrhynchos)	1.134	NOEL	8 d FD		Mortality	1000 ppm	0.056	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)
Northern Bobwhite Quail (Colinus virginianus)	0.173	NOEL	8 d FD		Mortality	1000 ppm	107.4	U.S. Environmental Protection Agency, and Office of Pesticide Programs. 2013. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.:. (as reported in USEPA ECOTOX Database accessed 10June2014)

Selected:

The selected study is based on growth in chickens exposed to 2,4-D in food for 56 days. There was no effect on growth at 5 ppm (an estimated dose of 0.349 mg/kgBW/day; NOAEL). There was a significant decrease in growth at 10 ppm (an estimated dose of 0.697 mg/kgBW/day). This study was selected based on the length of exposure and method of administration.

DURATION CODE:

L = LD_{50}	LD50 = Lethal dose at which 50% of the test subjects die	LOEL = Lowest-observed-effects level
A = Acute	LC50 = Lethal concentration at which 50% of the test subjects die	NOEL = No-observed-effects level
S = Subchronic	FD = Administered in food	
C = Chronic	OR = Dose Administered orally	

* -- Calculated Dose = Diet (mg/kg) x 1/BW (kg) x Food Ingestion (kg/day)

Bird food ingestion (kg/day; all birds) = 0.0582 x $BW^{0.651}$(kg); U.S. EPA 1993

Adult bobwhite quail weight (male and female) = 0.173 kg; average of adults in USEPA (1993)

Mallard body weight = 1.134 kg

Chicken food ingestion (kg/day) = 0.075 x $BW^{0.8449}$(kg); USEPA 1988

Chicken body weight (1 to 63 days weighted average Ross Boilers) = 1.6 kg; USEPA 1988

USEPA. 1988.

USEPA. 1993. Wildlife Exposure Factors Handbook. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600?R-93/187a.

Analyte	CAS Number	
4,4'-Methylene bis(2-chloroaniline)	101-14-4	Excerpts from HSDB (2014) - 4,4'-Methylenebis(2-chloroaniline) is used in curing urethane and epoxy resins and crosslinking urethane foam. 4,4'-Methylenebis(2-chloroaniline) is expected to have no mobility based upon an estimated Koc of 5700. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.1X10-11 atm-cu m/mole. The estimated log Kow is 3.91 (suggesting that bioaccumulation may be an important pathway). 4,4'-Methylene bis(2-chloroaniline) was not detected in any samples either on-site (as a potential source area) or off-site, and the likelihood that it is actually present is considered low. Fate and transport characteristics suggest there is a the potential that 4,4'-methylene bis(2-chloroaniline) could bioaccumulate and food-chain exposures could be an important exposure process. However, the lines of evidence (not detected and the site is an unlikely source area) suggest that the uncertainty surrounding the absence of an ESLB for 4,4'-methylene bis(2-chloroaniline) is low, and potential 4,4'-methylene bis(2-chloroaniline) exposures represent an incomplete or insignificant exposure pathway.
2-Chloroethyl vinyl ether	110-75-8	Excerpts from HSDB (2014) - 2-Chloroethyl vinyl ether is a synthetic organic chemical and is no longer produced in the United States. 2-Chloroethyl vinyl ether's former production and use as a monomer for vinyl polymer synthesis, and as a copolymer. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 8.8X10-3 atm-cu m/mole. 2-Chloroethyl vinyl ether may volatilize from dry soil surfaces based upon its vapor pressure of 26.8 mm Hg. RAIS (2014) reports a log Kow of 1.17 [suggesting a low potential for bioaccumulation]. Based on a high potential for volatilization (and thus a low likelihood to be persistent in surface soils) and low potential for bioaccumulation, the potential for birds to be exposed to 2-chloroethyl vinyl ether is considered low. 2-Chloroethylvinyl ether was not detected in soils, and the uncertainty associated with the absence of an ESLB for 2-chloroethylvinyl ether is considered low.

Analyte	CAS Number	
Ethyl tert-Butyl Ether	637-92-3	Excerpts from HSDB (2014) - Ethyl tert-butyl ether is used as a gasoline additive. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.64X10-3 atm-cu m/mole. The estimated log Kow is 1.92 [suggesting a low potential for bioaccumulation]. Based on a high potential for volatilization (and thus a low potential to be persistent in surface soils) and low potential for bioaccumulation, the potential for birds to be exposed to ethyl tert-butyl ether is considered low. Ethyl tert-butyl ether was not detected in soils, and the uncertainty associated with the absence of an ESLB for ethyl tert-butyl ether is considered low.
Isopropyl Ether	108-20-3	Excerpts from HSDB (2014) - Isopropyl ether is used as an extraction agent and as a solvent in paints/stain removers. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 2.3X10-3 atm-cu m/mole. Volatilization from dry soil surfaces may be important given the vapor pressure (149 mm Hg). The estimated log Kow is 1.52 [suggesting a low potential for bioaccumulation]. Based on a high potential for volatilization (and thus a low potential to be persistent in surface soils) and low potential for bioaccumulation, the potential for birds to be exposed to isopropyl ether is considered low. Isopropyl ether was not detected in soils, and the uncertainty associated with the absence of an ESLB for isopropyl ether is considered low.
Methyl-t-butyl ether	1634-04-4	Excerpts from HSDB (2014) - Methyl t-butyl ether is used as gasoline additive, chemical intermediate, and chromatographic eluent. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 5.87X10-4 atm-cu m/mole. The estimated log Kow is 0.94 [suggesting a low potential for bioaccumulation]. Based on a high potential for volatilization (and thus a low potential to be persistent in surface soils) and low potential for bioaccumulation, the potential for birds to be exposed to methyl t-butyl ether is considered low. Methyl t-butyl ether was not detected in soils, and the uncertainty associated with the absence of an ESLB for methyl t-butyl ether is considered low.

Analyte	CAS Number	
t-Butanol	75-65-0	Excerpts from HSDB (2014) - t-Butanol is used as a denaturant for ethanol, in the manufacture of flotation agents, flavors and perfumes, as a solvent, as an octane booster in gasoline as well as a dehydrating agent and in the manufacture of methyl methacrylate. Volatilization from moist soil surfaces is expected to be a moderately important fate process based upon a Henry's Law constant of 9.05X10-6 atm-cu m/mole. t-Butyl alcohol may volatilize from dry soil surfaces based upon its vapor pressure of 44.7 mm Hg. The estimated log Kow is 0.35 [suggesting a low potential for bioaccumulation]. Despite a slow volatilization rate, but based on a very low potential for bioaccumulation, the potential for birds to be exposed to t-butanol is considered low. t-Butanol was not detected in soils, and the uncertainty associated with the absence of an ESLB for t-butanol is considered low.
tert-Amyl Methyl Ether	994-05-8	Excerpts from HSDB (2014) - tert-Amyl methyl ether is used as a gasoline additive. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.32X10-3 atm-cu m/mole. tert-Amyl methyl ether may volatilize from dry soil surfaces based upon its vapor pressure of 75.2 mm Hg. The estimated log Kow is 1.55 [suggesting a low potential for bioaccumulation]. Based on a high potential for volatilization (and thus a low potential to be persistent in surface soils) and low potential for bioaccumulation, the potential for birds to be exposed to tert-amyl methyl ether is considered low. tert-Amyl methyl ether was not detected in soils, and the uncertainty associated with the absence of an ESLB for tert-amyl methyl ether is considered low.

Analyte	CAS Number	
Hexabromobenzene	87-82-1	Excerpts from HSDB (2014) - Hexabromobenzene is produced for use as a flame retardant and may also enter the environment as a result of the high temperature breakdown of other brominated fire retardants. Volatilization from moist soil surfaces may occur based on an estimated Henry's Law constant of 2.8X10-5 atm-cu m/mole. Volatilization from dry soil surfaces is not expected given the vapor pressure of 1.6X10-8 mm Hg. The estimated log Kow is 6.07 [suggesting a high potential for bioaccumulation] although empirical studies in water have resulted in conflicting conclusions, ranging from low to high. Hexabromobenzene was not detected in any samples either on-site (as a potential source area) or off-site, and the likelihood that it is actually present is considered low. Fate and transport characteristics suggest there is the potential that hexabromobenzene could bioaccumulate and food-chain exposures could be an important exposure process. However, the lines of evidence (not detected and the site an unlikely source area) suggest that the uncertainty surrounding the absence of an ESLB for hexabromobenzene is low.
Hexabromobiphenyl	HEX - varies	Excerpts from HSDB (2014) - Hexabromobiphenyl was used as an additive in flame retardants primarily in thermoplastics that were ultimately used in electrical housing equipment. Hexabromobiphenyl consists of 42 possible congeners. The sole US producer of hexabromobiphenyl ceased production in November 1974. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 4.3X10-6 atm-cu m/mole; in addition, the strong adsorption of hexabromobiphenyl to soils should attenuate volatilization. Volatilization from dry soil surfaces is not expected to be an important environmental fate process based on the vapor pressure of 5.2X10-8 mm Hg . Since hexabromobiphenyl is no longer produced or used in the United States, the potential for human exposure is low [which may also be inferred to apply to ecological receptors as well]. The estimated log Kow is 6.39 [suggesting a high potential for bioaccumulation]. Hexabromobiphenyl was not detected in any samples on-site and, in the absence of a potential source area, it was not analyzed off-site. The likelihood that it is actually present is considered low. Fate and transport characteristics suggest there is a the potential that hexabromobiphenyl could bioaccumulate and food-chain exposures could be an important exposure pathway if it were present. However, the lines of evidence (not detected on-site and the site an unlikely source area) suggest that the exposure pathway is nonexistent and, therefore, incomplete. Uncertainty surrounding the absence of an ESLB for hexabromobiphenyl is low.

Analyte	CAS Number	
Bisphenol-A	80-05-7	Excerpts from HSDB (2014) - Bisphenol A is used as an intermediate in the manufacture of epoxy, polycarbonate and other resins and for rubber chemicals and flame retardants. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 4.0X10-11 atm-cu m/mole. Bisphenol A is not expected to volatilize from dry soil surfaces based upon its vapor pressure of 4.0X10-8 mm Hg. In soil, bisphenol A may have high to slight mobility based upon a Koc range of 115 to 3886. Most of the measured Koc values suggest that bisphenol A may have moderate to low mobility in soil. The log Kow is 3.32, and bioconcentration factors in aquatic organisms suggest the potential for bioconcentration is low to moderate. Bisphenol-A was not detected in any samples on-site (as a potential source area) or off-site, and the likelihood that it is actually present is considered low. Fate and transport characteristics suggest there is a the potential that bisphenol-A could bioaccumulate and food-chain exposures could be an important exposure process. However, the lines of evidence (not detected and the site an unlikely source area) suggest that the uncertainty surrounding the absence of an ESLB for bisphenol-A is low, and potential bisphenol-A exposures represent an incomplete or insignificant exposure pathway.
Caprolactam	105-60-2	Excerpts from HSDB (2014) - Caprolactam is used in the manufacture of synthetic fibers of the polyamide type and as a solvent for high molecular weight polymers. Caprolactam is produced in small quantities by some plants (i.e. sunflowers) as a secondary metabolite. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 5.4X10-11 atm-cu m/mole. Caprolactam biodegradation in soil has not been reported, but it has a relatively short half life (5 to 14 days) in both aerobic waste water treatment systems and other aquatic systems (lakes and rivers), suggesting that it will be degraded in most aerobic soils. UNDEP (2001) reports a log Kow of 0.12, suggesting that the bioaccumulative potential of caprolactam is low. UNEP (2001) also reports that caprolactam is highly biodegradable. Caprolactam was not detected in soils. Based on low bioaccumulation potential, and low persistence in the environment (high biodegradability), caprolactam is unlikely to be a concern for terrestrial receptors. The uncertainty associated with the absence of an ESLB for caprolactam is considered low.

Analyte	CAS Number	
Ronnel	299-84-3	Excerpts from HSDB (2014) - Ronnel was used as an insecticide primarily for livestock applications. Ronnel has not been manufactured in the U.S. since 1979, and EPA cancelled the registration of all products containing ronnel as the active ingredient on Jan 22, 1991. The Koc values estimated from water solubility and Kow indicate that the leaching potential of ronnel from soil is low. Based on its low vapor pressure (8X10-4 mm Hg), moderate Henry's Law constant (3.2X10-5 atm-cu m/mole) and high Koc, volatilization should not be important for the dissipation of ronnel from soil. In soil the biodegradation of ronnel may be fast since the mean half-life in surface waters is 8.4 days. The estimated log Kow is 5.07 [suggesting a high potential for bioaccumulation]. Ronnel was not detected in any samples on-site (as a potential source area) or off-site, and the likelihood that it is actually present is considered low, particularly since Ronnel has not been used in decades, and it is readily biodegraded. Fate and transport characteristics suggest there is a the potential that ronnel could bioaccumulate and food-chain exposures could be an important exposure process, if it were present. However, the lines of evidence (not detected, the site an unlikely source area, and readily biodegraded) suggest that the potential for exposure to ronnel is low and the pathway, therefore, incomplete. Uncertainty surrounding the absence of an ESLB for ronnel is low.
4-Chlorotoluene	106-43-4	Excerpts from HSDB (2014) - 4-Chlorotoluene was used as a solvent and intermediate for organic solvents and dyes. It was also used as a disinfectant against intestinal parasites in fowl. 4-Chlorotoluene may be formed in the environment as a photodegradation product of 4-chlorobenzyl chloride, a chemical intermediate. An estimated Koc of 340 suggests that 4-chlorotoluene may have moderate mobility in soil. Volatilization from moist soil surfaces may occur based on an estimated Henry's Law constant of 4.4X10-3 atm-cu m/mole. Based on limited data, 4-chlorotoluene may biodegrade aerobically under some conditions. A log Kow = 3.33 suggests a portential for bioaccumulation. 4-Chlorotoluene was not detected in any samples collected from the site. The likelihood that it is present is low since there is no known source area and it was not detected. The probability that there could be a complete and significant pathway from soil to birds is low. Therefore, the uncertainty associated with the absence of an ESLB for 4-chlorotoluene is low.

Analyte	CAS Number	
Bromobenzene	108-86-1	Excerpts from HSDB (2014) - Bromobenzene is used as an additive to motor oil, in organic synthesis to make phenyl magnesium bromide, as a solvent for crystallization on a large scale, and where a heavy liquid is desirable may result in its release to the environment through various waste streams. An estimated Koc value of 268 suggests that bromobenzene will have moderate mobility in soil. Volatilizaton from moist soil surfaces should occur based upon an experimental Henry's Law constant of 2.08X10-3 atm-cu m/mole. Volatilization from dry soil surfaces should be important given the vapor pressure of this compound. Bromobenzene is not biodegraded in screening studies using an activated sludge. A log Kow of 2.99 indicates a low-to-moderate potential for bioacummulation. Bromobenzene was not detected in any samples associated with the site. Based on the absence of detections and volatilization potential, bromobenzene is not expected to significantly contribute to exposure for avian receptors, despite a moderate potential for bioaccumulation. Therefore, any uncertainty associated with the absence of an ESLB is expected to be low.
Chloroethane	75-00-3	Excerpts from HSDB (2014) - Chloroethane (AKA ethyl chloride) was used as a refrigerant, solvent, alkylating agent, starting point in the manufacture of tetraethyl lead, and as a topical anesthetic. If released to soil, ethyl chloride is expected to have very high mobility based upon an estimated Koc of 24. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.11X10-2 atm-cu m/mole. Ethyl chloride will volatilize from dry soil surfaces based upon its vapor pressure. Food chain concentration potential is low based on a log Kow of 1.43. Based on the absence of detections of chloroethane, it's rapid volatilization rate, and low potential to bioaccumulate, the absence of an ESLB does not contribute significantly to uncertanity of the risk analysis.

Analyte	CAS Number	
Cyclohexanone	108-94-1	Excerpts from HSDB (2014) - The active ingredient is no longer contained in any registered pesticide products. Over 96% of all cyclohexanone produced is oxidized to adipic acid (for the manufacture of nylon 66) or converted to caprolactam (for the manufacture of nylon 6). Cyclohexanone is estimated to be highly mobile in soil based on a Henry's Law constant of 9.0x10-6 atm-cu m/mole. In view of its moderate vapor pressure and low adsorption to soil, it would be expected to volatilize from surface soil. Although data are lacking, it may also undergo direct photolysis on the soil surface. Cyclohexanone is readily biodegradable according to aerobic screening tests and therefore would be expected to biodegrade in soil. A log Kow of 0.81 indicates that cyclohexanone is unlikely to bioaccumulate. Based on an absence of detections in samples from the site, a low potential to bioaccumulate, high volatility, and propensity to biodegrade, it is unlikely that cyclohexanone has the potential to complete an exposure pathway to avian receptors. Therefore, uncertainty associated with the absence of an ESLB for cyclohexane is low.
n-Butanol	71-36-3	Excerpts from HSDB (2014) - n-Butanol (AKA n-butyl alcohol) is employed as a solvent for paints, lacquers and varnishes, natural and synthetic resins, gums, vegetable oils, dyes & alkaloids. It is used as an intermediate in the manufacture of pharmaceuticals and chemicals, and employed in industries producing artificial leather, textiles, safety glass, rubber cement, shellac, raincoats, photographic films & perfumes. Based on an estimated Koc of 72, n-butyl alcohol is expected to have high mobility in soil. Volatilization of n-butyl alcohol from moist soil surfaces is expected to be an important fate process given a Henry's Law constant of 8.8X10-6 atm-cu m/mole. The potential for volatilization of n-butyl alcohol from dry soil surfaces may exist based upon a vapor pressure of 7 mm Hg. The biodegradation half-life of n-butyl alcohol in a sub-surface soil from Blacksburg, VA was approximately 7 days. A log Kow of 0.88 indicates a low potential for bioaccumulation. n-Butanol was not detected in any samples associated with the site. Based on an absence of detection, a high volatilization potential, low potential for bioaccumulation, and high biodegradation potential, no complete or significant exposure routes between n-butanol and avian receptors is likely. Therefore, uncertainty associated with the absence of an ESLB is low.

Analyte	CAS Number	
1,1,2-Trichlorotrifluoroethane	76-13-1	Excerpts from HSDB (2014) - (AKA 1,1,2-trichloro-1,2,2-trifluoroethane and abbreviated as CFC-113). Used as a selective solvent in degreasing electrical equipment, dry-cleaning solvent, fire extinguishers, blowing agent, solvent drying, drying electronic parts and precision equipment. An estimated Koc value of 552 indicates that 1,1,2-trichloro-1,2,2-trifluoroethane is expected to have low mobility in soil. Volatilization of 1,1,2-trichloro-1,2,2-trifluoroethane from moist soil surfaces is expected to be an important fate process given a estimated Henry's Law constant of 5.26X10-1 atm-cu m/mole. It is expected to volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation is not an important environmental fate process in soil. A log Kow of 3.16 indicates a moderate potential for bioaccumulation. 1,1,2-Trichlorotrifluoroethane was not detected in any samples associated with the site. Although it has a moderate potential to bioaccumulate, the absence of detection and its high volatilization potential makes it unlikely to be included in a complete or significant exposure pathway for avian receptors. Therefore, any uncertainty associated with the absence of an ESLB is low.
Tris(2,3-dibromopropyl)phosphate	126-72-7	Excerpts from HSDB (2014) - Tris(2,3-dibromo-1-propyl) phosphate (TRIS) is no longer used in the United States. Major uses for TRIS were in plastics and flame retardant additive used in children's nightwear. Other applications included the treatment of packaging, draperies, institutional bedding, toys, doll clothing, and wigs. If released to soil, it is expected to have no mobility based upon an estimated Koc of 9700. Volatilization from moist soil surfaces is expected to be a moderately important fate process based upon an estimated Henry's Law constant of 2.6X10-5 atm-cu m/mole. However, adsorption to soil is expected to attenuate volatilization from moist soil. It is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation is not an important environmental fate process. TRIS has a log Kow = 4.29 [suggesting a potential for bioaccumulation]. Tris(2,3-dibromopropyl)phosphate was not detected in any samples, but has a moderate-to-low potential to volatilize, low potential to be biologically degraded, and a potential for bioaccumulation. An ESLB was not identified; however, in comparison with HH screening values and a review of spatial distribution, TRIS was not considered a chemical of concern. Although the relationship between HH screening values and potential ecological values is unknown, it provides a qualitative level of evidence regarding TRIS. On balance, the absence of an ESLB for TRIS is considered low, but the absence of an ESLB may lead to an under- or overestimation of potential risks.

Analyte	CAS Number	
1,3-Dichloropropane	142-28-9	Excerpts from HSDB (2014) - 1,3-Dichloropropane is thought to have been used as part of dichloropropene-dichloropropane mixture. It is manufactured by photochlorination of isopropyl ether. There is no evidence that 1,3-dichloropropane is manufactured or used commercially in the United States, although it may be produced as a result of the photochlorination of isopropyl ether. If released to soil, 1,3-dichloropropane is expected to have moderate mobility based upon a an estimated Koc of 290. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 9.76X10-4 atm-cu m/mole. 1,3-Dichloropropane may volatilize from dry soil surfaces based upon its vapor pressure. The hydrolysis half-life of 1,3-dichloropropane is 2.3 years, indicating that hydrolysis will occur slowly in moist soil and water. A log Kow = 2.00 indicates a low propensity to bioaccumulate. 1,3-Dichloropropane was not detected in any samples associated with the site. Based on the absence of detection, high volatilization potential and low bioaccumulation potential, 1,3-dichloropropane is not expected to enter the food chain to result is a comlete or significant pathway. Therefore, any uncertainty associated with the absence of an ESLB is expected to be low.
Ethyl ether	60-29-7	Excerpts from HSDB (2014) - Ethyl ether (AKA diethyl ether) is produced and used as a solvent, in the manufacture of gun powder, formerly used in the US as an anesthetic and as a primer for gasoline engines. If released to soil, diethyl ether is expected to have high mobility based upon an estimated Koc of 73. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.23X10-3 atm-cu m/mole. Diethyl ether is expected to volatilize from dry soil surfaces based upon its extrapolated vapor pressure. Aqueous screening studies indicate biodegradation is expected to be a slow fate process in both soil and water. A log Kow = 0.89 indicates a low potential to bioaccumulate. Ethyl ether was not detected in samples associated with the site. Based on the absence of detections, high potential for volatilization and very low potential for bioaccumulation, ethyl ether is not expected to enter into either a complete or significant exposure route for avian receptors. Therefore, uncertainty associated with the absence of an ESLB is low.

Analyte	CAS Number	
2-Propanol	67-63-0	Excerpts from HSDB (2014) - 2-Propanol (AKA isopropanol) has been produced and used in the manufacture of acetone, glycerol, and isopropyl acetate and as a solvent for a variety of applications. If released to soil, isopropanol is expected to have very high mobility based upon an estimated Koc of 1.5. Volatilization from moist soil surfaces is expected to be a moderately important fate process based upon a Henry's Law constant of 8.10X10-6 atm-cu m/mole. Isopropanol is expected to volatilize from dry soil surfaces based upon its vapor pressure. Isopropanol has a log Kow of 0.05 and is not expected to bioaccumulate. 2-Propanol was not detected in samples associated with the site. Based on the absence of detections, relative volatility and low log Kow, exposure pathways for avian receptor are expected to be incomplete or insignificant 2-propanol. Therefore, uncertainty associated with the absence of an ESLB is low.
2,6-Dimethylphenol	576-26-1	Excerpts from HSDB (2014) - 2,6-Dimethylphenol is used for the preparation of coal tar disinfectants, in the manufacture of artificial resins, as a constituent of coal tar creosote, as a raw material for pesticides, and as a component of automobile and diesel exhaust. It has been found to occur naturally in tobacco and marijuana smoke and in black tea. If released to soil, 2,6-dimethylphenol is expected to have moderate mobility based upon an estimated Koc of 460. Volatilization from moist soil surfaces is expected to be a moderately important fate process based upon a Henry's Law constant of 6.7X10-6 atm-cu m/mole. Complete biodegradation of dimethylphenols has occurred between 4 to 14 days within a hard, carbonaceous woody loam. A log Kow of 2.36 suggests that is has a low potential to bioaccumulate. 2,6-Dimethylphenol was not detected in any samples associated with the site. Based on the absence of detections or a source area, relatively high volatilization and biodegradation potential, and low log Kow, 2,6-dimethylphenol is not expected to enter the food chain to result in a complete or significant pathway to avian receptors. Therefore, the absence of an ESLB for 2,6-dimethylphenol is not expected to be a significant source of uncertainty.

Analyte	CAS Number	
1,2-Diphenyl-hydrazine	122-66-7	Excerpts from HSDB (2014) - 1,2-Diphenylhydrazine is used as a chemical intermediate. If released to soil 1,2-diphenylhydrazine is expected to have low mobility based upon an estimated Koc of 950. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 4.8X10-7 atm-cu m/mole. It is not expected to volatilize from dry soil surfaces based on its vapor pressure. Based on limited aqueous screening study data, 1,2-diphenylhydrazine is expected to biodegrade in soil under aerobic conditions (80% degradation in 7 days). It may also oxidize to azobenzene by air or cations in the soil. A log Kow = 2.94 suggests a low-to-moderate potential to bioaccumulate. 1,2-Diphenylhydrazine was not detected in any samples associated with the site. Based on the absence of a source on site, the absence of detections, low bioaccumulation potential and high potential for biodegradation, a pathway to avian receptors for exposure to 1,2-diphenylhydrazine is not expected to be complete or significant. Therefore, the absence of an ESLB is not expected to contribute significantly to uncertainty in the risk evaluation.
Pentachlorethane	76-01-7	Excerpts form HSDB (2014) - Pentachloroethane's formation as a by-product during the manufacture of chlorinated hydrocarbons and the conversion of this by-product into tetrachloroethylene may result the release of pentachloroethane to the environment. If released to soil, pentachloroethane is expected to have low mobility based upon an estimated Koc of 1,340. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 1.9X10-3 atm-cu m/mole. Pentachloroethane may volatilize from dry soil surfaces based upon its vapor pressure. The importance of biodegradation is inconclusive. A log Kow of 3.22 suggests a low potential to bioaccumulate. Pentachloroethane was not detected in any samples associated with the site. Bioaccumulation potential is low (based on its log Kow) and it is not expected to be persistent in surface soils based on its high potential to volatilize from moist or dry soils. Therefore, food-chain transfer is not expected to be an important exposure pathway. Based on these chemical properties, uncertainty associated with the absence of an ESLB is low.

Analyte	CAS Number	
Ethylene oxide	75-21-8	Excerpts from HSDB (2014) - Ethylene oxide is used as a chemical intermediate and medical and foodstuff sterilizing agent. It is also used as an agricultural fumigant. If released to soil, ethylene oxide is expected to have very high mobility based upon a Koc of 2.2. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.48X10-4 atm-cu m/mole. Ethylene oxide hydrolyzes to ethylene glycol which is readily biodegraded. A log Kow of -0.03 suggest low bioaccumulation potential. Ethylene oxide was not detected in sample associated with the site. Based on the absence of detections or an on-site source, high propensity to volatilize and biodegrade (low persistence), and very low log Kow, food-chain transfer and exposures for avian receptors are considered complete or insignificant. Therefore, uncertainty due to the absence of an ESLB is low.
trans-1,4-Dichloro-2-butene	110-57-6	Excerpts from HSDB (2014) - trans-1,4-Dichloro-2-butene (AKA 1,4-dichloro-trans-2-butene) is produced and used as a starting material in the manufacture of adiponitrile, butane-1,4-diol and tetrahydrofuran. If released to soil, 1,4-dichloro-trans-2-butene is expected to have moderate mobility based upon a measured Koc of 215. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 6.6X10-4 atm-cu m/mole. 1,4-Dichloro-trans-2-butene may volatilize from dry soil surfaces based upon its vapor pressure. The hydrolysis half-life of 1,4-dichloro-trans-2-butene was measured as 3.2 days under neutral conditions, suggesting hydrolysis may be an important fate process in moist soils and water. Limited soil data suggest that biodegradation will not be an important fate process since volatilization and hydrolysis are expected to occur rapidly. A log Kow was not identified; however, a low log Koc would suggest a low log Kow as well. trans-1,4-Dichloro-2-butene was not detected in any samples associated with the site. Based on the absence of detection or source, its high potential to volatilize and short half-life, it is not expected to enter the food chain and result in exposure for avian receptors as a significant or complete pathway. Therefore, there is a low level of uncertainty due to the absence of an ESLB for this chemical.

Analyte	CAS Number	
bis(2-Chloroisopropyl)ether	39638-32-9	Excerpts from HSDB (2014) - If released to water or moist soil, bis(2-chloroisopropyl) ether will hydrolyze rapidly based on an estimated hydrolysis half-life of <38.4 sec in water. Therefore, biodegradation, bioconcentration in aquatic organisms and adsorption to soil and sediment are not expected to be significant fate processes for bis(2-chloroisopropyl) ether. Henry's constant, Koc and Log Kow were not identified. Bis(2-Chloroisopropyl) ether was not detected in any samples associated with the site (as a potential source area). It would not be expected to be persistent in surface soils based on its rapid hydrolysis; similarly, it would not be anticipated to be bioaccumulate in the food chain. Therefore, pathways to avian receptors are considered incomplete or insignificant. Therefore, uncertainty with the absence of an ESLB for this chemical is low.
(E)-alpha,beta-2,3,4,5,6-Heptachlorostyrene	29086-38-2	No information identified
(E)-beta-2,3,4,5,6-Hexachlorostyrene	90301-92-1	No information identified
(Z)-alpha,beta-2,3,4,5,6-Heptachlorostyrene	29086-39-3	No information identified
(Z)-beta-2,3,4,5,6-Hexachlorostyrene	90301-93-2	No information identified
2,3,4,5,6-Pentachlorostyrene	14992-81-5	No information identified
4-tert-Butylphenol	98-54-4	Information was unavailble from HSDB. However, use and environmental fate characteristics for 4-tert-
alpha-2,3,4,5,6-Hexachlorostyrene	68705-15-7	No information identified
Benzyl dichloride	98-87-3	Excerpts from HSDB (2014) - Benzyl dichloride may potentially be released to the environment by fugitive emissions and waste streams from benzyl chloride manufacture. It hydrolyzes rapidly in water (half-life of 7.4 minutes at 25 degrees C); therefore, hydrolysis is expected to be a dominant fate process in moist soil. A theoretical Koc value of 510 indicates medium to low soil mobility; however, leaching in moist soils is not expected to be significant since the compound is expected to hydrolyze first. Evaporation of benzyl dichloride from dry surfaces is expected to occur. A log Kow of 3.22 suggests a low potential to bioaccumulate. Benzyl dichloride was not detected in any samples associated with the site (as a potential source area). It hydrolyzes rapidly and has a low potential to bioaccumulate; therefore, exposure pathways to avian receptors are not expected to be complete or significant. Therefore, uncertainty associated with the absence of an ESLB for

Analyte	CAS Number	
beta,beta-2,3,4,5,6-Heptachlorostyrene	29082-75-5	No information identified
Ethyl methanesulfonate	62-50-0	Excerpts from HSDB (2014) - Ethyl methanesulfonate was formerly produced and used as a research chemical. If released to soil, it is expected to have very high mobility based upon an estimated Koc of 22. Volatilization from moist soil surfaces may occur based upon an estimated Henry's Law constant of 5.4X10-6 atm-cu m/mole. Ethyl methanesulfonate is expected to hydrolyze in the presence of water with reported half-lives of 46 and 96 hours and this is expected to be the major fate process for this compound in water and moist soil environments. Ethyl methanesulfonate is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation data were not available. A log Kow of -0.2 indicates a low potential to bioaccumulate. Based on rapid hydrolysis and volatility from moist soils (i.e., low persistence) and low potential to bioaccumulate, potential exposure pathways to avian receptors are considered incomplete or insignificant. Therefore, uncertainty due to the absence of an ESLB for ethyl methanesulfonate is low.
Hexachloropropene	1888-71-7	Excerpts from HSDB (2014) - Hexachloropropene is produced and used as a chemical intermediate in the production of uranium tetrachloride, as a solvent, plasticizer, and in hydraulic fluid. An estimated Koc value of 470 suggests moderate mobility in soil. Volatilization from moist soil surfaces is expected based on an estimated Henry's Law constant of 1.6X10-3 atm-cu m/mole. Volatilization from dry soil surfaces may occur given the vapor pressure. Log Kow = 4.38 (RAIS 2014) [indicates a potential to bioaccumulate] Hexachloropropene was not detected in samples from the site. Based on an absence of a source, lack of detections and a high potential to volatilize (and thus not be persistent in surface soils), hexachloropropene is not expected to enter into the food chain to avian receptors despite its potential to bioaccumulate. Therefore, exposure pathways are expected to be incomplete or insignificant. It is concluded that any uncertainty due to the absence of an ESLB for hexachloropropene is low.

Analyte	CAS Number	
Chlorobromomethane	74-97-5	Excerpts from HSDB (2014) - Chlorobromomethane is produced and used as a fire extinguisher fluid, especially in aircraft and portable units. If released to soil, chlorobromomethane is expected to have very high mobility based upon an estimated Koc of 24. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 1.46X10-3 atm-cu m/mole. Chlorobromomethane should volatilize from dry soil surfaces based upon its vapor pressure. Based on limited data, microbial degradation of bromochloromethane may occur in soil under anoxic conditions. A log Kow of 1.41 indicates a low potential to bioaccumulate. Chlorobromomethane was not detected in samples collected from the site. Based on the absence of a source, a low bioaccumulation potential and rapid volatilization (low persistence in surface soils), exposure pathways for avian receptors are incomplete or insignificant. Therefore, the uncertainty associated with the lack of an ESLB is low.
Trihalomethanes, Total	STL00209	Trihalomethanes are a group of four chemicals (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water (http://www.epa.gov/envirofw/html/icr/gloss_dbp.html accessed Oct2014). From HSDB (2014), the Henry's Law constants for these constituents range from 5.35X10-4 atm-cu m/mole to 3.67X10-3 atm-cu m/mole, indicating the volatilization is an important fate process. Also from HSDB (2014), log Kow values range from 1.97 to 2.4, suggesting a low bioaccumulation potential. Trihalomethanes were not detected in samples collected from the site. Based on the absence of a source, a low bioaccumulation potential and volatilization as an important fate process (low persistence in surface soils), exposure pathways for avian receptors are considered incomplete or insignificant. Therefore, the uncertainty associated with the lack of an ESLB is low.

Analyte	CAS Number	
Alpha, alpha-Dimethylphenethylamine	122-09-8	Excerpts from HSDB (2014) - Alpha, alpha-Dimethylphenethylamine (AKA phentermine) was produced and used as an appetite suppressant. It was a component of the popular diet-drug combination of fenfluramine and phentermine (Fen/phen). If released to soil, phentermine is expected to have moderate mobility based upon an estimated Koc of 260. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 1.4X10-6 atm-cu m/mole. Biodegradation data were not available. Hydrolysis is not expected to be an important fate process since this compound lacks functional groups that hydrolyze under environmental conditions. A log Kow of 1.9 [suggests a low potential for bioaccumulation]. Phentermine was not detected in samples collected from the site. Based on the absence of a source, a low bioaccumulation potential and volatilization from moist soils as an important fate process (low persistence in surface soils), exposure pathways for avian receptors are considered incomplete or insignificant. Therefore, the uncertainty associated with the lack of an ESLB is low.