Ecological Soil Screening Levels
for
Cadmium

Interim Final

OSWER Directive 9285.7-65

U.S. Environmental Protection Agency
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1.0 INTRODUCTION

Ecological Soil Screening Levels (Eco-SSLs) are concentrations of contaminants in soil that are protective of ecological receptors that commonly come into contact with and/or consume biota that live in or on soil. Eco-SSLs are derived separately for four groups of ecological receptors: plants, soil invertebrates, birds, and mammals. As such, these values are presumed to provide adequate protection of terrestrial ecosystems. Eco-SSLs are derived to be protective of the conservative end of the exposure and effects species distribution, and are intended to be applied at the screening stage of an ecological risk assessment. These screening levels should be used to identify the contaminants of potential concern (COPCs) that require further evaluation in the site-specific baseline ecological risk assessment that is completed according to specific guidance (U.S. EPA, 1997, 1998, and 1999). The Eco-SSLs are not designed to be used as cleanup levels and the United States (U.S.) Environmental Protection Agency (EPA) emphasizes that it would be inappropriate to adopt or modify the intended use of these Eco-SSLs as national cleanup standards.

The detailed procedures used to derive Eco-SSL values are described in separate documentation (U.S. EPA, 2003). The derivation procedures represent the collaborative effort of a multi-stakeholder group consisting of federal, state, consulting, industry, and academic participants led by the U.S. EPA Office of Solid Waste and Emergency Response.

This document provides the Eco-SSL values for cadmium and the documentation for their derivation. This document provides guidance and is designed to communicate national policy on identifying cadmium concentrations in soil that may present an unacceptable ecological risk to terrestrial receptors. The document does not, however, substitute for EPA's statutes or regulations, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon the circumstances of the site. EPA may change this guidance in the future, as appropriate. EPA and state personnel may use and accept other technically sound approaches, either on their own initiative, or at the suggestion of potentially responsible parties, or other interested parties. Therefore, interested parties are free to raise questions and objections about the substance of this document and the appropriateness of the application of this document to a particular situation. EPA welcomes public comments on this document at any time and may consider such comments in future revisions of this document.

2.0 SUMMARY OF ECO-SSLs FOR CADMIUM

Cadmium is a naturally occurring rare element that does not have any known essential or beneficial biological function (Eisler, 1985; OSHA, 1992) and is widely distributed in the earth's crust (http://toxnet.nlm.nih.gov). It may enter the environment during the mining, ore processing, and smelting of zinc and zinc-lead ores; the recovery of metal by processing scrap; the melting and pouring of cadmium metal; the casting of alloys for coating products (telephone cables, electrodes, sprinkling systems, fire alarms, switches, relays, circuit breakers, solder, and jewelry);

the combustion of coal and fossil fuels; use in paint, pigment, and battery manufacture, and the production of sewage-sludges and phosphate fertilizers (Hutton, 1983; Shore and Douben, 1994; and Van Enk, 1983).

Cadmium's initial route of entry to the environment is often via the atmosphere. When released, it generally occurs as particulate matter and is subject to dry and wet deposition. Although anthropogenic releases are as small particles, most cadmium appears to be deposited relatively close to its source. Since it occurs naturally in the earth's crust, cadmium may also enter the atmosphere from the weathering of rocks, windblown soil, and volcanoes. However, these sources are minor compared with anthropogenic ones.

In the environment, cadmium occurs as a divalent metal that is insoluble in water, but its chloride and sulfate salts are freely soluble (Eisler, 1985). If released or deposited on soil, cadmium is largely retained in the surface layers of soil. Cadmium is adsorbed to soil but to a much lesser extent than most other heavy metals. The most important soil properties influencing adsorption are pH and organic content. Adsorption increases with pH and organic content. Therefore, leaching is more apt to occur under acid conditions in sandy soil. Other studies indicate that cadmium adsorption correlates most with the cation exchange capacity of the soil (CEC) especially when the soil is saturated in divalent cations. In soil, cadmium is expected to convert to more insoluble forms, such as cadmium carbonate in aerobic environments and cadmium sulfide in anaerobic ones (http://toxnet.nlm.nih.gov).

The availability of cadmium to organisms in the environment is dependent on a number of factors including pH, Eh, and chemical speciation (Eisler, 1985). Cadmium is taken up by plants from soils and translocated with subsequent transfer through the terrestrial food chain (Shore and Douben, 1994). The most important soil factors influencing plant cadmium accumulation are soil pH and cadmium concentration. Soil cadmium is distributed between a number of pools or fractions, of which only the cadmium in soil solution is thought to be directly available for uptake by plants. Soil pH is the principal factor governing the concentration of cadmium in the soil solution. Cadmium adsorption to soil particles is greater in neutral or alkaline soils than in acidic ones and this leads to increased cadmium levels in the soil solution. As a consequence, plant uptake of cadmium decreases as soil pH increases (WHO, 1992; http://toxnet.nlm.nih.gov).

The main routes of cadmium absorption for mammals are via respiration and ingestion. Factors that are reported to affect dietary cadmium absorption from the GI tract include age, sex, chemical form, levels of protein, levels of calcium and the presence of other elements (Nriagu, 1981). Cadmium-induced effects associated with oral intake include nephrotoxicity and also possible effects on the liver, reproductive organs, and the hematopoietic, immune, skeletal, and cardiovascular systems (Shore and Douben, 1994).

The Eco-SSL values derived to date for cadmium are summarized in Table 2.1.

Table 2.1 Cadmium Eco-SSLs (mg/kg dry weight in soil)			
Plants	Soil Invertebrates	Wildlife	
		Avian	Mammalian
32	140	0.77	0.36

Eco-SSL values were derived for all receptor groups. The Eco-SSL values for cadmium range from 0.36 mg/kg dry weight (dw) for mammalian wildlife to 140 mg/kg dw for soil invertebrates. With the exception of the mammalian value, these concentrations are higher than the 50th percentile of reported background soil concentrations in eastern and western U.S. soils (0.23 and 0.40 mg/kg dw, respectively) (Figure 2.1). Background concentrations reported for many metals in U.S. soils are described in Attachment 1-4 of the Eco-SSL guidance (U.S. EPA, 2003).

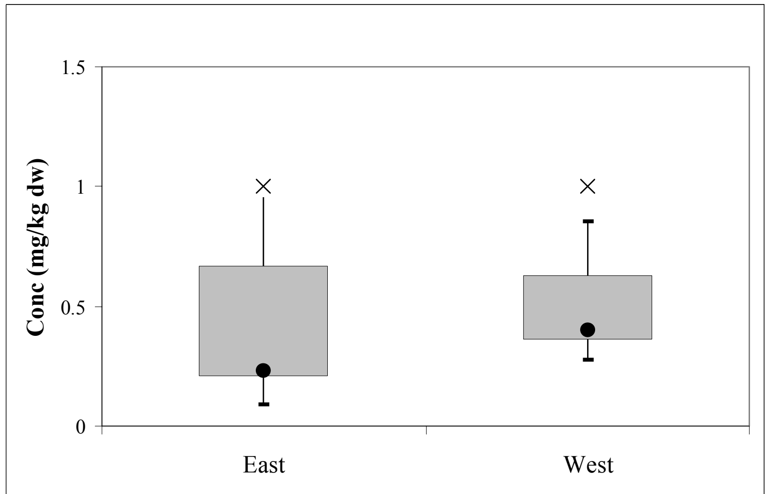
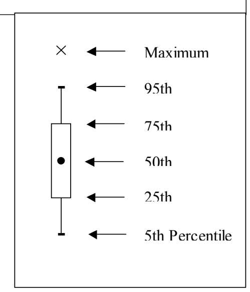


Figure 2.1 Typical Background Concentrations of Cadmium in U.S. Soils



3.0 ECO-SSL FOR TERRESTRIAL PLANTS

Of the papers identified from the literature search process, 716 papers were selected for acquisition for further review. Of those papers acquired, 62 met all 11 Study Acceptance Criteria (U.S. EPA, 2003; Attachment 3-1). Each of these papers were reviewed and the studies were scored according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 3-2). Fifty-nine received an Evaluation Score greater than ten (U.S. EPA, 2003; Attachment 3-1). These studies are listed in Table 3.1.

The studies in Table 3.1 are sorted by bioavailability score. There are fourteen studies eligible for Eco-SSL derivation with a bioavailability score of two. These results are used to derive the plant Eco-SSL for cadmium (U.S. EPA, 2003; Attachment 3-2). The Eco-SSL is the geometric mean of the maximum acceptable toxicant concentration (MATC) values for fourteen test species under different test conditions (pH and % organic matter (OM)) and is equal to 32 mg/kg dw.

Table 3.1 Plant Toxicity Data - Cadmium

Reference	Study ID	Test Organism		Soil pH	OM %	Bio-availability Score	ERE	Tox Parameter	Tox Value-Soil Conc. (mg/kg dw)	Total Evaluation Score	Eligible for Eco-SSL Derivation?	Used for Eco-SSL?
Singh and Jeng, 1993		Ryegrass	ns	6.0	0.1	2	GRO	MATC	22	14	Y	Y
Adema, 1989	a	Lettuce	*Lactuca sativa*	5.1	3.7	2	GRO	MATC	57	16	Y	Y
Adema, 1989	b	Tomato	*Lycopersicon esculentum*	5.1	3.7	2	GRO	MATC	57	16	Y	Y
Adema, 1989	c	Oats	*Avena sativa*	5.1	3.7	2	GRO	MATC	18	16	Y	Y
Lehoczky et al, 1996	b	Corn	*Zea mays*	4.2	4.43	2	GRO	MATC	71	14	Y	Y
Lehoczky et al, 1996	c	Garlic	*Allium sativum*	4.2	4.43	2	GRO	MATC	22	14	Y	Y
Monette, 1978		Barley	*Hordeum vulgare*	6.9	1.9	2	GRO	MATC	9	12	Y	Y
Kelly, 1979	a	White pine	*Pinus strobus*	4.8	1.9	2	GRO	MATC	39	12	Y	Y
Kelly, 1979	b	Yellow birch	*Betula allenghaniensis*	4.8	1.9	2	GRO	MATC	39	12	Y	Y
Kelly, 1979	c	Choke cherry	*Prunus virginiana*	4.8	1.9	2	GRO	MATC	39	12	Y	Y
Kelly, 1979	d	Loblolly pine	*Pinus taeda*	4.8	1.9	2	GRO	MATC	39	12	Y	Y
Dixon, 1988	b	Red oak	*Quercus rubras*	6.0	1.5	2	GRO	MATC	14	16	Y	Y
Taylor, 1974		Alfalfa	*Medicago sativa*	6.4	1.0	2	GRO	MATC	79	11	Y	Y
								Geometric Mean	32			
Data Not Used to Derive Plant Eco-SSL												
Lehoczky et al., 1998	b	Lettuce	*Lactuca sativa*	4.3	4.4	2	GRO	LOAEC	10	15	N	N
Dixon, 1988	a	Red oak	*Quercus rubras*	6.0	1.5	2	GRO	MATC	32	16	N	N
Gunther, 1990	a	Oats	*Avena sativa*	6.1	1.3	2	GRO	EC_{50}	239	12	N	N
Gunther, 1990	b	Turnip	*Brassica rapa*	6.1	1.3	2	GRO	EC_{50}	69	12	N	N
Cieslinski, 1996	a	Strawberry	*Fragaria* x *ananassa* Duch.	5.1	0.5	2	GRO	cnbd	cnbd	14	N	N
Mahler et al., 1987		Corn	*Zea mays*	5.5	2.58	2	GRO	LOAEC	5	12	N	N
Taylor, 1981	d	Alfalfa	*Medicago Sativa*	6.9	1.7	2	GRO	NOAEC	250	15	N	N
Taylor, 1981	f	Alfalfa	*Medicago Sativa*	6.9	1.7	2	GRO	NOAEC	250	15	N	N
Lehoczky et al, 1996	d	Spinach	*Spinacia deracea*	4.2	4.43	2	GRO	LOAEC	10	14	N	N
Kelly, 1979		Yellow poplar	*Liriodendron tulipifera*	4.8	1.9	2	GRO	NOAEC	100	12	N	N
Zaman, 1998	a	Radish	*Raphanus sative*	6.9	1.0	2	GRO	LOAEC	100	11	N	N
Zaman, 1998	a	Radish	*Raphanus sative*	6.9	1.0	2	GRO	LOAEC	100	11	N	N
Zaman, 1998	a	Radish	*Raphanus sative*	6.9	1.0	2	GRO	LOAEC	100	11	N	N
Zaman, 1998	b	Radish	*Raphanus sative*	6.9	1.0	2	GRO	LOAEC	50	11	N	N
Zaman, 1998	b	Radish	*Raphanus sative*	6.9	1.0	2	GRO	LOAEC	50	11	N	N
Zaman, 1998	b	Radish	*Raphanus sative*	6.9	1.0	2	GRO	LOAEC	50	11	N	N
Zaman, 1998	b	Radish	*Raphanus sative*	6.9	1.0	2	PHY	LOAEC	50	11	N	N
Rehab, 1978	b	Cotton	*Gossypium spp.*	6.8	1.3	2	GRO	LOAEC	300	12	N	N
Kelly, 1979	e	Yellow poplar	*Liriodendron tulipifera*	4.8	1.9	2	GRO	NOAEC	100	12	N	N
Miles and Parker, 1979	a	(7 species, pooled together)	(7 species, pooled together)	4.8	1.9	2	GRO	MATC	17	11	N	N
Miles and Parker, 1979	b	(7 species, pooled together)	(7 species, pooled together)	4.8	1.9	2	GRO	MATC	17	13	N	N
Miles and Parker, 1979	c	(7 species, pooled together)	(7 species, pooled together)	4.8	1.9	2	GRO	MATC	55	11	N	N
Singh and Nayyar, 1994	b	Cowpea	*Vigna unguiculata*	8	0.3	1	GRO	MATC	2	14	Y	N
Singh and Nayyar, 1994	c	Egyptian clover	*Trifolium alexandrinum L*	8	0.3	1	GRO	MATC	2	14	Y	N
Singh and Nayyar, 1994	d	Indiana clover	*Melilotus parviflora Desv.*	8	0.3	1	GRO	MATC	2	14	Y	N
Singh and Nayyar, 1994	e	Maize	*Zea mays L.*	8	0.3	1	GRO	MATC	35	14	Y	N
Singh and Nayyar, 1994	f	Oats	*Avena sativa*	8	0.3	1	GRO	MATC	4	14	Y	N
Singh and Nayyar, 1994	g	Pearl millet	*Pennisetum glaucum*	8	0.3	1	GRO	MATC	2	14	Y	N
Singh and Nayyar, 1994	a	Alfalfa	*Medicago sativa*	8	0.3	1	GRO	LOAEC	1	14	N	N

Table 3.1 Plant Toxicity Data - Cadmium

Reference	Study ID	Test Organism		Soil pH	OM %	Bio-availability Score	ERE	Tox Parameter	Tox Value-Soil Conc. (mg/kg dw)	Total Evaluation Score	Eligible for Eco-SSL Derivation?	Used for Eco-SSL?
Data Not Used to Derive Plant Eco-SSL												
Singh and Nayyar, 1994	h	Teosinte	*Zea mexicana*	8	0.3	1	GRO	LOAEC	1	14	N	N
Adema, 1989	d	Lettuce	*Lactuca sativa*	7.5	1.4	1	GRO	MATC	6	15	N	N
Adema, 1989	e	Tomato	*Lycopersicon esculentum*	7.5	1.4	1	GRO	LOAEC	3	15	N	N
Adema, 1989	f	Oats	*Avena sativa*	7.5	1.4	1	GRO	MATC	18	15	N	N
Miles and Parker, 1980		Black-eyed susan	*Rudbeckia hirta*	4.7-6.9	0.138-3.47	1	GRO	EC_{25}	10	11	Y	N
Miles and Parker, 1980		Wild bergamot	*Monarda fistulosa*	4.7-6.9	0.138-3.47	1	GRO	EC_{25}	6	11	Y	N
Miles and Parker, 1980		Little bluestem	*Andropogon scoparius*	4.7-6.9	0.138-3.47	1	GRO	EC_{25}	12	11	Y	N
Lehoczky et al, 1996	a	Garlic	*Allium sativum*	6.8	5.7	1	GRO	MATC	71	13	Y	N
Lehoczky et al., 1998	a	Lettuce	*Lactuca sativa*	6.8	5.7	1	GRO	NOAEC	10	14	N	N
Singh et al, 1989	a	Wheat (var LW 711)	*Triticum aestivum L.*	8.1	0.3	1	GRO	MATC	18	11	Y	N
Singh et al, 1989	b	Wheat (var LW 711)	*Triticum aestivum L.*	8.1	0.3	1	GRO	MATC	35	11	Y	N
Dang, 1990	C	Onion	*Allium cepa*	8.3	0.5	1	GRO	LOAEC	50	11	N	N
Dang, 1990	F	Fenugreek	*Trigonella poenum*	8.3	0.5	1	GRO	LOAEC	50	11	N	N
Mahler et al., 1987		Corn	*Zea mays*	6-6.4	2.58-4.64	1	GRO	LOAEC	5	11	N	N
Taylor, 1981	d	Alfalfa	*Medicago sativa*	6.9	4.8	1	GRO	MATC	177	14	N	N
Sadana, 1987	a	Wheat	*Triticum aestivum L.*	8.40	0.45	1	GRO	LOAEC	10	11	N	N

EC_{10} = Effect concentration for 10% of test population
EC_{25} = Effect concentration for 25% of test population
EC_{50} = Effect concentration for 50% of test population
ERE = Ecologically relevant endpoint
GRO = Growth
LOAEC = Lowest observed adverse effect concentration
MATC = Maximum acceptable toxicant concentration. Geometric mean of NOAEC and LOAEC.
N = No
NOAEC = No observed adverse effect concentration

ns = Not specified
OM = Organic matter content
PHY = Physiology
REP = Reproduction
Y = yes
cnbd = Could Not Be Determined
Bioavailability Score described in *Guidance for Developing Eco-SSLs* (U.S. EPA, 2003)
Total Evaluation Score described in *Guidance for Developing Eco-SSLs* (U.S. EPA, 2003)

4.0 ECO-SSL FOR SOIL INVERTEBRATES

Of the papers identified from the literature search process, 239 papers were selected for acquisition for further review. Of those papers acquired, 32 met all 11 Study Acceptance Criteria (U.S. EPA 2003; Attachment 3-1). Each of these papers were reviewed and the studies were scored according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 3-2). Forty-seven studies received an Evaluation Score greater than ten. These studies are listed in Table 4.1. The studies in Table 4.1 are sorted by bioavailability score. There are ten studies eligible for Eco-SSL derivation and all were used to derive the soil invertebrate Eco-SSL for cadmium (U.S. EPA, 2003; Attachment 3-2). The Eco-SSL is the geometric mean of the MATC or EC_{10} values for three test species under six different test conditions (pH) and is equal 140 mg/kg dw.

5.0 ECO-SSL FOR AVIAN WILDLIFE

The derivation of the Eco-SSL for avian wildlife was completed as two parts. First, the toxicity reference value (TRV) was derived according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-5). Second, the Eco-SSL (soil concentration) was back-calculated for each of three surrogate species representing different trophic levels based on the wildlife exposure model and the TRV (U.S. EPA, 2003).

5.1 Avian TRV

The literature search completed according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-1) identified 1,953 papers with possible toxicity data for either avian or mammalian species. Of these studies, 1,766 were rejected for use as described in Section 7.5. Of the remaining studies, 35 contained data for avian test species. These papers were reviewed and the data were extracted and scored according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-3 and 4-4). The results of the data extraction and review are provided as Table 5.1. The complete results are included as Appendix 5-1.

Within the reviewed papers, there are 93 results for biochemical (BIO), behavior (BEH), physiology (PHY), pathology (PTH), reproduction (REP), growth (GRO), and survival (MOR) effects that meet the Data Evaluation Score of >65 for use to derive the TRV (U.S. EPA, 2003; Attachment 4-4). These data are plotted in Figure 5.1 and correspond directly with the data presented in Table 5.1. The no-observed adverse effect level (NOAEL) results for growth and reproduction are used to calculate a geometric mean. This result is examined in relationship to the lowest bounded lowest-observed adverse effect level (LOAEL) for reproduction, growth, and survival to derive the TRV according to procedures in the Eco-SSL guidance (U.S. EPA, 2003); Attachment 4-5).

A geometric mean of the NOAEL values for reproduction and growth was calculated at 1.47 mg cadmium/kg bw/day. This value is lower than the lowest bounded LOAEL for reproduction, growth, or survival. Therefore, the TRV is equal to the geometric mean of NOAEL values for reproduction and growth and is equal to 1.47 mg cadmium/kg bw/day.

Table 4.1 Invertebrate Toxicity Data - Cadmium

Reference	Study ID	Test Organism		Soil pH	OM%	Bio-availability Score	ERE	Tox Parameter	Tox Value (Soil Conc at mg/kg dw)	Total Evaluation Score	Eligible for Eco-SSL Derivation?	Used for Eco-SSL?
Van Gestel et al., 1992	a	Earthworm	*Eisenia andrei*	6.0	10.0	1	REP	MATC	13	16	Y	Y
Crommentuijn et al., 1993		Springtail	*Folsomia candida*	6.0	10.0	1	REP	MATC	220	16	Y	Y
Van Gestel and Van Diepen, 1997		Springtail	*Folsomia candida*	5.6	10.0	1	POP	EC_{10}	6	16	Y	Y
Van Gestel et al., 1991	a	Earthworm	*Eisenia andrei*	6.7	10.0	1	GRO	MATC	24	16	Y	Y
Sandifer and Hopkin, 1997		Springtail	*Folsomia candida*	6.0	10.0	1	REP	MATC	600	16	Y	Y
Crouau et al., 1993	a	Springtail	*Folsomia candida*	6.0	10.0	1	REP	MATC	108	15	Y	Y
Sandifer and Hopkin, 1996	a	Springtail	*Folsomia candida*	6.0	10.0	1	REP	MATC	600	14	Y	Y
Sandifer and Hopkin, 1996	c	Springtail	*Folsomia candida*	4.5	10.0	1	REP	MATC	600	14	Y	Y
Sandifer and Hopkin, 1996	b	Springtail	*Folsomia candida*	5.0	10.0	1	REP	MATC	600	14	Y	Y
Kammenga et al., 1996		Nematode	*Plectuc acuminatus*	5.5	10.0	1	REP	MATC	566	14	Y	Y
								Geometric Mean	142			
Data not Used to Derive Soil Invertebrate Eco-SSL												
Donkin and Dusenbery, 1994		Nematode	*Caenorhabditis elegans*	4	4.2	2	MOR	LC_{50}	7	13	N	N
Korthals et al., 1996		Nematode	Total nematode fauna	4.1	3.2	2	REP	NOAEC	160	13	N	N
Peredney and Williams, 2000b	a	Nematode	*Caenorhabditis elegans*	4	1.14	2	MOR	LC_{50}	268	13	N	N
Peredney and Williams, 2000b	b	Nematode	*Caenorhabditis elegans*	4	1.14	2	MOR	LC_{50}	371	13	N	N
Peredney and Williams, 2000b	c	Nematode	*Caenorhabditis elegans*	4	4.2	2	MOR	LC_{50}	937	13	N	N
Peredney and Williams, 2000b	d	Nematode	*Caenorhabditis elegans*	4	4.2	2	MOR	LC_{50}	1215	13	N	N
Van Gestel and Van Dis, 1988	a	Earthworm	*Eisenia fetida*	4.1	1.7	2	MOR	LC_{50}	>1000	14	N	N
Vonk et al., 1996	c	Springtail	*Folsomia candida*	5.2	2.4	2	REP	EC_{50}	125	18	N	N
Vonk et al., 1996	e	Springtail	*Folsomia candida*	4.9	3.8	2	REP	EC_{50}	49	18	N	N
Vonk et al., 1996	h	Earthworm	*Eisenia fetida*	5.4	2.4	2	GRO	EC_{50}	393	17	N	N
Vonk et al., 1996	j	Earthworm	*Eisenia fetida*	4.9	3.8	2	GRO	EC_{50}	332	17	N	N
Wohlgemuth et al., 1990	e	Springtail	*Folsomia candida*	5.0	3.0	2	REP	NOAEC	120	12	N	N
Conder and Lanno, 2000		Earthworm	*Eisenia andrei*	6.5	10.0	1	MOR	ILL	112	16	N	N
Crommentuijn et al., 1995		Springtail	*Folsomia candida*	6.2	10.0	1	REP	EC_{50}	123	15	N	N
Fitzpatrick et al., 1996		Earthworm	*Eisenia fetida*	6.5	10.0	1	MOR	LC_{50}	298	13	N	N
Honeycutt et al., 1995		Earthworm	*Eisenia fetida*	6.5	10.0	1	MOR	NOAEC	1000	11	N	N
Neuhauser et al., 1986, 1985		Earthworm	*Eisenia fetida*	6.0	10.0	1	MOR	LC_{50}	876	14	N	N
Peredney and Williams, 2000a		Nematode	*Caenorhabditis elegans*	4	10	1	MOR	LC_{50}	1,641	12	N	N
Peredney and Williams, 2000b	e	Nematode	*Caenorhabditis elegans*	4	10	1	MOR	LC_{50}	1642	12	N	N
Peredney and Williams, 2000b	f	Nematode	*Caenorhabditis elegans*	4	10	1	MOR	LC_{50}	1852	12	N	N
Phillips et al., 1996	a	Earthworm	*Eisenia fetida*	6.0	10.0	1	MOR	NOAEC	200	13	N	N
Spurgeon and Hopkin, 1995		Earthworm	*Eisenia fetida*	6.1	10.0	1	GRO	EC_{50}	215	15	N	N

Table 4.1 Invertebrate Toxicity Data - Cadmium

Reference	Study ID	Test Organism		Soil pH	OM%	Bio-availability Score	ERE	Tox Parameter	Tox Value (Soil Conc at mg/kg dw)	Total Evaluation Score	Eligible for Eco-SSL Derivation?	Used for Eco-SSL?
Data not Used to Derive Soil Invertebrate Eco-SSL												
Spurgeon et al., 1994		Earthworm	*Eisenia fetida*	6.3	10.0	1	REP	EC_{50}	46	15	N	N
Van Gestel and Hensbergen, 1997		Springtail	*Folsomia candida*	6.0	10.0	1	REP	EC_{50}	40	15	N	N
Van Gestel et al., 1993		Earthworm	*Eisenia andrei*	6.0	10.0	1	REP	LOAEC	10	15	N	N
Vonk et al., 1996	a	Springtail	*Folsomia candida*	5.0	10	1	REP	EC_{50}	101	17	N	N
Vonk et al., 1996	b	Springtail	*Folsomia candida*	6.5	10	1	REP	EC_{50}	223	17	N	N
Vonk et al., 1996	d	Springtail	*Folsomia candida*	6.5	2.4	1	REP	EC_{50}	112	17	N	N
Vonk et al., 1996	f	Earthworm	*Eisenia fetida*	5.4	10.0	1	GRO	EC_{50}	410	16	N	N
Vonk et al., 1996	g	Earthworm	*Eisenia fetida*	6.9	10.0	1	GRO	EC_{50}	358	16	N	N
Vonk et al., 1996	I	Earthworm	*Eisenia fetida*	6.9	2.4	1	GRO	EC_{50}	343	16	N	N
Wohlgemuth et al., 1990	a	Springtail	*Folsomia candida*	7.5	0.0	1	REP	NOAEC	21	11	N	N
Wohlgemuth et al., 1990	b	Springtail	*Folsomia candida*	7.3	0.5	1	REP	NOAEC	67	11	N	N
Wohlgemuth et al., 1990	c	Springtail	*Folsomia candida*	7.2	1.0	1	REP	NOAEC	67	11	N	N
Van Gestel and Van Dis, 1988	b	Earthworm	*Eisenia fetida*	7.0	7.7	0	MOR	LC_{50}	>1000	12	N	N
Wohlgemuth et al., 1990	d	Springtail	*Folsomia candida*	7.0	5.0	0	REP	NOAEC	210	11	N	N
Wohlgemuth et al., 1990	f	Springtail	*Folsomia candida*	7.5	3.5	0	REP	NOAEC	380	11	N	N

EC_{10} = Effect concentration for 10% of test population
EC_{50} = Effect concentration for 50% of test population
ERE = Ecologically relevant endpoint
GRO = Growth
ILL = Incipient lethal level
LC_{50} = Concentration lethal to 50% of test population
LOAEC = Lowest observed adverse effect concentration
MATC = Maximum acceptable toxicant concentration
MOR = Mortality
N = No
NOAEC = No observed adverse effect concentration
OM = Organic matter content
POP = Population
REP = Reproduction
Y = Yes
Bioavailability Score described in *Guidance for Developing Eco-SSLs* (U.S.EPA, 2003)
Total Evaluation Score described in *Guidance for Developing Eco-SSLs* (U.S. EPA, 2003)

Table 5.1 Avian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)
Cadmium
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Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Biochemical																		
1	Cain et al, 1983	366	Mallard (*Anas platyrhychos*)	4	M	FD	12	w	1	d	JV	B	CHM	HMGL	BL	0.858		75
2	Blalock and Hill, 1988	386	Chicken (*Gallus domesticus*)	4	U	FD	2	w	1	d	JV	NR	CHM	HMGL	BL	1.02	2.04	76
3	Pilastro et al, 1993	433	Starling (*Sturnus vulgaris*)	3	U	FD	22	w	NR	NR	AD	B	ENZ	CYTC	LI	1.44	7.21	70
4	Congiu et al, 2000	25893	Starling (*Sturnus vulgaris*)	3	M	FD	22	w	NR	NR	MA	B	CHM	GLTH	LI	2.57	13.8	80
5	Lefevre et al, 1982	392	Chicken (*Gallus domesticus*)	3	U	FD	5	w	1	d	JV	NR	CHM	HMCT	BL	9.68		71
6	Di Giulio and Scanlon, 1984	183	Mallard (*Anas platyrhychos*)	4	U	FD	42	d	11	mo	JV	M	CHM	URIC	NR	12.5	37.6	77
7	Jordan and Bhatnagar, 1990	3736	Pekin Duck (*Anas platyrhynchos*)	2	U	FD	12	w	7	mo	JV	F	ENZ	GSTR	LI		2.76	69
8	Donaldson, 1985	429	Chicken (*Gallus domesticus*)	2	U	FD	3	w	1	d	JV	M	CHM	NEFA	BL		5.04	70
9	Freeland and Cousins, 1973	7011	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	M	CHM	HMCT	BL		9.75	70
10	Richardson et al, 1974	371	Japanese Quail (*Coturnix japonica*)	2	U	FD	4	w	1	d	JV	B	CHM	HMCT	BL		11.5	70
11	Rama and Planas, 1981	6468	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	NR	CHM	HMCT	BL		13.0	70
12	Van Vleet et al, 1981	80	Duck (*Anas sp* .)	3	U	FD	15	d	NR	NR	JV	M	ENZ	GLPX	BL		13.4	69
13	Spivey et al, 1971	7101	Japanese Quail (*Coturnix japonica*)	2	U	FD	2	w	1	d	JV	NR	CHM	HMCT	BL		14.7	70
Behavior																		
14	Congiu et al, 2000	25893	Starling (*Sturnus vulgaris*)	3	M	FD	22	w	NR	NR	MA	B	FDB	FCNS	WO	14.4		70
15	White and Finley, 1978	396	Mallard (*Anas platyrhychos*)	4	M	FD	90	d	1	yr	AD	B	FDB	FCNS	WO	16.9		66
16	White et al 1978	399	Mallard (*Anas platyrhynchos*)	4	M	FD	90	d	1	yr	AD	B	FDB	FCNS	WO	21.1		70
17	Di Giulio and Scanlon, 1984	183	Mallard (*Anas platyrhychos*)	4	U	FD	42	d	11	mo	JV	M	FDB	FCNS	WO	41.1		70
18	Silver and Nudds, 1995	410	Amercian black duck (*Anas rubripes*)	2	M	FD	106	d	NR	NR	AD	B	BEH	ACTV	WO		0.265	78
19	Lefevre et al, 1982	392	Chicken (*Gallus domesticus*)	3	U	FD	5	w	1	d	JV	NR	FDB	FCNS	WO		0.708	74
20	Fadil and Magid, 1996	5265	Chicken (*Gallus domesticus*)	3	U	DR	30	d	1	d	JV	NR	FDB	WCON	WO		1.05	67
21	Sell, 1975	807	Chicken (*Gallus domesticus*)	2	U	FD	6	d	16	mo	LB	F	FDB	FCNS	WO		2.40	73
22	Bafundo et al. 1984	8500	Chicken (*Gallus domesticus*)	3	U	FD	14	d	8	d	JV	M	FDB	FEFF	WO		4.80	72
23	Pritzl et al, 1974	403	Chicken (Gallus domesticus)	5	U	FD	20	d	2	w	JV	M	FDB	FCNS	WO		9.57	73
Physiology																		
24	Bokori et al, 1996	375	Chicken (*Gallus domesticus*)	3	U	FD	5	w	14	d	JV	M	PHY	FDCV	WO	1.24	3.71	79
Pathology																		
25	Mayack et al, 1981	393	Wood duck (*Aix sponsa*)	4	M	FD	12	w	1	w	JV	B	HIS	GHIS	KI	0.559	5.72	80
26	Lefevre et al, 1982	392	Chicken (*Gallus domesticus*)	3	U	FD	5	w	1	d	JV	NR	ORW	ORWT	LU	0.708	7.08	78
27	Bokori et al, 1996	375	Chicken (*Gallus domesticus*)	3	U	FD	39	w	14	d	JV	M	ORW	SMIX	LI	0.799	2.40	79
28	Cain et al, 1983	366	Mallard (*Anas platyrhychos*)	4	M	FD	12	w	1	d	JV	B	ORW	ORWT	LI	0.858		69
29	White and Finley, 1978	396	Mallard (*Anas platyrhychos*)	4	M	FD	90	d	1	yr	AD	B	ORW	ORWT	KI	1.22	16.9	77
30	Pilastro et al, 1993	433	Starling (*Sturnus vulgaris*)	3	U	FD	22	w	NR	NR	AD	B	ORW	SMIX	LI	1.44	7.21	73
31	White et al 1978	399	Mallard (*Anas platyrhynchos*)	4	M	FD	60	d	1	yr	AD	B	ORW	SMIX	KI	1.53	21.1	81
32	Congiu et al, 2000	25893	Starling (*Sturnus vulgaris*)	3	M	FD	22	w	NR	NR	MA	B	ORW	SMIX	LI	2.57	13.8	83
33	Di Giulio and Scanlon, 1984	183	Mallard (*Anas platyrhychos*)	4	U	FD	42	d	11	mo	JV	M	ORW	ORWT	AR	3.74	11.2	80
34	Di Giulio and Scanlon, 1985	389	Mallard (*Anas platyrhychos*)	3	U	FD	42	d	32	w	JV	M	ORW	ORWT	KI	4.20		72
35	Cain et al, 1983	366	Mallard (*Anas platyrhychos*)	2	M	FD	12	w	1	d	JV	B	HIS	NPHR	KI		0.858	78
36	Rao et al., 1989	818	Pekin Duck (*Anas platyrhynchos*)	2	U	FD	12	w	6	mo	JV	F	HIS	GLBM	KI		1.92	72
37	Rao et al, 1989	817	Pekin Duck (*Anas platyrhynchos*)	2	U	FD	13	w	7	mo	JV	F	HIS	GHIS	KI		2.76	72
38	Bokori et al, 1995	378	Chicken (*Gallus domesticus*)	4	U	FD	5	w	21	d	JV	M	HIS	GHIS	KI		3.71	73
39	Bokori, et al, 1995	379	Japanese Quail (*Coturnix japonica*)	4	U	FD	37	d	NR	NR	SM	F	HIS	GHIS	PS		7.65	73
40	Richardson et al, 1974	371	Japanese Quail (*Coturnix japonica*)	2	U	FD	4	w	1	d	JV	B	ORW	SMIX	HE		11.4	73
41	Richardson and Fox, 1974	402	Japanese Quail (*Coturnix japonica*)	2	U	FD	4	w	1	d	JV	B	HIS	GLSN	IN		12.8	73
42	Pritzl et al, 1974	403	Chicken (Gallus domesticus)	2	U	FD	20	d	2	w	JV	M	ORW	SMIX	LI		53.4	72
43	Van Vleet et al, 1981	80	Duck (*Anas sp* .)	2	U	FD	28	d	NR	NR	JV	M	HIS	NCRO	MU		66.9	72
Reproduction																		
44	Leach et al, 1978	398	Chicken (*Gallus domesticus*)	2	U	FD	12	w	8	mo	LB	F	REP	EGPN	WO	0.593	2.37	82
45	Leach et al, 1978	398	Chicken (*Gallus domesticus*)	3	U	FD	12	mo	6	mo	LB	F	REP	PROG	WO	0.593	2.37	82
46	Bokori et al, 1996	375	Chicken (*Gallus domesticus*)	1	U	FD	39	w	14	d	IM	M	REP	TEWT	TE	0.799	2.40	85
47	White and Finley, 1978	396	Mallard (*Anas platyrhychos*)	1	M	FD	90	d	1	yr	AD	F	REP	Other	NR	1.53	21.1	83
48	White et al 1978	399	Mallard (*Anas platyrhynchos*)	1	M	FD	90	d	1	yr	AD	B	REP	TEWT	TE	1.53	21.1	87
49	Di Giulio and Scanlon, 1985	389	Mallard (*Anas platyrhychos*)	1	U	FD	42	d	32	w	JV	M	REP	TEWT	TE	4.20		73
50	Sell, 1975	807	Chicken (*Gallus domesticus*)	1	U	FD	23	d	16	mo	LB	F	REP	PROG	WO		2.40	79
51	Bokori et al, 1995	378	Chicken (*Gallus domesticus*)	2	U	FD	5	w	21	d	JV	M	REP	TEDG	TE		3.71	79
52	Bokori, et al, 1995	379	Japanese Quail (*Coturnix japonica*)	1	U	FD	37	d	NR	NR	LB	F	REP	PROG	WO		7.65	79
53	Richardson et al, 1974	371	Japanese Quail (*Coturnix japonica*)	1	U	FD	6	w	1	d	JV	M	REP	TEWT	TE		10.4	79

Table 5.1 Avian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)
Cadmium
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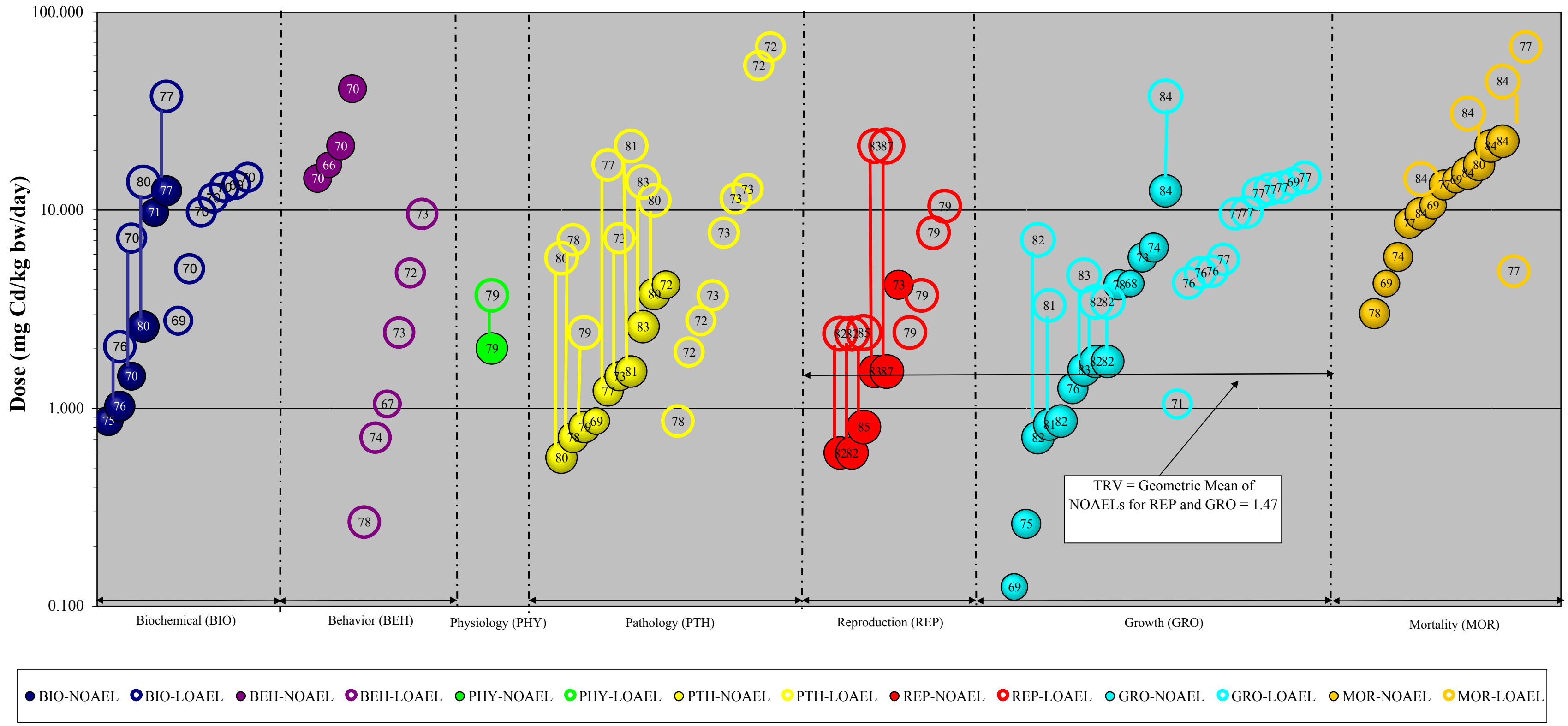
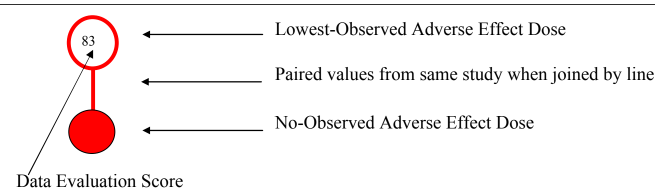
Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Growth																		
54	Jacobs et al, 1978	400	Japanese Quail (*Coturnix japonica*)	6	U	FD	7	d	7	d	JV	B	GRO	BDWT	WO	0.125		69
55	Stoewsand et al 1986	356	Japanese Quail (*Coturnix japonica*)	2	M	FD	63	d	1	d	JV	B	GRO	BDWT	WO	0.260		75
56	Lefevre et al, 1982	392	Chicken (*Gallus domesticus*)	3	U	FD	5	w	1	d	JV	NR	GRO	BDWT	WO	0.708	7.08	82
57	Leach et al, 1978	398	Chicken (*Gallus domesticus*)	4	U	FD	6	w	1	d	JV	M	GRO	BDWT	WO	0.826	3.30	81
58	Cain et al, 1983	366	Mallard (*Anas platyrhychos*)	4	M	FD	12	w	1	d	JV	B	GRO	BDWT	WO	0.858		82
59	Hill, 1974	1369	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	1.25		76
60	Bokori et al, 1996	375	Chicken (*Gallus domesticus*)	3	U	FD	4	w	14	d	JV	M	GRO	BDWT	WO	1.55	4.66	83
61	Hill 1979	397	Chicken (*Gallus domesticus*)	4	U	FD	2	w	1	d	JV	F	GRO	BDWT	WO	1.72	3.44	82
62	Hill, 1974	92	Chicken (*Gallus domesticus*)	6	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	1.72	3.44	82
63	Di Giulio and Scanlon, 1985	389	Mallard (*Anas platyrhychos*)	3	U	FD	42	d	32	w	JV	M	GRO	BDWT	WO	4.20		78
64	Blalock and Hill, 1988	386	Chicken (*Gallus domesticus*)	4	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO	4.24		68
65	Mayack et al, 1981	393	Wood duck (*Aix sponsa*)	4	M	FD	12	w	1	w	JV	B	GRO	BDWT	WO	5.76		73
66	Hill 1979	397	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	F	GRO	BDWT	WO	6.44		74
67	Di Giulio and Scanlon, 1984	183	Mallard (*Anas platyrhychos*)	4	U	FD	42	d	11	mo	JV	M	GRO	BDWT	WO	12.5	37.6	84
68	Fadil and Magid, 1996	5265	Chicken (*Gallus domesticus*)	3	U	DR	30	d	1	d	JV	NR	GRO	BDWT	WO		1.05	71
69	Hill, 1990	8125	Chicken (*Gallus domesticus*)	2	U	FD	18	d	1	d	JV	F	GRO	BDWT	WO		4.26	76
70	Bafundo et al. 1984	8500	Chicken (*Gallus domesticus*)	2	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO		4.80	76
71	Hill, 1974	1369	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO		4.90	76
72	Bokori et al, 1995	378	Chicken (*Gallus domesticus*)	4	U	FD	1	w	21	d	JV	M	GRO	BDWT	WO		5.63	77
73	Pritzl et al, 1974	403	Chicken (Gallus domesticus)	5	U	FD	20	d	2	w	JV	M	GRO	BDWT	WO		9.57	77
74	Freeland and Cousins, 1973	7011	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	M	GRO	BDWT	WO		9.75	77
75	Richardson et al, 1974	371	Japanese Quail (*Coturnix japonica*)	2	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO		12.2	77
76	Richardson and Fox, 1974	402	Japanese Quail (*Coturnix japonica*)	2	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO		12.8	77
77	Rama and Planas, 1981	6468	Chicken (*Gallus domesticus*)	2	U	FD	3	w	1	d	JV	NR	GRO	BDWT	WO		13.0	77
78	Hill, 1980	395	Chicken (*Gallus domesticus*)	2	U	FD	1	w	1	d	JV	F	GRO	BDWT	WO		13.8	69
79	Spivey et al, 1971	7101	Japanese Quail (*Coturnix japonica*)	2	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO		14.7	77
Survival																		
80	Bokori et al, 1996	375	Chicken (*Gallus domesticus*)	3	U	FD	12	w	14	d	JV	M	MOR	MORT	WO	3.00		78
81	Blalock and Hill, 1988	386	Chicken (*Gallus domesticus*)	4	U	FD	3	w	1	d	JV	NR	MOR	MORT	WO	4.24		69
82	Mayack et al, 1981	393	Wood duck (*Aix sponsa*)	4	M	FD	12	w	1	w	JV	B	MOR	MORT	WO	5.78		74
83	Hill, 1974	92	Chicken (*Gallus domesticus*)	6	U	FD	5	w	1	d	JV	B	MOR	MORT	WO	8.59		77
84	Pritzl et al, 1974	403	Chicken (*Gallus domesticus*)	5	U	FD	20	d	2	w	JV	M	MOR	MORT	WO	9.57	14.3	84
85	Richardson et al, 1974	371	Japanese Quail (*Coturnix japonica*)	2	U	FD	4	w	1	d	JV	B	MOR	MORT	WO	10.5		69
86	Van Vleet et al, 1981	80	Duck (*Anas sp* .)	3	U	FD	15	d	NR	NR	JV	M	MOR	MORT	WO	13.4		77
87	Spivey et al, 1971	7101	Japanese Quail (*Coturnix japonica*)	2	U	FD	2	w	1	d	JV	NR	MOR	MORT	WO	14.2		69
88	Bokori, et al, 1995	379	Japanese Quail (*Coturnix japonica*)	4	U	FD	37	d	NR	NR	SM	F	MOR	MORT	WO	15.3	30.6	84
89	White and Finley, 1978	396	Mallard (*Anas platyrhychos*)	4	M	FD	90	d	1	yr	AD	B	MOR	MORT	WO	16.9		80
90	White et al 1978	399	Mallard (*Anas platyrhynchos*)	4	M	FD	90	d	1	yr	AD	B	MOR	MORT	WO	21.1		84
91	Bokori et al, 1995	378	Chicken (*Gallus domesticus*)	4	U	FD	4	w	21	d	JV	M	MOR	MORT	WO	22.3	44.6	84
92	Hill, 1974	1369	Chicken (*Gallus domesticus*)	2	U	FD	2	w	1	d	JV	B	MOR	MORT	WO		4.90	77
93	Van Vleet et al, 1981	80	Duck (*Anas sp* .)	2	U	FD	28	d	NR	NR	JV	M	MOR	MORT	WO		66.9	77

ACTV = general activity levels; AD = adult; AR = adrenal gland; B = both; BDWT = body weight changes; BEH = behavior; BL = blood; BR = brain; CHM = chemical changes; CYTC = NADPH cytochrome C reductase; d = days; DR = Drinking water; EGPN = egg production; ENZ = enzyme changes; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FDCV =food conversion efficiency; FE = feathers; FEFF = feed efficiency; GCHM = general biochemical; GE = gestation; GHIS = general histology; GRO = growth; GLBM = glomerular basement membrane; GLPX = gluathione peroxidase; GLSN = gross lesions; GLTH = glutathione; GRS = gross wasting; GSTR = glutathione S-transferase; HE = heart; HIS = histology; HMCT = hematocrit; HMGL = hemoglobin; IN = intestine; JV = juvenile; KI = kidney; LB = laying bird; LI = liver; LOAEL = lowest observed adverse effect level; LU= lung; M = male; M = measured; m = months; MA = mature; MOR = mortality, MORT = mortality; MU = multiple; NCRO = necrosis; NEFA = fatty acids, nonesterified; NOAEL = no observed adverse effect level; NPHR = nephrosis; NR = Not reported; OR = other oral; ORW = organ weight changes; ORWT = organ weight; PHY = physiology; PROG = progeny counts; PS = pancreas; REP = reproduction; SM = sexually mature; SMIX = weight relative to body weight; SURV =
URIC = uric acid; w = weeks; WCON = water consumption; WO = whole organism

Figure 5.1 Avian TRV Derivation for Cadmium





<u>Wildlife TRV Derivation Process</u>

1) There are at least three results available for two test species within the growth, reproduction, and mortality effect groups. There are enough data to derive a TRV.

2) There are three NOAEL results available within the growth and reproduction effect groups for calculation of a geometric mean.

4) The geometric mean is equal to 1.47 mg cadmium/kg bw/d and is lower than the lowest bounded LOAEL within the reproduction, growth and survival effect groups.

5) The avian wildlife TRV for cadmium is equal to 1.47 mg cadmium/kg bw/day which is the geometric mean of the NOAEL values for growth and reproduction.

5.2 Estimation of Dose and Calculation of the Eco-SSL

Three separate Eco-SSL values were calculated for avian wildlife, one for each of three surrogate receptor species representing different trophic levels. The avian Eco-SSLs were calculated according to the Eco-SSL guidance (U.S. EPA, 2003) and are summarized in Table 5.2.

Table 5.2 Calculation of the Avian Eco-SSLs for Cadmium

Surrogate Receptor Group	TRV for Cadmium (mg dw/kg bw/d) [1]	Food Ingestion Rate (FIR)[2] (kg dw/kg bw/d)	Soil Ingestion as Proportion of Diet (P_s)[2]	Concentration of Cadmium in Biota Type (i)[2,3] (B_i) (mg/kg dw)	Eco-SSL (mg/kg dw)[4]
Avian herbivore (dove)	1.47	0.190	0.139	$\ln(B_i) = 0.546 * \ln(Soil_j) - 0.475$ where i = plants	28
Avian ground insectivore (woodcock)	1.47	0.214	0.164	$\ln(B_i) = 0.795 * \ln(Soil_j) + 2.114$ where i = earthworms	0.77
Avian carnivore (hawk)	1.47	0.0353	0.057	$\ln(B_i) = 0.4723 * \ln(Soil_j) - 1.2571$ where i = mammals	630

[1] The process for derivation of wildlife TRVs is described in Attachment 4-5 of U.S. EPA (2003).
[2] Parameters (FIR, P_s, B_i values, regressions) are provided in U.S. EPA (2003) Attachment 4-1 (revised February 2005).
[3] B_i = Concentration in biota type (i) which represents 100% of the diet for the respective receptor.
[4] $HQ = FIR * (Soil_j * P_s + B_i) / TRV)$ solved for HQ=1 where $Soil_j$ = Eco-SSL (Equation 4-2; U.S. EPA, 2003).
NA = Not Applicable

6.0 ECO-SSL FOR MAMMALIAN WILDLIFE

The derivation of the Eco-SSL for mammalian wildlife was completed as two parts. First, the TRV was derived according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-5). Second, the Eco-SSL (soil concentration) was back-calculated for each of three surrogate receptor species based on the wildlife exposure model and the TRV (U.S. EPA, 2003).

6.1 Mammalian TRV

The literature search was completed according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-2) and identified 1,953 papers with possible toxicity data for cadmium for either avian or mammalian species. Of these studies, 1,766 were rejected for use as described in Section 7.5. Of the remaining papers, 145 contained data for mammalian test species. These papers were reviewed and the data were extracted and scored according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-3 and 4-4). The results of the data extraction and review are summarized in Table 6.1. The complete results are provided as Appendix 6-1.

Table 6.1 Mammalian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)
Cadmium

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Total
Biochemical																		
1	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	6	M	FD	2	yr	7	w	AD	F	CHM	HMGL	BL	0.042	0.176	80
2	Weigel et al 1984	655	Rat (*Rattus norvegicus*)	3	U	FD	40	d	NR	NR	SM	M	CHM	RBCE	BL	0.218	0.556	71
3	Cousins et al 1977	670	Rat (*Rattus norvegicus*)	3	U	FD	14	w	NR	NR	JV	M	CHM	Other	KI	0.268	1.34	75
4	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	5	M	FD	2	yr	10	w	GE	F	CHM	CALC	BO	0.438	11.8	78
5	Mitsumori et al., 1998	591	Rat (*Rattus norvegicus*)	5	U	FD	2	mo	5	w	JV	F	CHM	HMGL	BL	0.467	2.33	75
6	Whelton et al, 1997	597	Mouse (Mus musculus)	3	U	FD	254	d	68	d	GE	F	CHM	CALC	FM	0.548	5.48	75
7	Bhattahcaryya, 1991	797	Mouse (*Mus musculus*)	3	U	FD	252	d	70-100	d	GE	F	CHM	CALC	BO	0.623	6.23	73
8	Kotsonis and Klassen, 1978	778	Rat (*Rattus norvegicus*)	4	U	DR	9	w	70	d	JV	M	CHM	PRTL	UR	0.810	2.15	72
9	Weber and Reid 1969	677	Mouse (*Mus musculus*)	4	U	FD	3	w	NR	NR	JV	B	CHM	Other	BO	0.815	4.08	75
10	Kodama et al., 1989	507	Dog (*Canis familiaris*)	6	U	FD	50	w	8	mo	JV	B	CHM	CREA	UR	0.833	4.17	74
11	Doyle et al, 1974	3703	Sheep (*Ovis aires*)	5	U	FD	163	d	4	mo	JV	M	CHM	HMCT	BL	0.928	1.73	77
12	Sutou, et al, 1980	443	Rat (*Rattus norvegicus*)	4	U	GV	9	w	5	w	JV	M	CHM	RBCE	BL	1.00	10.0	76
13	Takashima et al 1980	563	Rat (*Rattus norvegicus*)	4	U	FD	19	mo	NR	NR	JV	M	CHM	SODI	FM	1.04	5.18	74
14	Loeser and Lorke, 1977	446	Dog (*Canis familiaris*)	5	U	FD	3	mo	4-6	mo	JV	B	ENZ	ALPH	LI	1.36		70
15	Chetty et al, 1980	650	Rat (*Rattus norvegicus*)	4	U	FD	4	w	NR	NR	JV	M	ENZ	GENZ	LI	2.18	4.36	76
16	Whanger and Weswig, 1970	22300	Rat (Rattus norvegicus)	5	U	FD	8	w	21	d	JV	B	CHM	GBCM	BL	2.22	4.45	75
17	Yuyama 1982	710	Rat (*Rattus norvegicus*)	4	U	FD	2	w	5	w	JV	M	ENZ	Other	KI	2.65	10.6	75
18	Zielinska-Psuja et al, 1979	569	Rat (*Rattus norvegicus*)	3	U	FD	3	mo	NR	NR	JV	M	HRM	TSTR	SR	5.40	54.0	74
19	Bhattahcaryya, 1991	797	Mouse (*Mus musculus*)	3	U	FD	252	d	70-100	d	SM	F	CHM	CALC	BO	6.23		69
20	Wlostowski and Krasowska, 1999	25890	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	CHM	MCPR	LI	6.29	12.6	82
21	Weigel et al 1987	629	Rat (*Rattus norvegicus*)	3	M	FD	8	w	NR	NR	JV	M	ENZ	AATT	BL		0.0729	69
22	Merali and Singhal, 1980	639	Rat (*Rattus norvegicus*)	3	U	GV	45	d	1	d	JV	M	CHM	GLUC	BL		0.100	77
23	Rastogi et al 1977	753	Rat (*Rattus norvegicus*)	3	U	GV	30	d	1	d	JV	NR	CHM	Other	BR		0.100	72
24	Bakry et al, 1992	772	Rat (*Rattus norvegicus*)	2	U	GV	8	w	NR	NR	JV	B	CHM	CALC	FM		0.143	77
25	Schumann et al., 1996	594	Rat (*Rattus norvegicus*)	2	U	DR	7	d	57	d	JV	M	CHM	HMGL	BL		0.570	66
26	Dobryszycka et al., 1984	707	Rat (*Rattus norvegicus*)	2	U	GV	3	mo	3	mo	AD	B	ENZ	LADH	KI		1.04	67
27	Mitra et al, 1995	783	Rat (*Rattus norvegicus*)	2	M	FD	6	w	1	mo	JV	NR	CHM	PCLV	BL		1.85	69
28	Cousins et al., 1973	502	Pig (*Sus scrof* a)	5	U	FD	6	w	55	d	JV	M	CHM	HMCT	BL		1.91	71
29	Rajanna et al, 1984	637	Rat (*Rattus norvegicus*)	4	U	FD	120	d	6	w	JV	M	CHM	GLUC	SR		1.97	70
30	Sasser et al., 1985	9321	Rat (*Rattus norvegicus*)	4	U	DR	21	d	5	mo	GE	F	CHM	GCHM	LI		2.76	66
31	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	6	U	FD	100	d	NR	NR	JV	M	CHM	HMCT	BL		2.78	70
32	Groten et al, 1991	615	Rat (*Rattus norvegicus*)	2	M	FD	28	d	5	w	JV	F	ENZ	AATT	PL		2.80	75
33	Osuna and Edds, 1980	494	Pig (*Sus scrofa*)	2	M	FD	2	w	NR	NR	JV	M	CHM	HMGL	BL		3.59	75
34	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	NR	AD	F	ENZ	ACPH	LI		3.73	66
35	Suzuki and Yoshida 1978	768	Rat (*Rattus norvegicus*)	2	U	FD	180	d	NR	NR	JV	M	CHM	HMGL	BL		3.79	70
36	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	NR	GE	F	ENZ	SCDH	LI		3.93	66
37	Suzuki and Yoshida, 1978	572	Rat (*Rattus norvegicus*)	2	U	FD	14	d	NR	NR	JV	M	CHM	HMGL	BL		4.06	71
38	Suzuki and Yoshida 1979	780	Rat (*Rattus norvegicus*)	4	U	FD	28	d	NR	NR	JV	M	CHM	HMGL	BL		4.58	70
39	Chmielnicka and Sowa, 1996	21073	Rat (*Rattus norvegicus*)	2	U	DR	20	d	NR	NR	GE	F	CHM	MCPR	LI		4.59	69
40	Suzuki and Yoshida 1979	780	Rat (*Rattus norvegicus*)	2	U	FD	14	d	NR	NR	JV	M	CHM	HMGL	BL		4.91	70
41	Wlostowski et al, 2000	25891	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	CHM	MCPR	KI		5.00	79
42	Iguchi and Sano, 1982	556	Rat (Rattus norvegicus)	3	U	FD	6	w	NR	NR	YO	M	ENZ	GENZ	BO		5.01	70
43	Webster, 1978	824	Mouse (*Mus musculus*)	2	U	DR	19	d	NR	NR	GE	F	CHM	PCLV	BL		5.34	71
44	Kadiiska et al, 1985	19290	Rat (*Rattus norvegicus*)	2	U	DR	30	d	NR	NR	JV	M	ENZ	P450	LI		5.39	69
45	Lynch et al., 1976	3711	Cattle (*Bos taurus*)	2	U	OR	63	d	NR	NR	JV	M	ENZ	ALAD	BL		5.74	72
46	Pond et al, 1973	583	Pig (*Sus scrofa*)	2	U	FD	29	d	NR	NR	JV	NR	CHM	HMGL	BL		6.10	69
47	Ando et al., 1978	801	Rat (*Rattus norvegicus*)	2	U	GV	1	mo	64	d	JV	F	CHM	CALC	BO		6.13	77
48	Nakamura et al., 1983	638	Rat (*Rattus norvegicus*)	2	U	FD	11	w	NR	NR	NR	F	ENZ	GPTR	SR		9.54	71
49	Banis et al 1969	3733	Rat (*Rattus norvegicus*)	2	U	FD	30	d	NR	NR	JV	M	CHM	HMGL	BL		9.70	70
50	Banis et al 1969	3733	Rat (*Rattus norvegicus*)	2	U	FD	3	w	5	w	JV	B	CHM	HMGL	BL		10.4	70
51	Novelli et al, 1998	19496	Rat (*Rattus norvegicus*)	2	U	DR	2	mo	15	w	JV	M	CHM	PRTL	UR		12.4	66
52	Suzuki and Yoshida 1977	574	Rat (*Rattus norvegicus*)	2	U	FD	10	d	NR	NR	JV	M	CHM	HMGL	LI		20.7	70
53	Weber and Reid 1969	677	Mouse (*Mus musculus*)	4	U	FD	3	w	NR	NR	JV	B	ENZ	MADH	LI		571	71
Behavior																		
54	King et al, 1992	488	Pig (*Sus scrof* a)	3	M	FD	132	d	NR	NR	JV	F	FDB	FCNS	WO	0.0216		70
55	Lind et al., 1997	685	Mouse (*Mus musculus*)	2	M	FD	5	w	NR	NR	JV	F	FDB	FCNS	WO	0.0584		70
56	King et al, 1992	488	Pig (*Sus scrof* a)	5	M	FD	128	d	NR	NR	JV	M	FDB	FCNS	WO	0.0793		70
57	Yuhas et al 1979	776	Rat (*Rattus norvegicus*)	4	U	DR	13	w	35	d	JV	M	FDB	WCON	WO	0.0951	0.951	68
58	Cousins et al 1977	670	Rat (*Rattus norvegicus*)	3	U	FD	14	w	NR	NR	JV	M	FDB	FCNS	WO	0.251	1.25	78
59	Koo and Winslow, 1983	12092	Rat (*Rattus norvegicus*)	3	U	FD	11	w	NR	NR	JV	M	FDB	FCNS	WO	0.323		70
60	Kotsonis and Klassen, 1978	778	Rat (*Rattus norvegicus*)	4	U	DR	1	w	70	d	JV	M	FDB	WCON	WO	0.810	2.15	75
61	Nation et al., 1984	656	Rat (*Rattus norvegicus*)	3	U	FD	55	d	80	d	AD	M	AVO	STIM	WO	1.00	5.00	77
62	Lamphere et al., 1984	8980	Cattle (*Bos taurus*)	2	M	FD	60	d	9	mo	YO	NR	FDB	FCNS	WO	1.05		70
63	Sawick-Kapusta et al, 1987	820	Bank Vole (*Clethrionomys glareolus*)	3	M	FD	20	d	NR	NR	AD	B	FDB	FCNS	WO	1.50	35.3	77
64	Mahaffey et al., 1977	14580	Rat (*Rattus norvegicus*)	2	M	FD	10	w	NR	NR	AD	M	FDB	FCNS	WO	1.67		66
65	Sugawara and Sugawara, 1983	21111	Rat (*Rattus norvegicus*)	2	U	DR	36	d	27	d	JV	F	FDB	WCON	WO	1.78		68
66	Perry et al, 1977	3730	Rat (*Rattus norvegicus*)	7	U	DR	12	mo	21	d	JV	F	FDB	FCNS	WO	2.73	5.45	70
67	Mitsumori et al., 1998	591	Rat (*Rattus norvegicus*)	5	U	FD	1	mo	5	w	JV	F	FDB	FCNS	WO	2.80	14.0	78
68	Lee et al., 1994	733	Rat (*Rattus norvegicus*)	4	U	GV	13	w	60	d	JV	M	BEH	RRSP	WO	3.00	10.0	84
69	Osuna and Edds, 1980	494	Pig (*Sus scrofa*)	2	M	FD	4	w	NR	NR	JV	M	FDB	FCNS	WO	3.43		70

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Total
70	Suzuki and Yoshida, 1978	572	Rat (*Rattus norvegicus*)	2	U	FD	12	d	NR	NR	JV	M	FDB	FCNS	WO	3.82		74
71	Sorell and Braziano, 1990	822	Rat (*Rattus norvegicus*)	4	U	DR	14	d	NR	NR	GE	F	FDB	WCON	WO	4.88	8.46	74
72	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	6	M	FD	2	yr	7	w	AD	F	FDB	FCNS	WO	4.97		70
73	Felinska et al., 1995	796	Rat (*Rattus norvegicus*)	3	U	DR	21	d	NR	NR	GE	F	FDB	WCON	WO	5.25		69
74	Gustafson and Mercer, 1984	551	Rat (*Rattus norvegicus*)	7	U	FD	21	d	NR	NR	JV	M	FDB	FCNS	WO	6.06	15.2	79
75	Wlostowski et al, 2000	25891	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	FDB	FCNS	WO	10.5		73
76	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	5	M	FD	2	yr	10	w	GE	F	FDB	FCNS	WO	11.8		70
77	Machemer and Lorke, 1981	560	Rat (*Rattus norvegicus*)	4	U	FD	9	d	4	mo	GE	F	FDB	FCNS	WO	12.5		68
78	Wlostowski and Krasowska, 1999	25890	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	FDB	FCNS	WO	12.6		70
79	Berry et al, 1999	453	Sheep (*Ovis aires*)	2	U	FD	60	d	NR	NR	AD	M	BEH	GBHV	WO		0.0480	67
80	Lind et al., 1997	685	Mouse (*Mus musculus*)	2	M	FD	5	w	NR	NR	JV	F	FDB	FCNS	WO		0.0532	79
81	Weigel et al 1987	629	Rat (*Rattus norvegicus*)	3	M	FD	6	w	NR	NR	JV	M	FDB	FCNS	WO		0.0744	72
82	Rastogi et al 1977	753	Rat (*Rattus norvegicus*)	3	U	GV	30	d	1	d	JV	NR	BEH	NMVM	WO		0.100	75
83	Ahokas et al 1980	669	Rat (*Rattus norvegicus*)	4	U	DR	21	d	NR	NR	GE	F	FDB	WCON	WO		0.207	68
84	Cousins et al., 1973	502	Pig (*Sus scrofa*)	5	U	FD	6	w	55	d	JV	M	FDB	FCNS	WO		1.58	74
85	Zenick et al 1982	661	Rat (*Rattus norvegicus*)	4	U	DR	1	w	100	d	JV	M	FDB	WCON	WO		1.85	68
86	Mangler et al., 1988	521	Rat (*Rattus norvegicus*)	2	U	DR	6	mo	28	d	JV	F	FDB	WCON	WO		2.63	69
87	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	6	U	FD	100	d	NR	NR	JV	M	FDB	FCNS	WO		2.78	73
88	Groten et al, 1991	615	Rat (*Rattus norvegicus*)	2	M	FD	30	d	5	w	JV	B	FDB	FCNS	WO		2.80	78
89	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	NR	AD	F	FDB	WCON	WO		3.73	69
90	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	NR	GE	F	FDB	WCON	WO		3.93	69
91	Meyer et al 1982	662	Rat (*Rattus norvegicus*)	3	U	FD	30	d	NR	NR	JV	M	FDB	FCNS	WO		5.44	74
92	Webster, 1978	824	Mouse (*Mus musculus*)	2	U	DR	3	d	NR	NR	GE	F	FDB	WCON	WO		5.62	74
93	Lynch et al., 1976	3711	Cattle (*Bos taurus*)	2	U	OR	63	d	NR	NR	JV	M	FDB	FCNS	WO		5.74	75
94	Steibert et al., 1984	544	Rat (*Rattus norvegicus*)	2	U	DR	170	d	7	w	JV	F	FDB	WCON	WO		5.82	68
95	Pond et al, 1973	583	Pig (*Sus scrofa*)	2	U	FD	50	d	NR	NR	JV	NR	FDB	FCNS	WO		5.83	73
96	Freundt and Irbahim, 1990	2640	Rat (*Rattus norvegicus*)	2	U	DR	91	d	NR	NR	AD	F	FDB	WCON	WO		6.89	68
97	Novelli et al, 1998	21121	Rat (*Rattus norvegicus*)	2	U	DR	7	d	NR	NR	JV	M	FDB	WCON	WO		7.20	68
98	Bhattacharyya et al, 1988	626	Mouse (*Mus musculus*)	3	U	FD	252	d	68	d	GE	F	FDB	FCNS	WO		15.5	74
99	Nation et al., 1990	617	Rat (*Rattus norvegicus*)	2	U	FD	60	d	50	d	JV	M	BEH	ACTP	WO		9.15	73
100	Novelli et al, 1998	19496	Rat (*Rattus norvegicus*)	2	U	DR	2	mo	15	w	JV	M	FDB	WCON	WO		12.4	69
101	Pond and Walker, 1975	3731	Rat (*Rattus norvegicus*)	2	U	FD	21	d	12	w	GE	F	FDB	FCNS	WO		16.8	74
102	Nomiyama et al., 1975	581	Rabbit (*Oryctolagus cuniculus*)	2	U	FD	42	w	NR	NR	NR	M	FDB	FCNS	WO		17.0	73
103	Weber and Reid 1969	677	Mouse (*Mus musculus*)	4	U	FD	3	w	NR	NR	JV	B	FDB	FCNS	WO		571	74
	Physiology																	
104	Wills et al 1981	646	Rat (*Rattus norvegicus*)	3	U	FD	64	w	NR	NR	JV	B	PHY	BLPR	WO	0.00690		68
105	King et al, 1992	488	Pig (*Sus scrofa*)	3	M	FD	132	d	NR	NR	JV	F	PHY	FDCV	WO	0.0216		70
106	King et al, 1992	488	Pig (*Sus scrofa*)	5	M	FD	128	d	NR	NR	JV	M	PHY	FDCV	WO	0.0634		69
107	Perry et al, 1977	3730	Rat (*Rattus norvegicus*)	7	U	DR	6	mo	21	d	JV	F	PHY	BLPR	WO	0.100	0.250	70
108	Ahokas et al 1980	669	Rat (*Rattus norvegicus*)	4	U	DR	21	d	NR	NR	GE	F	PHY	FDCV	WO	0.207	1.57	71
109	Sutou, et al, 1980	443	Rat (*Rattus norvegicus*)	4	U	GV	4	w	5	w	JV	M	PHY	FDCV	WO	1.00	10.0	79
110	Sawick-Kapusta et al, 1987	820	Bank Vole (*Clethrionomys glareolus*)	3	M	FD	20	d	NR	NR	AD	B	PHY	MEEN	WO	1.50	35.3	77
111	Lee et al., 1994	733	Rat (*Rattus norvegicus*)	4	U	GV	13	w	60	d	JV	M	PHY	GPHY	EY	3.00	10.0	84
112	Kotsonis and Klassen, 1978	778	Rat (*Rattus norvegicus*)	4	U	DR	24	w	70	d	JV	M	PHY	HTRT	HE	6.44		69
113	Ogoshi et al., 1989	720	Rat (*Rattus norvegicus*)	6	U	DR	4	w	24	w	AD	NR	PHY	GPHY	FM	17.1		67
114	Weigel et al 1987	629	Rat (*Rattus norvegicus*)	3	M	FD	5	w	NR	NR	JV	M	PHY	FDCV	WO		0.0744	72
115	Mercado and Bibby 1973	757	Rat (*Rattus norvegicus*)	2	U	DR	50	d	23	d	JV	M	PHY	GPHY	WO		0.565	67
116	Kanisawa and Schroeder, 1969	15061	Rat (*Rattus norvegicus*)	2	U	DR	17	mo	21	d	JV	B	PHY	BLPR	WO		0.569	67
117	Ogoshi et al., 1989	720	Rat (*Rattus norvegicus*)	3	U	DR	4	w	21	d	JV	F	PHY	GPHY	FM		0.581	67
118	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	2	U	FD	50	d	NR	NR	JV	M	PHY	GPHY	TH		1.42	72
119	Mitra et al, 1995	783	Rat (*Rattus norvegicus*)	2	M	FD	6	w	1	mo	JV	NR	PHY	GPHY	BL		1.85	72
120	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	2	U	FD	50	d	NR	NR	JV	M	PHY	GPHY	TH		2.76	72
121	Suzuki and Yoshida 1978	768	Rat (*Rattus norvegicus*)	2	U	FD	180	d	NR	NR	JV	M	PHY	HYDR	TB		3.79	73
122	Meyer et al 1982	662	Rat (*Rattus norvegicus*)	3	U	FD	30	d	NR	NR	JV	M	PHY	FDCV	WO		5.44	74
123	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	2	U	FD	85	d	NR	NR	JV	M	PHY	GPHY	TH		5.51	72
124	Eakin et al 1980	659	Rat (*Rattus norvegicus*)	2	U	FD	16	w	NR	NR	JV	M	PHY	BLPR	WO		13.2	68
	Pathology																	
125	Wills et al 1981	646	Rat (*Rattus norvegicus*)	3	U	FD	64	w	NR	NR	JV	B	HIS	GHIS	KI	0.00690		68
126	Lind et al., 1997	685	Mouse (*Mus musculus*)	2	M	FD	5	w	NR	NR	JV	F	ORW	ORWT	LI	0.0584		70
127	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	5	M	FD	2	yr	10	w	GE	F	HIS	GHIS	BO	0.221	5.85	79
128	Sorell and Braziano, 1990	822	Rat (*Rattus norvegicus*)	4	U	DR	14	d	NR	NR	GE	F	GRS	BDWT	WO	0.651	4.88	72
129	Sutou, et al, 1980	443	Rat (*Rattus norvegicus*)	4	U	GV	13	w	5	w	JV	F	HIS	NCRO	LI	1.00	10.0	79
130	Rastogi et al 1977	753	Rat (*Rattus norvegicus*)	3	U	GV	30	d	1	d	JV	NR	ORW	ORWT	BR	1.00		75
131	Yuyama 1982	710	Rat (*Rattus norvegicus*)	4	U	FD	2	w	5	w	JV	M	ORW	ORWT	LI	2.65	10.6	78
132	Mitsumori et al., 1998	591	Rat (*Rattus norvegicus*)	5	U	FD	2	mo	5	w	JV	F	HIS	GHIS	KI	2.98	14.9	78
133	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	6	M	FD	2	yr	7	w	AD	F	HIS	GHIS	BO	4.97		70
134	Meyer et al 1982	662	Rat (*Rattus norvegicus*)	3	U	FD	30	d	NR	NR	JV	M	ORW	SMIX	HE	5.44	10.9	80
135	Prigge et al., 1977	779	Rat (*Rattus norvegicus*)	4	U	DR	48	d	NR	NR	AD	M	GRS	BDWT	WO	5.51	11.0	70
136	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	6	U	FD	100	d	NR	NR	JV	M	ORW	ORWT	HE	5.55	11.2	79
137	Takizawa et al 1981	775	Rat (*Rattus norvegicus*)	3	U	DR	180	d	NR	NR	GE	F	HIS	GHIS	KI	5.81	23.3	72
138	Rajanna et al, 1984	637	Rat (*Rattus norvegicus*)	4	U	FD	180	d	6	w	JV	M	ORW	ORWT	KI	5.95		73

Table 6.1 Mammalian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)
Cadmium

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Total
139	Gustafson and Mercer, 1984	551	Rat (*Rattus norvegicus*)	7	U	FD	21	d	NR	NR	JV	M	ORW	SMIX	LI	6.06	15.2	79
140	Kotsonis and Klassen, 1978	778	Rat (*Rattus norvegicus*)	4	U	DR	24	w	70	d	JV	M	ORW	SMIX	KI	6.44		69
141	Hokawa et al., 1978	769	Rat (*Rattus norvegicus*)	2	U	FD	60	d	NR	NR	SM	F	GRS	BDWT	WO	9.0		66
142	Hamada et al, 1991	465	Dog (*Canis familiaris*)	6	U	FD	9	yr	6-8	mo	JV	M	HIS	GHIS	KI	10.0	50.0	81
143	Wlostowski et al, 2000	25891	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	ORW	ORWT	KI	10.5		82
144	Wlostowski and Krasowska, 1999	25890	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	ORW	ORWT	LI	11.5		78
145	Seidenberg et al 1986	113	Mouse (*Mus musculus*)	2	U	GV	4	d	NR	NR	GE	F	GRS	BDWT	WO	41.1		70
146	Dodds-Smith et al., 1992	2069	Shrew (*Sorex araneus*)	2	U	FD	12	w	NR	NR	JV	B	ORW	ORWT	KI	120		69
147	Perry et al, 1977	3730	Rat (*Rattus norvegicus*)	7	U	DR	18	mo	21	d	JV	F	ORW	ORWT	LI		0.0706	69
148	Kanisawa and Schroeder, 1969	15061	Rat (*Rattus norvegicus*)	2	U	DR	30	mo	21	d	JV	B	HIS	GHIS	KI		0.569	67
149	Dobryszycka et al., 1984	707	Rat (*Rattus norvegicus*)	2	U	GV	12	mo	3	mo	AD	B	HIS	NCRO	KI		1.0	70
150	Mahaffey et al., 1977	14580	Rat (*Rattus norvegicus*)	2	M	FD	10	w	NR	NR	AD	M	ORW	SMIX	LI		1.67	66
151	Mitra et al, 1995	783	Rat (*Rattus norvegicus*)	2	M	FD	6	w	1	mo	JV	NR	ORW	SMIX	KI		1.8	72
152	Swiergosz et al 1998	506	Bank vole (*Clethrionomys glareolus*)	3	U	FD	6	mo	5	mo	JV	M	HIS	GHIS	LI		1.87	73
153	Mangler et al., 1988	521	Rat (*Rattus norvegicus*)	2	U	DR	12	mo	28	d	JV	F	HIS	GHIS	KI		2.7	69
154	Suzuki and Yoshida 1978	768	Rat (*Rattus norvegicus*)	2	U	FD	180	d	NR	NR	JV	M	ORW	ORWT	IN		3.8	73
155	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	NR	GE	F	HIS	GHIS	LI		3.9	69
156	Webster, 1978	824	Mouse (*Mus musculus*)	2	U	DR	19	d	NR	NR	GE	F	GRS	BDWT	WO		5.4	74
157	Steibert et al., 1984	544	Rat (*Rattus norvegicus*)	2	U	DR	170	d	7	w	JV	F	HIS	GHIS	KI		5.8	68
158	Novelli et al, 1998	21121	Rat (*Rattus norvegicus*)	2	U	DR	7	d	NR	NR	JV	M	ORW	ORWT	KI		7.20	68
159	Iguchi and Sano, 1982	556	Rat (Rattus norvegicus)	3	U	FD	8	w	NR	NR	YO	M	HIS	GHIS	BO		10.0	73
160	Kajikawa et al 1981	667	Rat (*Rattus norvegicus*)	2	U	DR	91	w	NR	NR	JV	M	HIS	NPHR	KI		14.7	68
161	Nomiyama et al., 1975	581	Rabbit (*Oryctolagus cuniculus*)	2	U	FD	42	w	NR	NR	NR	M	GRS	BDWT	WO		17.0	73
162	Van Vleet et al, 1981	149	Pig (*Sus scrofa*)	2	U	FD	10	w	NR	NR	JV	M	HIS	GLSN	HE		21.3	72
			Reproduction															
163	Wills et al 1981	646	Rat (*Rattus norvegicus*)	3	U	FD	64	w	NR	NR	GE	B	REP	PROG	WO	0.0069		74
164	Webster, 1988	525	Mouse (*Mus musculus*)	4	U	DR	60	d	8	w	GE	F	REP	PRWT	WO	0.0939	15.6	76
165	Sorell and Braziano, 1990	822	Rat (*Rattus norvegicus*)	4	U	DR	14	d	NR	NR	GE	F	REP	PRWT	WO	0.651	4.88	78
166	Combs et al, 1983	643	Rat (*Rattus norvegicus*)	5	U	FD	57	d	NR	NR	JV	M	REP	TEWT	TE	0.890		70
167	Sutou, et al, 1980	443	Rat (*Rattus norvegicus*)	4	U	GV	6	w	5	w	GE	F	REP	Other	WO	1.00	10.0	85
168	Sutou et al, 1980	647	Rat (*Rattus norvegicus*)	4	U	GV	6	w	5	w	GE	F	REP	RSEM	WO	1.00	10.0	90
169	Sawicka-Kapusta et al 1994	694	Mouse (*Mus musculus*)	4	U	FD	6	d	NR	NR	GE	F	REP	DEYO	WO	1.14	2.28	84
170	Ahokas et al 1980	669	Rat (*Rattus norvegicus*)	4	U	DR	21	d	NR	NR	GE	F	REP	PRWT	WO	1.57	4.50	79
171	Loeser and Lorke 1977	754	Rat (*Rattus norvegicus*)	5	U	FD	3	mo	NR	NR	JV	B	REP	SPCL	SM	2.53		70
172	Baranski and Sitarek, 1987	809	Rat (*Rattus norvegicus*)	5	U	GV	7	w	3	mo	JV	F	REP	GREP	WO	4.00	40.0	85
173	Baranski et al, 1983	641	Rat (*Rattus norvegicus*)	4	U	GV	8	w	3	mo	GE	F	REP	RSEM	WO	4.00		72
174	Zielinska-Psuja et al, 1979	569	Rat (*Rattus norvegicus*)	3	U	FD	3	mo	NR	NR	JV	M	REP	TEWT	TE	5.40	54.0	83
175	Sasser et al, 1985	9321	Rat (*Rattus norvegicus*)	4	U	DR	21	d	5	mo	GE	F	REP	PRWT	WO	6.00	10.0	81
176	Machemer and Lorke, 1981	560	Rat (*Rattus norvegicus*)	5	U	GV	9	d	4	mo	GE	F	REP	FERT	WO	6.13	18.4	92
177	Kotsonis and Klassen, 1978	778	Rat (*Rattus norvegicus*)	4	U	DR	24	w	70	d	JV	M	REP	PRFM	WO	6.44		66
178	Zenick et al 1982	661	Rat (*Rattus norvegicus*)	4	U	DR	11	w	100	d	JV	M	REP	SPCL	SM	7.41		67
179	Caflisch, 1994	607	Rat (*Rattus norvegicus*)	3	U	DR	40	d	NR	NR	AD	M	REP	TEWT	TE	11.4		74
180	Machemer and Lorke, 1981	560	Rat (*Rattus norvegicus*)	4	U	FD	9	d	4	mo	GE	F	REP	FERT	WO	12.5		74
181	Desi et al, 1998	592	Rat (*Rattus norvegicus*)	4	U	GV	16	d	12	w	GE	F	REP	PRWT	WO	13.9		77
182	Cornwall et al, 1984	651	Rat (*Rattus norvegicus*)	2	U	GV	13	d	NR	NR	GE	F	REP	RSEM	WO	25.0		79
183	Seidenberg et al 1986	113	Mouse (*Mus musculus*)	2	U	GV	4	d	NR	NR	GE	F	REP	PRWT	WO	41.1		80
184	Wardell et al., 1982	748	Rat (*Rattus norvegicus*)	5	U	GV	12	d	NR	NR	GE	F	REP	RSEM	WO	50.0	75	92
185	Simmons et al, 1984	652	Rat (*Rattus norvegicus*)	4	U	GV	13	d	NR	NR	GE	F	REP	RSEM	WO	50.0		77
186	Whelton et al, 1988	625	Mouse (*Mus musculus*)	3	U	FD	252	d	68	d	GE	F	REP	PROG	WO		0.661	79
187	Webster, 1978	824	Mouse (*Mus musculus*)	4	U	DR	19	d	NR	NR	GE	F	REP	PRWT	WO		1.42	80
188	Schroeder and Mitchener, 1971	66	Mouse (Mus musculus)	2	U	DR	6	mo	21	d	JV	F	REP	DEYO	WO		1.45	67
189	Swiergosz et al 1998	506	Bank vole (*Clethrionomys glareolus*)	3	U	FD	6	mo	5	mo	JV	M	REP	SPCL	TE		1.87	79
190	Hastings et al, 1978	571	Rat (*Rattus norvegicus*)	2	U	DR	111	d	NR	NR	GE	F	REP	PRWT	WO		2.14	68
191	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	NR	GE	F	REP	PRWT	WO		3.93	75
192	Mallol et al., 1984	550	Rat (*Rattus norvegicus*)	2	U	DR	25	d	2	w	JV	B	REP	TEWT	TE		4.61	73
193	Webster, 1979	823	Mouse (*Mus musculus*)	2	U	DR	19	d	NR	NR	GE	F	REP	PRWT	WO		5.59	74
194	Steibert et al., 1984	544	Rat (*Rattus norvegicus*)	2	U	DR	170	d	7	w	JV	F	REP	PRWT	WO		5.82	74
195	Gupta et al., 1993	608	Rat (*Rattus norvegicus*)	2	U	DR	28	d	NR	NR	GE	F	REP	PRWT	WO		6.30	73
196	Saxena, et.al. 1989	2857	Rat (*Rattus norvegicus*)	2	U	DR	120	d	NR	NR	JV	M	REP	SPCL	TE		7.28	69
197	Pond and Walker, 1975	3731	Rat (*Rattus norvegicus*)	2	U	FD	21	d	12	w	GE	F	REP	PRWT	WO		236	80
			Growth															
198	Wills et al 1981	646	Rat (*Rattus norvegicus*)	3	U	FD	64	w	NR	NR	JV	B	GRO	BDWT	WO	0.00690		72
199	Vreman et al, 1988	471	Cattle (*Bos taurus*)	2	M	FD	330	d	NR	NR	JV	M	GRO	BDWT	WO	0.00792		69
200	Vreman et al, 1988	471	Cattle (*Bos taurus*)	2	M	FD	328	d	NR	NR	JV	M	GRO	BDWT	WO	0.00884		69
201	Vreman et al, 1988	471	Cattle (*Bos taurus*)	2	M	FD	330	d	NR	NR	JV	M	GRO	BDWT	WO	0.0187		69
202	Lind et al., 1997	685	Mouse (*Mus musculus*)	2	M	FD	5	w	NR	NR	JV	F	GRO	BDWT	WO	0.0584		74
203	King et al, 1992	488	Pig (*Sus scrofa*)	5	M	FD	128	d	NR	NR	JV	F	GRO	BDWT	WO	0.0793		74
204	Merali and Singhal, 1980	639	Rat (*Rattus norvegicus*)	3	U	GV	7	d	1	d	JV	M	GRO	BDWT	WO	0.100	1.0	88
205	Rastogi et al 1977	753	Rat (*Rattus norvegicus*)	3	U	GV	30	d	1	d	JV	NR	GRO	BDWT	WO	0.100	1.0	83
206	Williams et al 1978	483	Vole (*Microtus pennsylvanicus*)	2	U	FD	40	d	NR	NR	JV	NR	GRO	BDWT	WO	0.179		69
207	Ahokas et al 1980	669	Rat (*Rattus norvegicus*)	4	U	DR	21	d	NR	NR	GE	F	GRO	BDWT	WO	0.207	1.6	75

Table 6.1 Mammalian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)
Cadmium

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Total
208	Cousins et al 1977	670	Rat (*Rattus norvegicus*)	3	U	FD	14	w	NR	NR	JV	M	GRO	BDWT	WO	0.268	1.3	82
209	Koo and Winslow, 1983	12092	Rat (*Rattus norvegicus*)	3	U	FD	11	w	NR	NR	JV	M	GRO	BDWT	WO	0.323		72
210	Baranski and Sitarek, 1987	809	Rat (*Rattus norvegicus*)	5	U	GV	12	w	3	mo	JV	F	GRO	BDWT	WO	0.400	4.0	83
211	Doyle et al, 1974	3703	Sheep (*Ovis aires*)	5	U	FD	163	d	4	mo	JV	M	GRO	BDWT	WO	0.448	0.909	80
212	Williams et al 1978	483	Vole (*Microtus pennsylvanicus*)	3	U	FD	40	d	NR	NR	JV	NR	GRO	BDWT	WO	0.478		69
213	Williams et al 1978	483	Vole (*Microtus pennsylvanicus*)	2	U	FD	40	d	NR	NR	JV	NR	GRO	BDWT	WO	0.579		69
214	Ogoshi et al., 1989	720	Rat (*Rattus norvegicus*)	3	U	DR	4	w	21	d	JV	F	GRO	BDWT	WO	0.581	1.2	77
215	Schroeder et al, 1963	14446	Rat (*Rattus norvegicus*)	2	U	DR	32	d	28	d	JV	B	GRO	BDWT	WO	0.593		66
216	Perry et al, 1977	3730	Rat (*Rattus norvegicus*)	7	U	DR	24	mo	21	d	JV	F	GRO	BDWT	WO	0.645	1.6	74
217	Yuhas et al 1979	776	Rat (*Rattus norvegicus*)	4	U	DR	2	w	35	d	JV	M	GRO	BDWT	WO	0.770	7.70	72
218	Combs et al, 1983	643	Rat (*Rattus norvegicus*)	5	U	FD	57	d	NR	NR	JV	M	GRO	BDWT	WO	0.890		69
219	Combs et al, 1983	643	Rat (*Rattus norvegicus*)	5	U	FD	57	d	NR	NR	JV	M	GRO	BDWT	WO	0.890		69
220	Sutou, et al, 1980	443	Rat (*Rattus norvegicus*)	4	U	GV	6	w	5	w	GE	F	GRO	BDWT	WO	1.00	10.0	83
221	Takashima et al 1980	563	Rat (*Rattus norvegicus*)	4	U	FD	19	mo	NR	NR	JV	M	MPH	GMPH	BO	1.04	5.2	81
222	Bhattacharyya et al, 1988	626	Mouse (*Mus musculus*)	3	U	FD	252	d	68	d	GE	F	GRO	BDWT	WO	1.08	10.8	82
223	Loeser and Lorke, 1977	446	Dog (*Canis familiaris*)	5	U	FD	3	mo	4-6	mo	JV	B	GRO	BDWT	WO	1.36		68
224	Sugawara and Sugawara, 1983	21111	Rat (*Rattus norvegicus*)	2	U	DR	36	d	27	d	JV	F	GRO	BDWT	WO	1.78		72
225	Machemer and Lorke, 1981	560	Rat (*Rattus norvegicus*)	5	U	GV	9	d	2	mo	GE	F	GRO	BDWT	WO	1.84	6.13	88
226	Mitra et al, 1995	783	Rat (*Rattus norvegicus*)	2	M	FD	6	w	1	mo	JV	NR	GRO	BDWT	WO	1.85		76
227	Mangler et al., 1988	521	Rat (*Rattus norvegicus*)	2	U	DR	18	mo	28	d	JV	F	GRO	BDWT	WO	2.22		73
228	Loeser and Lorke 1977	754	Rat (*Rattus norvegicus*)	5	U	FD	3	mo	NR	NR	JV	B	GRO	BDWT	WO	2.53		68
229	Yuyama 1982	710	Rat (*Rattus norvegicus*)	4	U	FD	2	w	5	w	JV	M	GRO	BDWT	WO	2.65	10.6	82
230	Washko and Cousins 1977	770	Rat (*Rattus norvegicus*)	2	U	DR	8	w	NR	NR	JV	M	GRO	BDWT	WO	2.78		72
231	Lee et al., 1994	733	Rat (*Rattus norvegicus*)	4	U	GV	8	w	60	d	JV	M	GRO	BDWT	WO	3.00	10.0	88
232	Mitsumori et al., 1998	591	Rat (*Rattus norvegicus*)	5	U	FD	4	d	5	w	JV	F	GRO	BDWT	WO	3.08	15.4	82
233	Steibert et al., 1984	543	Rat (*Rattus norvegicus*)	2	U	DR	170	d	NR	mo	AD	F	GRO	BDWT	WO	3.73		73
234	Cousins et al., 1973	502	Pig (*Sus scrofa*)	5	U	FD	6	w	55	d	JV	M	GRO	BDWT	WO	4.05	12.1	84
235	Chetty et al, 1980	650	Rat (*Rattus norvegicus*)	4	U	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO	4.36	8.71	83
236	Koller and Roan, 1977	814	Mouse (*Mus musculus*)	4	U	DR	70	d	28	d	JV	NR	GRO	BDWT	WO	4.44	44.4	76
237	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	6	M	FD	2	yr	7	w	AD	F	GRO	BDWT	WO	4.97		74
238	Swiergosz et al 1998	506	Bank vole (*Clethrionomys glareolus*)	3	U	FD	6	mo	5	mo	JV	M	GRO	BDWT	WO	4.99		68
239	Zielinska-Psuja et al, 1979	569	Rat (*Rattus norvegicus*)	3	U	FD	3	mo	NR	NR	JV	M	GRO	BDWT	WO	5.40	54.0	81
240	Sugawara and Sugawara, 1983	21111	Rat (*Rattus norvegicus*)	2	U	DR	330	d	27	d	JV	F	GRO	BDWT	WO	5.54		72
241	Gustafson and Mercer, 1984	551	Rat (*Rattus norvegicus*)	7	U	FD	21	d	NR	NR	JV	M	GRO	BDWT	WO	6.06	15.2	83
242	Blakely, 1984	547	Mouse (*Mus musculus*)	4	U	DR	3	w	6	w	JV	F	GRO	BDWT	WO	7.23		71
243	Zenick et al 1982	661	Rat (*Rattus norvegicus*)	4	U	DR	80	d	100	d	JV	M	GRO	BDWT	WO	7.38		72
244	Weber and Reid 1969	677	Mouse (*Mus musculus*)	4	U	FD	3	w	NR	NR	JV	B	GRO	BDWT	WO	8.53		69
245	Ogoshi et al., 1989	720	Rat (*Rattus norvegicus*)	6	U	DR	4	w	24	w	AD	NR	GRO	BDWT	WO	8.54	17.1	77
246	Tanaka et al 1995	690	Rat (*Rattus norvegicus*)	3	M	FD	5	mo	3	w	JV	M	GRO	BDWT	WO	8.61		73
247	Wlostowski et al, 2000	25891	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	GRO	BDWT	WO	10.5		82
248	Watanabe et al, 1986	632	Mouse (*Mus musculus*)	5	M	FD	2	yr	10	w	GE	F	GRO	BDWT	WO	11.8		74
249	Machemer and Lorke, 1981	560	Rat (*Rattus norvegicus*)	4	U	FD	9	d	4	mo	GE	F	GRO	BDWT	WO	12.5		72
250	Kodama et al., 1989	507	Dog (*Canis familiaris*)	6	U	FD	250	w	8	mo	JV	B	MPH	GMPH	BO	12.5		68
251	Wlostowski and Krasowska, 1999	25890	Bank vole (*Clethrionomys glareolus*)	3	UX	FD	6	w	1	mo	JV	M	GRO	BDWT	WO	12.6		83
252	Ogoshi et al., 1989	720	Rat (*Rattus norvegicus*)	3	U	DR	4	w	2	yr	AD	NR	MPH	GMPH	FM	16.9		67
253	King et al, 1992	488	Pig (*Sus scrof* a)	3	M	FD	132	d	NR	NR	JV	F	GRO	BDWT	WO	21.3		74
254	Nation et al., 1990	617	Rat (*Rattus norvegicus*)	2	U	FD	61	d	50	d	JV	M	GRO	BDWT	WO	31.3		68
255	Exon et al., 1979	3847	Mouse (*Mus musculus*)	5	U	DR	6	w	NR	NR	JV	M	GRO	BDWT	WO	43.0	85.9	73
256	Hamada et al, 1991	465	Dog (*Canis familiaris*)	6	U	FD	9	yr	6-8	mo	JV	B	GRO	BDWT	WO	50.0	100	87
257	Weigel et al 1987	629	Rat (*Rattus norvegicus*)	3	M	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO		0.0744	76
258	Bakry et al, 1992	772	Rat (*Rattus norvegicus*)	2	U	GV	2	w	NR	NR	JV	B	MPH	GMPH	WO		0.143	84
259	Smith et al, 1985	636	Rat (*Rattus norvegicus*)	2	U	GV	14	d	5	d	JV	M	DVP	GDPV	EY		1.00	84
260	Rajanna et al, 1984	637	Rat (*Rattus norvegicus*)	4	U	FD	180	d	6	w	JV	M	GRO	BDWT	WO		1.97	77
261	Groten et al, 1991	615	Rat (*Rattus norvegicus*)	2	M	FD	7	d	5	w	JV	B	GRO	BDWT	WO		3.01	82
262	Wilson et al 1940	825	Rat (*Rattus norvegicus*)	6	U	FD	25	d	NR	NR	JV	M	GRO	BDWT	WO		3.21	77
263	Osuna and Edds, 1980	494	Pig (*Sus scrofa*)	2	M	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO		3.43	83
264	Pond et al, 1973	583	Pig (*Sus scrofa*)	2	U	FD	50	d	NR	NR	JV	NR	GRO	BDWT	WO		3.88	78
265	Suzuki and Yoshida, 1978	572	Rat (*Rattus norvegicus*)	2	U	FD	14	d	NR	NR	JV	M	GRO	BDWT	WO		4.06	78
266	Suzuki and Yoshida 1979	780	Rat (*Rattus norvegicus*)	4	U	FD	28	d	NR	NR	JV	M	GRO	BDWT	WO		4.58	77
267	Suzuki and Yoshida 1978	768	Rat (*Rattus norvegicus*)	2	U	FD	9	d	NR	NR	JV	M	GRO	BDWT	WO		5.08	77
268	Suzuki and Yoshida 1979	780	Rat (*Rattus norvegicus*)	2	U	FD	14	d	NR	NR	JV	M	GRO	BDWT	WO		5.18	77
269	Meyer et al 1982	662	Rat (*Rattus norvegicus*)	3	U	FD	30	d	NR	NR	JV	M	GRO	BDWT	WO		5.44	78
270	Lynch et al., 1976	3711	Cattle (*Bos taurus*)	2	U	OR	63	d	NR	NR	JV	M	GRO	BDWT	WO		5.74	79
271	Steibert et al., 1984	544	Rat (*Rattus norvegicus*)	2	U	DR	170	d	7	w	JV	F	GRO	BDWT	WO		5.82	72
272	Ando et al., 1978	801	Rat (*Rattus norvegicus*)	2	U	GV	2	mo	64	d	JV	F	MPH	GMPH	BO		6.13	84
273	Freundt and Irbahim, 1990	2640	Rat (*Rattus norvegicus*)	2	U	DR	5	w	NR	NR	AD	F	GRO	BDWT	WO		6.89	72
274	Nakamura et al., 1983	638	Rat (*Rattus norvegicus*)	2	U	FD	11	w	NR	NR	NR	F	GRO	BDWT	WO		9.54	78
275	Banis et al 1969	3733	Rat (*Rattus norvegicus*)	2	U	FD	30	d	NR	NR	JV	M	GRO	BDWT	WO		9.70	77
276	Iguchi and Sano, 1982	556	Rat (Rattus norvegicus)	3	U	FD	8	w	NR	NR	YO	M	MPH	GMPH	TB		10.0	77
277	Banis et al 1969	3733	Rat (*Rattus norvegicus*)	2	U	FD	3	w	5	w	JV	B	GRO	BDWT	WO		10.4	77
278	Eakin et al 1980	659	Rat (*Rattus norvegicus*)	2	U	FD	16	w	NR	NR	JV	M	GRO	BDWT	WO		13.2	72

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Total
279	Kajikawa et al 1981	667	Rat (*Rattus norvegicus*)	2	U	DR	91	w	NR	NR	JV	M	GRO	BDWT	WO		14.7	72
280	Pond and Walker, 1975	3731	Rat (*Rattus norvegicus*)	2	U	FD	21	d	12	w	GE	F	GRO	BDWT	WO		16.8	78
281	Suzuki and Yoshida 1977	574	Rat (*Rattus norvegicus*)	2	U	FD	10	d	NR	NR	JV	M	GRO	BDWT	WO		20.7	77
282	Van Vleet et al, 1981	149	Pig (*Sus scrofa*)	2	U	FD	2	w	NR	NR	JV	M	GRO	BDWT	WO		75.8	77
283	Dodds-Smith et al., 1992	440	Shrew (*Sorex araneus*)	2	U	FD	12	w	NR	NR	JV	B	GRO	BDWT	WO		103	77
284	Weber and Reid 1969	677	Mouse (*Mus musculus*)	4	U	FD	3	w	NR	NR	JV	B	GRO	BDWT	WO		571	78
								Survival										
285	Wills et al 1981	646	Rat (*Rattus norvegicus*)	3	U	FD	64	w	NR	NR	JV	B	MOR	MORT	WO	0.00690		73
286	Loeser and Lorke, 1977	446	Dog (*Canis familiaris*)	5	U	FD	3	mo	4-6	mo	JV	B	MOR	MORT	WO	1.36		78
287	Swiergosz et al 1998	506	Bank vole (*Clethrionomys glareolus*)	3	U	FD	6	mo	5	mo	JV	M	MOR	MORT	WO	1.87	4.99	84
288	Mangler et al., 1988	521	Rat (*Rattus norvegicus*)	2	U	DR	18	mo	28	d	JV	F	MOR	MORT	WO	2.22		74
289	Loeser and Lorke 1977	754	Rat (*Rattus norvegicus*)	5	U	FD	3	mo	NR	NR	JV	B	MOR	MORT	WO	2.53		69
290	Groten et al, 1991	615	Rat (*Rattus norvegicus*)	2	M	FD	56	d	5	w	JV	B	MOR	MORT	WO	2.61		83
291	Baranski and Sitarek, 1987	809	Rat (*Rattus norvegicus*)	5	U	GV	13	w	3	mo	JV	F	MOR	MORT	WO	4.00	40.0	84
292	Baranski et al, 1983	641	Rat (*Rattus norvegicus*)	4	U	GV	8	w	3	mo	GE	F	MOR	SURV	WO	4.00		76
293	Whelton et al, 1988	625	Mouse (*Mus musculus*)	3	U	FD	252	d	68	d	GE	F	MOR	MORT	WO	6.61		78
294	Sutou, et al, 1980	443	Rat (*Rattus norvegicus*)	4	U	GV	6	w	5	w	JV	B	MOR	MORT	WO	10.0		85
295	Sasser et al, 1985	9321	Rat (*Rattus norvegicus*)	4	U	DR	21	d	5	mo	GE	F	MOR	MORT	WO	10.0		74
296	Machemer and Lorke, 1981	560	Rat (*Rattus norvegicus*)	4	U	FD	9	d	4	mo	GE	F	MOR	MORT	WO	12.5		73
297	Van Vleet et al, 1981	149	Pig (*Sus scrofa*)	2	U	FD	10	w	NR	NR	JV	M	MOR	MORT	WO	21.3		77
298	Seidenberg et al 1986	113	Mouse (*Mus musculus*)	2	U	GV	4	d	NR	NR	GE	F	MOR	MORT	WO	41.1		79
299	Cousins et al., 1973	502	Pig (*Sus scrofa*)	5	U	FD	6	w	55	d	JV	M	MOR	MORT	WO	67.3		70
300	Dodds-Smith et al., 1992	440	Shrew (*Sorex araneus*)	2	U	FD	12	w	NR	NR	JV	B	MOR	MORT	WO	103		78
301	Weber and Reid 1969	677	Mouse (*Mus musculus*)	4	U	FD	3	w	NR	NR	JV	B	MOR	MORT	WO	571	2160	83
302	Schroeder et al, 1963	14446	Rat (*Rattus norvegicus*)	2	U	DR	6	mo	28	d	JV	M	MOR	SURV	WO		0.551	67
303	Schroeder et al, 1964	14447	Mouse (*Mus musculus*)	2	U	DR	18	mo	21	d	JV	B	MOR	SURV	WO		0.620	73
304	Lynch et al., 1976	3711	Cattle (*Bos taurus*)	2	U	OR	63	d	NR	NR	JV	M	MOR	SURV	WO		5.74	80

AATT= alanine aminotransferase; ACPH = acid phosphatase; ACTP = accuracy of learned behavior; AD = adult; ALAD = (delta) -aminolevulinic acid dehydrogenase; ALPH = alkaline phosphatase; AVO = avoidance; B = both; BL = blood; BDWT = body weight changes; BEH = behavior; BL = blood; BLPR = blood pressure; BO = bone; BR = brain; bw = body weight; CALC = calcium; CHM = chemical changes; CREA = creatinine; d- day; DEYO = death of young; DR = Drinking water; DVP = development; ENZ = enyzme level changes; EY= eye; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FDCV = food conversion efficiency; FERT = fertility; FM = femur; FOOD = food avoidance; G6PG = glucose-6-phosphate dehydrogenase; GBCM = general biochemical changes; GBHV = general behavioral changes; GDVP = general development; GE = gestation; GENZ = general enzyme changes; GHIS = general histology; GLUC = glucose; GLSN = gross lesions; GMPH = general morphology; GPHY = general pysiology changes; GPTR = glutamic pyruvic transaminase; GREP = general reproductive effect; GRO = growth; GRS = gross body weight changes; GV = gavage;
HE = heart; HIS = histological changes; HMCT = hematocrit; HMGL = hemoglobin; HRTR = heart rate; HYDR = hydration; HRM = hormone changes; IN = intestinal tract; JV = juvenile; kg = kilograms; KI = kidney; L = liter; LADH = lactate dehydrogenase; LI = liver; LOAEL = lowest observed adverse effect level; mo = months; M = male; M = measured; MA = mature; MADH = malic dehydrogenase; MCPR = microsomal proteins; MEEN = metabolizable energy; MOR = effects on mortality and survival; MORT = mortality; MPH = morphology; NCRO = necrosis; NEUT = neutrophil; NMVM = number of movements; NOAEL = No Observed Advese Effect Level; NORE = norephinephrine; NPHR = nephrosis; NR = Not reported; ODVP = offspring development; OR = other oral; ORW = organ weight changes; ORWT = organ weight changes; P450 = changes in cytochrome P450; PCLV = packed cell volume; PHOS = phosphate; PHST = phospholipid content, total; PHY = physiology; PL = plasma; POTA = potassium; PRFM = sexual performance; PROG = progeny numbers/counts; PRTL = protein level; PRWT = progeny weight; PTH = pathology; RBCE = red blood cell count;
REP = reproduction; RRSP = righting response; RSEM = resorbed embryos; SCDH = succinate dehydrogenase; SM = sperm; SM = sexually mature; SMIX = weight relative to body weight; SODI = sodium; SPCL = sperm cell counts; SR = serum; STIM = response to stimulus; SURV = survival; TB = tibia; TDTH = time to death; TE = testes; TSTR = testosterone; TEWT = testes weight; TSTR = testosterone; U = unmeasured; UR = urine; UX = measured but values not reported; w = weeks; WCON = water consumption; WO = whole organism; YO = young; yr = year.

Within the 145 papers there are 304 results for biochemical (BIO), behavior (BEH), physiology (PHY), pathology (PTH), reproduction (REP), growth (GRO), and survival (MOR) endpoints with a total Data Evaluation Score >65 that were used to derive the TRV (U.S. EPA 2003; Attachment 4-4). These data are plotted in Figure 6.1 and correspond directly with the data presented in Table 6.1. The NOAEL results for growth and reproduction are used to calculate a geometric mean NOAEL. This geometric mean is examined in relationship to the lowest bounded LOAEL for reproduction, growth, and survival to derive the TRV according to the Eco-SSL guidance (U.S. EPA 2003; Attachment 4-5).

A geometric mean of the NOAEL values for reproduction and growth was calculated at 1.86 mg cadmium/kg bw/day. However, this value is higher than the lowest bounded LOAEL for reproduction, growth, or mortality results. Therefore, the TRV is equal to the highest bounded NOAEL below the lowest bounded LOAEL for reproduction, growth, or survival, and is equal to 0.770 mg cadmium/kg bw/day.

6.2 Estimation of Dose and Calculation of the Eco-SSL

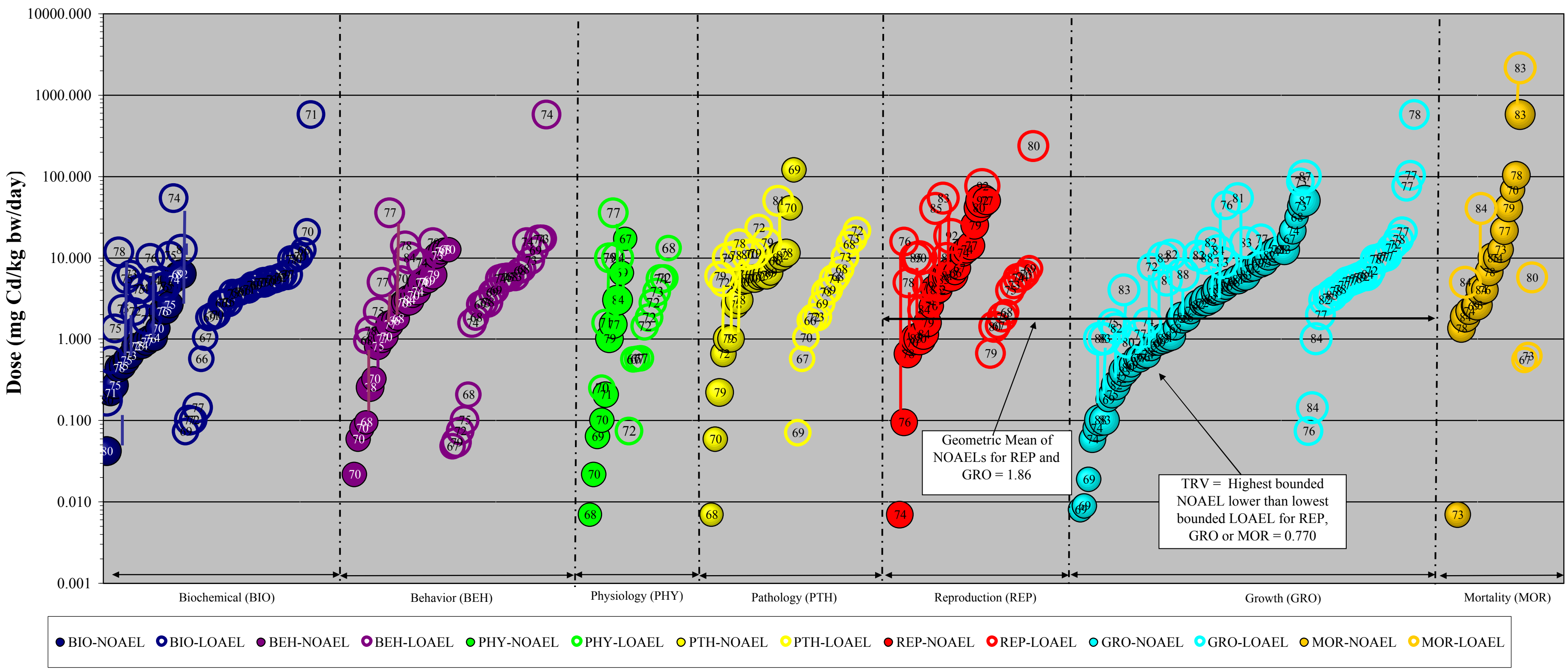
Three separate Eco-SSL values were calculated for mammalian wildlife, one for each of three surrogate receptor groups representing different trophic levels. The mammalian Eco-SSLs derived for cadmium were calculated according to the Eco-SSL guidance (U.S. EPA, 2003; Attachment 4-5) and are summarized in Table 6.2.

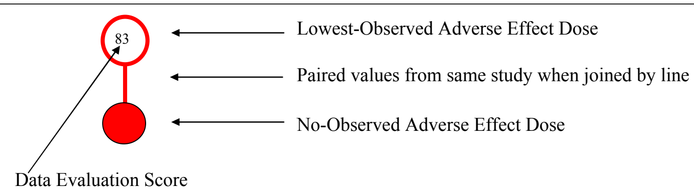
Table 6.2 Calculation of the Mammalian Eco-SSLs for Cadmium

Surrogate Receptor Group	TRV for Cadmium (mg dw/kg bw/d) [1]	Food Ingestion Rate (FIR)[2] (kg dw/kg bw/d)	Soil Ingestion as Proportion of Diet (P_s)[2]	Concentration of Cadmium in Biota Type (i)[2,3] (B_i) (mg/kg dw)	Eco-SSL *(mg/kg dw)*[4]
Mammalian herbivore (vole)	0.770	0.0875	0.032	$\ln(B_i) = 0.546 * \ln(Soil_j) - 0.475$ where i = plants	73
Mammalian ground insectivore (shrew)	0.770	0.209	0.030	$\ln(B_i) = 0.795 * \ln(Soil_j) + 2.114$ where i = earthworms	0.36
Mammalian carnivore (weasel)	0.770	0.130	0.043	$\ln(B_i) = 0.4723 * \ln(Soil_j) - 1.2571$ where i = mammals	84

[1] The process for derivation of wildlife TRVs is described in Attachment 4-5 of U.S. EPA (2003).
[2] Parameters (FIR, P_s, B_i values, regressions) are provided in U.S. EPA (2003) Attachment 4-1 (revised February 2005).
[3] B_i = Concentration in biota type (i) which represents 100% of the diet for the respective receptor.
[4] $HQ = FIR * (Soil_j * P_s + B_i) / TRV$ solved for HQ=1 where $Soil_j$ = Eco-SSL (Equation 4-2; U.S. EPA, 2003).
NA = Not Applicable

Figure 6.1 Mammalian TRV Derivation for Cadmium





Wildlife TRV Derivation Process

1) There are at least three results available for two test species within the growth, reproduction, and mortality effect groups. There are enough data to derive a TRV.

2) There are three NOAEL results available within the growth and reproduction effect groups for calculation of a geometric mean.

4) The geometric mean is equal to 1.86 mg cadmium /kg bw/d but is higher than the lowest bounded LOAEL for results within the reproduction, growth, and survival (MOR) effect groups.

5) The mammalian wildlife TRV for cadmium is equal to 0.770 mg cadmium/kg bw/day which is the highest bounded NOAEL lower than the lowest bounded LOAEL for reproduction, growth, or survival.

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Literature Rejection Categories		
Rejection Criteria	**Description**	**Receptor**
ABSTRACT (Abstract)	Abstracts of journal publications or conference presentations.	Wildlife Plants and Soil Invertebrates
ACUTE STUDIES (Acu)	Single oral dose or exposure duration of three days or less.	Wildlife
AIR POLLUTION (Air P)	Studies describing the results for air pollution studies.	Wildlife Plants and Soil Invertebrates
ALTERED RECEPTOR (Alt)	Studies that describe the effects of the contaminant on surgically-altered or chemically-modified receptors (e.g., right nephrectomy, left renal artery ligature, hormone implant, etc.).	Wildlife
AQUATIC STUDIES (Aquatic)	Studies that investigate toxicity in aquatic organisms.	Wildlife Plants and Soil Invertebrates
ANATOMICAL STUDIES (Anat)	Studies of anatomy. Instance where the contaminant is used in physical studies (e.g., silver nitrate staining for histology).	Wildlife
BACTERIA (Bact)	Studies on bacteria or susceptibility to bacterial infection.	Wildlife Plants and Soil Invertebrates
BIOACCUMULATION SURVEY (Bio Acc)	Studies reporting the measurement of the concentration of the contaminant in tissues.	Wildlife Plants and Soil Invertebrates
BIOLOGICAL PRODUCT (BioP)	Studies of biological toxicants, including venoms, fungal toxins, *Bacillus thuringiensis*, other plant, animal, or microbial extracts or toxins.	Wildlife Plants and Soil Invertebrates
BIOMARKER (Biom)	Studies reporting results for a biomarker having no reported association with an adverse effect and an exposure dose (or concentration).	Wildlife
CARCINOGENICITY STUDIES (Carcin)	Studies that report data only for carcinogenic endpoints such as tumor induction. Papers that report systemic toxicity data are retained for coding of appropriate endpoints.	Wildlife Plants and Soil Invertebrates
CHEMICAL METHODS (Chem Meth)	Studies reporting methods for determination of contaminants, purification of chemicals, etc. Studies describing the preparation and analysis of the contaminant in the tissues of the receptor.	Wildlife Plants and Soil Invertebrates
CONFERENCE PROCEEDINGS (CP)	Studies reported in conference and symposium proceedings.	Wildlife Plants and Soil Invertebrates
DEAD (Dead)	Studies reporting results for dead organisms. Studies reporting field mortalities with necropsy data where it is not possible to establish the dose to the organism.	Wildlife Plants and Soil Invertebrates
DISSERTATIONS (Diss)	Dissertations are excluded. However, dissertations are flagged for possible future use.	Wildlife
DRUG (Drug)	Studies reporting results for testing of drug and therapeutic effects and side-effects. Therapeutic drugs include vitamins and minerals. Studies of some minerals may be included if there is potential for adverse effects.	Wildlife Plants and Soil Invertebrates
DUPLICATE DATA (Dup)	Studies reporting results that are duplicated in a separate publication. The publication with the earlier year is used.	Wildlife Plants and Soil Invertebrates

Literature Rejection Categories		
Rejection Criteria	**Description**	**Receptor**
ECOLOGICAL INTERACTIONS (Ecol)	Studies of ecological processes that do not investigate effects of contaminant exposure (e.g., studies of "silver" fox natural history; studies on ferrets identified in iron search).	Wildlife Plants and Soil Invertebrates
EFFLUENT (Effl)	Studies reporting effects of effluent, sewage, or polluted runoff.	Wildlife Plants and Soil Invertebrates
ECOLOGICALLY RELEVANT ENDPOINT (ERE)	Studies reporting a result for endpoints considered as ecologically relevant but is not used for deriving Eco-SSLs (e.g., behavior, mortality).	Plants and Soil Invertebrates
CONTAMINANT FATE/METABOLISM (Fate)	Studies reporting what happens to the contaminant, rather than what happens to the organism. Studies describing the intermediary metabolism of the contaminant (e.g., radioactive tracer studies) without description of adverse effects.	Wildlife Plants and Soil Invertebrates
FOREIGN LANGUAGE (FL)	Studies in languages other than English.	Wildlife Plants and Soil Invertebrates
FOOD STUDIES (Food)	Food science studies conducted to improve production of food for human consumption.	Wildlife
FUNGUS (Fungus)	Studies on fungus.	Wildlife Plants and Soil Invertebrates
GENE (Gene)	Studies of genotoxicity (chromosomal aberrations and mutagenicity).	Wildlife Plants and Soil Invertebrates
HUMAN HEALTH (HHE)	Studies with human subjects.	Wildlife Plants and Soil Invertebrates
IMMUNOLOGY (IMM)	Studies on the effects of contaminants on immunological endpoints.	Wildlife Plants and Soil Invertebrates
INVERTEBRATE (Invert)	Studies that investigate the effects of contaminants on terrestrial invertebrates are excluded.	Wildlife
IN VITRO (In Vit)	*In vitro* studies, including exposure of cell cultures, excised tissues and/or excised organs.	Wildlife Plants and Soil Invertebrates
LEAD SHOT (Lead shot)	Studies administering lead shot as the exposure form. These studies are labeled separately for possible later retrieval and review.	Wildlife
MEDIA (Media)	Authors must report that the study was conducted using natural or artificial soil. Studies conducted in pore water or any other aqueous phase (e.g., hydroponic solution), filter paper, petri dishes, manure, organic or histosoils (e.g., peat muck, humus), are not considered suitable for use in defining soil screening levels.	Plants and Soil Invertebrates
METHODS (Meth)	Studies reporting methods or methods development without usable toxicity test results for specific endpoints.	Wildlife Plants and Soil Invertebrates
MINERAL REQUIREMENTS (Mineral)	Studies examining the minerals required for better production of animals for human consumption, unless there is potential for adverse effects.	Wildlife
MIXTURE (Mix)	Studies that report data for combinations of single toxicants (e.g. cadmium and copper) are excluded. Exposure in a field setting from contaminated natural soils or waste application to soil may be coded as Field Survey.	Wildlife Plants and Soil Invertebrates

Literature Rejection Categories		
Rejection Criteria	**Description**	**Receptor**
MODELING (Model)	Studies reporting the use of existing data for modeling, i.e., no new organism toxicity data are reported. Studies which extrapolate effects based on known relationships between parameters and adverse effects.	Wildlife Plants and Soil Invertebrates
NO CONTAMINANT OF CONCERN (No COC)	Studies that do not examine the toxicity of Eco-SSL contaminants of concern.	Wildlife Plants and Soil Invertebrates
NO CONTROL (No Control)	Studies which lack a control or which have a control that is classified as invalid for derivation of TRVs.	Wildlife Plants and Soil Invertebrates
NO DATA (No Data)	Studies for which results are stated in text but no data is provided. Also refers to studies with insufficient data where results are reported for only one organism per exposure concentration or dose (wildlife).	Wildlife Plants and Soil Invertebrates
NO DOSE or CONC (No Dose)	Studies with no usable dose or concentration reported, or an insufficient number of doses/concentrations are used based on Eco-SSL SOPs. These are usually identified after examination of full paper. This includes studies which examine effects after exposure to contaminant ceases. This also includes studies where offspring are exposed in utero and/or lactation by doses to parents and then after weaning to similar concentrations as their parents. Dose cannot be determined.	Wildlife Plants and Soil Invertebrates
NO DURATION (No Dur)	Studies with no exposure duration. These are usually identified after examination of full paper.	Wildlife Plants and Soil Invertebrates
NO EFFECT (No Efct)	Studies with no relevant effect evaluated in a biological test species or data not reported for effect discussed.	Wildlife Plants and Soil Invertebrates
NO ORAL (No Oral)	Studies using non-oral routes of contaminant administration including intraperitoneal injection, other injection, inhalation, and dermal exposures.	Wildlife
NO ORGANISM (No Org) or NO SPECIES	Studies that do not examine or test a viable organism (also see in vitro rejection category).	Wildlife Plants and Soil Invertebrates
NOT AVAILABLE (Not Avail)	Papers that could not be located. Citation from electronic searches may be incorrect or the source is not readily available.	Wildlife Plants and Soil Invertebrates
NOT PRIMARY (Not Prim)	Papers that are not the original compilation and/or publication of the experimental data.	Wildlife Plants and Soil Invertebrates
NO TOXICANT (No Tox)	No toxicant used. Publications often report responses to changes in water or soil chemistry variables, e.g., pH or temperature. Such publications are not included.	Wildlife Plants and Soil Invertebrates
NO TOX DATA (No Tox Data)	Studies where toxicant used but no results reported that had a negative impact (plants and soil invertebrates).	Plants and Soil Invertebrates
NUTRIENT (Nutrient)	Nutrition studies reporting no concentration related negative impact.	Plants and Soil Invertebrates
NUTRIENT DEFICIENCY (Nut def)	Studies of the effects of nutrient deficiencies. Nutritional deficient diet is identified by the author. If reviewer is uncertain then the administrator should be consulted. Effects associated with added nutrients are coded.	Wildlife
NUTRITION (Nut)	Studies examining the best or minimum level of a chemical in the diet for improvement of health or maintenance of animals in captivity.	Wildlife
OTHER AMBIENT CONDITIONS (OAC)	Studies which examine other ambient conditions: pH, salinity, DO, UV, radiation, etc.	Wildlife Plants and Soil Invertebrates

Literature Rejection Categories		
Rejection Criteria	**Description**	**Receptor**
OIL (Oil)	Studies which examine the effects of oil and petroleum products.	Wildlife Plants and Soil Invertebrates
OM, pH (OM, pH)	Organic matter content of the test soil must be reported by the authors, but may be presented in one of the following ways; total organic carbon (TOC), particulate organic carbon (POC), organic carbon (OC), coarse particulate organic matter (CPOM), particulate organic matter (POM), ash free dry weight of soil, ash free dry mass of soil, percent organic matter, percent peat, loss on ignition (LOI), organic matter content (OMC). With the exception of studies on non-ionizing substances, the study must report the pH of the soil, and the soil pH should be within the range of $4 and #8.5. Studies that do not report pH or report pH outside this range are rejected.	Plants and Soil Invertebrates
ORGANIC METAL (Org Met)	Studies which examine the effects of organic metals. This includes tetraethyl lead, triethyl lead, chromium picolinate, phenylarsonic acid, roxarsone, 3-nitro-4-phenylarsonic acid,, zinc phosphide, monomethylarsonic acid (MMA), dimethylarsinic acid (DMA), trimethylarsine oxide (TMAO), or arsenobetaine (AsBe) and other organo metallic fungicides. Metal acetates and methionines are not rejected and are evaluated.	Wildlife
LEAD BEHAVIOR OR HIGH DOSE MODELS (Pb Behav)	There are a high number of studies in the literature that expose rats or mice to high concentrations of lead in drinking water (0.1, 1 to 2% solutions) and then observe behavior in offspring, and/or pathology changes in the brain of the exposed dam and/or the progeny. Only a representative subset of these studies were coded. Behavior studies examining complex behavior (learned tasks) were also not coded.	Wildlife
PHYSIOLOGY STUDIES (Phys)	Physiology studies where adverse effects are not associated with exposure to contaminants of concern.	Wildlife
PLANT (Plant)	Studies of terrestrial plants are excluded.	Wildlife
PRIMATE (Prim)	Primate studies are excluded.	Wildlife
PUBL AS (Publ as)	The author states that the information in this report has been published in another source. Data are recorded from only one source. The secondary citation is noted as Publ As.	Wildlife Plants and Soil Invertebrates
QSAR (QSAR)	Derivation of Quantitative Structure-Activity Relationships (QSAR) is a form of modeling. QSAR publications are rejected if raw toxicity data are not reported or if the toxicity data are published elsewhere as original data.	Wildlife Plants and Soil Invertebrates
REGULATIONS (Reg)	Regulations and related publications that are not a primary source of data.	Wildlife Plants and Soil Invertebrates
REVIEW (Rev)	Studies in which the data reported in the article are not primary data from research conducted by the author. The publication is a compilation of data published elsewhere. These publications are reviewed manually to identify other relevant literature.	Wildlife Plants and Soil Invertebrates

Literature Rejection Categories		
Rejection Criteria	**Description**	**Receptor**
SEDIMENT CONC (Sed)	Studies in which the only exposure concentration/dose reported is for the level of a toxicant in sediment.	Wildlife Plants and Soil Invertebrates
SCORE (Score)	Papers in which all studies had data evaluation scores at or lower then the acceptable cut-off (#10 of 18) for plants and soil invertebrates).	Plants and Soil Invertebrates
SEDIMENT CONC (Sed)	Studies in which the only exposure concentration/dose reported is for the level of a toxicant in sediment.	Wildlife Plants and Soil Invertebrates
SLUDGE	Studies on the effects of ingestion of soils amended with sewage sludge.	Wildlife Plants and Soil Invertebrates
SOIL CONC (Soil)	Studies in which the only exposure concentration/dose reported is for the level of a toxicant in soil.	Wildlife
SPECIES	Studies in which the species of concern was not a terrestrial invertebrate or plant or mammal or bird.	Plants and Soil Invertebrates Wildlife
STRESSOR (QAC)	Studies examining the interaction of a stressor (e.g., radiation, heat, etc.) and the contaminant, where the effect of the contaminant alone cannot be isolated.	Wildlife Plants and Soil Invertebrates
SURVEY (Surv)	Studies reporting the toxicity of a contaminant in the field over a period of time. Often neither a duration nor an exposure concentration is reported.	Wildlife Plants and Soil Invertebrates
REPTILE OR AMPHIBIAN (Herp)	Studies on reptiles and amphibians. These papers flagged for possible later review.	Wildlife Plants and Soil Invertebrates
UNRELATED (Unrel)	Studies that are unrelated to contaminant exposure and response and/or the receptor groups of interest.	Wildlife
WATER QUALITY STUDY (Wqual)	Studies of water quality.	Wildlife Plants and Soil Invertebrates
YEAST (Yeast)	Studies of yeast.	Wildlife Plants and Soil Invertebrates

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Appendix 5-1

Avian Toxicity Data Extracted and Reviewed for Wildlife Toxicity Reference Value (TRV) - Cadmium

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March 2005

Appendix 5.1 Avian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)
Cadmium

Ref			Exposure																				Effects						Conversion to mg/kg bw/day				Result		Data Evaluation Score										
Result #	Ref N.	Reference	Chemical Form	MW%	Test Species	Phase #	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg/day or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
Biochemical																																													
1	366	Cain et al, 1983	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/4.3/9.2/14.6	mg/kg diet	Y	10	ADL	M	FD	12	w	1	d	JV	B	C	Lab	BIO	CHM	HMGL	BL	14.6		Y	1.128	N	0.06295	0.858		10	10	10	10	6	1	4	10	10	4	75
2	386	Blalock and Hill, 1988	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	4	0/10/20/40	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	NR	C	Lab	BIO	CHM	HMGL	BL	10.0	20.0	Y	0.2	N	0.02041	1.02	2.04	10	10	5	10	6	1	10	10	10	4	76
3	433	Pilastro et al, 1993	Cadmium chloride	100	Starling (*Sturnus vulgaris*)	1	3	0/10/50	mg/kg diet	N	NR	ADL	U	FD	22	w	NR	NR	AD	B	C	Lab	BIO	ENZ	CYTC	LI	10.0	50.0	Y	0.0742	N	0.0107	1.44	7.21	10	10	5	10	6	1	8	10	6	4	70
4	25893	Congiu et al, 2000	Cadmium chloride	100	Starling (*Sturnus vulgaris*)	1	3	0/10.27/55.23	ug/g diet	N	NR	ADL	M	FD	22	w	NR	NR	MA	B	C	Lab	BIO	CHM	GLTH	LI	10.27	55.23	Y	0.0742	Y	0.0186	2.57	13.8	10	10	10	10	7	1	8	10	10	4	80
5	392	Lefevre et al, 1982	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/kg diet	N	NR	ADL	U	FD	5	w	1	d	JV	NR	C	Lab	BIO	CHM	HMCT	BL	100		Y	0.186	Y	0.018	9.68		10	10	5	10	7	1	4	10	10	4	71
6	183	Di Giulio and Scanlon, 1984	Cadmium chloride	61.32	Mallard Duck (*Anas platyrhychos*)	1	4	0/50/150/450	mg/kg diet	Y	10	ADL	U	FD	42	d	11	mo	JV	M	C	Lab	BIO	CHM	URIC	NR	150	450	Y	1.11	Y	0.136	12.5	37.6	10	10	5	10	7	1	10	10	10	4	77
7	3736	Jordan and Bhatnagar, 1990	Cadmium chloride	61.32	Pekin Duck (*Anas platyrhynchos*)	1	2	0/80	mg/kg diet	N	NR	ADL	U	FD	12	w	7	mo	JV	F	C	Lab	BIO	ENZ	GSTR	LI		80.0	N	1.1	N	0.06193		2.76	10	10	5	10	5	1	4	10	10	4	69
8	429	Donaldson, 1985	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/60	mg/kg diet	N	NR	ADL	U	FD	3	w	1	d	JV	M	C	Lab	BIO	CHM	NEFA	BL		60.0	Y	0.349	N	0.02933		5.04	10	10	5	10	6	1	4	10	10	4	70
9	7011	Freeland and Cousins, 1973	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/75	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	M	C	Lab	BIO	CHM	HMCT	BL		75.0	Y	0.1	N	0.013		9.75	10	10	5	10	6	1	4	10	10	4	70
10	371	Richardson et al, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	ADL	U	FD	4	w	1	d	JV	B	C	Lab	BIO	CHM	HMCT	BL		75.0	Y	0.062	N	0.00952		11.5	10	10	5	10	6	1	4	10	10	4	70
11	6468	Rama and Planas, 1981	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/100	mg/kg diet	N	NR	DLY	U	FD	2	w	1	d	JV	NR	C	Lab	BIO	CHM	HMCT	BL		100	Y	0.1	N	0.013		13.0	10	10	5	10	6	1	4	10	10	4	70
12	80	Van Vleet et al, 1981	Cadmium sulfate	100	Duck (*Anas sp.*)	1	3	0/100	mg/kg diet	N	NR	ADL	U	FD	15	d	NR	NR	JV	M	C	Lab	BIO	ENZ	GLPX	BL		100	N	0.092	N	0.01231		13.4	10	10	5	10	5	1	4	10	10	4	69
13	7101	Spivey et al, 1971	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	DLY	U	FD	2	w	1	d	JV	NR	C	Lab	BIO	CHM	HMCT	BL		75.0	Y	0.031	N	0.00606		14.7	10	10	5	10	6	1	4	10	10	4	70
Behavior																																													
14	25893	Congiu et al, 2000	Cadmium chloride	100	Starling (*Sturnus vulgaris*)	1	3	0/10.27/55.23	ug/g diet	N	NR	ADL	M	FD	22	w	NR	NR	MA	B	C	Lab	BEH	FDB	FCNS	WO	55.23		Y	0.0714	Y	0.0186	14.4		10	10	10	10	7	4	4	1	10	4	70
15	396	White and Finley, 1978	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	BEH	FDB	FCNS	WO	210		Y	1.153	Y	0.088	16.9		10	10	10	10	7	4	4	1	6	4	66
16	399	White et al 1978	Cadmium chloride	100	Mallard (*Anas platyrhynchos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	BEH	FDB	FCNS	WO	210		Y	1.153	Y	0.11	21.1		10	10	10	10	7	4	4	1	10	4	70
17	183	Di Giulio and Scanlon, 1984	Cadmium chloride	61.32	Mallard Duck (*Anas platyrhychos*)	1	4	0/50/150/450	mg/kg diet	Y	10	ADL	U	FD	42	d	11	mo	JV	M	C	Lab	BEH	FDB	FCNS	WO	450		Y	0.911	Y	0.122	41.1		10	10	5	10	7	4	4	6	10	4	70
18	410	Silver and Nudds, 1995	Cadmium chloride	100	Amercian black duck (*Anas rubripes*)	1	2	0/6.53	mg/kg diet	N	NR	ADL	M	FD	106	d	NR	NR	AD	B	M	FieldA	BEH	BEH	ACTV	WO		6.53	N	1.4	Y	0.0569		0.265	10	10	10	10	6	4	4	10	10	4	78
19	392	Lefevre et al, 1982	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/kg diet	N	NR	ADL	U	FD	5	w	1	d	JV	NR	C	Lab	BEH	FDB	FCNS	WO		10.0	Y	0.284	Y	0.0201		0.708	10	10	5	10	7	4	4	10	10	4	74
20	5265	Fadil and Magid, 1996	Cadmium chloride	61.32	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/L	N	NR	ADL	U	DR	30	d	1	d	JV	NR	C	Lab	BEH	FDB	WCON	WO		10.0	N	0.0397	N	0.00679		1.05	10	5	5	10	5	4	4	10	10	4	67
21	807	Sell, 1975	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/60	mg/kg diet	N	NR	ADL	U	FD	6	d	16	mo	LB	F	C	Lab	BEH	FDB	FCNS	WO		60.0	N	1.6	Y	0.064		2.40	10	10	5	10	6	4	4	10	10	4	73
22	8500	Bafundo et al. 1984	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/45	mg/kg diet	N	NR	ADL	U	FD	14	d	8	d	JV	M	C	Lab	BEH	FDB	FEFF	WO		45.0	N	0.288	N	0.02588		4.80	10	10	5	10	5	4	4	10	10	4	72
23	403	Pritzl et al, 1974	Cadmium carbonate	100	Chicken (Gallus domesticus)	1	5	0/400/600/800/1000	mg/kg diet	N	NR	ADL	U	FD	20	d	2	w	JV	M	C	Lab	BEH	FDB	FCNS	WO		400	N	0.46	Y	0.011		9.57	10	10	5	10	6	4	4	10	10	4	73
Physiology																																													
24	375	Bokori et al, 1996	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	3	0/25/75	mg/kg diet	N	NR	ADL	U	FD	5	w	14	d	JV	M	C	Lab	PHY	PHY	FDCV	WO	25.0	75.0	Y	1.589	N	0.07868	1.24	3.71	10	10	5	10	6	4	10	10	10	4	79
Pathology																																													
25	393	Mayack et al, 1981	Cadmium chloride	100	Wood duck (*Aix sponsa*)	1	4	0/2.18/7.61/77.85	mg/kg diet	N	NR	ADL	M	FD	12	w	1	w	JV	B	C	Lab	PTH	HIS	GHIS	KI	7.61	77.85	Y	0.5126	N	0.03767	0.559	5.72	10	10	10	10	6	4	6	10	10	4	80
26	392	Lefevre et al, 1982	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/kg diet	N	NR	ADL	U	FD	5	w	1	d	JV	NR	C	Lab	PTH	ORW	ORWT	LU	10.0	100	Y	0.284	Y	0.0201	0.708	7.08	10	10	5	10	7	4	8	10	10	4	78
27	375	Bokori et al, 1996	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	3	0/25/75	mg/kg diet	N	NR	ADL	U	FD	39	w	14	d	JV	M	C	Lab	PTH	ORW	SMIX	LI	25.0	75.0	Y	5.58	N	0.17823	0.799	2.40	10	10	5	10	6	4	10	10	10	4	79
28	366	Cain et al, 1983	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/4.3/9.2/14.6	mg/kg diet	Y	10	ADL	M	FD	12	w	1	d	JV	B	C	Lab	PTH	ORW	ORWT	LI	14.6		Y	1.128	N	0.06295	0.858		10	10	10	10	6	4	4	1	10	4	69
29	396	White and Finley, 1978	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	PTH	ORW	ORWT	KI	15.2	210	Y	1.153	Y	0.088	1.22	16.9	10	10	10	10	7	4	6	10	6	4	77
30	433	Pilastro et al, 1993	Cadmium chloride	100	Starling (*Sturnus vulgaris*)	1	3	0/10/50	mg/kg diet	N	NR	ADL	U	FD	22	w	NR	NR	AD	B	C	Lab	PTH	ORW	SMIX	LI	10.0	50.0	Y	0.0742	N	0.0107	1.44	7.21	10	10	5	10	6	4	8	10	6	4	73
31	399	White et al 1978	Cadmium chloride	100	Mallard (*Anas platyrhynchos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	60	d	1	yr	AD	B	V	Lab	PTH	ORW	SMIX	KI	15.2	210	Y	1.153	Y	0.11	1.53	21.1	10	10	10	10	7	4	6	10	10	4	81
32	25893	Congiu et al, 2000	Cadmium chloride	100	Starling (*Sturnus vulgaris*)	1	3	0/10.27/55.23	ug/g diet	N	NR	ADL	M	FD	22	w	NR	NR	MA	B	C	Lab	PTH	ORW	SMIX	LI	10.27	55.23	Y	0.0742	Y	0.0186	2.57	13.8	10	10	10	10	7	4	8	10	10	4	83
33	183	Di Giulio and Scanlon, 1984	Cadmium chloride	61.32	Mallard Duck (*Anas platyrhychos*)	1	4	0/50/150/450	mg/kg diet	Y	10	ADL	U	FD	42	d	11	mo	JV	M	C	Lab	PTH	ORW	ORWT	AR	50.0	150	Y	1.22	Y	0.134	3.74	11.2	10	10	5	10	7	4	10	10	10	4	80
34	389	Di Giulio and Scanlon, 1985	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	3	0/10/50	ug/g diet	Y	10	ADL	U	FD	42	d	32	w	JV	M	C	Lab	PTH	ORW	ORWT	KI	50.0		Y	1.153	Y	0.0872	4.20		10	10	5	10	7	4	4	8	10	4	72
35	366	Cain et al, 1983	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	2	2	0/14.6	mg/kg diet	Y	10	ADL	M	FD	12	w	1	d	JV	B	C	Lab	PTH	HIS	NPHR	KI		14.6	Y	1.128	N	0.06295		0.858	10	10	10	10	6	4	4	10	10	4	78
36	818	Rao et al., 1989	Cadmium chloride	61.32	Pekin Duck (*Anas platyrhynchos*)	1	2	0/80	mg/kg diet	N	NR	ADL	U	FD	12	w	6	mo	JV	F	C	Lab	PTH	HIS	GLBM	KI		80.0	N	3.12	N	0.12207		1.92	10	10	5	10	5	4	4	10	10	4	72
37	817	Rao et al, 1989	Cadmium chloride	61.32	Pekin Duck (*Anas platyrhynchos*)	1	2	0/80	mg/kg diet	N	NR	ADL	U	FD	13	w	7	mo	JV	F	C	Lab	PTH	HIS	GHIS	KI		80.0	N	1.1	N	0.06193		2.76	10	10	5	10	5	4	4	10	10	4	72
38	378	Bokori et al, 1995	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	4	0/75/300/600	mg/kg diet	N	NR	ADL	U	FD	5	w	21	d	JV	M	C	Lab	PTH	HIS	GHIS	KI		75.0	Y	1.596	N	0.07892		3.71	10	10	5	10	6	4	4	10	10	4	73
39	379	Bokori, et al, 1995	Cadmium sulfate	100	Japanese Quail (*Coturnix japonica*)	1	4	0/75/150/300	mg/kg diet	N	NR	ADL	U	FD	37	d	NR	NR	SM	F	C	Lab	PTH	HIS	GHIS	PS		75.0	Y	0.2	N	0.02041		7.65	10	10	5	10	6	4	4	10	10	4	73
40	371	Richardson et al, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	2	2	0/75	mg/kg diet	N	NR	ADL	U	FD	4	w	1	d	JV	B	C	Lab	PTH	ORW	SMIX	HE		75.0	Y	0.064	N	0.00972		11.4	10	10	5	10	6	4	4	10	10	4	73
41	402	Richardson and Fox, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	NR	U	FD	4	w	1	d	JV	B	C	Lab	PTH	HIS	GLSN	IN		75.0	Y	0.0461	N	0.00785		12.8	10	10	5	10	6	4	4	10	10	4	73
42	403	Pritzl et al, 1974	Cadmium carbonate	100	Chicken (Gallus domesticus)	2	2	0/700	mg/kg diet	N	NR	ADL	U	FD	20	d	2	w	JV	M	C	Lab	PTH	ORW	SMIX	LI		700	N	0.46	N	0.03511		53.4	10	10	5	10	5	4	4	10	10	4	72
43	80	Van Vleet et al, 1981	Cadmium sulfate	100	Duck (*Anas sp.*)	2	2	0/500	mg/kg diet	N	NR	ADL	U	FD	28	d	NR	NR	JV	M	C	Lab	PTH	HIS	NCRO	MU		500	N	0.092	N	0.01231		66.9	10	10	5	10	5	4	4	10	10	4	72
Reproduction																																													
44	398	Leach et al, 1978	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	4	0/3/12/48	ug/g diet	N	NR	ADL	U	FD	12	w	8	mo	LB	F	C	Lab	REP	REP	EGPN	WO	12.0	48.0	N	1.6	N	0.07903	0.593	2.37	10	10	5	10	5	10	8	10	10	4	82
45	398	Leach et al, 1978	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	3	4	0/3/12/48	ug/g diet	N	NR	ADL	U	FD	12	mo	6	mo	LB	F	C	Lab	REP	REP	PROG	WO	12.0	48.0	N	1.6	N	0.07903	0.593	2.37	10	10	5	10	5	10	8	10	10	4	82
46	375	Bokori et al, 1996	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	3	0/25/75	mg/kg diet	N	NR	ADL	U	FD	39	w	14	d	IM	M	C	Lab	REP	REP	TEWT	TE	25.0	75.0	Y	5.58	N	0.17823	0.799	2.40	10	10	5	10	6	10	10	10	10	4	85
47	396	White and Finley, 1978	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	F	V	Lab	REP	REP	Other	NR	15.2	210	Y	1.153	Y	0.11	1.53	21.1	10	10	10	10	7	10	6	10	6	4	83
48	399	White et al 1978	Cadmium chloride	100	Mallard (*Anas platyrhynchos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	REP	REP	TEWT	TE	15.2	210	Y	1.153	Y	0.11	1.53	21.1	10	10	10	10	7	10	6	10	10	4	87
49	389	Di Giulio and Scanlon, 1985	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	3	0/10/50	ug/g diet	Y	10	ADL	U	FD	42	d	32	w	JV	M	C	Lab	REP	REP	TEWT	TE	50.0		Y	1.153	Y	0.0872	4.20		10	10	5	10	7	10	4	3	10	4	73
50	807	Sell, 1975	cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/60	mg/kg diet	N	NR	ADL	U	FD	23	d	16	mo	LB	F	C	Lab	REP	REP	PROG	WO		60.0	N	1.6	Y	0.064		2.40	10	10	5	10	6	10	4	10	10	4	79

Ref			Exposure																				Effects						Conversion to mg/kg bw/day				Result		Data Evaluation Score										
Result #	Ref N.	Reference	Chemical Form	MW%	Test Species	Phase #	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg/day or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
51	378	Bokori et al, 1995	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	4	0/75/300/600	mg/kg diet	N	NR	ADL	U	FD	5	w	21	d	JV	M	C	Lab	REP	REP	TEDG	TE		75.0	Y	1.596	N	0.07892		3.71	10	10	5	10	6	10	4	10	10	4	79
52	379	Bokori, et al, 1995	Cadmium sulfate	100	Japanese Quail (*Coturnix japonica*)	1	4	0/75/150/300	mg/kg diet	N	NR	ADL	U	FD	37	d	NR	NR	LB	F	C	Lab	REP	REP	PROG	WO		75.0	Y	0.2	N	0.02041		7.65	10	10	5	10	6	10	4	10	10	4	79
53	371	Richardson et al, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	ADL	U	FD	6	w	1	d	JV	M	C	Lab	REP	REP	TEWT	TE		75.0	Y	0.082	N	0.01142		10.4	10	10	5	10	6	10	4	10	10	4	79
Growth																																													
54	400	Jacobs et al, 1978	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	6	0/62/125/250/500/1000	ug/kg diet	N	NR	ADL	U	FD	7	d	7	d	JV	B	C	Lab	GRO	GRO	BDWT	WO	1000		Y	0.0415	Y	0.00517	0.125		10	10	5	10	7	8	4	1	10	4	69
55	356	Stoewsand et al 1986	Cadmium	100	Japanese Quail (*Coturnix japonica*)	1	2	0/2.00	mg/kg diet	N	NR	ADL	M	FD	63	d	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO	2.00		N	0.1	N	0.013	0.260		10	10	10	4	5	8	4	10	10	4	75
56	392	Lefevre et al, 1982	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/kg diet	N	NR	ADL	U	FD	5	w	1	d	JV	NR	C	Lab	GRO	GRO	BDWT	WO	10.0	100	Y	0.284	Y	0.0201	0.708	7.08	10	10	5	10	7	8	8	10	10	4	82
57	398	Leach et al, 1978	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	4	0/3/12/48	ug/g diet	N	NR	ADL	U	FD	6	w	1	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	12.0	48.0	Y	0.619	N	0.04259	0.826	3.30	10	10	5	10	6	8	8	10	10	4	81
58	366	Cain et al, 1983	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/4.3/9.2/14.6	mg/kg diet	Y	10	ADL	M	FD	12	w	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO	14.6		Y	1.128	N	0.06295	0.858		10	10	10	10	6	8	4	10	10	4	82
59	1369	Hill, 1974	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	2	0/14.6	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO	14.6		N	0.328	N	0.02817	1.25		10	10	5	10	5	8	4	10	10	4	76
60	375	Bokori et al, 1996	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	3	0/25/75	mg/kg diet	N	NR	ADL	U	FD	4	w	14	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	25.0	75.0	Y	0.828	N	0.05147	1.55	4.66	10	10	5	10	6	8	10	10	10	4	83
61	397	Hill 1979	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	4	4	0/20/40/60	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	F	C	NR	GRO	GRO	BDWT	WO	20.0	40.0	N	0.328	N	0.02817	1.72	3.44	10	10	5	10	5	8	10	10	10	4	82
62	92	Hill, 1974	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	6	0/20/40/60/80/100	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO	20.0	40.0	N	0.328	N	0.02817	1.72	3.44	10	10	5	10	5	8	10	10	10	4	82
63	389	Di Giulio and Scanlon, 1985	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	3	0/10/50	ug/g diet	Y	10	ADL	U	FD	42	d	32	w	JV	M	C	Lab	GRO	GRO	BDWT	WO	50.0		Y	1.153	Y	0.0872	4.20		10	10	5	10	7	8	4	10	10	4	78
64	386	Blalock and Hill, 1988	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	4	0/10/20/40	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	NR	C	Lab	GRO	GRO	BDWT	WO	40.0		Y	0.18	N	0.01906	4.24		10	10	5	10	6	8	4	1	10	4	68
65	393	Mayack et al, 1981	Cadmium chloride	100	Wood duck (*Aix sponsa*)	1	4	0/2.18/7.61/77.85	mg/kg diet	N	NR	ADL	M	FD	12	w	1	w	JV	B	C	Lab	GRO	GRO	BDWT	WO	77.85		Y	0.4988	N	0.03701	5.76		10	10	10	10	6	8	4	1	10	4	73
66	397	Hill 1979	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/75	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	F	C	NR	GRO	GRO	BDWT	WO	75.0		N	0.328	N	0.02817	6.44		10	10	5	10	5	8	4	8	10	4	74
67	183	Di Giulio and Scanlon, 1984	Cadmium chloride	61.32	Mallard Duck (*Anas platyrhychos*)	1	4	0/50/150/450	mg/kg diet	Y	10	ADL	U	FD	42	d	11	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	150	450	Y	1.11	Y	0.136	12.5	37.6	10	10	5	10	7	8	10	10	10	4	84
68	5265	Fadil and Magid, 1996	Cadmium chloride	61.32	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/L	N	NR	ADL	U	DR	30	d	1	d	JV	NR	C	Lab	GRO	GRO	BDWT	WO		10.0	N	0.0397	N	0.00679		1.05	10	5	5	10	5	8	4	10	10	4	71
69	8125	Hill, 1990	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/60	mg/kg diet	N	NR	ADL	U	FD	18	d	1	d	JV	F	C	Lab	GRO	GRO	BDWT	WO		60.0	N	0.564	N	0.04009		4.26	10	10	5	10	5	8	4	10	10	4	76
70	8500	Bafundo et al. 1984	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/45	mg/kg diet	N	NR	ADL	U	FD	14	d	8	d	JV	M	C	Lab	GRO	GRO	BDWT	WO		45.0	N	0.288	N	0.02588		4.80	10	10	5	10	5	8	4	10	10	4	76
71	1369	Hill, 1974	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/57	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO		57.0	N	0.328	N	0.02817		4.90	10	10	5	10	5	8	4	10	10	4	76
72	378	Bokori et al, 1995	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	4	0/75/300/600	mg/kg diet	N	NR	ADL	U	FD	1	w	21	d	JV	M	C	Lab	GRO	GRO	BDWT	WO		75.0	Y	0.484	N	0.03626		5.63	10	10	5	10	6	8	4	10	10	4	77
73	403	Pritzl et al, 1974	Cadmium carbonate	100	Chicken (Gallus domesticus)	1	5	0/400/600/800/1000	mg/kg diet	N	NR	ADL	U	FD	20	d	2	w	JV	M	C	Lab	GRO	GRO	BDWT	WO		400	N	0.46	Y	0.011		9.57	10	10	5	10	6	8	4	10	10	4	77
74	7011	Freeland and Cousins, 1973	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/75	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	M	C	Lab	GRO	GRO	BDWT	WO		75.0	Y	0.1	N	0.013		9.75	10	10	5	10	6	8	4	10	10	4	77
75	371	Richardson et al, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	ADL	U	FD	4	w	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO		75.0	Y	0.053	N	0.0086		12.2	10	10	5	10	6	8	4	10	10	4	77
76	402	Richardson and Fox, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	NR	U	FD	4	w	1	d	JV	B	C	Lab	GRO	GRO	BDWT	WO		75.0	Y	0.0461	N	0.00785		12.8	10	10	5	10	6	8	4	10	10	4	77
77	6468	Rama and Planas, 1981	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/100	mg/kg diet	N	NR	DLY	U	FD	3	w	1	d	JV	NR	C	Lab	GRO	GRO	BDWT	WO		100	Y	0.1	N	0.013		13.0	10	10	5	10	6	8	4	10	10	4	77
78	395	Hill, 1980	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/100	mg/kg diet	N	NR	NR	U	FD	1	w	1	d	JV	F	C	FieldA	GRO	GRO	BDWT	WO		100	N	0.084	N	0.0116		13.8	10	10	5	10	5	8	4	10	3	4	69
79	7101	Spivey et al, 1971	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	DLY	U	FD	2	w	1	d	JV	NR	C	Lab	GRO	GRO	BDWT	WO		75.0	Y	0.031	N	0.00606		14.7	10	10	5	10	6	8	4	10	10	4	77
Survival																																													
80	375	Bokori et al, 1996	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	3	0/25/75	mg/kg diet	N	NR	ADL	U	FD	12	w	14	d	JV	M	C	Lab	MOR	MOR	MORT	WO	75.0		Y	2.925	N	0.11705	3.00		10	10	5	10	6	9	4	10	10	4	78
81	386	Blalock and Hill, 1988	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	4	0/10/20/40	mg/kg diet	N	NR	ADL	U	FD	3	w	1	d	JV	NR	C	Lab	MOR	MOR	MORT	WO	40.0		Y	0.18	N	0.01906	4.24		10	10	5	10	6	9	4	1	10	4	69
82	393	Mayack et al, 1981	Cadmium chloride	100	Wood duck (*Aix sponsa*)	1	4	0/2.18/7.61/77.85	mg/kg diet	N	NR	ADL	M	FD	12	w	1	w	JV	B	C	Lab	MOR	MOR	MORT	WO	77.85		Y	0.4988	N	0.03701	5.78		10	10	10	10	6	9	4	1	10	4	74
83	92	Hill, 1974	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	6	0/20/40/60/80/100	mg/kg diet	N	NR	ADL	U	FD	5	w	1	d	JV	B	C	Lab	MOR	MOR	MORT	WO	100		N	0.328	N	0.02817	8.59		10	10	5	10	5	9	4	10	10	4	77
84	403	Pritzl et al, 1974	Cadmium carbonate	100	Chicken (Gallus domesticus)	1	5	0/400/600/800/1000	mg/kg diet	N	NR	ADL	U	FD	20	d	2	w	JV	M	C	Lab	MOR	MOR	MORT	WO	400	600	N	0.46	Y	0.011	9.57	14.3	10	10	5	10	6	9	10	10	10	4	84
85	371	Richardson et al, 1974	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	2	2	0/75	mg/kg diet	N	NR	ADL	U	FD	4	w	1	d	JV	B	C	Lab	MOR	MOR	MORT	WO	75.0		Y	0.064	N	0.00972	10.5		10	10	5	10	6	9	4	1	10	4	69
86	80	Van Vleet et al, 1981	Cadmium sulfate	100	Duck (*Anas sp* .)	1	3	0/100	mg/kg diet	N	NR	ADL	U	FD	15	d	NR	NR	JV	M	C	Lab	MOR	MOR	MORT	WO	100		N	0.092	N	0.01231	13.4		10	10	5	10	5	9	4	10	10	4	77
87	7101	Spivey et al, 1971	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	2	0/75	mg/kg diet	N	NR	DLY	U	FD	2	w	1	d	JV	NR	C	Lab	MOR	MOR	MORT	WO	75.0		Y	0.034	N	0.00644	14.2		10	10	5	10	6	9	4	1	10	4	69
88	379	Bokori, et al, 1995	Cadmium sulfate	100	Japanese Quail (*Coturnix japonica*)	1	4	0/75/150/300	mg/kg diet	N	NR	ADL	U	FD	37	d	NR	NR	SM	F	C	Lab	MOR	MOR	MORT	WO	150	300	Y	0.2	N	0.02041	15.3	30.6	10	10	5	10	6	9	10	10	10	4	84
89	396	White and Finley, 1978	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	MOR	MOR	MORT	WO	210		Y	1.153	Y	0.088	16.9		10	10	10	10	7	9	4	10	6	4	80
90	399	White et al 1978	Cadmium chloride	100	Mallard (*Anas platyrhynchos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	MOR	MOR	MORT	WO	210		Y	1.153	Y	0.11	21.1		10	10	10	10	7	9	4	10	10	4	84
91	378	Bokori et al, 1995	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	4	0/75/300/600	mg/kg diet	N	NR	ADL	U	FD	4	w	21	d	JV	M	C	Lab	MOR	MOR	MORT	WO	300	600	Y	0.496	N	0.03686	22.3	44.6	10	10	5	10	6	9	10	10	10	4	84
92	1369	Hill, 1974	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	1	2	0/57	mg/kg diet	N	NR	ADL	U	FD	2	w	1	d	JV	B	C	Lab	MOR	MOR	MORT	WO		57.0	N	0.328	N	0.02817		4.90	10	10	5	10	5	9	4	10	10	4	77
93	80	Van Vleet et al, 1981	Cadmium sulfate	100	Duck (*Anas sp* .)	2	2	0/500	mg/kg diet	N	NR	ADL	U	FD	28	d	NR	NR	JV	M	C	Lab	MOR	MOR	MORT	WO		500	N	0.092	N	0.01231		66.9	10	10	5	10	5	9	4	10	10	4	77
Data Not Used to Derive Wildlife Toxicity Reference Value																																													
94	400	Jacobs et al, 1978	Cadmium chloride	100	Japanese Quail (*Coturnix japonica*)	1	6	0/62/125/250/500/1000	ug/kg diet	N	NR	ADL	U	FD	7	d	7	d	JV	B	C	Lab	BEH	FDB	FCNS	WO	1000		Y	0.0415	Y	0.00517	0.125		10	10	5	10	7	4	4	1	10	4	65
95	389	Di Giulio and Scanlon, 1985	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	3	0/10/50	ug/g diet	Y	10	ADL	U	FD	42	d	32	w	JV	M	C	Lab	BIO	CHM	GLYC	LI	50.0		Y	1.153	Y	0.0872	4.20		10	10	5	10	7	1	4	3	10	4	64
96	8500	Bafundo et al. 1984	Cadmium chloride	100	Chicken (*Gallus domesticus*)	1	2	0/45	mg/kg diet	N	NR	ADL	U	FD	14	d	8	d	JV	M	C	Lab	BIO	CHM	HMGL	BL	45.0		N	0.288	N	0.02588	4.80		10	10	5	10	5	4	1	1	10	4	60
97	80	Van Vleet et al, 1981	Cadmium sulfate	100	Duck (*Anas sp* .)	1	3	0/100	mg/kg diet	N	NR	ADL	U	FD	15	d	NR	NR	JV	M	C	Lab	PTH	HIS	NCRO	MU	100		N	0.092	N	0.01231	13.4		10	10	5	10	5	4	4	1	10	4	63
98	396	White and Finley, 1978	Cadmium chloride	100	Mallard Duck (*Anas platyrhychos*)	1	4	0/1.6/15.2/210	mg/kg diet	Y	10	ADL	M	FD	90	d	1	yr	AD	B	V	Lab	BIO	CHM	HMCT	BL	210		Y	1.153	Y	0.088	16.9		10	10	10	10	7	1	4	1	6	4	63
99	378	Bokori et al, 1995	Cadmium sulfate	100	Chicken (*Gallus domesticus*)	2	4	0/75/300/600	mg/kg diet	N	NR	ADL	U	FD	3	w	21	d	JV	M	C	Lab	BIO	CHM	CALC	BO	600		Y	0.353	N	0.02955	50.2		10	10	5	10	6	1	4	1	10	4	61
100	5265	Fadil and Magid, 1996	Cadmium chloride	61.32	Chicken (*Gallus domesticus*)	1	3	0/10/100	mg/L	N	NR	ADL	U	DR	30	d	1	d	JV	NR	C	Lab	BIO	CHM	RBCE	BL		10.0	N	0.0397	N	0.00679		1.05	10	5	5	10	5	1	4	10	10	4	64

All abbreviations and definitions are used in coding stuides are available from Attachment 4-3 of the Eco-SSL guidance (U.S. EPA 2003).

Appendix 6-1

Mammalian Toxicity Data Extracted and Reviewed for Wildlife Toxicity Reference Value (TRV) - Cadmium

March 2005

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Ref			Exposure																			Effects						Conversion to mg/kg bw/day				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
Biochemical																																												
1	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	6	0/0.38/1.34/5.62/6.14/149	ug/org/d	N	NR	ADL	M	FD	2	yr	7	w	AD	F	C	Lab	BIO	CHM	HMGL	BL	1.34	5.62	Y	0.032	Y	0.00256	0.042	0.176	10	10	10	10	7	1	8	10	10	4	80
2	655	Weigel et al 1984	Cadmium oxide	100	Rat (*Rattus norvegicus*)	3	0/2.80/7.15	ug/g diet	N	NR	DLY	U	FD	40	d	NR	NR	SM	M	M	NR	BIO	CHM	RBCE	BL	2.80	7.15	N	0.5	N	0.038861	0.218	0.556	10	10	5	10	5	1	10	10	6	4	71
3	670	Cousins et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/25	mg/kg diet	N	NR	ADL	U	FD	14	w	NR	NR	JV	M	C	Lab	BIO	CHM	Other	KI	5.00	25.0	Y	0.385	Y	0.0206	0.268	1.34	10	10	5	10	7	1	8	10	10	4	75
4	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	5	0/0.48/1.78/1.75/47.1	mg/kg diet	N	NR	ADL	M	FD	2	yr	10	w	GE	F	C	Lab	BIO	CHM	CALC	BO	1.75	47.1	Y	0.032	Y	0.008	0.438	11.8	10	10	10	10	7	1	6	10	10	4	78
5	591	Mitsumori et al., 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/8/40/200/600	mg/kg diet	N	NR	ADL	U	FD	2	mo	5	w	JV	F	C	Lab	BIO	CHM	HMGL	BL	8.00	40.0	Y	0.3	Y	0.0175	0.467	2.33	10	10	5	10	7	1	8	10	10	4	75
6	597	Whelton et al, 1997	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5/50	mg/kg diet	N	NR	ADL	U	FD	254	d	68	d	GE	F	C	Lab	BIO	CHM	CALC	FM	5.00	50.0	Y	0.0358	Y	0.009	0.548	5.48	10	10	5	10	7	1	8	1	10	4	75
7	797	Bhattahcaryya, 1991	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5/50	ug/g diet	N	NR	ADL	U	FD	252	d	70-100	d	GE	F	C	Lab	BIO	CHM	CALC	BO	5.00	50.0	N	0.0353	N	0.004398	0.623	6.23	10	10	5	10	5	1	8	10	10	4	73
8	778	Kotsonis and Klassen, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	9	w	70	d	JV	M	C	Lab	BIO	CHM	TOPR	UR	0.410	1.09	Y	0.506	Y	0.0362	0.810	2.15	10	5	5	10	7	1	10	10	10	4	72
9	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/0.019/0.095/0.186	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	BIO	CHM	Other	BO	0.0190	0.0950	Y	0.0233	Y	0.00556	0.815	4.08	10	10	5	10	7	1	8	10	10	4	75
10	507	Kodama et al., 1989	Cadmium chloride	100	Dog (*Canis familiaris*)	6	0/1/3/10/50/100	mg/d	N	NR	ADL	U	FD	50	w	8	mo	JV	B	C	Lab	BIO	CHM	CREA	UR	10.0	50.0	Y	12	N	0.529717	0.833	4.17	10	10	5	10	6	1	8	10	10	4	74
11	3703	Doyle et al, 1974	Cadmium chloride	100	Sheep (*Ovis aires*)	5	0/10.8/29.4/59.7/111.2	mg/org/d	N	NR	ADL	U	FD	163	d	4	mo	JV	M	C	Lab	BIO	CHM	HMCT	BL	59.7	111	Y	64.33	Y	1.99	0.928	1.73	10	10	5	10	7	1	10	10	10	4	77
12	443	Sutou, et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1/10	mg/kg bw/d	N	NR	DLY	U	GV	9	w	5	w	JV	M	C	Lab	BIO	CHM	RBCE	BL	1.00	10.0	Y	0.45	N	0.035637	1.00	10.0	10	8	5	10	10	1	8	10	10	4	76
13	563	Takashima et al 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/10/50/100	mg/kg diet	N	NR	ADL	U	FD	19	mo	NR	NR	JV	M	C	Lab	BIO	CHM	SODI	FM	10.0	50.0	Y	0.1	N	0.01035	1.04	5.18	10	10	5	10	6	1	8	10	10	4	74
14	446	Loeser and Lorke, 1977	Cadmium chloride	100	Dog (*Canis familiaris*)	5	0/1/3/10/30	mg/kg diet	N	NR	NR	U	FD	3	mo	4-6	mo	JV	B	C	Lab	BIO	ENZ	ALPH	LI	30.0		Y	10.5	N	0.474651	1.36		10	10	5	10	6	1	4	10	10	4	70
15	650	Chetty et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/100	mg/kg diet	N	NR	ADL	U	FD	4	w	NR	NR	JV	M	C	Lab	BIO	ENZ	GENZ	LI	25.0	50.0	Y	0.2631	N	0.022924	2.18	4.36	10	10	5	10	6	1	10	10	10	4	76
16	22300	Whanger and Weswig, 1970	Cadmium chloride	100	Rat (Rattus norvegicus)	5	0/10/25/40/100	mg/kg diet	N	NR	ADL	U	FD	8	w	21	d	JV	B	C	Lab	BIO	CHM	GBCM	BL	25.0	50.0	N	0.235	N	0.020892	2.22	4.45	10	10	5	10	5	1	10	10	10	4	75
17	710	Yuyama 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.5/2.0/5.0	mg/d	N	NR	ADL	U	FD	2	w	5	w	JV	M	C	Lab	BIO	ENZ	Other	KI	0.5	2.00	Y	0.189	Y	0.0134	2.65	10.6	10	10	5	10	7	1	8	10	10	4	75
18	569	Zielinska-Psuja et al, 1979	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	3	0/8.8/88	mg/kg bw/d	N	NR	DLY	U	FD	3	mo	NR	NR	JV	M	C	Lab	BIO	HRM	TSTR	SR	8.80	88.0	Y	0.306	N	0.025955	5.40	54.0	10	10	5	10	10	1	8	10	6	4	74
19	797	Bhattahcaryya, 1991	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5/50	ug/g diet	N	NR	ADL	U	FD	252	d	70-100	d	SM	F	C	Lab	BIO	CHM	CALC	BO	50.0		N	0.0353	N	0.004398	6.23		10	10	5	10	5	1	4	10	10	4	69
20	25890	Wlostowski and Krasowska, 1999	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/40/80	ug/g diet	N	NR	ADL	UX	FD	6	w	1	mo	JV	M	C	Lab	BIO	CHM	MCPR	LI	40.0	80.0	Y	0.0159	Y	0.0025	6.29	12.6	10	10	10	10	7	1	10	10	10	4	82
21	629	Weigel et al 1987	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.85/2.25	ug/g diet	N	NR	ADL	M	FD	8	w	NR	NR	JV	M	C	Lab	BIO	ENZ	AATT	BL		0.850	Y	0.287	N	0.024623		0.0729	10	10	10	4	6	1	4	10	10	4	69
22	639	Merali and Singhal, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.1/1.0	mg/kg bw/d	N	NR	DLY	U	GV	45	d	1	d	JV	M	C	Lab	BIO	CHM	GLUC	BL		0.100	Y	0.16	N	0.015232		0.100	10	8	10	10	10	1	4	10	10	4	77
23	753	Rastogi et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.1/1	mg/kg bw/d	N	NR	DLY	U	GV	30	d	1	d	JV	NR	V	Lab	BIO	CHM	Other	BR		0.100	Y	0.104	N	0.01069		0.100	10	8	5	10	10	1	4	10	10	4	72
24	772	Bakry et al, 1992	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.143/0.561/2.00	mg/kg bw/d	N	NR	NR	U	GV	8	w	NR	NR	JV	B	C	Lab	BIO	CHM	CALC	FM		0.143	Y	0.20916	N	0.018984		0.143	10	8	10	10	10	1	4	10	10	4	77
25	594	Schumann et al., 1996	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/10	mg/l	N	NR	ADL	U	DR	7	d	57	d	JV	M	C	Lab	BIO	CHM	HMGL	BL		10.0	Y	0.351	Y	0.02		0.570	10	5	5	10	7	1	4	10	10	4	66
26	707	Dobryszycka et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.48	mg/org/d	N	NR	DLY	U	GV	3	mo	3	mo	AD	B	C	Lab	BIO	ENZ	LADH	KI		0.480	N	0.462	N	0.036416		1.04	10	8	5	10	5	1	4	10	10	4	67
27	783	Mitra et al, 1995	Cadium	100	Rat (*Rattus norvegicus*)	2	0/18.08	ug/g diet	N	NR	DLY	M	FD	6	w	1	mo	JV	NR	C	Lab	BIO	CHM	PCLV	BL		18.1	Y	0.10825	N	0.011047		1.85	10	10	10	4	6	1	4	10	10	4	69
28	502	Cousins et al., 1973	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/50/150/450/1350	mg/kg diet	N	NR	ADL	U	FD	6	w	55	d	JV	M	C	FieldA	BIO	CHM	HMCT	BL		50.0	Y	35.3	Y	1.35		1.91	10	10	5	10	7	1	4	10	10	4	71
29	637	Rajanna et al, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/75	mg/kg diet	N	NR	ADL	U	FD	120	d	6	w	JV	M	C	Lab	BIO	CHM	GLUC	SR		25.0	Y	0.45925	N	0.036238		1.97	10	10	5	10	6	1	4	10	10	4	70
30	9321	Sasser et al., 1985	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.69/1.5/2.5	mg/org/d	N	NR	ADL	U	DR	21	d	5	mo	GE	F	C	Lab	BIO	CHM	GCHM	LI		0.690	Y	0.25	N	0.02843		2.76	10	5	5	10	7	1	4	10	10	4	66
31	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/0.0031/0.0062/0.0125/0.025/0.05	% in diet	N	NR	NR	U	FD	100	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMCT	BL		0.00310	Y	0.225	N	0.020158		2.78	10	10	5	10	6	1	4	10	10	4	70
32	615	Groten et al, 1991	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/30.5	mg/kg diet	N	NR	ADL	M	FD	28	d	5	w	JV	F	C	Lab	BIO	ENZ	AATT	PL		30.5	Y	0.195	N	0.017921		2.80	10	10	10	10	6	1	4	10	10	4	75
33	494	Osuna and Edds, 1980	Cadmium chloride	100	Pig (*Sus scrofa*)	2	0/88	ug/g diet	N	NR	ADL	M	FD	2	w	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL		88.0	Y	18.73	Y	0.73		3.59	10	10	10	10	6	1	4	10	10	4	75
34	543	Steibert et al., 1984	cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	NR	AD	F	C	Lab	BIO	ENZ	ACPH	LI		50.0	Y	0.2798	Y	0.0209		3.73	10	5	5	10	7	1	4	10	10	4	66
35	768	Suzuki and Yoshida 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	180	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL		50.0	Y	0.5788	N	0.043828		3.79	10	10	5	10	6	1	4	10	10	4	70
36	543	Steibert et al., 1984	Cadmium sulfate	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	NR	GE	F	C	Lab	BIO	ENZ	SCDH	LI		50.0	Y	0.2798	Y	0.022		3.93	10	5	5	10	7	1	4	10	10	4	66
37	572	Suzuki and Yoshida, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	14	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL		50.0	Y	0.13906	Y	0.0113		4.06	10	10	5	10	7	1	4	10	10	4	71
38	780	Suzuki and Yoshida 1979	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/50/100/200	mg/kg diet	N	NR	ADL	U	FD	28	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL		50.0	Y	0.1991	N	0.01823		4.58	10	10	5	10	6	1	4	10	10	4	70
39	21073	Chmielnicka and Sowa, 1996	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/4.59	mg/kg bw/d	N	NR	NR	U	DR	20	d	NR	NR	GE	F	C	Lab	BIO	CHM	MCPR	LI		4.59	Y	0.2	N	0.023257		4.59	10	5	5	10	10	1	4	10	10	4	69
40	780	Suzuki and Yoshida 1979	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	14	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL		50.0	Y	0.1343	N	0.01319		4.91	10	10	5	10	6	1	4	10	10	4	70
41	25891	Wlostowski et al, 2000	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/5000/10500	ug/kg bw/d	N	NR	1 per w	UX	FD	6	w	1	mo	JV	M	C	Lab	BIO	CHM	MCPR	KI		5000	Y	1.05	Y	0.0029		5.00	10	10	10	10	10	1	4	10	10	4	79
42	556	Iguchi and Sano, 1982	Cadmium chloride	100	Rat (Rattus norvegicus)	3	0/50/100	mg/kg diet	N	NR	ADL	U	FD	6	w	NR	NR	YO	M	C	Lab	BIO	ENZ	GENZ	BO		50.0	Y	0.12	N	0.012024		5.01	10	10	5	10	6	1	4	10	10	4	70
43	824	Webster, 1978	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/40	mg/L	N	NR	DLY	U	DR	19	d	NR	NR	GE	F	C	Lab	BIO	CHM	PCLV	BL		40.0	Y	0.043	N	0.005831		5.34	10	5	5	10	6	1	4	10	10	10	71
44	19290	Kadiiska et al, 1985	Cadmium sulfate	53.92	Rat (*Rattus norvegicus*)	2	0/10	mg/kg bw/d	N	NR	DLY	U	DR	30	d	NR	NR	JV	M	C	Lab	BIO	ENZ	P450	LI		10.0	Y	0.175	N	0.020624		5.39	10	5	5	10	10	1	4	10	10	4	69
45	3711	Lynch et al., 1976	Cadmium chloride	100	Cattle (*Bos taurus*)	2	0/5.74	mg/kg bw/d	N	NR	3 per w	U	OR	63	d	NR	NR	JV	M	C	Lab	BIO	ENZ	ALAD	BL		5.74	Y	71.4	Y	0.051		5.74	10	8	5	10	10	1	4	10	10	4	72
46	583	Pond et al, 1973	Cadmium chloride	100	Pig (*Sus scrofa*)	2	0/154	mg/kg diet	N	NR	ADL	U	FD	29	d	NR	NR	JV	NR	C	Lab	BIO	CHM	HMGL	BL		154	N	22.019	N	0.872442		6.10	10	10	5	10	5	1	4	10	10	4	69
47	801	Ando et al., 1978	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	2	0/10	mg/kg bw/d	N	NR	DLY	U	GV	1	mo	64	d	JV	F	C	Lab	BIO	CHM	CALC	BO		10.0	N	0.156	N	0.014918		6.13	10	8	10	10	10	1	4	10	10	4	77
48	638	Nakamura et al., 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	ug/g diet	N	NR	ADL	U	FD	11	w	NR	NR	NR	F	C	Lab	BIO	ENZ	GPTR	SR		200	Y	0.1678	Y	0.008		9.54	10	10	5	10	7	1	4	10	10	4	71
49	3733	Banis et al 1969	Cadmium chloride dihydrate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL		100	Y	0.144	N	0.013968		9.70	10	10	5	10	6	1	4	10	10	4	70
50	3733	Banis et al 1969	Cadmium chloride dihydrate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	3	w	5	w	JV	B	C	Lab	BIO	CHM	HMGL	BL		100	Y	0.0955	N	0.009966		10.4	10	10	5	10	6	1	4	10	10	4	70
51	19496	Novelli et al, 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/100	mg/l	N	NR	ADL	U	DR	2	mo	15	w	JV	M	C	Lab	BIO	CHM	PRTL	UR		100	Y	0.2	Y	0.02352		12.4	10	5	5	10	7	1	4	10	10	4	66
52	574	Suzuki and Yoshida 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	mg/kg diet	N	NR	ADL	U	FD	10	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	LI		200	Y	0.100	N	0.01035		20.7	10	10	5	10	6	1	4	10	10	4	70
53	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/5.71/21.6/9.81	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	BIO	ENZ	MADH	LI		5.71	Y	0.01	Y	0.00414		571	10	10	5	10	7	1	4	10	10	4	71
Behavior																																												
54	488	King et al, 1992	Rock phosphate	100	Pig (*Sus scrof*a)	3	0/0.61/1.20	mg/kg diet	N	NR	DLY	M	FD	132	d	NR	NR	JV	F	C	Lab	BEH	FDB	FCNS	WO	1.20		Y	90	Y	1.62	0.0216		10	10	10	10	7	4	4	1	10	4	70
55	685	Lind et al., 1997	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/1.24	ug/org/d	N	NR	1 per w	M	FD	5	w	NR	NR	JV	F	C	Lab	BEH	FDB	FCNS	WO	1.24		Y	0.02125	Y	0.00343	0.0584		10	10	10	10	7	4	4	1	10	4	70
56	488	King et al, 1992	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/0.47/0.86/2.27/4.46	mg/kg diet	N	NR	DLY	M	FD	128	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	4.46		Y	90	Y	1.6	0.0793		10	10	10	10	7	4	4	1	10	4	70
57	776	Yuhas et al 1979	Cadmium acetate	100	Rat (*Rattus norvegicus*)	4	0/1/10/100	mg/L	N	NR	ADL	U	DR	13	w	35	d	JV	M	V	Lab	BEH	FDB	WCON	WO	1.00	10.0	Y	0.43	Y	0.0409	0.0951	0.951	10	5	5	5	7	4	8	10	10	4	68
58	670	Cousins et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/25	mg/kg diet	N	NR	ADL	U	FD	14	w	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	5.00	25.0	Y	0.385	Y	0.0193	0.251	1.25	10	10	5	10	7	4	8	10	10	4	78
59	12092	Koo and Winslow, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/2/5	mg/kg diet	N	NR	ADL	U	FD	11	w	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	5.00		Y	0.49	Y	0.0317	0.323		10	10	5	10	7	4	4	10	6	4	70
60	778	Kotsonis and Klassen, 1978	Cadmium acetate	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	1	w	70	d	JV	M	C	Lab	BEH	FDB	WCON	WO	0.410	1.09	Y	0.506	Y	0.0362	0.810	2.15	10	5	5	10	7	4	10	10	10	4	75
61	656	Nation et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/1/5	mg/kg bw/d	N	NR	ADL	U	FD	55	d	80	d	AD	M	C	Lab	BEH	AVO	STIM	WO	1.00	5.00	Y	0.21	Y	0.001	1.00	5.00	10	10	5	10	10	4	8	10	6	4	77

Appendix 6.1 Mammalian Toxicity Data Extracted for Wildlife Toxicity Reference Value (TRV)

Cadmium

Ref			Exposure																			Effects						Conversion to mg/kg bw/day				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
62	8980	Lamphere et al., 1984	Cadmium chloride	100	Cattle (*Bos taurus*)	2	0/52.9	ug/g diet	N	NR	2 per d	M	FD	60	d	9	mo	YO	NR	C	FieldA	BEH	FDB	FCNS	WO	52.9		Y	202	Y	4	1.05		10	10	10	10	7	4	4	1	10	4	70
63	820	Sawick-Kapusta et al, 1987	Cadmium chloride	100	Bank Vole (*Clethrionomys glareolus*)	3	0/1.5/35.3	mg/kg bw/d	N	NR	CON	M	FD	20	d	NR	NR	AD	B	C	Lab	BEH	FDB	FCNS	WO	1.50	35.3	Y	0.02125	N	0.002898	1.50	35.3	10	10	10	10	7	4	6	10	6	4	77
64	14580	Mahaffey et al., 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	NR	U	FD	10	w	NR	NR	AD	M	C	Lab	BEH	FDB	FCNS	WO	50.0		N	0.523	Y	0.0174	1.67		10	10	5	10	6	4	4	10	3	4	66
65	21111	Sugawara and Sugawara, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/15	mg/L	N	NR	ADL	U	DR	36	d	27	d	JV	F	C	Lab	BEH	FDB	WCON	WO	15.0		Y	0.164	N	0.019453	1.78		10	5	5	10	6	4	4	10	10	4	68
66	3730	Perry et al, 1977	Cadmium acetate	100	Rat (*Rattus norvegicus*)	7	0/1/2.5/5/10/25/50	mg/L	N	NR	ADL	U	DR	12	mo	21	d	JV	F	C	Lab	BEH	FDB	FCNS	WO	25.0	50.0	Y	0.275	Y	0.03	2.73	5.45	10	5	5	5	7	4	10	10	10	4	70
67	591	Mitsumori et al., 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/8/40/200/600	mg/kg diet	N	NR	ADL	U	FD	1	mo	5	w	JV	F	C	Lab	BEH	FDB	FCNS	WO	40.0	200	Y	0.2	Y	0.014	2.80	14.0	10	10	5	10	7	4	8	10	10	4	78
68	733	Lee et al., 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1/3/10	mg/kg bw	N	NR	DLY	U	GV	13	w	60	d	JV	M	C	Lab	BEH	BEH	RRSP	WO	3.00	10.0	Y	0.5019	N	0.038982	3.00	10.0	10	8	10	10	10	4	8	10	10	4	84
69	494	Osuna and Edds, 1980	Cadmium chloride	100	Pig (*Sus scrofa*)	2	0/88	ug/g diet	N	NR	ADL	M	FD	4	w	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	88.0		Y	18.73	Y	0.73	3.43		10	10	10	10	7	4	4	1	10	4	70
70	572	Suzuki and Yoshida, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	12	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	50.0		Y	0.12184	Y	0.0093	3.82		10	10	5	10	7	4	4	10	10	4	74
71	822	Sorell and Braziano, 1990	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/220/1650/2860	ug/org/d	N	NR	ADL	U	DR	14	d	NR	NR	GE	F	C	Lab	BEH	FDB	WCON	WO	1650	2860	N	0.338	Y	0.0286	4.88	8.46	10	5	5	10	6	4	10	10	10	4	74
72	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	6	0/0.38/1.34/5.62/6.14/149	ug/org/d	N	NR	ADL	M	FD	2	yr	7	w	AD	F	C	Lab	BEH	FDB	FCNS	WO	149		Y	0.03	Y	0.0032	4.97		10	10	10	10	7	4	4	1	10	4	70
73	796	Felinska et al., 1995	Cadmium acetate	100	Rat (*Rattus norvegicus*)	3	0/5/50	mg/L	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	BEH	FDB	WCON	WO	50.0		Y	0.22	Y	0.0231	5.25		10	5	5	10	7	4	4	10	10	4	69
74	551	Gustafson and Mercer, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	7	0/50/100/250/500/750/1000	mg/kg diet	N	NR	ADL	U	FD	21	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	100	250	N	0.267	Y	0.01619	6.06	15.2	10	10	5	10	6	4	10	10	10	4	79
75	25891	Wlostowski et al, 2000	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/5000/10500	ug/kg bw/d	N	NR	1 per w	UX	FD	6	w	1	mo	JV	M	C	Lab	BEH	FDB	FCNS	WO	10500		Y	1.01	Y	0.0029	10.5		10	10	10	10	10	4	4	1	10	4	73
76	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	5	0/0.48/1.78/1.75/47.1	mg/kg diet	N	NR	ADL	M	FD	2	yr	10	w	GE	F	C	Lab	BEH	FDB	FCNS	WO	47.1		Y	0.032	Y	0.008	11.8		10	10	10	10	7	4	4	1	10	4	70
77	560	Machemer and Lorke, 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1.2/3.5/12.5	mg/kg bw	N	NR	DLY	U	FD	9	d	4	mo	GE	F	C	Lab	BEH	FDB	FCNS	WO	12.5		N	0.382	Y	0.0336	12.5		10	10	5	10	10	4	4	1	10	4	68
78	25890	Wlostowski and Krasowska, 1999	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/40/80	ug/g diet	N	NR	ADL	UX	FD	6	w	1	mo	JV	M	C	Lab	BEH	FDB	FCNS	WO	80.0		Y	0.0159	Y	0.0025	12.6		10	10	10	10	7	4	4	1	10	4	70
79	453	Berry et al, 1999	Cadmium sulfate	100	Sheep (*Ovis aires*)	2	0/5	mg/kg diet	N	NR	ADL	U	FD	60	d	NR	NR	AD	M	C	FieldA	BEH	BEH	GBHV	WO		5.00	Y	78.12	Y	0.75		0.0480	10	10	5	10	7	4	4	10	3	4	67
80	685	Lind et al., 1997	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/1.13	ug/org/d	N	NR	ADL	M	FD	5	w	NR	NR	JV	F	C	Lab	BEH	FDB	FCNS	WO		1.13	Y	0.02125	Y	0.00371		0.0532	10	10	10	10	7	4	4	10	10	4	79
81	629	Weigel et al 1987	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.85/2.25	ug/g diet	N	NR	ADL	M	FD	6	w	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO		0.850	Y	0.257	N	0.022486		0.0744	10	10	10	4	6	4	4	10	10	4	72
82	753	Rastogi et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.1/1	mg/kg bw/d	N	NR	DLY	U	GV	30	d	1	d	JV	NR	V	Lab	BEH	BEH	NMVM	WO		0.100	Y	0.104	N	0.01069		0.100	10	8	5	10	10	4	4	10	10	4	75
83	669	Ahokas et al 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.07/0.53/1.52	mg/d	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	BEH	FDB	WCON	WO		0.0700	N	0.338	Y	0.0362		0.207	10	5	5	10	6	4	4	10	10	4	68
84	502	Cousins et al., 1973	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/50/150/450/1350	mg/kg diet	N	NR	ADL	U	FD	6	w	55	d	JV	M	C	FieldA	BEH	FDB	FCNS	WO		50.0	Y	30.76	Y	0.97		1.58	10	10	5	10	7	4	4	10	10	4	74
85	661	Zenick et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/17.2/34.4/68.8	mg/L	N	NR	ADL	U	DR	1	w	100	d	JV	M	C	Lab	BEH	FDB	WCON	WO		17.2	Y	0.446	N	0.047867		1.85	10	5	5	10	6	4	4	10	10	4	68
86	521	Mangler et al., 1988	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/31.5	mg/L	N	NR	ADL	U	DR	6	mo	28	d	JV	F	C	Lab	BEH	FDB	WCON	WO		31.5	Y	0.287	Y	0.024		2.63	10	5	5	10	7	4	4	10	10	4	69
87	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/0.0031/0.0062/0.0125/0.025/0.05	% in diet	N	NR	NR	U	FD	100	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO		0.00310	Y	0.225	N	0.020158		2.78	10	10	5	10	6	4	4	10	10	4	73
88	615	Groten et al, 1991	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/30.5	mg/kg diet	N	NR	ADL	M	FD	30	d	5	w	JV	B	C	Lab	BEH	FDB	FCNS	WO		30.5	Y	0.195	N	0.017921		2.80	10	10	10	10	6	4	4	10	10	4	78
89	543	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	NR	AD	F	C	Lab	BEH	FDB	WCON	WO		50.0	Y	0.2798	Y	0.0209		3.73	10	5	5	10	7	4	4	10	10	4	69
90	543	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	NR	GE	F	C	Lab	BEH	FDB	WCON	WO		50.0	Y	0.2798	Y	0.022		3.93	10	5	5	10	7	4	4	10	10	4	69
91	662	Meyer et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/30/60	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO		30.0	Y	0.08	Y	0.0145		5.44	10	10	5	10	7	4	4	10	10	4	74
92	824	Webster, 1978	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/40	mg/L	N	NR	DLY	U	DR	3	d	NR	NR	GE	F	C	Lab	BEH	FDB	WCON	WO		40.0	Y	0.03	N	0.004217		5.62	10	5	5	10	6	4	4	10	10	10	74
93	3711	Lynch et al., 1976	Cadmium chloride	100	Cattle (*Bos taurus*)	2	0/5.74	mg/kg bw/d	N	NR	3 per w	U	OR	63	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO		5.74	Y	71.4	Y	0.051		5.74	10	8	5	10	10	4	4	10	10	4	75
94	544	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	7	w	JV	F	M	Lab	BEH	FDB	WCON	WO		50.0	Y	0.1983	N	0.023079		5.82	10	5	5	10	6	4	4	10	10	4	68
95	583	Pond et al, 1973	Cadmium chloride	100	Pig (*Sus scrofa*)	2	0/154	mg/kg diet	N	NR	ADL	U	FD	50	d	NR	NR	JV	NR	C	Lab	BEH	FDB	FCNS	WO		154	Y	28.55	N	1.080102		5.83	10	10	5	10	6	4	4	10	10	4	73
96	2640	Freundt and Irbahim, 1990	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	2	0/100	mg/L	N	NR	ADL	U	DR	91	d	NR	NR	AD	F	C	Lab	BEH	FDB	WCON	WO		100	Y	0.28	N	0.031483		6.89	10	5	5	10	6	4	4	10	10	4	68
97	21121	Novelli et al, 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/1.44	mg/d	N	NR	ADL	U	DR	7	d	NR	NR	JV	M	C	Lab	BEH	FDB	WCON	WO		1.44	Y	0.200	N	na		7.20	10	5	5	10	6	4	4	10	10	4	68
98	626	Bhattacharyya et al, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5/50	mg/kg diet	N	NR	ADL	U	FD	252	d	68	d	GE	F	C	Lab	BEH	FDB	FCNS	WO		50.0	Y	0.028	Y	0.00867		15.5	10	10	5	10	7	4	4	10	10	4	74
99	617	Nation et al., 1990	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	60	d	50	d	JV	M	C	Lab	BEH	BEH	ACTP	WO		100	Y	0.2	N	0.018298		9.15	10	10	5	10	6	4	4	10	10	4	73
100	19496	Novelli et al, 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/100	mg/l	N	NR	ADL	U	DR	2	mo	15	w	JV	M	C	Lab	BEH	FDB	WCON	WO		100	Y	0.2	Y	0.02352		12.4	10	5	5	10	7	4	4	10	10	4	69
101	3731	Pond and Walker, 1975	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	mg/kg diet	N	NR	ADL	U	FD	21	d	12	w	GE	F	C	Lab	BEH	FDB	FCNS	WO		200	Y	0.2046	Y	0.0172		16.8	10	10	5	10	7	4	4	10	10	4	74
102	581	Nomiyama et al., 1975	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/300	mg/kg diet	N	NR	ADL	U	FD	42	w	NR	NR	NR	M	C	Lab	BEH	FDB	FCNS	WO		300	Y	3	N	0.169492		17.0	10	10	5	10	6	4	4	10	10	4	73
103	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/5.71/21.6/9.81	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	BEH	FDB	FCNS	WO		5.71	Y	0.01	Y	0.00414		571	10	10	5	10	7	4	4	10	10	4	74
Physiology																																												
104	646	Wills et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5.5/6.9	ug/kg bw/d	N	NR	DLY	U	FD	64	w	NR	NR	JV	B	C	Lab	PHY	PHY	BLPR	WO	6.90		Y	0.602	N	0.045267	0.0069		10	10	5	10	10	4	4	1	10	4	68
105	488	King et al, 1992	Rock phosphate	100	Pig (*Sus scrof*a)	3	0/0.61/1.20	mg/kg diet	N	NR	DLY	M	FD	132	d	NR	NR	JV	F	C	Lab	PHY	PHY	FDCV	WO	1.20		Y	90	Y	1.62	0.0216		10	10	10	10	7	4	4	1	10	4	70
106	488	King et al, 1992	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/0.47/0.86/2.27/4.46	mg/kg diet	N	NR	DLY	M	FD	128	d	NR	NR	JV	M	C	Lab	PHY	PHY	FDCV	WO	4.46		N	90	Y	1.28	0.0634		10	10	10	10	6	4	4	1	10	4	69
107	3730	Perry et al, 1977	Cadmium acetate	100	Rat (*Rattus norvegicus*)	7	0/1/2.5/5/10/25/50	mg/L	N	NR	ADL	U	DR	6	mo	21	d	JV	F	C	Lab	PHY	PHY	BLPR	WO	1.00	2.50	Y	0.3	Y	0.03	0.100	0.25	10	5	5	5	7	4	10	10	10	4	70
108	669	Ahokas et al 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.07/0.53/1.52	mg/d	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	PHY	PHY	FDCV	WO	0.0700	0.530	N	0.338	N	0.037296	0.207	1.57	10	5	5	10	5	4	8	10	10	4	71
109	443	Sutou, et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1/10	mg/kg bw/d	N	NR	DLY	U	GV	4	w	5	w	JV	M	C	Lab	PHY	PHY	FDCV	WO	1.00	10.0	Y	0.3	N	0.025536	1.00	10.0	10	8	5	10	10	4	8	10	10	4	79
110	820	Sawick-Kapusta et al, 1987	Cadmium chloride	100	Bank Vole (*Clethrionomys glareolus*)	3	0/1.5/35.3	mg/kg bw/d	N	NR	CON	M	FD	20	d	NR	NR	AD	B	C	Lab	PHY	PHY	MEEN	WO	1.50	35.3	Y	0.02125	N	0.002898	1.50	35.3	10	10	10	10	7	4	6	10	6	4	77
111	733	Lee et al., 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1/3/10	mg/kg bw	N	NR	DLY	U	GV	13	w	60	d	JV	M	C	Lab	PHY	PHY	GPHY	EY	3.00	10.0	Y	0.5019	N	0.038982	3.00	10.0	10	8	10	10	10	4	8	10	10	4	84
112	778	Kotsonis and Klassen, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	24	w	70	d	JV	M	C	Lab	PHY	PHY	HTRT	HE	2.82		Y	0.438	Y	0.0282	6.44		10	5	5	10	7	4	4	10	10	4	69
113	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/10/20/40/80/160	mg/L	N	NR	ADL	U	DR	4	w	24	w	AD	NR	C	Lab	PHY	PHY	GPHY	FM	160		N	0.4702	N	0.050198	17.1		10	5	5	10	5	4	4	10	10	4	67
114	629	Weigel et al 1987	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.85/2.25	ug/g diet	N	NR	ADL	M	FD	5	w	NR	NR	JV	M	C	Lab	PHY	PHY	FDCV	WO		0.850	Y	0.257	N	0.022486		0.074372	10	10	10	4	6	4	4	10	10	4	72
115	757	Mercado and Bibby 1973	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	ADL	U	DR	50	d	23	d	JV	M	C	Lab	PHY	PHY	GPHY	WO		5.00	N	0.267	N	0.030164		0.565	10	5	5	10	5	4	4	10	10	4	67
116	15061	Kanisawa and Schroeder, 1969	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	DLY	U	DR	17	mo	21	d	JV	B	C	Lab	PHY	PHY	BLPR	WO		5.00	N	0.248	N	0.028226		0.569	10	5	5	10	5	4	4	10	10	4	67
117	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/10	mg/L	N	NR	ADL	U	DR	4	w	21	d	JV	F	C	Lab	PHY	PHY	GPHY	FM		5.00	N	0.2024	N	0.023508		0.581	10	5	5	10	5	4	4	10	10	4	67
118	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.0016	% in diet	N	NR	NR	U	FD	50	d	NR	NR	JV	M	C	Lab	PHY	PHY	GPHY	TH		0.00160	N	0.235	N	0.020892		1.42	10	10	5	10	5	4	4	10	10	4	72
119	783	Mitra et al, 1995	Cadium	100	Rat (*Rattus norvegicus*)	2	0/18.08	ug/g diet	N	NR	DLY	M	FD	6	w	1	mo	JV	NR	C	Lab	PHY	PHY	GPHY	BL		18.08	Y	0.10825	N	0.011047		1.85	10	10	10	4	6	4	4	10	10	4	72
120	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.0031	% in diet	N	NR	NR	U	FD	50	d	NR	NR	JV	M	C	Lab	PHY	PHY	GPHY	TH		0.0031	N	0.235	N	0.020892		2.76	10	10	5	10	5	4	4	10	10	4	72
121	768	Suzuki and Yoshida 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	180	d	NR	NR	JV	M	C	Lab	PHY	PHY	HYDR	TB		50.0	Y	0.5788	N	0.043828		3.79	10	10	5	10	6	4	4	10	10	4	73
122	662	Meyer et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/30/60	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	PHY	PHY	FDCV	WO		30.0	Y	0.08	Y	0.0145		5.44	10	10	5	10	7	4	4	10	10	4	74
123	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.0062	% in diet	N	NR	NR	U	FD	85	d	NR	NR	JV	M	C	Lab	PHY	PHY	GPHY	TH		0.00620	N	0.235	N	0.020892		5.51	10	10	5	10	5	4	4	10	10	4	72

Ref			Exposure																			Effects						Conversion to mg/kg bw/da				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
124	659	Eakin et al 1980	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/150	mg/kg diet	N	NR	ADL	U	FD	16	w	NR	NR	JV	M	C	Lab	PHY	PHY	BLPR	WO		150	Y	0.25	N	0.021982		13.2	10	10	5	5	6	4	4	10	10	4	68
Pathology																																												
125	646	Wills et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5.5/6.9	ug/kg bw/d	N	NR	DLY	U	FD	64	w	NR	NR	JV	B	C	Lab	PTH	HIS	GHIS	KI	6.90		Y	0.602	N	0.045267	0.00690		10	10	5	10	10	4	4	1	10	4	68
126	685	Lind et al., 1997	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/1.24	ug/org/d	N	NR	1 per w	M	FD	5	w	NR	NR	JV	F	C	Lab	PTH	ORW	ORWT	LI	1.24		Y	0.02125	Y	0.00343	0.0584		10	10	10	10	7	4	4	1	10	4	70
127	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	5	0/0.48/1.78/1.75/47.1	mg/kg diet	N	NR	ADL	M	FD	2	yr	10	w	GE	F	C	Lab	PTH	HIS	GHIS	BO	1.78	47.1	N	0.036	N	0.004469	0.221	5.85	10	10	10	10	5	4	6	10	10	4	79
128	822	Sorell and Braziano, 1990	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/220/1650/2860	ug/org/d	N	NR	ADL	U	DR	14	d	NR	NR	GE	F	C	Lab	PTH	GRS	BDWT	WO	220	1650	N	0.338	Y	0.044	0.651	4.88	10	5	5	10	6	4	8	10	10	4	72
129	443	Sutou, et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1/10	mg/kg bw/d	N	NR	DLY	U	GV	13	w	5	w	JV	F	C	Lab	PTH	HIS	NCRO	LI	1.00	10.0	N	0.225	N	0.020158	1.00	10.0	10	8	5	10	10	4	8	10	10	4	79
130	753	Rastogi et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.1/1	mg/kg bw/d	N	NR	DLY	U	GV	30	d	1	d	JV	NR	V	Lab	PTH	ORW	ORWT	BR	1.00		Y	0.091	N	0.009578	1.00		10	8	5	10	10	4	4	10	10	4	75
131	710	Yuyama 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.5/2.0/5.0	mg/d	N	NR	ADL	U	FD	2	w	5	w	JV	M	C	Lab	PTH	ORW	ORWT	LI	0.500	2.00	Y	0.189	Y	0.0134	2.65	10.6	10	10	5	10	7	4	8	10	10	4	78
132	591	Mitsumori et al., 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/8/40/200/600	mg/kg diet	N	NR	ADL	U	FD	2	mo	5	w	JV	F	C	Lab	PTH	HIS	GHIS	KI	40.0	200	Y	0.215	Y	0.016	2.98	14.9	10	10	5	10	7	4	8	10	10	4	78
133	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	6	0/0.38/1.34/5.62/6.14/149	ug/org/d	N	NR	ADL	M	FD	2	yr	7	w	AD	F	C	Lab	PTH	HIS	GHIS	BO	149		Y	0.03	Y	0.0032	4.97		10	10	10	10	7	4	4	1	10	4	70
134	662	Meyer et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/30/60	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	PTH	ORW	SMIX	HE	30.0	60.0	Y	0.08	Y	0.0145	5.44	10.9	10	10	5	10	7	4	10	10	10	4	80
135	779	Prigge et al., 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/100	mg/L	N	NR	ADL	U	DR	48	d	NR	NR	AD	M	C	Lab	PTH	GRS	BDWT	WO	50.0	100	Y	0.3412	N	0.037613	5.51	11.0	10	5	5	10	6	4	10	10	6	4	70
136	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/0.0031/0.0062/0.0125/0.025/0.05	% in diet	N	NR	NR	U	FD	100	d	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	HE	0.00620	0.0125	Y	0.225	N	0.020158	5.55	11.2	10	10	5	10	6	4	10	10	10	4	79
137	775	Takizawa et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/50/200	mg/L	N	NR	NR	U	DR	180	d	NR	NR	GE	F	C	Lab	PTH	HIS	GHIS	KI	50.0	200	Y	0.2	N	0.023257	5.81	23.3	10	5	5	10	6	4	8	10	10	4	72
138	637	Rajanna et al, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/75	mg/kg diet	N	NR	ADL	U	FD	180	d	6	w	JV	M	C	Lab	PTH	ORW	ORWT	KI	75.0		Y	0.445	N	0.035311	5.95		10	10	5	10	6	4	4	10	10	4	73
139	551	Gustafson and Mercer, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	7	0/50/100/250/500/750/1000	mg/kg diet	N	NR	ADL	U	FD	21	d	NR	NR	JV	M	C	Lab	PTH	ORW	SMIX	LI	100	250	N	0.267	Y	0.01619	6.06	15.2	10	10	5	10	6	4	10	10	10	4	79
140	778	Kotsonis and Klassen, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	24	w	70	d	JV	M	C	Lab	PTH	ORW	SMIX	KI	2.82		Y	0.438	Y	0.0282	6.44		10	5	5	10	7	4	4	10	10	4	69
141	769	Hokawa et al., 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	60	d	NR	NR	SM	F	C	Lab	PTH	GRS	BDWT	WO	100		Y	0.2145	N	0.019382	9.04		10	10	5	10	6	4	4	10	3	4	66
142	465	Hamada et al, 1991	Cadmium chloride	100	Dog (*Canis familiaris*)	6	0/1/3/10/50/100	mg/kg bw/d	N	NR	DLY	U	FD	9	yr	6-8	mo	JV	M	C	Lab	PTH	HIS	GHIS	KI	10.0	50	Y	12.9	N	0.562162	10.0	50.0	10	10	5	10	10	4	8	10	10	4	81
143	25891	Wlostowski et al, 2000	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/5000/10500	ug/kg bw/d	N	NR	1 per w	UX	FD	6	w	1	mo	JV	M	C	Lab	PTH	ORW	ORWT	KI	10500		Y	1.01	Y	0.0029	10.5		10	10	10	10	10	4	4	10	10	4	82
144	25890	Wlostowski and Krasowska, 1999	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/40/80	ug/g diet	N	NR	ADL	UX	FD	6	w	1	mo	JV	M	C	Lab	PTH	ORW	ORWT	LI	80.0		Y	0.0159	N	0.002283	11.5		10	10	10	10	6	4	4	10	10	4	78
145	113	Seidenberg et al 1986	Cadmium	100	Mouse (*Mus musculus*)	2	0/340	mg/kg/d	N	NR	DLY	U	GV	4	d	NR	NR	GE	F	C	Lab	PTH	GRS	BDWT	WO	340		Y	0.042	N	0.005073	41.1		10	8	10	4	10	4	4	6	10	4	70
146	2069	Dodds-Smith et al., 1992	Cadmium chloride	100	Shrew (*Sorex araneus*)	2	0/0.85	mg/d	N	NR	DLY	U	FD	12	w	NR	NR	JV	B	C	Lab	PTH	ORW	ORWT	KI	0.850		Y	0.0071	N	0.001177	120		10	10	5	10	6	4	4	6	10	4	69
147	3730	Perry et al, 1977	Cadmium acetate	100	Rat (*Rattus norvegicus*)	7	0/1/2.5/5/10/25/50	mg/L	N	NR	ADL	U	DR	18	mo	21	d	JV	F	C	Lab	PTH	ORW	ORWT	LI		1.00	Y	0.425	Y	0.03		0.0706	10	5	5	10	7	4	4	10	10	4	69
148	15061	Kanisawa and Schroeder, 1969	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	DLY	U	DR	30	mo	21	d	JV	B	C	Lab	PTH	HIS	GHIS	KI		5.00	N	0.248	N	0.028226		0.569	10	5	5	10	5	4	4	10	10	4	67
149	707	Dobryszycka et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.48	mg/org/d	N	NR	DLY	U	GV	12	mo	3	mo	AD	B	C	Lab	PTH	HIS	NCRO	KI		0.480	N	0.462	N	0.036416		1.04	10	8	5	10	5	4	4	10	10	4	70
150	14580	Mahaffey et al., 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	NR	U	FD	10	w	NR	NR	AD	M	C	Lab	PTH	ORW	SMIX	LI		50.0	N	0.523	Y	0.0174		1.67	10	10	5	10	6	4	4	10	3	4	66
151	783	Mitra et al, 1995	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/18.08	ug/g diet	N	NR	DLY	M	FD	6	w	1	mo	JV	NR	C	Lab	PTH	ORW	SMIX	KI		18.08	Y	0.10825	N	0.011047		1.85	10	10	10	4	6	4	4	10	10	4	72
152	506	Swiergosz et al 1998	Cadmium chloride hydrate	100	Bank vole (*Clethrionomys glareolus*)	3	0/15/40	ug/g diet	N	NR	ADL	U	FD	6	mo	5	mo	JV	M	C	Lab	PTH	HIS	GHIS	LI		15.0	Y	0.035	N	0.004367		1.87	10	10	5	10	6	4	4	10	10	4	73
153	521	Mangler et al., 1988	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/31.5	mg/L	N	NR	ADL	U	DR	12	mo	28	d	JV	F	C	Lab	PTH	HIS	GHIS	KI		31.5	Y	0.2819	Y	0.024		2.68	10	5	5	10	7	4	4	10	10	4	69
154	768	Suzuki and Yoshida 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	180	d	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	IN		50.0	Y	0.5788	N	0.043828		3.79	10	10	5	10	6	4	4	10	10	4	73
155	543	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	NR	GE	F	C	Lab	PTH	HIS	GHIS	LI		50.0	Y	0.2798	Y	0.022		3.93	10	5	5	10	7	4	4	10	10	4	69
156	824	Webster, 1978	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/40	mg/L	N	NR	DLY	U	DR	19	d	NR	NR	GE	F	C	Lab	PTH	GRS	BDWT	WO		40.0	Y	0.043	N	0.005831		5.42	10	5	5	10	6	4	4	10	10	10	74
157	544	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	7	w	JV	F	M	Lab	PTH	HIS	GHIS	KI		50.0	Y	0.1983	N	0.023079		5.82	10	5	5	10	6	4	4	10	10	4	68
158	21121	Novelli et al, 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/1.44	mg/d	N	NR	ADL	U	DR	7	d	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	KI		1.44	Y	0.200	N	na		7.20	10	5	5	10	6	4	4	10	10	4	68
159	556	Iguchi and Sano, 1982	Cadmium chloride	100	Rat (Rattus norvegicus)	3	0/50/100	mg/kg diet	N	NR	ADL	U	FD	8	w	NR	NR	YO	M	C	Lab	PTH	HIS	GHIS	BO		100	Y	0.12	N	0.012024		10.0	10	10	5	10	6	4	4	10	10	4	73
160	667	Kajikawa et al 1981	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	2	0/200	mg/L	N	NR	NR	U	DR	91	w	NR	NR	JV	M	C	Lab	PTH	HIS	NPHR	KI		200	Y	0.15	N	0.017952		14.7	10	5	5	10	6	4	4	10	10	4	68
161	581	Nomiyama et al., 1975	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/300	mg/kg diet	N	NR	ADL	U	FD	42	w	NR	NR	NR	M	C	Lab	PTH	GRS	BDWT	WO		300	Y	3	N	0.169492		17.0	10	10	5	10	6	4	4	10	10	4	73
162	149	Van Vleet et al, 1981	Cadmium sulfate	100	Pig (*Sus scrofa*)	2	0/500	mg/kg diet	N	NR	ADL	U	FD	10	w	NR	NR	JV	M	C	Lab	PTH	HIS	GLSN	HE		500	N	14.8	N	0.629378		21.3	10	10	5	10	5	4	4	10	10	4	72
Reproduction																																												
163	646	Wills et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5.5/6.9	ug/kg bw/d	N	NR	DLY	U	FD	64	w	NR	NR	GE	B	C	Lab	REP	REP	PROG	WO	6.90		Y	0.34	N	0.028303	0.00690		10	10	5	10	10	10	4	1	10	4	74
164	525	Webster, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/1.48//242.7/39806	ug/L	N	NR	ADL	U	DR	60	d	8	w	GE	F	C	Lab	REP	REP	PRWT	WO	243	39806	N	0.0225	Y	0.0088	0.0939	15.6	10	5	5	10	6	10	6	10	10	4	76
165	822	Sorell and Braziano, 1990	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/220/1650/2860	ug/org/d	N	NR	ADL	U	DR	14	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO	220	1650	N	0.338	Y	0.044	0.651	4.88	10	5	5	10	6	10	8	10	10	4	78
166	643	Combs et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/4.0/7.6/10.1/15.9	ug/g diet	N	NR	ADL	U	FD	57	d	NR	NR	JV	M	C	Lab	REP	REP	TEWT	TE	15.9		N	0.2304	Y	0.0129	0.890		10	10	5	10	6	10	4	1	10	4	70
167	443	Sutou, et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1/10	mg/kg bw/d	N	NR	DLY	U	GV	6	w	5	w	GE	F	C	Lab	REP	REP	OTHR	WO	1.00	10.0	Y	0.2	N	0.018298	1.00	10.0	10	8	5	10	10	10	8	10	10	4	85
168	647	Sutou et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1.0/10	mg/kg bw/d	N	NR	DLY	U	GV	6	w	5	w	GE	F	C	Lab	REP	REP	RSEM	WO	1.00	10.0	Y	0.25	N	0.021982	1.00	10.0	10	8	10	10	10	10	8	10	10	4	90
169	694	Sawicka-Kapusta et al 1994	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/10/20/60	ug/g diet	N	NR	NR	U	FD	6	d	NR	NR	GE	F	C	Lab	REP	REP	DEYO	WO	10.0	20.0	N	0.0575	N	0.006568	1.14	2.28	10	10	5	10	5	10	10	10	10	4	84
170	669	Ahokas et al 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.07/0.53/1.52	mg/d	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO	0.530	1.52	N	0.338	N	0.037296	1.57	4.50	10	5	5	10	5	10	10	10	10	4	79
171	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	REP	REP	SPCL	SM	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	10	4	1	10	4	70
172	809	Baranski and Sitarek, 1987	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/0.04/0.4/4.0/40	mg/kg bw/d	N	NR	5 per w	U	GV	7	w	3	mo	JV	F	C	Lab	REP	REP	GREP	WO	4.00	40.0	Y	0.247	N	0.021765	4.00	40.0	10	8	5	10	10	10	8	10	10	4	85
173	641	Baranski et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.04/0.4/4	mg/kg bw/d	N	NR	5 per w	U	GV	8	w	3	mo	GE	F	C	Lab	REP	REP	RSEM	WO	4.00		Y	0.192	N	0.017694	4.00		10	8	5	10	10	10	4	1	10	4	72
174	569	Zielinska-Psuja et al, 1979	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	3	0/8.8/88	mg/kg bw/d	N	NR	DLY	U	FD	3	mo	NR	NR	JV	M	C	Lab	REP	REP	TEWT	TE	8.80	88.0	Y	0.00031	N	8.88E-05	5.40	54.0	10	10	5	10	10	10	8	10	6	4	83
175	9321	Sasser et al, 1985	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.69/1.5/2.5	mg/org/d	N	NR	ADL	U	DR	21	d	5	mo	GE	F	C	Lab	REP	REP	PRWT	WO	1.50	2.50	Y	0.25	N	0.02843	6.00	10.0	10	5	5	10	7	10	10	10	10	4	81
176	560	Machemer and Lorke, 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1.84/6.13/18.39/61.32	mg/kg bw	N	NR	DLY	U	GV	9	d	4	mo	GE	F	C	Lab	REP	REP	FERT	WO	6.13	18.4	Y	0.382	N	0.031147	6.13	18.4	10	8	10	10	10	10	10	10	10	4	92
177	778	Kotsonis and Klassen, 1978	cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	24	w	70	d	JV	M	C	Lab	REP	REP	PRFM	WO	2.82		Y	0.438	Y	0.0282	6.44		10	5	5	10	7	10	4	1	10	4	66
178	661	Zenick et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/17.2/34.4/68.8	mg/L	N	NR	ADL	U	DR	11	w	100	d	JV	M	C	Lab	REP	REP	SPCL	SM	68.8		Y	0.431	N	0.046416	7.41		10	5	5	10	6	10	4	3	10	4	67
179	607	Caflisch, 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/50/100	mg/L	N	NR	ADL	U	DR	40	d	NR	NR	AD	M	C	Lab	REP	REP	TEWT	TE	100		Y	0.25	N	0.02843	11.4		10	5	5	10	6	10	4	10	10	4	74
180	560	Machemer and Lorke, 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1.2/3.5/12.5	mg/kg bw	N	NR	DLY	U	FD	9	d	4	mo	GE	F	C	Lab	REP	REP	FERT	WO	12.5		Y	0.382	Y	0.0336	12.5		10	10	5	10	10	10	4	1	10	4	74
181	592	Desi et al, 1998	Cadmium chloride	99.5	Rat (*Rattus norvegicus*)	4	0/3.5/7.0/14.0	mg/kg bw/d	N	NR	ADL	M	GV	16	d	12	w	GE	F	C	Lab	REP	REP	PRWT	WO	14.0		N	0.297	N	0.025326	13.9		10	8	10	10	10	10	4	1	10	4	77
182	651	Cornwall et al, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/25	mg/kg bw/d	N	NR	DLY	U	GV	13	d	NR	NR	GE	F	C	Lab	REP	REP	RSEM	WO	25.0		Y	0.25	N	0.021982	25.0		10	8	10	10	10	10	4	3	10	4	79
183	113	Seidenberg et al 1986	Cadmium	100	Mouse (*Mus musculus*)	2	0/340	mg/kg/d	N	NR	DLY	U	GV	4	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO	340		Y	0.042	N	0.005073	41.1		10	8	10	4	10	10	4	10	10	4	80
184	748	Wardell et al., 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/10/50/75/100	mg/kg bw/d	N	NR	DLY	U	GV	12	d	NR	NR	GE	F	C	Lab	REP	REP	RSEM	WO	50.0	75.0	Y	0.2	Y	0.001	50.0	75.0	10	8	10	10	10	10	10	10	10	4	92

Ref			Exposure																			Effects						Conversion to mg/kg bw/da				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
185	652	Simmons et al, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/10/25/50	mg/kg bw/d	N	NR	DLY	U	GV	13	d	NR	NR	GE	F	C	Lab	REP	REP	RSEM	WO	50.0		Y	0.24	N	0.021256	50.0		10	8	10	10	10	10	4	1	10	4	77
186	625	Whelton et al, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5.0/50.0	mg/kg diet	N	NR	ADL	U	FD	252	d	68	d	GE	F	C	Lab	REP	REP	PROG	WO		5.00	Y	0.0252	N	0.003334		0.661	10	10	5	10	6	10	4	10	10	4	79
187	824	Webster, 1978	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/10/20/40	mg/L	N	NR	DLY	U	DR	19	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO		10.0	Y	0.051	N	0.006799		1.42	10	5	5	10	6	10	4	10	10	10	80
188	66	Schroeder and Mitchener, 1971	Cadmium	100	Mouse (Mus musculus)	2	0/10	mg/L	N	NR	ADL	U	DR	6	mo	21	d	JV	F	C	Lab	REP	REP	DEYO	WO		10.0	N	0.0225	N	0.003255		1.45	10	5	5	4	5	10	4	10	10	4	67
189	506	Swiergosz et al 1998	Cadmium chloride hydrate	100	Bank vole (*Clethrionomys glareolus*)	3	0/15/40	ug/g diet	N	NR	ADL	U	FD	6	mo	5	mo	JV	M	C	Lab	REP	REP	SPCL	TE		15.0	Y	0.035	N	0.004367		1.87	10	10	5	10	6	10	4	10	10	4	79
190	571	Hastings et al, 1978	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/17200	ug/L	N	NR	ADL	U	DR	111	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO		17200	Y	0.1	N	0.012463		2.14	10	5	5	4	6	10	4	10	10	4	68
191	543	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO		50.0	Y	0.2798	Y	0.022		3.93	10	5	5	10	7	10	4	10	10	4	75
192	550	Mallol et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/40	mg/L	N	NR	DLY	U	DR	25	d	2	w	JV	B	C	Lab	REP	REP	TEWT	TE		40.0	N	0.217	N	0.025029		4.61	10	5	5	10	5	10	4	10	10	4	73
193	823	Webster, 1979	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/40	mg/L	N	NR	ADL	U	DR	19	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO		40.0	Y	0.032	N	0.00447		5.59	10	5	5	10	6	10	4	10	10	4	74
194	544	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	7	w	JV	F	M	Lab	REP	REP	PRWT	WO		50.0	Y	0.1983	N	0.023079		5.82	10	5	5	10	6	10	4	10	10	4	74
195	608	Gupta et al., 1993	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/6.3	mg/kg bw/d	N	NR	ADL	U	DR	28	d	NR	NR	GE	F	C	Lab	REP	REP	PRWT	WO		6.30	Y	0.18	N	0.021153		6.30	10	5	5	5	10	10	4	10	10	4	73
196	2857	Saxena, et.al. 1989	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/2.140	mg/org/d	N	NR	ADL	U	DR	120	d	NR	NR	JV	M	C	Lab	REP	REP	SPCL	TE		2.14	Y	0.294	N	0.032896		7.28	10	5	5	5	6	10	4	10	10	4	69
197	3731	Pond and Walker, 1975	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	mg/kg diet	N	NR	ADL	U	FD	21	d	12	w	GE	F	C	Lab	REP	REP	PRWT	WO		200	Y	0.2046	Y	0.0172		236	10	10	5	10	7	10	4	10	10	4	80
Growth																																												
198	646	Wills et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5.5/6.9	ug/kg bw/d	N	NR	DLY	U	FD	64	w	NR	NR	JV	B	C	Lab	GRO	GRO	BDWT	WO	6.90		Y	0.602	N	0.045267	0.0069		10	10	5	10	10	8	4	1	10	4	72
199	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.2	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	1.20		Y	500	Y	3.30	0.00792		10	10	10	5	7	8	4	1	10	4	69
200	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.3	mg/kg diet	N	NR	ADL	M	FD	328	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	1.30		Y	500	Y	3.40	0.00884		10	10	10	5	7	8	4	1	10	4	69
201	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.8	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	1.80		Y	500	Y	5.20	0.0187		10	10	10	5	7	8	4	1	10	4	69
202	685	Lind et al., 1997	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/1.24	ug/org/d	N	NR	1 per w	M	FD	5	w	NR	NR	JV	F	C	Lab	GRO	GRO	BDWT	WO	1.24		Y	0.02125	Y	0.00343	0.0584		10	10	10	10	7	8	4	1	10	4	74
203	488	King et al, 1992	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/0.47/0.86/2.27/4.46	mg/kg diet	N	NR	DLY	M	FD	128	d	NR	NR	JV	F	C	Lab	GRO	GRO	BDWT	WO	4.46		Y	90	Y	1.60	0.0793		10	10	10	10	7	8	4	1	10	4	74
204	639	Merali and Singhal, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.1/1.0	mg/kg bw/d	N	NR	DLY	U	GV	7	d	1	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	0.100	1.00	Y	0.02	N	0.002757	0.100	1.00	10	8	10	10	10	8	8	10	10	4	88
205	753	Rastogi et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.1/1	mg/kg bw/d	N	NR	DLY	U	GV	30	d	1	d	JV	NR	V	Lab	GRO	GRO	BDWT	WO	0.100	1.00	Y	0.104	N	0.01069	0.100	1.00	10	8	5	10	10	8	8	10	10	4	83
206	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/5.09	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	GRO	GRO	BDWT	WO	5.09		Y	0.0284	Y	0.00508	0.179		10	10	5	10	7	8	4	1	10	4	69
207	669	Ahokas et al 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.07/0.53/1.52	mg/d	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	GRO	GRO	BDWT	WO	0.07	0.53	N	0.338	N	0.037296	0.207	1.57	10	5	5	10	5	8	8	10	10	4	75
208	670	Cousins et al 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/25	mg/kg diet	N	NR	ADL	U	FD	14	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	5.00	25.0	Y	0.385	Y	0.0206	0.268	1.34	10	10	5	10	7	8	8	10	10	4	82
209	12092	Koo and Winslow, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/2/5	mg/kg diet	N	NR	ADL	U	FD	11	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	5.00		Y	0.49	Y	0.0317	0.323		10	10	5	10	7	8	4	8	6	4	72
210	809	Baranski and Sitarek, 1987	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/0.04/0.4/4.0/40	mg/kg bw/d	N	NR	5 per w	U	GV	12	w	3	mo	JV	F	C	Lab	GRO	GRO	BDWT	WO	0.400	4.00	Y	0.2	N	0.018298	0.400	4.00	10	8	5	10	10	8	8	10	10	4	83
211	3703	Doyle et al, 1974	Cadmium chloride	100	Sheep (*Ovis aires*)	5	0/10.8/29.4/59.7/111.2	mg/org/d	N	NR	ADL	U	FD	163	d	4	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	29.4	59.7	Y	65.66	Y	1.99	0.448	0.909	10	10	5	10	7	8	10	10	6	4	80
212	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	3	0/4.93/12.82	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	GRO	GRO	BDWT	WO	12.82		Y	0.0268	Y	0.00442	0.478		10	10	5	10	7	8	4	1	10	4	69
213	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/16.67	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	GRO	GRO	BDWT	WO	16.67		Y	0.0288	Y	0.00604	0.579		10	10	5	10	7	8	4	1	10	4	69
214	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/10	mg/L	N	NR	ADL	U	DR	4	w	21	d	JV	F	C	Lab	GRO	GRO	BDWT	WO	5.00	10.0	N	0.2024	N	0.023508	0.581	1.16	10	5	5	10	5	8	10	10	10	4	77
215	14446	Schroeder et al, 1963	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	DLY	U	DR	32	d	28	d	JV	B	C	Lab	GRO	GRO	BDWT	WO	5		Y	0.1652	N	0.019581	0.593		10	5	5	4	6	8	4	10	10	4	66
216	3730	Perry et al, 1977	Cadmium acetate	100	Rat (*Rattus norvegicus*)	7	0/1/2.5/5/10/25/50	mg/L	N	NR	ADL	U	DR	24	mo	21	d	JV	F	C	Lab	GRO	GRO	BDWT	WO	10	25	Y	0.465	Y	0.03	0.645	1.61	10	5	5	5	7	8	10	10	10	4	74
217	776	Yuhas et al 1979	Cadmium acetate	100	Rat (*Rattus norvegicus*)	4	0/1/10/100	mg/L	N	NR	ADL	U	DR	2	w	35	d	JV	M	V	Lab	GRO	GRO	BDWT	WO	10	100	Y	0.43	Y	0.0331	0.770	7.70	10	5	5	5	7	8	8	10	10	4	72
218	643	Combs et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/4.0/7.6/10.1/15.9	ug/g diet	N	NR	ADL	U	FD	57	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	15.9		Y	0.2304	Y	0.0129	0.890		10	10	5	10	7	8	4	1	10	4	69
219	643	Combs et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/4.0/7.6/10.1/15.9	ug/g diet	N	NR	ADL	U	FD	57	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	15.9		Y	0.2304	Y	0.0129	0.890		10	10	5	10	7	8	4	1	10	4	69
220	443	Sutou, et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1/10	mg/kg bw/d	N	NR	DLY	U	GV	6	w	5	w	GE	F	C	Lab	GRO	GRO	BDWT	WO	1.00	10.0	N	0.2	N	0.018298	1.00	10.0	10	8	5	10	10	8	8	10	10	4	83
221	563	Takashima et al 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/10/50/100	mg/kg diet	N	NR	ADL	U	FD	19	mo	NR	NR	JV	M	C	Lab	GRO	MPH	GMPH	BO	10.0	50.0	Y	0.1	N	0.01035	1.04	5.18	10	10	5	10	6	8	8	10	10	4	81
222	626	Bhattacharyya et al, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5/50	mg/kg diet	N	NR	ADL	U	FD	252	d	68	d	GE	F	C	Lab	GRO	GRO	BDWT	WO	5.00	50.0	Y	0.040	Y	0.00867	1.08	10.8	10	10	5	10	7	8	8	10	10	4	82
223	446	Loeser and Lorke, 1977	Cadmium chloride (CdCl2.1H2	100	Dog (*Canis familiaris*)	5	0/1/3/10/30	mg/kg diet	N	NR	NR	U	FD	3	mo	4-6	mo	JV	B	C	Lab	GRO	GRO	BDWT	WO	30.0		Y	10.5	N	0.474651	1.36		10	10	5	10	6	8	4	1	10	4	68
224	21111	Sugawara and Sugawara, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/15	mg/L	N	NR	ADL	U	DR	36	d	27	d	JV	F	C	Lab	GRO	GRO	BDWT	WO	15.0		Y	0.164	N	0.019453	1.78		10	5	5	10	6	8	4	10	10	4	72
225	560	Machemer and Lorke, 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1.84/6.13/18.39/61.32	mg/kg bw	N	NR	DLY	U	GV	9	d	2	mo	GE	F	C	Lab	GRO	GRO	BDWT	WO	1.84	6.13	Y	0.3575	N	0.029495	1.84	6.13	10	8	10	10	10	8	8	10	10	4	88
226	783	Mitra et al, 1995	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/18.08	ug/g diet	N	NR	DLY	M	FD	6	w	1	mo	JV	NR	C	Lab	GRO	GRO	BDWT	WO	18.08		Y	0.10825	N	0.011047	1.85		10	10	10	4	6	8	4	10	10	4	76
227	521	Mangler et al., 1988	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/31.5	mg/L	N	NR	ADL	U	DR	18	mo	28	d	JV	F	C	Lab	GRO	GRO	BDWT	WO	31.5		Y	0.341	Y	0.024	2.22		10	5	5	10	7	8	4	10	10	4	73
228	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	GRO	GRO	BDWT	WO	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	8	4	1	10	4	68
229	710	Yuyama 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.5/2.0/5.0	mg/d	N	NR	ADL	U	FD	2	w	5	w	JV	M	C	Lab	GRO	GRO	BDWT	WO	0.500	2.00	Y	0.189	Y	0.0134	2.65	10.6	10	10	5	10	7	8	8	10	10	4	82
230	770	Washko and Cousins 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/25	mg/L	N	NR	DLY	U	DR	8	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	25.0		Y	0.314	N	0.00349	2.78		10	10	5	10	6	8	4	10	10	4	72
231	733	Lee et al., 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1/3/10	mg/kg bw	N	NR	DLY	U	GV	8	w	60	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	3.00	10.0	Y	0.5019	N	0.038982	3.00	10.0	10	8	10	10	10	8	8	10	10	4	88
232	591	Mitsumori et al., 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/8/40/200/600	mg/kg diet	N	NR	ADL	U	FD	4	d	5	w	JV	F	C	Lab	GRO	GRO	BDWT	WO	40.0	200	N	0.13	Y	0.0100	3.08	15.4	10	10	5	10	7	8	8	10	10	4	82
233	543	Steibert et al., 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	NR	mo	AD	F	C	Lab	GRO	GRO	BDWT	WO	50.0		Y	0.2798	Y	0.0209	3.73		10	5	5	10	7	8	4	10	10	4	73
234	502	Cousins et al., 1973	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/50/150/450/1350	mg/kg diet	N	NR	ADL	U	FD	6	w	55	d	JV	M	C	FieldA	GRO	GRO	BDWT	WO	50.0	150	Y	13.72	Y	1.11	4.05	12.1	10	10	5	10	7	8	10	10	10	4	84
235	650	Chetty et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/100	mg/kg diet	N	NR	ADL	U	FD	4	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	50.0	100	Y	0.2631	N	0.022924	4.36	8.71	10	10	5	10	6	8	10	10	10	4	83
236	814	Koller and Roan, 1977	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/3/30/300	mg/L	N	NR	NR	U	DR	70	d	28	d	JV	NR	C	Lab	GRO	GRO	BDWT	WO	30.0	300	Y	0.018	N	0.002663	4.44	44.4	10	5	5	10	6	8	8	10	10	4	76
237	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	6	0/0.38/1.34/5.62/6.14/149	ug/org/d	N	NR	ADL	M	FD	2	yr	7	w	AD	F	C	Lab	GRO	GRO	BDWT	WO	149		Y	0.03	Y	0.0032	4.97		10	10	10	10	7	8	4	1	10	4	74
238	506	Swiergosz et al 1998	Cadmium chloride hydrate	100	Bank vole (*Clethrionomys glareolus*)	3	0/15/40	ug/g diet	N	NR	ADL	U	FD	6	mo	5	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	40.0		Y	0.035	N	0.004367	4.99		10	10	5	10	6	8	4	1	10	4	68
239	569	Zielinska-Psuja et al, 1979	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	3	0/8.8/88	mg/kg bw/d	N	NR	DLY	U	FD	3	mo	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	8.80	88.0	Y	0.306	N	0.025955	5.40	54.0	10	10	5	10	10	8	8	10	6	4	81
240	21111	Sugawara and Sugawara, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	330	d	27	d	JV	F	C	Lab	GRO	GRO	BDWT	WO	50.0		Y	0.327	N	0.036202	5.54		10	5	5	10	6	8	4	10	10	4	72
241	551	Gustafson and Mercer, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	7	0/50/100/250/500/750/1000	mg/kg diet	N	NR	ADL	U	FD	21	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	100	250	N	0.267	Y	0.01619	6.06	15.2	10	10	5	10	6	8	10	10	10	4	83
242	547	Blakely, 1984	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/5000/10000/50000	ug/L	N	NR	ADL	U	DR	3	w	6	w	JV	F	C	Lab	GRO	GRO	BDWT	WO	50000		N	0.0225	N	0.003255	7.23		10	5	5	10	5	8	4	10	10	4	71
243	661	Zenick et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/17.2/34.4/68.8	mg/L	N	NR	ADL	U	DR	80	d	100	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	68.8		Y	0.446	N	0.047867	7.38		10	5	5	10	6	8	4	10	10	4	72
244	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/0.019/0.095/0.186	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	GRO	GRO	BDWT	WO	0.186		Y	0.0218	Y	0.00557	8.53		10	10	5	10	7	8	4	1	10	4	69
245	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/10/20/40/80/160	mg/L	N	NR	ADL	U	DR	4	w	24	w	AD	NR	C	Lab	GRO	GRO	BDWT	WO	80.0	160	N	0.4702	N	0.050198	8.54	17.1	10	5	5	10	5	8	10	10	10	4	77
246	690	Tanaka et al 1995	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/0.52/106	mg/kg diet	N	NR	ADL	M	FD	5	mo	3	w	JV	M	M	Lab	GRO	GRO	BDWT	WO	106		Y	0.39	N	0.031682	8.61		10	10	10	10	6	8	4	1	10	4	73

Ref			Exposure																			Effects						Conversion to mg/kg bw/da				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
247	25891	Wlostowski et al, 2000	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/5000/10500	ug/kg bw/d	N	NR	1 per w	UX	FD	6	w	1	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	10500		Y	1.01	Y	0.0029	10.5		10	10	10	10	10	8	4	10	6	4	82
248	632	Watanabe et al, 1986	Cadmium chloride	100	Mouse (*Mus musculus*)	5	0/0.48/1.78/1.75/47.1	mg/kg diet	N	NR	ADL	M	FD	2	yr	10	w	GE	F	C	Lab	GRO	GRO	BDWT	WO	47.1		Y	0.032	Y	0.008	11.8		10	10	10	10	7	8	4	1	10	4	74
249	560	Machemer and Lorke, 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1.2/3.5/12.5	mg/kg bw	N	NR	DLY	U	FD	9	d	4	mo	GE	F	C	Lab	GRO	GRO	BDWT	WO	12.5		N	0.382	N	0.031147	12.5		10	10	5	10	10	8	4	1	10	4	72
250	507	Kodama et al., 1989	Cadmium chloride	100	Dog (*Canis familiaris*)	6	0/1/3/10/50/100	mg/d	N	NR	ADL	U	FD	250	w	8	mo	JV	B	C	Lab	GRO	MPH	GMPH	BO	100		Y	8	N	0.379574	12.5		10	10	5	10	6	8	4	1	10	4	68
251	25890	Wlostowski and Krasowska, 1999	Cadmium chloride	100	Bank vole (*Clethrionomys glareolus*)	3	0/40/80	ug/g diet	N	NR	ADL	UX	FD	6	w	1	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	80		Y	0.0159	Y	0.0025	12.6		10	10	10	10	7	8	4	10	10	4	83
252	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/80/160	mg/L	N	NR	ADL	U	DR	4	w	2	yr	AD	NR	C	Lab	GRO	MPH	GMPH	FM	160		N	0.05401	N	0.054007	16.9		10	5	5	10	5	8	4	10	6	4	67
253	488	King et al, 1992	Rock phosphate	100	Pig (*Sus scrof*a)	3	0/0.61/1.20	mg/kg diet	N	NR	DLY	M	FD	132	d	NR	NR	JV	F	C	Lab	GRO	GRO	BDWT	WO	1.20		Y	0.09	Y	1.62	21.3		10	10	10	10	7	8	4	1	10	4	74
254	617	Nation et al., 1990	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	61	d	50	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	100		Y	0.0002	N	6.26E-05	31.3		10	10	5	10	6	8	4	1	10	4	68
255	3847	Exon et al., 1979	Cadmium acetate	100	Mouse (*Mus musculus*)	5	0/3/30/300/600	mg/L	N	NR	ADL	U	DR	6	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	300	600	Y	0.0249	N	0.003566	43.0	85.9	10	5	5	5	6	8	10	10	10	4	73
256	465	Hamada et al, 1991	Cadmium chloride	100	Dog (*Canis familiaris*)	6	0/1/3/10/50/100	mg/kg bw/d	N	NR	DLY	U	FD	9	yr	6-8	mo	JV	B	C	Lab	GRO	GRO	BDWT	WO	50.0	100	Y	12.9	N	0.562162	50.0	100	10	10	5	10	10	8	10	10	10	4	87
257	629	Weigel et al 1987	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.85/2.25	ug/g diet	N	NR	ADL	M	FD	6	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		0.850	Y	0.257	N	0.022486		0.0744	10	10	10	4	6	8	4	10	10	4	76
258	772	Bakry et al., 1992	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/0.143/0.561/2.00	mg/kg bw/d	N	NR	NR	U	GV	2	w	NR	NR	JV	B	C	Lab	GRO	MPH	GMPH	WO		0.143	Y	0.172	N	0.016164		0.143	10	8	10	10	10	8	4	10	10	4	84
259	636	Smith et al, 1985	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/1.0	mg/kg bw/d	N	NR	DLY	U	GV	14	d	5	d	JV	M	C	Lab	GRO	DVP	GDPV	EY		1.00	Y	0.1003	N	0.010376		1.00	10	8	10	10	10	8	4	10	10	4	84
260	637	Rajanna et al, 1984	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/75	mg/kg diet	N	NR	ADL	U	FD	180	d	6	w	JV	M	C	Lab	GRO	GRO	BDWT	WO		25.0	Y	0.4589	N	0.036215		1.97	10	10	5	10	6	8	4	10	10	4	77
261	615	Groten et al, 1991	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/30.5	mg/kg diet	N	NR	ADL	M	FD	7	d	5	w	JV	B	C	Lab	GRO	GRO	BDWT	WO		30.5	Y	0.130	N	0.012842		3.01	10	10	10	10	6	8	4	10	10	4	82
262	825	Wilson et al 1940	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/0.0031/0.0062/0.0125/0.025/0.05	% in diet	N	NR	NR	U	FD	25	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		0.00310	Y	0.1	N	0.01035		3.21	10	10	5	10	6	8	4	10	10	4	77
263	494	Osuna and Edds, 1980	Cadmium chloride	100	Pig (*Sus scrofa*)	2	0/88	ug/g diet	N	NR	ADL	M	FD	4	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		88.0	Y	18.73	Y	0.73		3.43	10	10	10	10	7	8	4	10	10	4	83
264	583	Pond et al, 1973	Cadmium chloride	100	Pig (*Sus scrofa*)	2	0/154	mg/kg diet	N	NR	ADL	U	FD	50	d	NR	NR	JV	NR	C	Lab	GRO	GRO	BDWT	WO		154	Y	28.55	Y	0.72		3.88	10	10	5	10	7	8	4	10	10	4	78
265	572	Suzuki and Yoshida, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	14	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		50.0	Y	0.13906	Y	0.0113		4.06	10	10	5	10	7	8	4	10	10	4	78
266	780	Suzuki and Yoshida 1979	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/50/100/200	mg/kg diet	N	NR	ADL	U	FD	28	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		50.0	Y	0.1991	N	0.01823		4.58	10	10	5	10	6	8	4	10	10	4	77
267	768	Suzuki and Yoshida 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	9	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		50.0	Y	0.1108	N	0.011261		5.08	10	10	5	10	6	8	4	10	10	4	77
268	780	Suzuki and Yoshida 1979	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	14	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		50.0	Y	0.1343	N	0.01319		5.18	10	10	5	10	6	8	4	10	10	4	77
269	662	Meyer et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/30/60	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		30.0	Y	0.08	Y	0.0145		5.44	10	10	5	10	7	8	4	10	10	4	78
270	3711	Lynch et al., 1976	Cadmium chloride	100	Cattle (*Bos taurus*)	2	0/5.74	mg/kg bw/d	N	NR	3 per w	U	OR	63	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		5.74	Y	71.4	Y	0.051		5.74	10	8	5	10	10	8	4	10	10	4	79
271	544	Steibert et al., 1984	cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	170	d	7	w	JV	F	M	Lab	GRO	GRO	BDWT	WO		50.0	Y	0.1983	N	0.023079		5.82	10	5	5	10	6	8	4	10	10	4	72
272	801	Ando et al., 1978	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	2	0/10	mg/kg bw/d	N	NR	DLY	U	GV	2	mo	64	d	JV	F	C	Lab	GRO	MPH	GMPH	BO		10.0	N	0.156	N	0.014918		6.13	10	8	10	10	10	8	4	10	10	4	84
273	2640	Freundt and Irbahim, 1990	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	2	0/100	mg/L	N	NR	ADL	U	DR	5	w	NR	NR	AD	F	C	Lab	GRO	GRO	BDWT	WO		100	Y	0.28	N	0.031483		6.89	10	5	5	10	6	8	4	10	10	4	72
274	638	Nakamura et al., 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	ug/g diet	N	NR	ADL	U	FD	11	w	NR	NR	NR	F	C	Lab	GRO	GRO	BDWT	WO		200	Y	0.1678	Y	0.008		9.54	10	10	5	10	7	8	4	10	10	4	78
275	3733	Banis et al 1969	Cadmium chloride dihydrate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		100	Y	0.144	N	0.013968		9.70	10	10	5	10	6	8	4	10	10	4	77
276	556	Iguchi and Sano, 1982	Cadmium chloride	100	Rat (Rattus norvegicus)	3	0/50/100	mg/kg diet	N	NR	ADL	U	FD	8	w	NR	NR	YO	M	C	Lab	GRO	MPH	GMPH	TB		100	Y	0.12	N	0.012024		10.0	10	10	5	10	6	8	4	10	10	4	77
277	3733	Banis et al 1969	Cadmium chloride dihydrate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	3	w	5	w	JV	B	C	Lab	GRO	GRO	BDWT	WO		100	Y	0.0955	N	0.009966		10.4	10	10	5	10	6	8	4	10	10	4	77
278	659	Eakin et al 1980	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/150	mg/kg diet	N	NR	ADL	U	FD	16	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		150	Y	0.25	N	0.021982		13.2	10	10	5	5	6	8	4	10	10	4	72
279	667	Kajikawa et al 1981	Cadmium chloride	61.32	Rat (*Rattus norvegicus*)	2	0/200	mg/L	N	NR	NR	U	DR	91	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		200	Y	0.15	N	0.017952		14.7	10	5	5	10	6	8	4	10	10	4	72
280	3731	Pond and Walker, 1975	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	mg/kg diet	N	NR	ADL	U	FD	21	d	12	w	GE	F	C	Lab	GRO	GRO	BDWT	WO		200	Y	0.2046	Y	0.0172		16.8	10	10	5	10	7	8	4	10	10	4	78
281	574	Suzuki and Yoshida 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	mg/kg diet	N	NR	ADL	U	FD	10	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		200	Y	0.100	N	0.01035		20.7	10	10	5	10	6	8	4	10	10	4	77
282	149	Van Vleet et al, 1981	Cadmium sulfate	100	Pig (*Sus scrofa*)	2	0/500	mg/kg diet	N	NR	ADL	U	FD	2	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO		500	Y	11.7	N	0.518807		75.8	10	10	5	10	6	8	4	10	10	4	77
283	440	Dodds-Smith et al., 1992	cadmium chloride	100	Shrew (*Sorex araneus*)	2	0/0.73	mg/d	N	NR	DLY	U	FD	12	w	NR	NR	JV	B	C	Lab	GRO	GRO	BDWT	WO		0.73	Y	0.0071	N	0.001177		103	10	10	5	10	6	8	4	10	10	4	77
284	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/5.71/21.6/9.81	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	GRO	GRO	BDWT	WO		5.71	Y	0.01	Y	0.00414		571	10	10	5	10	7	8	4	10	10	4	78
Survival																																												
285	646	Wills et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5.5/6.9	ug/kg bw/d	N	NR	DLY	U	FD	64	w	NR	NR	JV	B	C	Lab	MOR	MOR	MORT	WO	6.90		Y	0.602	N	0.045267	0.00690		10	10	5	10	10	9	4	1	10	4	73
286	446	Loeser and Lorke, 1977	Cadmium chloride	100	Dog (*Canis familiaris*)	5	0/1/3/10/30	mg/kg diet	N	NR	NR	U	FD	3	mo	4-6	mo	JV	B	C	Lab	MOR	MOR	MORT	WO	30.0		Y	10.5	N	0.474651	1.36		10	10	5	10	6	9	4	10	10	4	78
287	506	Swiergosz et al 1998	Cadmium chloride hydrate	100	Bank vole (*Clethrionomys glareolus*)	3	0/15/40	ug/g diet	N	NR	ADL	U	FD	6	mo	5	mo	JV	M	C	Lab	MOR	MOR	MORT	WO	15.0	40	Y	0.035	N	0.004367	1.87	4.99	10	10	5	10	6	9	10	10	10	4	84
288	521	Mangler et al., 1988	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/31.5	mg/L	N	NR	ADL	U	DR	18	mo	28	d	JV	F	C	Lab	MOR	MOR	MORT	WO	31.5		Y	0.341	Y	0.024	2.22		10	5	5	10	7	9	4	10	10	4	74
289	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	MOR	MOR	MORT	WO	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	9	4	1	10	4	69
290	615	Groten et al, 1991	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/30.5	mg/kg diet	N	NR	ADL	M	FD	56	d	5	w	JV	B	C	Lab	MOR	MOR	MORT	WO	30.5		Y	0.29	N	0.024834	2.61		10	10	10	10	6	9	4	10	10	4	83
291	809	Baranski and Sitarek, 1987	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/0.04/0.4/4.0/40	mg/kg bw/d	N	NR	5 per w	U	GV	13	w	3	mo	JV	F	C	Lab	MOR	MOR	MORT	WO	4.00	40.0	Y	0.247	N	0.021765	4.00	40.0	10	8	5	10	10	9	8	10	10	4	84
292	641	Baranski et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.04/0.4/4	mg/kg bw/d	N	NR	5 per w	U	GV	8	w	3	mo	GE	F	C	Lab	MOR	MOR	SURV	WO	4.00		Y	0.192	N	0.017694	4.00		10	8	10	10	10	9	4	1	10	4	76
293	625	Whelton et al, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	3	0/5.0/50.0	mg/kg diet	N	NR	ADL	U	FD	252	d	68	d	GE	F	C	Lab	MOR	MOR	MORT	WO	50.0		Y	0.0252	N	0.003334	6.61		10	10	5	10	6	9	4	10	10	4	78
294	443	Sutou, et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.1/1/10	mg/kg bw/d	N	NR	DLY	U	GV	6	w	5	w	JV	B	C	Lab	MOR	MOR	MORT	WO	10.0		Y	0.25	N	0.021982	10.0		10	8	10	10	10	9	4	10	10	4	85
295	9321	Sasser et al, 1985	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.69/1.5/2.5	mg/org/d	N	NR	ADL	U	DR	21	d	5	mo	GE	F	C	Lab	MOR	MOR	MORT	WO	2.50		Y	0.25	N	0.02843	10.0		10	5	5	10	7	9	4	10	10	4	74
296	560	Machemer and Lorke, 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/1.2/3.5/12.5	mg/kg bw	N	NR	DLY	U	FD	9	d	4	mo	GE	F	C	Lab	MOR	MOR	MORT	WO	12.5		Y	0.382	N	0.031147	12.5		10	10	5	10	10	9	4	1	10	4	73
297	149	Van Vleet et al, 1981	Cadmium sulfate	100	Pig (*Sus scrofa*)	2	0/500	mg/kg diet	N	NR	ADL	U	FD	10	w	NR	NR	JV	M	C	Lab	MOR	MOR	MORT	WO	500		N	14.8	N	0.629378	21.3		10	10	5	10	5	9	4	10	10	4	77
298	113	Seidenberg et al 1986	Cadmium	100	Mouse (*Mus musculus*)	2	0/340	mg/kg/d	N	NR	DLY	U	GV	4	d	NR	NR	GE	F	C	Lab	MOR	MOR	MORT	WO	340		Y	0.042	N	0.005073	41.1		10	8	10	4	10	9	4	10	10	4	79
299	502	Cousins et al., 1973	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/50/150/450/1350	mg/kg diet	N	NR	ADL	U	FD	6	w	55	d	JV	M	C	FieldA	MOR	MOR	MORT	WO	1350		Y	13.84	Y	0.69	67.3		10	10	5	10	7	9	4	1	10	4	70
300	440	Dodds-Smith et al., 1992	Cadmium chloride	100	Shrew (*Sorex araneus*)	2	0/0.73	mg/d	N	NR	DLY	U	FD	12	w	NR	NR	JV	B	C	Lab	MOR	MOR	MORT	WO	0.730		Y	0.0071	N	0.001177	103		10	10	5	10	6	9	4	10	10	4	78
301	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/5.71/21.6/9.81	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	MOR	MOR	MORT	WO	5.71	21.6	Y	0.01	Y	0.00414	571	2160	10	10	5	10	7	9	8	10	10	4	83
302	14446	Schroeder et al, 1963	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	DLY	U	DR	6	mo	28	d	JV	M	C	Lab	MOR	MOR	SURV	WO		5.00	Y	0.3405	N	0.037544		0.551	10	5	5	4	6	9	4	10	10	4	67
303	14447	Schroeder et al, 1964	Cadmium	100	Mouse (*Mus musculus*)	2	0/5	mg/L	N	NR	DLY	U	DR	18	mo	21	d	JV	B	C	Lab	MOR	MOR	SURV	WO		5.00	N	0.0375	Y	0.00465		0.620	10	5	5	10	6	9	4	10	10	4	73
304	3711	Lynch et al., 1976	Cadmium chloride	100	Cattle (*Bos taurus*)	2	0/5.74	mg/kg bw/d	N	NR	3 per w	U	OR	63	d	NR	NR	JV	M	C	Lab	MOR	MOR	SURV	WO		5.74	Y	71.4	Y	0.051		5.74	10	8	5	10	10	9	4	10	10	4	80

Ref			Exposure																			Effects						Conversion to mg/kg bw/day				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
Data Not Used to Derive Wildlife Toxicity Reference Value																																												
305	13088	Pechova et al, 1998	Cadmium chloride	100	Cattle (*Bos taurus*)	3	0/1/2	mg/org/d	N	NR	DLY	U	DR	92	d	14-30	d	JV	NR	C	FieldU	BIO	ENZ	ASAT	PL	2.00		N	272	N	15.3726	0.00735		10	5	5	10	5	1	4	3	10	4	57
306	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.2	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	1.20		Y	500	Y	3.3	0.00792		10	10	10	5	7	4	4	1	10	4	65
307	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.2	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	PTH	HIS	GHIS	MT	1.20		Y	500	Y	3.3	0.00792		10	10	10	5	7	4	4	1	10	4	65
308	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.3	mg/kg diet	N	NR	ADL	M	FD	328	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	1.30		Y	500	Y	3.4	0.00884		10	10	10	5	7	4	4	1	10	4	65
309	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.3	mg/kg diet	N	NR	ADL	M	FD	328	d	NR	NR	JV	M	C	Lab	PTH	HIS	GHIS	MT	1.30		Y	500	Y	3.4	0.00884		10	10	10	5	7	4	4	1	10	4	65
310	14697	Herman et al, 1980	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.1/5	mg/L	N	NR	NR	U	DR	40	d	40	d	JV	M	C	Lab	BEH	BEH	ACTV	WO	0.100	5.00	N	0.217	N	0.0250	0.0121	0.607	10	5	5	4	5	4	6	10	10	4	63
311	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.8	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	1.80		Y	500	Y	5.2	0.0187		10	10	10	5	7	4	4	1	10	4	65
312	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.8	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	BIO	CHM	HMGL	BL	1.80		Y	500	Y	5.2	0.0187		10	10	10	5	7	1	4	1	10	4	62
313	471	Vreman et al, 1988	Cadmium acetate	100	Cattle (*Bos taurus*)	2	0/1.8	mg/kg diet	N	NR	ADL	M	FD	330	d	NR	NR	JV	M	C	Lab	PTH	HIS	GHIS	MT	1.80		Y	500	Y	5.2	0.0187		10	10	10	5	7	4	4	1	10	4	65
314	453	Berry et al, 1999	Cadmium sulfate	100	Sheep (*Ovis aires*)	2	0/5	mg/kg diet	N	NR	ADL	U	FD	60	d	NR	NR	AD	M	C	FieldA	REP	REP	SPCL	SM	5.00		Y	78.12	Y	0.75	0.0480		10	10	5	10	7	10	4	1	3	4	64
315	453	Berry et al, 1999	Cadmium sulfate	100	Sheep (*Ovis aires*)	2	0/5	mg/kg diet	N	NR	ADL	U	FD	60	d	NR	NR	AD	M	C	FieldA	PTH	GRS	BDWT	WO	5.00		Y	78.12	Y	0.75	0.0480		10	10	5	10	7	4	4	1	3	4	58
316	489	Smith et al, 1991	Cadmium chloride	100	Cattle (*Bos taurus*)	3	0/0.025/0.125	mg/kg bw/d	N	NR	ADL	U	FD	394	d	13	mo	GE	F	C	FieldA	BIO	CHM	CALC	SR	0.125		Y	340	N	8.276227	0.125		10	10	5	10	10	1	4	1	10	4	65
317	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/5.09	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	BEH	FDB	FCNS	WO	5.09		Y	0.0284	Y	0.00508	0.179		10	10	5	10	7	4	4	1	10	4	65
318	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/5.09	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	PHY	PHY	FDCV	WO	5.09		Y	0.0284	Y	0.00508	0.179		10	10	5	10	7	4	4	1	10	4	65
319	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/5.09	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	PTH	ORW	ORWT	LI	5.09		Y	0.0284	Y	0.00508	0.179		10	10	5	10	7	4	4	1	10	4	65
320	525	Webster, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/1.48//242.7/39806	ug/L	N	NR	ADL	U	DR	60	d	8	w	GE	F	C	Lab	BEH	FDB	WCON	WO	243		N	0.0225	Y	0.0088	0.352		10	5	5	10	6	4	4	1	10	4	59
321	12092	Koo and Winslow, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/2/5	mg/kg diet	N	NR	ADL	U	FD	11	w	NR	NR	JV	M	C	Lab	BIO	CHM	CHOL	SR	5.00		Y	0.49	Y	0.0371	0.379		10	10	5	10	7	1	4	6	6	4	63
322	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	3	0/4.93/12.82	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	BEH	FDB	FCNS	WO	12.8		Y	0.0268	Y	0.00442	0.478		10	10	5	10	7	4	4	1	10	4	65
323	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	3	0/4.93/12.82	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	PHY	PHY	FDCV	WO	12.8		Y	0.0268	Y	0.00442	0.478		10	10	5	10	7	4	4	1	10	4	65
324	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	3	0/4.93/12.82	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	PTH	ORW	ORWT	LI	12.8		Y	0.0268	Y	0.00442	0.478		10	10	5	10	7	4	4	1	10	4	65
325	757	Mercado and Bibby 1973	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	ADL	U	DR	50	d	23	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	5.0		N	0.267	N	0.030164	0.565		10	5	5	10	5	8	4	1	10	4	62
326	3701	Kanisawa and Schroeder, 1969	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	DLY	U	DR	1134	d	21	d	JV	B	C	Lab	MOR	MOR	LFSP	WO	5.0		N	0.248	N	0.028226	0.569		10	5	5	5	5	9	4	1	10	4	58
327	594	Schumann et al., 1996	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/10	mg/l	N	NR	ADL	U	DR	7	d	57	d	JV	M	C	Lab	BEH	FDB	FCNS	WO	10.0		Y	0.351	Y	0.02	0.570		10	5	5	10	7	4	4	1	10	4	60
328	594	Schumann et al., 1996	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/10	mg/l	N	NR	ADL	U	DR	7	d	57	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	10.0		Y	0.351	Y	0.02	0.570		10	5	5	10	7	8	4	1	10	4	64
329	633	Lockett and Leary, 1986	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/5	mg/L	N	NR	ADL	M	DR	16	mo	NR	NR	JV	M	C	Lab	BEH	BEH	ACTV	WO	5.00		N	0.217	N	0.025029	0.577		10	5	10	4	5	4	4	1	10	4	57
330	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/16.67	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	PTH	ORW	ORWT	LI	16.67		Y	0.0288	Y	0.00604	0.579		10	10	5	10	7	4	4	1	10	4	65
331	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/16.67	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	PHY	PHY	FDCV	WO	16.67		Y	0.0288	Y	0.00604	0.642		10	10	5	10	7	4	4	1	10	4	65
332	508	Wlostowski et al., 1996	cadmium	100	Bank vole	2	0/13.2	ug/org/d	N	NR	ADL	U	DR	6	w	1	mo	JV	B	C	Lab	GRO	GRO	BDWT	WO	13.2		Y	0.0204	Y	0.0044	0.647		10	5	5	4	7	8	4	1	10	4	58
333	508	Wlostowski et al., 1996	cadmium	100	Bank vole	2	0/13.2	ug/org/d	N	NR	ADL	U	DR	6	w	1	mo	JV	B	C	Lab	GRO	GRO	BDWT	WO	13.2		Y	0.0204	Y	0.0044	0.647		10	5	5	4	7	8	4	1	10	4	58
334	508	Wlostowski et al., 1996	Cadmium	100	Bank vole	2	0/13.2	ug/org/d	N	NR	ADL	U	DR	6	w	1	mo	JV	B	C	Lab	PTH	ORW	ORWT	MT	13.2		Y	0.0204	Y	0.0044	0.647		10	5	5	4	7	4	4	1	10	4	54
335	508	Wlostowski et al., 1996	Cadmium	100	Bank vole	2	0/13.2	ug/org/d	N	NR	ADL	U	DR	6	w	1	mo	JV	B	C	Lab	BEH	FDB	FCNS	WO	13.2		Y	0.0198	Y	0.0044	0.667		10	5	5	4	7	4	4	1	10	4	54
336	643	Combs et al, 1983	Cadmium chloride	100	Goat (*Capra hircus*)	4	0/10.4/18.0/28.5	ug/g diet	N	NR	ADL	U	FD	125	d	NR	NR	SM	B	C	Lab	BEH	FDB	FCNS	WO	28.5		Y	27.475	Y	0.81	0.840		10	10	5	10	7	4	4	1	6	4	61
337	643	Combs et al, 1983	Cadmium chloride	100	Goat (*Capra hircus*)	4	0/10.4/18.0/28.5	ug/g diet	N	NR	ADL	U	FD	125	d	NR	NR	SM	B	C	Lab	GRO	GRO	BDWT	WO	28.5		Y	27.475	Y	0.81	0.840		10	10	5	10	7	8	4	1	6	4	65
338	643	Combs et al, 1983	Cadmium chloride	100	Goat (*Capra hircus*)	4	0/10.4/18.0/28.5	ug/g diet	N	NR	ADL	U	FD	125	d	NR	NR	JV	B	C	Lab	PTH	ORW	ORWT	KI	28.5		Y	27.475	Y	0.81	0.840		10	10	5	10	7	4	4	1	6	4	61
339	643	Combs et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/4.0/7.6/10.1/15.9	ug/g diet	N	NR	ADL	U	FD	57	d	NR	NR	JV	M	C	Lab	BEH	FDB	FCNS	WO	15.9		Y	0.2304	Y	0.0129	0.890		10	10	5	10	7	4	4	1	10	4	65
340	643	Combs et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/4.0/7.6/10.1/15.9	ug/g diet	N	NR	ADL	U	FD	57	d	NR	NR	JV	M	C	Lab	BIO	CHM	PHOS	KI	15.9		Y	0.2304	Y	0.0129	0.890		10	10	5	10	7	1	4	1	10	4	62
341	643	Combs et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/4.0/7.6/10.1/15.9	ug/g diet	N	NR	ADL	U	FD	57	d	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	KI	15.9		Y	0.2304	Y	0.0129	0.890		10	10	5	10	7	4	4	1	10	4	65
342	611	Saygi et al, 1991	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/10	mg/L	N	NR	ADL	U	DR	52	d	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	KI	10.0		Y	0.1	N	0.012463	1.25		10	5	5	4	6	4	4	1	10	4	53
343	611	Saygi et al, 1991	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/10	mg/L	N	NR	ADL	U	DR	52	w	5	w	JV	M	C	Lab	REP	REP	TEDG	TE	10.0		Y	0.1	N	0.012463	1.25		10	5	5	4	6	10	4	1	10	4	59
344	446	Loeser and Lorke, 1977	Cadmium chloride	100	Dog (*Canis familiaris*)	5	0/1/3/10/30	mg/kg diet	N	NR	NR	U	FD	3	mo	4-6	mo	JV	B	C	Lab	BEH	FDB	FCNS	WO	30.0		Y	10.5	N	0.474651	1.36		10	10	5	10	6	4	4	1	10	4	64
345	446	Loeser and Lorke, 1977	Cadmium chloride	100	Dog (*Canis familiaris*)	5	0/1/3/10/30	mg/kg diet	N	NR	NR	U	FD	3	mo	4-6	mo	JV	B	C	Lab	PHY	PHY	BLPR	WO	30.0		Y	10.5	N	0.474651	1.36		10	10	5	10	6	4	4	1	10	4	64
346	446	Loeser and Lorke, 1977	Cadmium chloride	100	Dog (*Canis familiaris*)	5	0/1/3/10/30	mg/kg diet	N	NR	NR	U	FD	3	mo	4-6	mo	JV	B	C	Lab	PTH	ORW	ORWT	MT	30.0		Y	10.5	N	0.474651	1.36		10	10	5	10	6	4	4	1	10	4	64
347	21111	Sugawara and Sugawara, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/15	mg/L	N	NR	ADL	U	DR	36	d	NR	NR	AD	F	C	Lab	BEH	FDB	WCON	WO	15.0		Y	0.296	N	0.033098	1.68		10	5	5	10	6	4	4	6	3	4	57
348	21111	Sugawara and Sugawara, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/15	mg/L	N	NR	ADL	U	DR	36	d	NR	NR	AD	F	C	Lab	PTH	GRS	BDWT	WO	15.0		Y	0.296	N	0.033098	1.68		10	5	5	10	6	4	4	10	3	4	61
349	480	Boscolo et al, 1985	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/20	mg/L	N	NR	NR	U	DR	10	mo	3	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	20.0		N	3.76	N	0.326065	1.73		10	5	5	10	5	8	4	1	10	4	62
350	480	Boscolo et al, 1985	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/20	mg/L	N	NR	NR	U	DR	10	mo	3	mo	JV	M	C	Lab	PTH	HIS	GHIS	MT	20.0		N	3.76	N	0.326065	1.73		10	5	5	10	5	4	4	1	10	4	58
351	480	Boscolo et al, 1985	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/20	mg/L	N	NR	NR	U	DR	10	mo	3	mo	SM	M	C	Lab	REP	REP	TEWT	TE	20.0		N	3.76	N	0.326065	1.73		10	5	5	10	5	10	4	1	10	4	64
352	3703	Doyle et al, 1974	Cadmium chloride	100	Sheep (*Ovis aires*)	5	0/10.8/29.4/59.7/111.2	mg/org/d	N	NR	ADL	U	FD	163	d	4	mo	JV	M	C	Lab	BEH	FDB	FCNS	WO	111		Y	63.92	Y	1.85	1.74		10	10	5	10	7	4	4	1	10	4	65
353	536	Murthy et al., 1986	cadmium acetate	100	Rat (*Rattus norvegicus*)	3	0/4200/8400	ug/L	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	BEH	FDB	FCNS	WO	8400		Y	0.225	Y	0.048	1.79		10	5	5	5	7	4	4	3	10	4	57
354	483	Williams et al 1978	Cadmium sulfate	100	Vole (*Microtus pennsylvanicus*)	2	0/16.67	ug/org/d	N	NR	ADL	U	FD	40	d	NR	NR	JV	NR	C	Lab	BEH	FDB	FCNS	WO	16.7		Y	0.0288	Y	0.00604	1.89		10	10	5	10	7	4	4	1	10	4	65
355	659	Eakin et al 1980	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/10/20	mg/L	N	NR	ADL	U	DR	20	mo	NR	NR	JV	M	C	Lab	BIO	ENZ	Other	KI	20.0		N	0.235	N	0.02689	2.29		10	5	5	4	5	1	4	1	10	4	49
356	659	Eakin et al 1980	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/10/20	mg/L	N	NR	ADL	U	DR	20	mo	NR	NR	JV	M	C	Lab	PHY	PHY	BLPR	BL	20.0		N	0.235	N	0.02689	2.29		10	5	5	4	5	4	4	1	10	4	52
357	659	Eakin et al 1980	Cadmium	100	Sprague Dawley	2	0/20	mg/L	N	NR	ADL	U	DR	20	mo	NR	NR	JV	M	C	Lab	PHY	PHY	BLPR	BL	20.0		N	0.235	N	0.02689	2.29		10	5	5	4	5	4	4	1	10	4	52
358	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	BEH	FDB	FCNS	WO	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	4	4	1	10	4	64
359	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	BIO	CHM	HMGL	BL	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	1	4	1	10	4	61
360	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	PHY	PHY	BLPR	WO	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	4	4	1	10	4	64
361	754	Loeser and Lorke 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	5	0/1/3/10/30	mg/kg diet	N	NR	ADL	U	FD	3	mo	NR	NR	JV	B	C	Lab	PTH	ORW	ORWT	MT	30.0		Y	0.315	N	0.026581	2.53		10	10	5	10	6	4	4	1	10	4	64
362	780	Suzuki and Yoshida 1979	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	ADL	U	FD	14	d	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	LI	50.0		Y	0.1343	N	0.01319	4.91		10	10	5	10	6	4	4	1	10	4	64
363	711	Battersby et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/50	mg/L	N	NR	ADL	U	DR	40	w	12	w	JV	M	C	Lab	BIO	HRM	TSTR	PL	50.0		N	0.523	N	0.055244	5.28		10	5	5	10	5	1	4	1	10	4	55
364	711	Battersby et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/50	mg/L	N	NR	ADL	U	DR	40	w	22	w	JV	M	C	Lab	PTH	HIS	GHIS	PG	50.0		N	0.523	N	0.055244	5.28		10	5	5	10	5	4	4	1	10	4	58
365	3730	Perry et al, 1977	Cadmium acetate	100	Rat (*Rattus norvegicus*)	7	0/1/2.5/5/10/25/50	mg/L	N	NR	ADL	U	DR	30	mo	21	d	JV	F	C	Lab	MOR	MOR	MORT	WO	50.0		Y	0.275	Y	0.03	5.45		10	5	5	5	7	9	4	1	10	4	60
366	21013	Jin et al, 1999	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/50/100	mg/L	N	NR	ADL	U	DR	90	d	NR	NR	JV	F	C	Lab	BIO	CHM	TOPR	UR	100		Y	200	N	11.65634	5.83		10	5	5	10	6	1	4	1	10	4	56

Ref			Exposure																				Effects							Conversion to mg/kg bw/da				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
367	664	Revis 1981	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	3	mo	3	mo	JV	M	C	Lab	BEH	FDB	FCNS	WO	50.0		Y	0.192	Y	0.0246	6.41		10	5	5	4	7	4	4	3	10	4	56
368	664	Revis 1981	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	90	d	3	mo	JV	M	C	Lab	GRO	GRO	BDWT	WO	50.0		Y	0.192	Y	0.0246	6.41		10	5	5	4	7	8	4	1	10	4	58
369	664	Revis 1981	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	60	d	3	mo	JV	M	C	Lab	PTH	HIS	NCRO	KI	50.0		Y	0.192	Y	0.0246	6.41		10	5	5	4	7	4	4	1	10	4	54
370	778	Kotsonis and Klassen, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	24	w	70	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	2.82		Y	0.438	Y	0.0282	6.44		10	5	5	10	7	8	4	1	10	4	64
371	778	Kotsonis and Klassen, 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.41/1.09/2.82	mg/d	N	NR	ADL	U	DR	24	w	70	d	JV	M	C	Lab	GRO	GRO	BDWT	WO	2.82		Y	0.438	Y	0.0282	6.44		10	5	5	10	7	8	4	1	10	4	64
372	21121	Novelli et al, 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/1.44	mg/d	N	NR	ADL	U	DR	7	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	1.44		Y	0.200	N	na	7.20		10	5	5	10	6	8	4	1	10	4	63
373	2857	Saxena, et.al. 1989	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/2.140	mg/org/d	N	NR	ADL	U	DR	120	d	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	2.14		Y	0.294	N	0.032896	7.28		10	5	5	5	6	8	4	6	10	4	63
374	776	Yuhas et al 1979	Cadmium acetate	100	Rat (*Rattus norvegicus*)	4	0/1/10/100	mg/L	N	NR	ADL	U	DR	13	w	35	d	JV	M	V	Lab	PTH	HIS	GHIS	LI	100		Y	0.38	Y	0.0281	7.39		10	5	5	5	7	4	4	1	10	4	55
375	668	Bonner et al 1980	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/75	mg/kg diet	N	NR	NR	U	FD	48	w	NR	NR	JV	M	C	Lab	GRO	GRO	BDWT	WO	75.0		Y	0.1	N	0.01035	7.76		10	10	5	4	6	8	4	1	10	4	62
376	650	Chetty et al, 1980	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/100	mg/kg diet	N	NR	ADL	U	FD	8	w	NR	NR	JV	M	C	Lab	PTH	ORW	ORWT	MT	100		Y	0.3692	N	0.030286	8.20		10	10	5	10	6	4	4	1	10	4	64
377	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/0.019/0.095/0.186	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	BEH	FDB	FCNS	WO	0.186		Y	0.0218	Y	0.00557	8.53		10	10	5	10	7	4	4	1	10	4	65
378	677	Weber and Reid 1969	Cadmium acetate	100	Mouse (*Mus musculus*)	4	0/0.019/0.095/0.186	mg/org/d	N	NR	ADL	U	FD	3	w	NR	NR	JV	B	C	Lab	PHY	PHY	MEEN	WO	0.186		Y	0.0218	Y	0.00557	8.53		10	10	5	10	7	4	4	1	10	4	65
379	689	Davis et al 1995	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/90	mg/L	N	NR	ADL	U	DR	112	d	40	d	JV	M	V	Lab	GRO	GRO	BDWT	WO	90.0		N	0.4702	N	0.050198	9.61		10	5	5	4	5	8	4	1	10	4	56
380	662	Meyer et al 1982	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/30/60	mg/kg diet	N	NR	ADL	U	FD	30	d	NR	NR	JV	M	C	Lab	BIO	ENZ	GLPX	KI	60.0		Y	0.0794	Y	0.0133	10.1		10	10	5	10	7	1	4	1	10	4	62
381	697	Xu et al., 1993	Cadmium	100	Mouse (*Mus musculus*)	3	0/30/75	mg/L	N	NR	ADL	U	DR	87	d	NR	NR	GE	B	C	Lab	REP	REP	PROG	WO	75		Y	0.02	N	0.002928	11.0		10	5	5	4	6	10	4	1	10	4	59
382	607	Caflisch, 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/50/100	mg/L	N	NR	ADL	U	DR	40	d	NR	NR	AD	M	C	Lab	BIO	HRM	TSTR	PL	100		Y	0.25	N	0.02843	11.4		10	5	5	10	6	1	4	10	6	4	61
383	530	Murthy et al., 1987	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/L	N	NR	ADL	U	DR	120	d	90	d	AD	M	C	Lab	PTH	HIS	GHIS	BR	100		Y	0.23	N	0.026375	11.5		10	5	5	5	6	4	4	1	10	4	54
384	659	Eakin et al 1980	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/150	mg/kg diet	N	NR	ADL	U	FD	16	w	NR	NR	JV	M	C	Lab	BIO	ENZ	Other	KI	150		Y	0.25	N	0.021982	13.2		10	10	5	5	6	1	4	1	10	4	56
385	659	Eakin et al 1980	Cadmium acetate	100	Sprague Dawley	2	0/150	mg/kg diet	N	NR	ADL	U	FD	16	w	NR	NR	JV	M	C	Lab	BIO	ENZ	Other	KI	150		N	0.235	N	0.020892	13.3		10	10	5	5	5	1	4	1	10	4	55
386	659	Eakin et al 1980	Cadmium acetate	100	Sprague Dawley	2	0/150	mg/kg diet	N	NR	ADL	U	FD	16	w	NR	NR	JV	M	C	Lab	PHY	PHY	BLPR	BL	150		N	0.235	N	0.020892	13.3		10	10	5	5	5	4	4	1	10	4	58
387	525	Webster, 1988	Cadmium chloride	100	Mouse (*Mus musculus*)	4	0/1.48//242.7/39806	ug/L	N	NR	ADL	U	DR	60	d	8	w	GE	F	C	Lab	BEH	FDB	WCON	WO	243		N	0.0225	Y	0.0088	15.6		10	5	5	10	6	4	4	1	10	4	59
388	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/80/160	mg/L	N	NR	ADL	U	DR	4	w	2	yr	AD	NR	C	Lab	PHY	PHY	GPHY	FM	160		N	0.51	N	0.054007	16.9		10	5	5	10	5	4	4	10	6	4	63
389	581	Nomiyama et al., 1975	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/300	mg/kg diet	N	NR	ADL	U	FD	52	w	NR	NR	NR	M	C	Lab	PHY	PHY	Other	NR	300		Y	3	N	0.169492	17.0		10	10	5	10	6	4	4	1	10	4	64
390	149	Van Vleet et al, 1981	Cadmium sulfate	100	Pig (*Sus scrofa*)	2	0/500	mg/kg diet	N	NR	ADL	U	FD	10	w	NR	NR	JV	M	C	Lab	BIO	ENZ	GLPX	BL	500		Y	14.8	N	0.629378	21.3		10	10	5	10	6	1	4	3	10	4	63
391	775	Takizawa et al 1981	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/50/200	mg/L	N	NR	NR	U	DR	180	d	NR	NR	GE	F	C	Lab	BIO	CHM	PHOS	SR	200		Y	0.2	N	0.023257	23.3		10	5	5	10	6	1	4	1	10	4	56
392	814	Koller and Roan, 1977	cadmium chloride	100	Mouse (*Mus musculus*)	4	0/3/30/300	mg/L	N	NR	NR	U	DR	70	d	28	d	JV	NR	C	Lab	BIO	ENZ	ACPH	MT	300		Y	0.018	N	0.002663	44.4		10	5	5	10	6	1	4	1	10	4	56
393	502	Cousins et al., 1973	Cadmium chloride	100	Pig (*Sus scrof*a)	5	0/50/150/450/1350	mg/kg diet	N	NR	ADL	U	FD	6	w	55	d	JV	M	C	FieldA	PTH	HIS	GHIS	MT	1350		Y	13.84	Y	0.69	67.3		10	10	5	10	7	4	4	1	10	4	65
394	14697	Herman et al, 1980	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.1/5	mg/L	N	NR	NR	U	DR	40	d	40	d	JV	M	C	Lab	BIO	HRM	GHRM	BR		0.100	N	0.217	N	0.025029		0.0121	10	5	5	4	5	1	4	10	10	4	58
395	649	Machida et al., 1983	Cadmium	100	Rat (*Rattus norvegicus*)	3	0/0.3/30	ug/g diet	N	NR	ADL	U	FD	12	mo	NR	NR	JV	B	C	Lab	BIO	CHM	GBCM	UR		0.300	Y	0.18	N	0.01678		0.0280	10	10	5	4	6	1	4	10	10	4	64
396	522	Muller and Stacey, 1988	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/48	ug/kg bw/d	N	NR	DLY	U	GV	6	w	NR	NR	AD	M	V	Lab	BIO	ENZ	CCOX	LI		48.0	Y	0.375	N	0.030677		0.0480	10	8	5	5	10	1	4	10	3	4	60
397	776	Yuhas et al 1979	Cadmium acetate	100	Rat (*Rattus norvegicus*)	4	0/1/10/100	mg/L	N	NR	ADL	U	DR	13	w	35	d	JV	M	V	Lab	BIO	ENZ	ALPH	SR		1.00	Y	0.43	Y	0.0409		0.0951	10	5	5	5	7	1	4	10	10	4	61
398	720	Ogoshi et al., 1989	cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/5/10	mg/L	N	NR	ADL	U	DR	4	w	21	d	JV	F	C	Lab	BIO	CHM	HMGL	BL		5.00	N	0.2024	N	0.023508		0.581	10	5	5	10	5	1	4	10	10	4	64
399	822	Sorell and Braziano, 1990	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/220/1650/2860	ug/org/d	N	NR	ADL	U	DR	14	d	NR	NR	GE	F	C	Lab	BIO	ENZ	ALAD	SR		220	N	0.338	Y	0.044		0.651	10	5	5	10	6	1	4	10	10	4	65
400	21099	Carmignani and Boscolo, 1984	Cadmium acetate	100	Rat (*Rattus norvegicus*)	3	0/10/20	mg/L	N	NR	ADL	U	DR	190	d	NR	NR	JV	M	C	Lab	PHY	PHY	BLPR	BL		10.0	N	0.267	N	0.030164		1.13	10	5	5	5	5	4	4	10	10	4	62
401	14580	Mahaffey et al., 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/kg diet	N	NR	NR	U	FD	10	w	NR	NR	AD	M	C	Lab	BIO	CHM	RBCE	BL		50.0	N	0.523	Y	0.0174		1.67	10	10	5	10	6	1	4	10	3	4	63
402	672	Larsson and Piscator 1971	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/25	mg/L	N	NR	ADL	U	DR	1	mo	8	mo	JV	NR	C	Lab	BIO	CHM	CALC	TB		25.0	N	0.523	N	0.055244		2.64	10	5	5	4	5	1	4	10	10	4	58
403	672	Larsson and Piscator 1971	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/25	mg/L	N	NR	ADL	U	DR	2	mo	8	mo	JV	NR	C	Lab	GRO	GRO	BDWT	WO		25.0	N	0.523	N	0.055244		2.64	10	5	5	4	5	8	4	10	10	4	65
404	779	Prigge et al., 1977	cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/25/50/100	mg/L	N	NR	ADL	U	DR	48	d	NR	NR	AD	M	C	Lab	BIO	CHM	HMCT	BL		25.0	Y	0.3708	N	0.040538		2.73	10	5	5	10	6	1	4	10	6	4	61
405	770	Washko and Cousins 1977	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/25	mg/L	N	NR	DLY	U	DR	8	w	NR	NR	JV	M	C	Lab	BIO	CHM	PCLV	BL		25.0	Y	0.314	N	0.00349		2.78	10	10	5	10	6	1	4	10	10	4	65
406	15506	Schroeder, 1968	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/3.570	mg/kg bw/d	N	NR	ADL	U	DR	727	d	21-23	d	JV	M	C	Lab	BIO	CHM	CHOL	SR		3.57	N	0.235	N	0.02689		3.57	10	5	5	5	10	1	4	10	10	4	64
407	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/10/20/40/80/160	mg/L	N	NR	ADL	U	DR	4	w	24	w	AD	NR	C	Lab	BIO	ENZ	ALPH	SR		40.0	N	0.4702	N	0.050198		4.27	10	5	5	10	5	1	4	10	10	4	64
408	631	Tewari et al., 1986	Cadmium chloride hydrate	49.23	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	45	d	NR	NR	NR	M	M	Lab	BIO	CHM	GLUC	BL		100	Y	0.12	N	0.012024		4.93	10	10	5	10	6	1	4	10	3	4	63
409	542	Valois and Webster, 1985	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/40	mg/L	N	NR	ADL	U	DR	3	w	NR	NR	AD	NR	C	Lab	PTH	HIS	GHIS	BR		40.0	N	0.0375	N	0.005155		5.50	10	5	5	10	5	4	4	10	3	4	60
410	21111	Sugawara and Sugawara, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	330	d	27	d	JV	F	C	Lab	BIO	CHM	ALBM	SR		50.0	Y	0.327	N	0.036202		5.54	10	5	5	10	6	1	4	10	10	4	65
411	607	Caflisch, 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/50/100	mg/L	N	NR	ADL	U	DR	40	d	NR	NR	AD	M	C	Lab	PHY	PHY	GPHY	SV		50.0	Y	0.25	N	0.02843		5.69	10	5	5	10	6	4	4	10	6	4	64
412	664	Revis 1981	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/50	mg/L	N	NR	ADL	U	DR	45	d	3	mo	JV	M	C	Lab	BIO	CHM	Other	KI		50.0	Y	0.192	Y	0.0246		6.41	10	5	5	4	7	1	4	10	10	4	60
413	21121	Novelli et al, 1998	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/1.44	mg/d	N	NR	ADL	U	DR	7	d	NR	NR	JV	M	C	Lab	BIO	CHM	TOPR	UR		1.44	Y	0.200	N	na		7.20	10	5	5	10	6	1	4	10	10	4	65
414	668	Bonner et al 1980	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/75	mg/kg diet	N	NR	NR	U	FD	48	w	NR	NR	JV	M	C	Lab	BIO	ENZ	ALPH	BO		75.0	Y	0.1	N	0.01035		7.76	10	10	5	4	6	1	4	10	10	4	64
415	720	Ogoshi et al., 1989	Cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/80/160	mg/L	N	NR	ADL	U	DR	4	w	2	yr	AD	NR	C	Lab	PTH	GRS	BDWT	WO		80.0	N	0.51	N	0.054007		8.47	10	5	5	10	5	4	4	10	6	4	63
416	720	Ogoshi et al., 1989	cadmium chloride	100	Rat (*Rattus norvegicus*)	3	0/80/160	mg/L	N	NR	ADL	U	DR	4	w	2	yr	AD	NR	C	Lab	BIO	CHM	MCHC	BL		80.0	N	0.51	N	0.054007		8.47	10	5	5	10	5	1	4	10	6	4	60
417	769	Hokawa et al., 1978	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/100	mg/kg diet	N	NR	ADL	U	FD	60	d	NR	NR	SM	F	C	Lab	BIO	CHM	HMCT	BL		100	Y	0.2145	N	0.019382		9.04	10	10	5	10	6	1	4	10	3	4	63
418	689	Davis et al 1995	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/90	mg/L	N	NR	ADL	U	DR	112	d	40	d	JV	M	V	Lab	BEH	BEH	AGGT	WO		90.0	N	0.4702	N	0.050198		9.61	10	5	5	4	5	4	4	10	10	4	61
419	744	Tseng et al 1988	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/L	N	NR	ADL	U	DR	30	d	NR	NR	JV	M	C	Lab	BIO	ENZ	GPTR	LI		100	Y	0.06	N	0.00787		13.1	10	5	5	10	6	1	4	10	10	4	65
420	744	Tseng et al 1988	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/L	N	NR	ADL	U	DR	30	d	NR	NR	JV	M	C	Lab	BIO	ENZ	GPTR	LI		100	Y	0.06	N	0.00787		13.1	10	5	5	10	6	1	4	10	10	4	65
421	530	Murthy et al., 1987	Cadmium acetate	100	Rat (*Rattus norvegicus*)	2	0/100	mg/L	N	NR	ADL	U	DR	120	d	21	d	JV	NR	C	Lab	PTH	HIS	GHIS	BR		100	Y	0.05	N	0.006679		13.4	10	5	5	5	6	4	4	10	10	4	63
422	581	Nomiyama et al., 1975	Cadmium chloride	100	Rabbit (*Oryctolagus cuniculus*)	2	0/300	mg/kg diet	N	NR	ADL	U	FD	4	w	NR	NR	NR	M	C	Lab	BIO	ENZ	ACPH	UR		300	Y	3	N	0.169492		17.0	10	10	5	10	6	1	4	10	3	4	63
423	19500	Novelli et al, 1994	Cadmium chloride	100	Rat (*Rattus norvegicus*)	2	0/200	mg/L	N	NR	ADL	U	DR	7	d	15	mo	AD	M	C	Lab	BIO	ENZ	ALPH	SR		200	N	0.5	N	0.053053		22.3	10	5	5	10	5	1	4	10	3	4	57
Data Not Used to Derive Wildlife Toxicity Reference Value - Measurements of biochemical, behavioral and pathology changes in progeny of exposed parents																																												
424	641	Baranski et al, 1983	Cadmium chloride	100	Rat (*Rattus norvegicus*)	4	0/0.04/0.4/4	mg/kg bw/d	N	NR	5 per w	U	GV	8	w	3	mo	GE	F	C	Lab	REP	REP	OTHR	PY	0.400	4.00	Y	0.192	N	0.017694	0.400	4.00	10	8	10	10	10	10	8	10	10	4	90
425	21073	Chmielnicka and Sowa, 1996	Cadmium chloride	100	Rat (*Rattus norvegicus*)	6	0/0.72/1.34/3.04/4.59/9.17	mg/kg bw/d	N	NR	NR	U	DR	20	d	NR	NR	GE	F	C	Lab	REP	REP	OTHR	PY	1.34	3.04	Y	0.2	N	0.023257	1.34	3.04	10	5	5	10	10	10	10	10	10	4	84
426	489	Smith et al, 1991	Cadmium chloride	100	Cattle (*Bos taurus*)	3	0/0.025/0.125	mg/kg bw/d	N	NR	ADL	U	FD	394	d	NR	NR	GE	F	C	FieldA	REP	REP	OTHR	PY		0.0250	Y	340	N	8.276227		0.0250	10	10	5	10	10	10	4	10	10	4	83
427	536	Murthy et al., 1986	Cadmium acetate	100	Rat (*Rattus norvegicus*)	3	0/4200/8400	ug/L	N	NR	ADL	U	DR	21	d	NR	NR	GE	F	C	Lab	REP	REP	OTHR	PY		4200	Y	0.225	Y	0.048		0.896	10	5	5	5	7	10	4	10	10	4	70
428	824	Webster, 1978	Cadmium chloride	100	Mouse (*Mus musculus*)	2	0/40	mg/L	N	NR	DLY	U	DR	19	d	NR	NR	GE	F	C	Lab	REP	REP	OTHR	PY		40.0	Y	0.043	N	0.005831		5.42	10	5	5	10	6	10	4	10	10	10	80

Ref			Exposure																			Effects						Conversion to mg/kg bw/day				Result		Data Evaluation Score										
Result #	Ref N.		Chemical Form	MW%	Test Species	# of Conc/ Doses	Conc/ Doses	Conc/Dose Units	Wet Weight Reported?	Percent Moisture	Application Frequency	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Control Type	Test Location	General Effect Group	Effect Type	Effect Measure	Response Site	Study NOAEL	Study LOAEL	Body Weight Reported?	Body Weight in kg	Ingestion Rate Reported?	Ingestion Rate in kg or L/day	NOAEL Dose (mg/kg/day)	LOAEL Dose (mg/kg/day)	Data Source	Dose Route	Test Concentrations	Chemical form	Dose Quantification	Endpoint	Dose Range	Statistical Power	Exposure Duration	Test Conditions	Total
429	746	Stewart et al 1984	Cadmium	100	Rat (*Rattus norvegicus*)	2	0/25	mg/kg bw/d	N	NR	DLY	U	GV	12	d	NR	NR	GE	F	C	Lab	REP	REP	OTHR	PY		25.0	Y	0.25	N	0.021982		25.0	10	8	10	4	10	10	4	10	10	4	80

All abbreviations and definitions are used in coding stuides are available from Attachment 4-3 of the Eco-SSL g*uidance* (U.S. EPA 2003).