RATL: A Database of Reptile and Amphibian Toxicology Literature

B.D. Pauli, J.A. Perrault and S.L. Money

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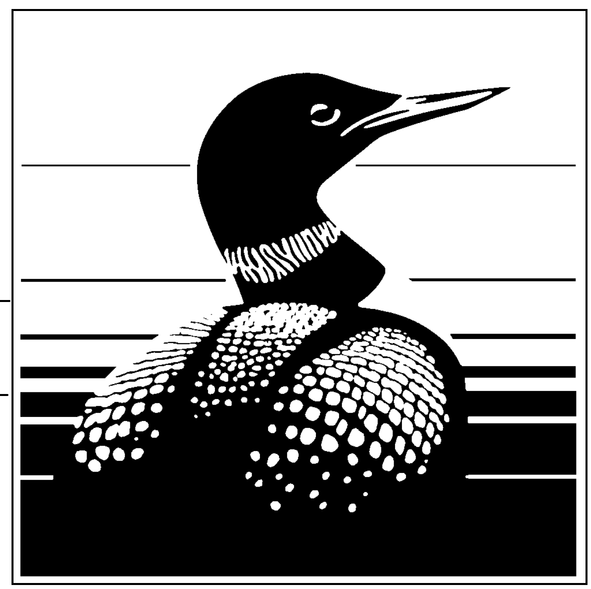

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ABSTRACT

Many amphibian and reptile populations are presently in decline. As environmental contaminants have been implicated as a possible cause of some declines, there has been a great deal of interest in reptile and amphibian ecotoxicology. Data resulting from earlier published research on the effects of environmental contaminants on amphibians were tabulated and assessed in a Canadian Wildlife Service report published in 1989 (Harfenist A., T. Power, K.L. Clark and D.B. Peakall. 1989. *A Review and Evaluation of the Amphibian Toxicological Literature*. Technical Report Series No. 61. Canadian Wildlife Service, Headquarters). In the present document we attempt to bring this earlier report up to date by adding data from the more recent literature on amphibian ecotoxicology, and at the same time expand it by adding data on the effects of environmental contaminants on reptiles.

As the project progressed, it became clear that making the information in the database electronically searchable might be beneficial to users of the database. Therefore, a graphical user interface (GUI) was added to the database to allow the user to perform custom searches and generate reports. The database can be searched in a number of ways, for instance, by contaminant group, common name, trade name or CAS number; by species, genus, or higher taxonomic group; by author; or by certain toxicological effects categories. Combined searches are also possible. The database and GUI will be available to be downloaded from a CWS website; please contact the authors for details.

The RATL (Reptile and Amphibian Toxicology Literature) database contains data extracted from the primary literature for amphibian and reptile ecotoxicology studies published up to and including 1997; there are some data from studies published in 1998 and 1999. As of September, 2000, there was approximately 2000 references in the database. Citations were gathered through searches of various literature databases, but these searches concentrated on the environmental pollution literature with the result that our bibliography cannot be considered exhaustive. Thus the authors would be happy to hear about (even happier to receive copies of) publications and grey literature reports not included in our reference list. The user should also be aware that certain fields of research (e.g. effects of administration of pharmaceuticals or hormones) may not be well covered in the database.

The information in this report has been organized into eight main tables categorized by the type of study which generated the data: 1) laboratory studies (except traditional acute toxicity studies), 2) field studies, 3) tissue residue studies, 4) acute toxicity studies, 5) studies examining the effect of pH changes, 6) FETAX (Frog Embryo Teratogenicity Assay - *Xenopus*) studies, 7) contaminant review papers, and 8) general publications dealing with amphibian and reptile population declines. While these tables provide summaries of the data, the purpose of RATL is to provide the user with the appropriate references to the primary amphibian and reptile ecotoxicology literature. In other words, because the data in RATL have

been extracted from primary sources, a process subject to interpretation and editing, it is recommended that the user consult the original reference before using the data presented in the RATL database.

Although this CWS Technical Report is available as a static copy available from a CWS website, data and references will be added to the electronic copy of the database, and the GUI will be modified as a result of suggestions and feedback from users. Therefore, we consider the RATL database as "under construction." Finally, this CWS Technical Report represents only a subset of the data provided in the electronic copy of the database which is available at the website mentioned above.

PRÉFACE

De nombreuses populations d'amphibiens et de reptiles sont actuellement en déclin. Comme les contaminants de l'environnement ont été identifiés comme étant une cause possible de certains déclins, l'intérêt pour l'écotoxicologie des reptiles et des amphibiens s'est accru de beaucoup. Les données tirées de recherches publiées antérieurement concernant les effets des contaminants de l'environnement sur les amphibiens ont été mises en tableaux et évaluées dans un rapport du Service canadien de la faune publié en 1989 (Harfenist A., T. Power, K.L. Clark et D.B. Peakall. 1989. *A Review and Evaluation of the Amphibian Toxicological Literature*, Série de rapports techniques n° 61, Service canadien de la faune, Administration centrale). Le présent document a pour but de faire une mise à jour du rapport précédent en y ajoutant des données tirées de documents plus récents sur l'écotoxicologie des amphibiens et, en même temps, d'en accroître la portée en y ajoutant aussi des données sur les effets des contaminants de l'environnement sur les reptiles.

À mesure que le projet avançait, il est devenu clair que rendre la base de données consultable électroniquement serait peut-être avantageux pour les utilisateurs. Une interface GUI a donc été ajoutée à la base de données afin de permettre aux utilisateurs d'effectuer des recherches personnalisées et de produire des rapports. Il y a un certain nombre de façons d'exécuter une recherche dans la base de données, par exemple, par groupes de contaminants, par noms communs ou de commerce ou par numéro de registre CAS; par espèce, par genre ou par niveau taxinomique plus élevé; par auteur ou par certaines catégories d'effets toxicologiques. Il est aussi possible d'effectuer des recherches combinées. Il sera possible de télécharger la base de données et l'interface GUI à partir d'un site Web du Service canadien de la faune. Veuillez communiquer avec les auteurs pour obtenir plus de renseignements.

La Base de données bibliographiques sur la toxicologie liée aux reptiles et aux amphibiens (la base RATL) contient des données tirées d'études préalables sur l'écotoxicologie des amphibiens et des reptiles qui ont été publiées jusqu'en 1997 inclusivement; il y a aussi certaines données tirées d'études publiées en 1998 et en 1999. Depuis septembre 2000, il y a près de 2000 références dans la base de données. Des citations ont été recueillies lors de recherches dans diverses bases de données, mais ces recherches étaient concentrées sur des textes traitant de la pollution de l'environnement; notre bibliographie n'est donc pas exhaustive. Par conséquent, les auteurs seraient heureux d'entendre parler de publications ou de rapports de littérature grise qui ne sont pas inscrits à notre liste de références, et encore plus heureux de recevoir des exemplaires. Il faut aussi que les utilisateurs sachent que certains domaines de recherche (p. ex. les effets de l'administration de produits pharmaceutiques ou d'hormones) peuvent ne pas être traités en profondeur dans la base de données.

Dans le présent rapport, l'information a été organisée en huit principaux tableaux et classifiée par le type d'étude dans laquelle des données ont été trouvées : 1) les études de laboratoires (sauf les études traditionnelles sur la toxicité aiguë); 2) les études sur le terrain; 3) les études sur les résidus de tissus, 4) les études sur la toxicité aiguë; 5) les études qui examinent les effets des changements du pH; 6) les études « FETAX » (Frog Embryo Teratogenicity Assay - Xenopus); 7) les articles de synthèse sur les contaminants; 8) les publications générales sur les populations d'amphibiens et de reptiles en déclin. Alors que ces tableaux donnent un résumé des données, le but de la base RATL est de fournir aux utilisateurs les références pertinentes aux documents de fond sur les amphibiens et les reptiles. Autrement dit, parce que les données dans la base RATL ont été tirées de sources primaires, une démarche sujette à l'interprétation et à la révision, nous recommandons aux utilisateurs de consulter la référence originale avant d'utiliser les données présentées dans la base de données de la base RATL.

Même si ce rapport technique du SCF est disponible en format statique sur un site Web du SCF, des données et des références seront ajoutées au format électronique de la base de données, et l'interface GUI sera modifiée suite aux suggestions et aux réactions des utilisateurs. Nous considérons donc que la base de données RATL est « en construction ». Enfin, le présent rapport technique du SCF ne présente qu'un sous-ensemble des données qui sont accessibles dans le format électronique de la base de données du site Web précité.

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ACKNOWLEDGEMENTS

We would like to acknowledge Jean-François Belanger and Sanjeev Singla of Singla Consultants for their contributions to this project. We owe David Ward and Sara Lancaster a special debt of gratitude for their initial contributions to the design of the database and interface, and special thanks to Sara for her many hours spent in data entry.

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INTRODUCTION

Why is there a need for studies in amphibian and reptile ecotoxicology?

A worldwide decline in amphibian and reptile populations has caused great concern in the scientific community. As environmental contaminants have been implicated as a possible cause of some declines, there has been a substantial increase in the amount of amphibian and reptile ecotoxicology research conducted over the last decade. In addition, amphibians and reptiles are considered to be good indicators of general environmental health. Reptiles are long-lived, sedentary beings and therefore may be good "biomonitors" of their local environment. Amphibians typically have both terrestrial and aquatic life stages and may be susceptible to the effects of environmental contaminants.

Background

In 1989 the Canadian Wildlife Service (CWS) published a report in the CWS Technical Report Series which reviewed the available literature concerning the effects of environmental contaminants on amphibians (Harfenist A., T. Power, K.L. Clark and D.B. Peakall. 1989. A Review and Evaluation of the Amphibian Toxicological Literature. Technical Report Series No. 61. Canadian Wildlife Service, Headquarters). Harfenist *et al.* (1989) divided their report into data tables containing field data, laboratory data, acute toxicity data, and tissue residue data. The tables were organized by contaminant. The tables summarized the conditions of the study and some of the effects or results that were presented in the original publication. The report also provided a review of principal contaminants and contaminant classes and described short and long term effects, residues and mechanisms of toxicity for each. Contaminant classes that were discussed include insecticides (organochlorines, carbamates, organophosphates and pyrethroids), herbicides and fungicides, bactericides, lampricides, various other organics, metals, radioactive isotopes, and other more generally classified stressors such as industrial effluents, water quality and pH. The Harfenist *et al.* report was found to be highly useful and was very popular. Nevertheless, it became clear that an updated version of the information, available as an electronic, searchable database, might be of some benefit to the scientific community.

Therefore, to meet a growing interest in reptile and amphibian ecotoxicology, we decided to compile a new version of the Harfenist *et al.* report which would include updated information on amphibian ecotoxicology and include ecotoxicological data on reptiles. We attempted to obtain as much primary literature as we could on these subjects, as well as literature concerning the effects of other "environmental stressors." Examples of the latter might be increases in temperature or effects of exposure to "non-traditional" environmental contaminants (such as pharmaceutical products that may be contained in waste streams). In the process, we developed a database we called the Reptile and Amphibian Toxicological Literature (RATL) database and made the database interactively searchable using a graphical user interface. The graphical user interface allows the user to perform custom searches and generate reports. For instance, searches can be made by: contaminant group, common name, trade name or CAS number; by species, genus, or higher taxonomic group; by author; or by certain toxicological effects categories. Combined searches are also possible. Finally, a decision was made to make the database and interface software available to anyone who wanted to download it from a site on the World Wide Web.

The RATL database

The RATL database allows searches of the worldwide (but mostly English-language) literature concerning reptile and amphibian ecotoxicology. It allows the user to find published information on the effects of environmental contaminants on these animals, and, possibly more importantly, can help identify gaps in this literature and aid in the determination of relevant areas of future study.

The RATL database contains data extracted from the primary literature for amphibian and reptile ecotoxicology studies published up to and including 1997. Many citations from 1998 have had their data entered and some data for 1999 are also included. We hope that the database will be updated regularly with new publications in the field. Currently, there are approximately 2000 references in the database.

The data extracted from the RATL references were classified based on three categories: species, contaminant and lifestage. One *study* (as defined for entry into the RATL database) was considered to have one unique species, contaminant and lifestage. This means that one *reference* (one citation) may contribute multiple studies to the RATL database if, for example, the effect of a specific contaminant was studied on a variety of species and/or lifestages (one lifestage, one contaminant, and one species = one study).

At present, the RATL database contains approximately 6200 contaminant-related studies, divided almost equally between reptiles and amphibians. Approximately 650 different species are listed in the database and 380 species have contaminant data for them. At present, 72% of the species with contaminant data are amphibians. The database contains information from as early as 1926 and represents studies from 48 different countries. Of the field studies where country was reported, 60% were done in the United States while 17% of the sites were in Canada (74% in Ontario, 16% in Quebec, 5% in British Columbia). Approximately 1300 of the studies contain tissue residue concentrations, 65% of which pertain to reptiles. Approximately 700 studies contain acute toxicology data, almost all of which pertain to amphibians.

There are 820 different contaminants listed in the database. Of the classes of contaminants studied, pesticides account for the majority of studies (43%) and insecticides account for 57% of the studies conducted with pesticides. The RATL database also includes studies on metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), radiation studies and altered acidity studies, amongst others. Available in association with the electronic version of the database is the introduction and data evaluation from the original 1989 Harfenist *et al.* report. We have not conducted a similar evaluation of the newer literature. Finally, some studies that are not directly related to contaminant exposure were also included in the database but their data was not entered in a comprehensive manner.

Limitations of RATL

The RATL database is intended as a tool to search for data contained in the published literature. It was not possible to extract and enter all relevant or pertinent data from the original papers and the primary source should be consulted for full details on methodology, specific toxicological effects, and authors' conclusions. Further, although the information in RATL was extracted from the primary sources as accurately as possible, it might be considered an interpretation of the text and data provided in the papers, and should therefore be used with caution. In addition, study endpoints and exposure routes were generally assigned using standardized classification terms (these can be found in Appendix 6); sometimes these were not specifically reported in the paper. In effect, the level of detail reported in the RATL database does not reflect the amount of information provided in the original primary source. For these reasons, it is highly recommended that the user obtain the original reference before using the data presented in this report or obtained from the RATL database.

Data entry in the RATL database

Data extraction methods, interpretation of studies and RATL data entry methods changed over time and also varied between data entry personnel. The initial data extraction process was far more intensive than it was for studies entered later. Eventually, standardized codes were employed so that data entry would be more consistent and the level and kinds of detail reported were similar between papers and data entry personnel. As a result, users may notice some difference in the level of detail entered for some studies

Purpose and scope of this report

The purpose of this report is to provide a map or a guideline to the primary published amphibian and reptile English-language ecotoxicology literature. This report represents a subset of the detail provided in the electronic version of the RATL database. The information in this report has been organized into eight main tables separated by the type of study which generated the data: 1) laboratory studies, 2) field studies, 3) tissue residue studies, 4) acute toxicity studies, 5) studies examining the effect of pH changes, 6) FETAX (Frog Embryo Teratogenicity Assay - *Xenopus*) studies, 7) contaminant review papers, and 8) general publications dealing with amphibian and reptile population declines. Tables 1 to 6 include certain information that has been coded or given acronyms; this coded information is detailed in the Appendices following the tables.

Future plans for RATL

A further component of this project is to analyse the collected information in terms of the comparative toxicity of compounds or classes of compounds to amphibians in relation to other aquatic organisms. As RATL is still a "work in progress," comments and suggestions on how the RATL database could be made more useful are welcome and should be submitted to the authors.

Table 1: Contaminant residues measured in field samples of reptiles and amphibians

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
2,4,5-T	APSE	adult	TX, USA	1977		ND			ND	ND	ND		Harris 1978
2,4,5-T	TRSC	adult	TX, USA	1977		ND-252			ND-245	ND-2	ND-13	ND-18	Harris 1978
acephate	BUXX	adult	ME, USA	1977	ND-222 ppb in tissues 1 d following the appl. 30 d post-spray= ND								Sassaman 1978
acephate	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
acephate	RAXX	adult	ME, USA	1977	ND-222 ppb in tissues 1 d following the appl. 30 d post-spray= ND								Sassaman 1978
Ag	BOBO	adult	Hungary	< 1997	kidney>liver~= skin> muscle~= stomach> ovary (F)								Puky and Oertel 1997
Ag	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						0.57-2.50		Lee and Stuebing 1990
Ag	RAES	adult	Hungary	< 1997	ovary: Range of Means= 1.08-171 mg/kg	Range of Means= 1.08-171 mg/kg							Puky and Oertel 1997
Ag	RAES	egg	Hungary	< 1997		Range of Means= 0-81.6 mg/kg							Puky and Oertel 1997
Al	ACJA	adult	Papua New Guinea	1980-81						3.0			Yoshinaga et al. 1992
Al	AGSS	adult	Greece	< 1997	carcass; ppm dw		769-1601.7				120-133		Loumbourdis 1997
Al	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 1.5, L. Griffin= 2.0, L. Apopka= 1.3.							Heinz et al. 1991
Al	CACA	egg	FL, USA	1977		3.5- 6.3 µg/g							Stoneburner et al. 1980
Al	CHMY	adult	Papua New Guinea	1980-81						12.2			Yoshinaga et al. 1992
Al	CHMY	juvenile	HI, USA	< 1994							Range= 1.0-5.0		Aguirre et al. 1994
Al	CHXX	adult	Papua New Guinea	1980-81						25.8			Yoshinaga et al. 1992

Table 1- Field Residues - 2

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Al	CRAC	egg	FL, USA	1980		shell= 52.36 µg/g; yolk/alb= 10.86 µg/g							Stoneburner 1984
Al	CRPO	adult	Papua New Guinea	1980-81						4.1			Yoshinaga et al. 1992
Al	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= 5.0	11.1 µg/g ww		Linder et al. 1991
Al	VAXX	adult	Papua New Guinea	1980-81						6.1			Yoshinaga et al. 1992
aldicarb	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
aldrin	AMBA	egg	Australia	1970-71					ND				Best 1973
aldrin	BUAM	adult	MO, USA	1965-67	Aldrin= 0.03; dieldrin=1.37; DDD, DDE, DDT= 0.13								Korschgen 1970 [k]
aldrin	BUAM	tadpole	MO, USA	1965-67	Dieldrin=4.60; DDD, DDE, DDT= 0.07 in 10gww								Korschgen 1970 [k]
aldrin	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
aldrin	CRNO	egg	Australia	1970-71					ND				Best 1973
aldrin	CRPO	egg	Australia	1970-71					ND				Best 1973
aldrin	KIFL	adult	TX, USA	1974	carcass		4						Flickinger and Mulhern 1980
aldrin	LIOL	egg	Australia	1970-71					ND				Best 1973
aldrin	MOSV	egg	Australia	1970-71					ND				Best 1973
aldrin	NERH	adult	LA, USA	1977-79			ND-0.01 ppm		ND-0.02	ND	ND		Sabourin et al. 1984
aldrin	NERH	embryo	LA, USA	1977-79	embryo= ND-0.13 ppm								Sabourin et al. 1984
aldrin	PSAU	egg	Australia	1970-71					ND-0.05				Best 1973
aldrin	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
aldrin	STMO	egg	Australia	1970-71					ND				Best 1973
aldrin	SUSU	egg	Australia	1970-71					ND				Best 1973
aldrin	TRSC	adult	TX, USA	1968-71		0.2	4.8						Flickinger and King 1972
aldrin	VAGI	egg	Australia	1970-71					ND				Best 1973
aldrin	VAGO	egg	Australia	1970-71					ND				Best 1973
aminocarb	BUAM	larvae	PQ, CAN	1984	stage 25- 31 up to 1 d post-spray= 0.25- 0.128; 3 d post-spray= 0.022- 0.026; 14 d post-spray < 0.005								Mamarbachi et al. 1987 [k]

Table 1- Field Residues - 3

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
aminocarb	RASY	larvae	PQ, CAN	1984	0.25 d post-spray stage 31-32 larvae= 0.022; 12 d post-spray stage 29-37 larvae < 0.005								Mamarbachi et al. 1987 [k]
Ar	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
Aroclor 1254	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Aroclor 1254	NECY	embryo	LA, USA	1977-79	embryo= 1.33 ppm								Sabourin et al. 1984
Aroclor 1254	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.61- 28.5 ppm								Gendron et al. 1997
Aroclor 1254	NERH	embryo	LA, USA	1977-79	embryo= 0.8- 1.28 ppm								Sabourin et al. 1984
Aroclor 1260	CACA	egg	FL, USA	1976		0.032- 0.201							Clark and Krynitsky 1980
Aroclor 1260	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Aroclor 1260	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.14- 8.5 ppm								Gendron et al. 1997
As	ACCR	tadpole	TX, USA	1994			Mean= 6.70; Range= 4.32- 9.52						Clark et al. 1998
As	CHMY	juvenile	HI, USA	< 1994							Range= 0.9-6.4		Aguirre et al. 1994
As	DECO	adult	Ireland	1988					1.28± 0.18	0.21± 0.07 (pectoral)	0.58± 0.11		Davenport and Wrench 1990
As	RACA	tadpole	TX, USA	1994	carcass= 0.41 (n=1)								Clark et al. 1998
As	RACA	tadpole	SC, USA	1995-96			Mean for ash site= 48.9; Mean for ref site= 2.5 dw						Rowe et al. 1996
As	RACL	tadpole	TX, USA	1994			Range= 0.56- 5.47						Clark et al. 1998
As	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= ND	ND		Linder et al. 1991
As	RASP	tadpole	TX, USA	1994	carcass= 0.32 (n=1)		Mean= 0.54; Range= 0.33- 0.82						Clark et al. 1998
atrazine	RACA	tadpole	KS, USA	1973-74	atrazine: 0.235- 0.309 2- 85 d post-spray; carbofuran: ND when applied at 0.025 ppm with atrazine= 0.3 ppm								Klassen and Kadoum 1979 [k]

Table 1- Field Residues - 4

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
atrazine	RACL	adult & young of the year	ON, CAN	1993-95	orchard 1 at 0.051-0.081 µg/L; orchard 2 0.063 -15.0 µg/L; orchard 3 0.063- 0.13 µg/L; orchard 4 0.055- 0.11 µg/L and at orchard sites from 0.039- 0.2 µg/L								Harris et al. 1998
atrazine	RAPI	adult & young of the year	ON, CAN	1993-95	0.07 µg/L in pond water at orchard 1; 0.37 µg/L at orchard 2; 0.08 µg/L at orchard 3; 0.07µg/L at orchard 4								Harris et al. 1998
azinphos-methyl	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
azinphos-methyl	RACL	adult & young of the year	ON, CAN	1993-95	at orchard 1 only at 1.0 µg/L								Harris et al. 1998
azinphos-methyl	RAPI	adult & young of the year	ON, CAN	1993-95	ND at all of the orchard sites								Harris et al. 1998
Ba	AGSS	adult	Greece	< 1997	carcass; ppm dw		49.76-122.88				13-22.77		Loumbourdis 1997
Ba	CHMY	juvenile	HI, USA	< 1994							Range= 0.58-0.83		Aguirre et al. 1994
Ba	RACA	tadpole	SC, USA	1995-96			Mean (ash site)= 211.5; Mean (ref site)= 81.2 dw						Rowe et al. 1996
Be	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
bendiocarb	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
benzene hydrochloride	ALMI	adult	FL, USA	1985	tail muscle					0.01-0.04 (tail)			Delany et al. 1988
benzene hydrochloride	CNXX	adult	TX, USA	1965						0-2.0			Culley and Applegate 1966
benzene hydrochloride	CNXX	adult	TX, USA	1965						2.3			Culley and Applegate 1966
benzene hydrochloride	CNXX	adult	TX, USA	1965	gravid female					1.1			Culley and Applegate 1966
benzene hydrochloride	CNXX	egg	TX, USA	1965		11.6							Culley and Applegate 1966
benzene hydrochloride	NECY	adult	LA, USA	1977-79			ND-0.1ppm						Sabourin et al. 1984

Table 1- Field Residues - 5

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
benzene hydrochloride	NECY	embryo	LA, USA	1977-79	embryo= 0.64 ppm								Sabourin et al. 1984
benzene hydrochloride	NERH	adult	LA, USA	1977-79			ND		1.47 (n=7)				Sabourin et al. 1984
BHC	AMBA	egg	Australia	1970-71					ND				Best 1973
BHC	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
BHC	CHPI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); ND- 0.06								Campbell 1975
BHC	CHSE	adult	ON, CAN	1995	Range of Means in blood= ND-0.4 ng/g ww (M)								de Solla et al. 1998
BHC	CHSE	egg	ON, CAN	1986-89		1986-87: 0.1-17; 1988-89: 0.7-25 ng/g ww							Bishop et al. 1991
BHC	CHSE	egg	ON, CAN	1981-91		0.003-0.35							Bishop et al. 1996
BHC	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.4-17.2 ng/g ww							Bonin et al. 1995
BHC	CHSE	egg	ON, CAN	1981, 84		Range= ND-0.13 mg/kg. L. St. Clair 0.13 mg/kg; Loon Island 0.043 mg/kg; <0.001 at Algonquin Park							Struger et al. 1993
BHC	CNXX	adult	TX, USA	1965	brain=0-0.4; Range of Mean values for 3 sites and 3 mos and 5-6 animals per site/mo	5.6	0.8-1.1	0-1.5 ppm	0-11.5	0-2.0 ppm	0-1.1 ppm		Culley and Applegate 1967
BHC	CRNO	egg	Australia	1970-71					ND				Best 1973
BHC	CRPO	egg	Australia	1970-71					ND				Best 1973
BHC	CRVI	adult	CO, USA	1971					alpha and beta BHC =< 0.01-0.01 ppm				Bauerle et al. 1975

Table 1- Field Residues - 6

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
BHC	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); < 0.01								Campbell 1975
BHC	LIOL	egg	Australia	1970-71					ND				Best 1973
BHC	LIPG	adult	India	1991			0.01-0.02 ng/g ww						Ramesh et al. 1992
BHC	LITA	adult	Australia	1972	0.007 mg/kg ww								Birks and Olsen 1987
BHC	MOSV	egg	Australia	1970-71					ND				Best 1973
BHC	NECY	adult	LA, USA	1977-79			<0.01-0.07 ppm						Sabourin et al. 1984
BHC	NECY	embryo	LA, USA	1977-79	embryo= 0.14 ppm								Sabourin et al. 1984
BHC	NEMA	adult	ON, CAN	1988, 90			pooled= 0.2-4.3 ng/g ww						Bonin et al. 1995
BHC	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.002-0.015 ppm								Gendron et al. 1997
BHC	NERH	adult	LA, USA	1977-79			0.02-0.20 ppm		0.2-1.72 ppm	ND-0.01	0.01-0.03 ppm		Sabourin et al. 1984
BHC	NERH	embryo	LA, USA	1977-79		0.04-0.27 ppm (Belle Helene> Thomas Point)							Sabourin et al. 1984
BHC	PICA	adult	CO, USA	1971					beta BHC= 0.013 ppm				Bauerle et al. 1975
BHC	PSAU	egg	Australia	1970-71					ND-0.22				Best 1973
BHC	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
BHC	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
BHC	RACL	adult	ON, CAN	<1997			Range= 0.08-0.49						Russell et al. 1997
BHC	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
BHC	STMO	egg	Australia	1970-71					0.02				Best 1973
BHC	SUSU	egg	Australia	1970-71					ND				Best 1973
BHC	VAGI	egg	Australia	1970-71					ND				Best 1973
BHC	VAGO	egg	Australia	1970-71					ND-0.02				Best 1973

Table 1- Field Residues - 7

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
BHC	VAXX	adult	India	1987			0.03-0.31 ng/g ww						Ramesh et al. 1992
BHC	XXFR	adult	Greece	1992-93			Mean= 0.56-2.45 (alpha-beta); Range= ND-3.60						Albanis et al. 1996
bromocyclen	PYMB	adult	UK	~1983	heart: 12 µg/g; brain: 2.3 µg/g; stomach: 17 µg/g				4670 µg/g	3.8 µg/g	169 µg/g	34 µg/g	Quick 1992
carbaryl	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
carbofuran	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
carbofuran	THSI	adult	VA, USA	1991	brain= ND								Stinson et al. 1994
carbo-phenothion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Cd	AGSS	adult	Greece	< 1997	carcass; ppm dw		1.01-1.36				9.87-27.18		Loumbourdis 1997
Cd	ALMI	adult	FL, USA	1985	tail muscle					0.01-0.06 (tail)			Delany et al. 1988
Cd	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
Cd	BOBO	adult	Hungary	< 1997	kidney>skin> liver>stomach~=muscle>ovary (F)								Puky and Oertel 1997
Cd	BUAM	adult	PA, USA	1979			Range= 0.9-2.1 mg/kg dw						Beyer et al. 1985 [k]
Cd	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						0.45-3.08		Lee and Stuebing 1990
Cd	BUWO	adult	PA, USA	1979			Range= 1.0-1.6 mg/kg dw						Beyer et al. 1985 [k]
Cd	BUXX	adult	MD, USA	< 1984			0.15- 4				0.08- 0.13	1.9	Hall and Mulhern 1984 [k]
Cd	CACA	adult	Japan	1990-91						Mean= 0.062, Range= 0.041-0.117	Mean= 9.29, Range= 5.66-14.6,	Mean= 39.4, Range= 18.1-56.5	Sakai et al. 1995

Table 1- Field Residues - 8

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cd	CACA	egg	GA, USA	< 1974		Mean= 0.17 (yolk); 0.56 (alb) ppm							Hillestad et al. 1974
Cd	CACA	egg	Japan	1990-91		Mean= 14.7, Range= 13.2-16.5							Sakai et al. 1995
Cd	CACA	egg	FL, USA	1977		0.2- 0.19 µg/g							Stoneburner et al. 1980
Cd	CHMY	adult	Japan	1990-91							Mean= 9.3, Range= 0.39-26.0	Mean= 26, Range= 4.72-70.2	Sakai et al. 1995
Cd	CHMY	juvenile	HI, USA	< 1994							Range= 0.39-26.0		Aguirre et al. 1994
Cd	CHSE	adult	NJ, USA	1981-82							0.06-0.10 for all sites	0.07 (M), 0.07 (F) from Control, 0.24 (M), 0.3 (F) from brackish water, 0.09 (M) from fresh water	Albers et al. 1986
Cd	CHSE	adult	MN, USA	1981						Red Meat: 0.002-0.025 Mean= 0.01 mg/kg			Helwig and Hora 1983
Cd	CHSE	adult	MN, USA	1981						Range= 0.002-0.025 mg/kg			Minnesota Pollution Control Agency 1982
Cd	CRAC	egg	FL, USA	1980		shell= 1.36 µg/g; yolk/alb= 0.13 µg/g							Stoneburner 1984

Table 1- Field Residues - 9

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cd	CRNI	egg	Zimbabwe	1981-82		< 0.03-0.168 mg/kg dw							Phelps et al. 1986
Cd	DECO	adult	Ireland	1988					<0.01	0.06± 0.01 (pectoral)	0.22± 0.02		Davenport and Wrench 1990
Cd	DECO	adult	Japan	1990-91						0.06	0.22		Sakai et al. 1995
Cd	DECO	egg shells	Mexico	1992-93		1.04 mg/kg							Vazquez et al. 1997
Cd	NOVI	adult	PA, USA	1987			max= 1.8						Storm et al. 1994
Cd	PIME	hatchling	NJ, USA	1985-90	skin= 115± 28		115± 20						Burger 1992
Cd	PLCI	adult	PA, USA	1979			Range= 1.1-2.6 mg/kg dw						Beyer et al. 1985 [k]
Cd	PLCI	adult	PA, USA	1987			Range of Means= 0.4- 1.6						Storm et al. 1994
Cd	PLGL	adult	PA, USA	1979			Range= 0.9-1.0 mg/kg dw						Beyer et al. 1985 [k]
Cd	RACA	adult	MD, USA	< 1984		0.16- 0.24							Hall and Mulhern 1984 [k]
Cd	RACA	adult	MO, USA	1981-82	0.26- 0.31								Niethammer et al. 1985 [k]
Cd	RACA	tadpole	SC, USA	1995-96			Mean for ash site= 1.71; Mean for ref site= 0.15 dw						Rowe et al. 1996
Cd	RACL	adult	MD, USA	< 1984		0.10- 0.19							Hall and Mulhern 1984 [k]
Cd	RACL	tadpole	PA, USA	1987			Range of Means= 0.3-1.5						Storm et al. 1994
Cd	RAES	adult	Hungary	< 1997	ovary: Range of Means = 13.5-237 mg/kg (F)								Puky and Oertel 1997
Cd	RAES	egg	Hungary	< 1997		Range of Means= 0.11-69.6 mg/kg							Puky and Oertel 1997

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cd	RAPE	adult	Spain	1984-86						0.08- 0.19			Rico et al. 1987 [k]
Cd	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= ND	0.5 µg/g ww		Linder et al. 1991
Cd	RASY	adult	PA, USA	1979			Range= 1.1-2.3 mg/kg dw						Beyer et al. 1985 [k]
Cd	RAXX	adult	MD, USA	< 1984			0.10- 0.36						Hall and Mulhern 1984 [k]
Cd	TRSC	egg	SC, USA	1996		Contents= 67, Shell= 13 ppb dw							Burger and Gibbons 1998
Cd	TRSP	adult	TN, USA	< 1975	small intestine (F): Range = ND-0.19							9.87 (high)	Robinson and Wells 1975
Cd	TRVU, RAES, RATE, PEFU and BUVI	adult	Poland	1975	pooled results		7.9-10.7 ppm dw (control 0.70)						Dmowski and Karolewski 1979 [k]
Cd	XXXA	tadpole	MO, USA	1972			1.4- 3.0 µg/g dw						Gale et al. 1973 [k]
chlordane	CACA	egg	FL, USA	1976		ND-0.017							Clark and Krynitsky 1980
chlordane	CHSE	adult	ON, CAN	1995	blood: Range of Means = 0.2-7.0 ng/g ww								de Solla et al. 1998
chlordane	CHSE	adult	ON, CAN	1995	blood: Range of Means = ND-0.8 ng/g ww (M)								de Solla et al. 1998
chlordane	CHSE	egg	ON, CAN	1986-89		1986-87: <0.01-112; 1988-89 <0.01-112 ng/g ww							Bishop et al. 1991
chlordane	CHSE	egg	ON, CAN	1981, 84		Range was ND- 0.06 mg/Kg. ND at Alqonquin Provincial Park.							Struger et al. 1993

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
chlordane	CHSE	egg	ON, CAN	1981, 84		Range was ND-0.11 mg/kg (Hamilton Harbour). Detected in 2 samples at Algonquin Park.							Struger et al. 1993
chlordane	CRAC	egg	FL, USA	1979		ND-0.07							Hall et al. 1979
chlordane	CRAC	egg	FL, USA	1979		ND-0.01							Hall et al. 1979
chlordane	LEKE	juvenile	NY, USA	1980-89					Range of Means= 2.26-5.30		Range of Means= ND-4.87		L. et al. 1994
chlordane	NELE	adult	NC, USA	< 1985	Geometric Mean= 0.02								Hall et al. 1985 [k]
chlordane	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.0021-0.204 ppm								Gendron et al. 1997
chlordane	TATO	adult	BC, CAN	1980			1036 d post-spray= 0.011; 14 d post-spray = ND						Albright et al. 1980 [k]
chlordane (cis-chlordane)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.1-62.4 ng/g ww							Bonin et al. 1995
chlordane (cis-chlordane)	NEMA	adult	ON, CAN	1988, 90			pooled= 0.6-13.9 ng/g ww						Bonin et al. 1995

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
chlordane (cis)	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee ND, L. Griffin= ND, L. Apopka= 0.09. 1985: L. Griffin= 0.03, L. Apopka= 0.06							Heinz et al. 1991
chlordane (cis)	CHSE	adult	NJ, USA	1981-89	3% detection				ND (M/F) control, ND (M), 0.12 (F) brackish water, ND (M) fresh water				Albers et al. 1986
chlordane (cis)	CHSE	adult	NJ, USA	1981-91	9% detection				0.08 (M), 0.04 (F) control, ND (male & (F) brackish water, ND (M) fresh water				Albers et al. 1986
chlordane (cis)	PSCR	adult	ON, CAN	1983	µg/kg ww		0.08 (SE= 0.038)						Russell et al. 1995
chlordane (oxy, cis and trans)	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
chlordane (oxychlordane)	ALMI	egg	FL, USA	1984-85		1985: L. Griffin= 0.03, L. Apopka= 0.03							Heinz et al. 1991

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
chlordane (oxychlordane)	CHSE	adult	NJ, USA	1981-90	88% detection				2.0 (M), 1.53 (F) control, 9.33 (M), 2.12 (F) brackish water, 1.3 (M) fresh water				Albers et al. 1986
chlordane (oxychlordane)	CHSE	egg	ON, PQ CAN; NY, USA	1989-90		Range= 2.8-101.5 ng/g ww							Bonin et al. 1995
chlordane (oxychlordane)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.2-4.7 ng/g ww							Bonin et al. 1995
chlordane (oxychlordane)	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.0017-0.0094 ppm								Gendron et al. 1997
chlordane (oxychlordane)	PSCR	adult	ON, CAN	1993	µg/kg ww		1.74 (SE= 0.185)						Russell et al. 1995
chlordane (trans-chlordane)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.1-3.9 ng/g ww							Bonin et al. 1995
chlordane (trans-chlordane)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.5-7.1 ng/g ww							Bonin et al. 1995
chlordane (trans)	ALMI	egg	FL, USA	1984-85		1985: L. Griffin= 0.02, L. Apopka= 0.006							Heinz et al. 1991
chlordane (trans)	PSCR	adult	ON, CAN	1983	µg/kg ww		0.11 (SE= 0.040)						Russell et al. 1995
chlorfenvinphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994

Table 1- Field Residues - 14

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
chlorophenols	RACA	tadpole	ON, CAN	1980			2,6-DCP= 84; 2,4,6-TCP= 10; 2,4,5-TCP= 31; 2,4-DCP, 3,4-DCP, 2,3,4,6-TTCP= ND (ppb)						Metcalfe et al. 1984 [k]
chloropyrifos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Co	AGSS	adult	Greece	< 1997	carcass; ppm dw		2.53-3.62				3.5-5.08		Loumbourdis 1997
Co	BUJU	adult	Malaysia	1990	Range of Means across sites; µg/g dw						1.10-3.81		Lee and Stuebing 1990
Co	CACA	adult	Japan	1990-91						<0.03	<0.03	Range= 0.129-0.257	Sakai et al. 1995
Co	CACA	egg	FL, USA	1977		0.03- 0.07 µg/g							Stoneburner et al. 1980
Co	CHSE	adult	TN, USA	1988							cont. (Bq/g ww): $5.17x10^{-2}$ ± $1.7x10^{-2}$		Meyers-Schöne et al. 1993
Co	CRAC	egg	FL, USA	1980		shell= 1.70 µg/g; yolk/alb= 1.12 µg/g							Stoneburner 1984
Co	TRSC	adult	TN, USA	1987							Mean (Bq/g ww): $6.03x10^{-2}$ ± $1.7x10^{2}$ (cont)		Meyers-Schöne et al. 1993
coumaphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Cr	ACCR	tadpole	TX, USA	1994			Mean= 6.82; Range= 5.21- 9.57						Clark et al. 1998
Cr	ACJA	adult	Papua New Guinea	1980-81						0.06			Yoshinaga et al. 1992
Cr	AGSS	adult	Greece	< 1997	carcass; ppm dw		4.16-5.57				1.35-2.37		Loumbourdis 1997
Cr	ALMI	adult	FL, USA	1985	tail muscle					0.03-0.11 (tail)			Delany et al. 1988

Table 1- Field Residues - 15

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cr	ALMI	egg	FL, USA	1984-85		1984: L. Okeechobee 0.09, L. Griffin= 0.08, L. Apopka= 0.09.							Heinz et al. 1991
Cr	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						0.76-3.37		Lee and Stuebing 1990
Cr	CACA	egg	FL, USA	1977		1.04- 1.71 µg/g							Stoneburner et al. 1980
Cr	CHMY	adult	Papua New Guinea	1980-81						0.25			Yoshinaga et al. 1992
Cr	CHMY	juvenile	HI, USA	< 1994							Range= 0.2-0.5		Aguirre et al. 1994
Cr	CHSE	adult	NJ, USA	1981-83							0.36-1.97 for all sites	0.93 (M), 1.26 (F) Control; 2.97 (M), 2.70 (F) brackish water; 1.13 (M) fresh water	Albers et al. 1986
Cr	CHXX	adult	Papua New Guinea	1980-81						0.50			Yoshinaga et al. 1992
Cr	CRAC	egg	FL, USA	1980		shell= 20.46 µg/g; yolk/alb= 2.64 µg/g							Stoneburner 1984
Cr	CRPO	adult	Papua New Guinea	1980-81						0.16			Yoshinaga et al. 1992
Cr	PIME	hatchling	NJ, USA	1985-90	skin= 5047± 482		3479± 1070						Burger 1992
Cr	RACA	tadpole	TX, USA	1994	carcass= 0.58 (n=1)								Clark et al. 1998
Cr	RACA	tadpole	SC, USA	1995-96			Mean for ash= 17.2; Mean for ref site= 1.4 dw						Rowe et al. 1996

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cr	RACL	tadpole	TX, USA	1994			Range= 1.4- 18						Clark et al. 1998
Cr	RAES	adult	Italy	1974	Highest in skin and gonads (2.47 ppm dw)								Baudo 1976
Cr	RAES	juvenile	Italy	1974			0.47 ppm dw						Baudo 1976
Cr	RAES	tadpole	Italy	1974			avg= 2.56 ppm dw						Baudo 1976
Cr	RASP	tadpole	TX, USA	1994	carcass= 0.41 (n=1)		Mean= 1.85; Range= 0.95- 3.53						Clark et al. 1998
Cr	TRSC	egg	SC, USA	1996		Contents= 139, Shell= 383 ppb dw							Burger and Gibbons 1998
Cr	VAXX	adult	Papua New Guinea	1980-81						0.11			Yoshinaga et al. 1992
crotoxyphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
cruformate	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Cs	ABER	adult	SC, USA	1971-72	near vicinity of reactor effluent stream 131.5 - 1032.6 pCi/g ww; reactor cooling reservoir 27.7- 139.3 pCi/g; uncont. sites 2.4- 2.6 pCi/g								Brisbin et al. 1974
Cs	AGCO	adult	SC, USA	1971-72	"								Brisbin et al. 1974
Cs	AGPI	adult	SC, USA	1971-72	"								Brisbin et al. 1974
Cs	AGSS	adult	Greece	< 1997	carcass; ppm dw		0.16- 0.26				0.48- 0.98		Loumbourdis 1997
Cs	ALMI	hatchling	SC, USA	< 1989	13 pCi/g ww								Brisbin 1989
Cs	CHSE	adult	TN, USA	1988						$39.6x10^{-2}$ ± $9.05x10^{-2}$, Bq/g ww Mean	Mean (control) (Bq/g ww): $17.4x10^{-2}$ ± $3.19x10^{-2}$		Meyers-Schöne et al. 1993
Cs	COCO	adult	SC, USA	1971-72	near vicinity of reactor effluent stream 131.5- 1032.6 pCi/g ww; reactor cooling reservoir 27.7- 139.3 pCi/g; uncont. sites 2.4- 2.6 pCi/g								Brisbin et al. 1974
Cs	CRHO	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	ELGU	adult	SC, USA	1971-72	``								Brisbin et al. 1974

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cs	ELOO	adult	SC, USA	1971-72	near vicinity of reactor effluent stream 131.5- 1032.6 pCi/g ww; reactor cooling reservoir 27.7-139.3 pCi/g; uncont. sites 2.4- 2.6 pCi/g								Brisbin et al. 1974
Cs	FAAB	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	HEPL	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	HESI	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	HYCI	adult	SC, USA	1972			204.2 pCi/g dw						Dapson and Kaplan 1975 [k]
Cs	LAGE	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	MAFL	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	NAEY	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	NATA	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	NESI	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	OPAE	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	PIME	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	PSSC	adult	USA	1983	Seasonal rate constants for overall elimination of Cs ranged from <0.002-0.029/d								Scott et al. 1986
Cs	THSA	adult	SC, USA	1971-72	near vicinity of reactor effluent stream 131.5- 1032.6 pCi/g ww; reactor cooling reservoir 27.7-139.3 pCi/g; uncont. sites 2.4- 2.6 pCi/g								Brisbin et al. 1974
Cs	THSI	adult	SC, USA	1971-72	``								Brisbin et al. 1974
Cs	TRSC	adult	SC, USA	< 1991	SD found between control sites and cont. sites in total body burdens: (Bq/g body mass)		Range= 164.7-4679.3; Mean= 841.901 (cont sites); Mean=< 0.002 (controls)						Lamb et al. 1991
Cs	TRSC	adult	TN, USA	1987						Mean 44.9± 42 Bq/g ww	Mean 5.84± 5.48 Bq/g ww		Meyers-Schöne et al. 1993

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cu	ACJA	adult	Papua New Guinea	1980-81						0.13			Yoshinaga et al. 1992
Cu	AGSS	adult	Greece	< 1997	carcass; ppm dw		27.1-27.4				140-209		Loumbourdis 1997
Cu	ALMI	adult	FL, USA	1985	tail muscle					0.28-6.03 (tail)			Delany et al. 1988
Cu	ALMI	egg	FL, USA	1984-85		1984: L. Okeechobee 0.32, L. Griffin= 0.78, L. Apopka= 0.52.							Heinz et al. 1991
Cu	BOBO	adult	Hungary	< 1997	kidney>liver~= stomach> muscle>skin> ovary (F)								Puky and Oertel 1997
Cu	BUAM	adult	PA, USA	1979			Range= 5.6-7.6 mg/kg dw						Beyer et al. 1985 [k]
Cu	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						45.6-437.6		Lee and Stuebing 1990
Cu	BUMA	adult	unknown	< 1956							10- 1640 ppm dw		Beck 1956 [k]
Cu	BUMA	adult	Dominican Republic	< 1970	liver						367-2091 ppm dw		Goldfischer et al. 1970 [k]
Cu	BUWO	adult	PA, USA	1979			Range= 6.0-7.9 mg/kg dw						Beyer et al. 1985 [k]
Cu	BUXX	adult	MD, USA	< 1984		2.1- 5.0							Hall and Mulhern 1984 [k]
Cu	CACA	adult	Japan	1990-91						Mean= 0.83, Range= 0.531-1.28	Mean= 17.9, Range= 6.47-33.9	Mean= 1.30, Range= 0.988-1.56	Sakai et al. 1995
Cu	CACA	egg	GA, USA	< 1974		Mean= 2.08 ppm in yolk, Mean= 6.0 ppm in alb							Hillestad et al. 1974

Table 1- Field Residues - 19

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cu	CACA	egg	Japan	1990-91		Mean= 0.52, Range= 0.30-0.90							Sakai et al. 1995
Cu	CACA	egg	FL, USA	1977		4.96- 6.60 µg/g							Stoneburner et al. 1980
Cu	CHMY	adult	Japan	1990-91							Mean =87.6, Range= 11.3-189	Mean= 3.6, Range= 1.1-10.5	Sakai et al. 1995
Cu	CHMY	adult	Papua New Guinea	1980-81						0.73			Yoshinaga et al. 1992
Cu	CHMY	juvenile	HI, USA	< 1994							Range= 1.3-173		Aguirre et al. 1994
Cu	CHSE	adult	NJ, USA	1981-84							1.28-9.72 for all sites	0.82 (M), 1.07 (F) Control, 1.81 (M), 1.27 (F) brackish water, 1.73 (M) fresh water	Albers et al. 1986
Cu	CHXX	adult	Papua New Guinea	1980-81						0.57			Yoshinaga et al. 1992
Cu	CRAC	egg	FL, USA	1980		Shell= 17.17 µg/g; yolk/alb= 6.21 µg/g							Stoneburner 1984
Cu	CRPO	adult	Papua New Guinea	1980-81						0.17			Yoshinaga et al. 1992
Cu	DECO	adult	Ireland	1988					0.06± 0.02	0.26± 0.05 (pectoral)	0.15± 0.04		Davenport and Wrench 1990
Cu	DECO	adult	Japan	1990-91						0.26	0.15		Sakai et al. 1995
Cu	DECO	egg shell	Mexico	1992-93		12.9 mg/kg							Vazquez et al. 1997
Cu	HYXX	adult		< 1956							10-1640 ppm dw		Beck 1956 [k]
Cu	LEOL	adult	Ecuador	1981	bone: Range of Means= 8.6- 9.1 µg/g								Witkowski and Frazier 1982

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cu	LIXX	adult		< 1956							10-1640 ppm dw		Beck 1956 [k]
Cu	NOVI	adult	PA, USA	1987			max= 3.0						Storm et al. 1994
Cu	PLCI	adult	PA, USA	1979			Range= 4.6-6.4 mg/kg dw						Beyer et al. 1985 [k]
Cu	PLCI	adult	PA, USA	1987			Range of Means= 1.7- 2.2						Storm et al. 1994
Cu	PLGL	adult	PA, USA	1979			Range= 3.2-3.4 mg/kg dw						Beyer et al. 1985 [k]
Cu	RACA	tadpole	MD, USA	< 1984		1.4- 3.2							Hall and Mulhern 1984 [k]
Cu	RACA	tadpole	SC, USA	1995-96			Mean for ash site= 31.4; Mean for ref site= 17.5 dw						Rowe et al. 1996
Cu	RACL	tadpole	MD, USA	< 1984		0.93- 1.2							Hall and Mulhern 1984 [k]
Cu	RACL	tadpole	PA, USA	1987			Range of Means= 0.3- 0.8						Storm et al. 1994
Cu	RAES	adult	Italy	1974							63.08 ppm dw (M)		Baudo 1976
Cu	RAES	adult	Czecho-slovakia	1982-84			6.2- 14.8 ppm dw						Pavel and Kucera 1986 [k]
Cu	RAES	adult	Hungary	< 1997	ovary: Range of Means= 0-7.04 mg/kg (F)	Range of Means= 0-7.04 mg/kg							Puky and Oertel 1997
Cu	RAES	egg	Hungary	< 1997		Range of Means= 2.07-72.3 mg/kg							Puky and Oertel 1997
Cu	RAES	juvenile	Italy	1974			7.92 ppm dw						Baudo 1976

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Cu	RAES	tadpole	Italy	1974			avg= 21.25 ppm dw						Baudo 1976
Cu	RAPE	adult	Spain	1984-86						0.28- 2.61			Rico et al. 1987 [k]
Cu	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= 2.1	24.3 µg/g ww		Linder et al. 1991
Cu	RASY	adult	PA, USA	1979			Range= 3.4-9.2 mg/kg dw						Beyer et al. 1985 [k]
Cu	RATE	adult	Finland	1971-72							male: 156.9-503.2 female: 314-845.1		Pasanen and Koskela 1974
Cu	RAXX	adult	MD, USA	< 1984		1.2- 3.5							Hall and Mulhern 1984 [k]
Cu	VAXX	adult	Papua New Guinea	1980-81						0.17			Yoshinaga et al. 1992
Cu	XXXA	tadpole	MO, USA	1972			17- 44 µg/g dw						Gale et al. 1973 [k]
Cu	XXXA	tadpole	MO, USA	< 1979	liver/heart eviscerated = 15-20 ppm; intestine 234-260 ppm		169 ppm				Mean= 91 ppm		Jennett et al. 1979 [k]
DDC	RAPI	adult & young of the year	ON, CAN	1993-95	dithiocarbamate was ND at all orchard sites								Harris et al. 1998
DDD	AGPI	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.01; Range = ND-0.05						Ford and Hill 1991
DDD	ALMI	adult	FL, USA	1985						0.02-0.12 (tail)			Delany et al. 1988

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDD	ALMI	egg	FL, USA	1984-85		1984: L. Okeechobee ND, L. Griffin= ND, L. Apopka= 0.82. 1985: L. Griffin= 0.007, L. Apopka= 0.37							Heinz et al. 1991
DDD	AMBA	egg	Australia	1970-71					ND				Best 1973
DDD	CACA	adult	NC, USA	1991-92					subcutaneous fat=2.39-35.6 µg/kg		< 2 µg/kg		Rybitski et al. 1995
DDD	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
DDD	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.2- 16.4 ng/g ww							Bonin et al. 1995
DDD	CNSP	adult	TX, USA	<1970			0-0.84						Applegate 1970
DDD	CNTI	adult	TX, USA	<1970			0-0.77						Applegate 1970
DDD	CNXX	adult	TX, USA	1965						0.1-6.0			Culley and Applegate 1966
DDD	CNXX	adult	TX, USA	1965	brain=0.1-6.0; all values are a Range of Means with n=5-6 each of 27	7.3 Mean	Range of Means= 2.8 (n=8)	Range of Means= 0.1-2.7	Range of Means= 0-34.3	Range of Means= 0.1-6.0	Range of Means= 0-4.7		Culley and Applegate 1967
DDD	CNXX	adult	TX, USA	1965	gravid female					2.0			Culley and Applegate 1966
DDD	CNXX	adult	TX, USA	1965	gravid female					2.8			Culley and Applegate 1966
DDD	CNXX	egg	TX, USA	1965		10.7							Culley and Applegate 1966
DDD	COTE	adult	TX, USA	<1970			0-0.93						Applegate 1970
DDD	CRAC	egg	FL, USA	1979		ND-0.07							Hall et al. 1979
DDD	CRNI	egg	Zimbabwe	1979		Range= 0.20-3.25 mg/kg ww for 15 sites							Wessels and Tannock 1980

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDD	CRNO	egg	Australia	1970-71					ND				Best 1973
DDD	CRPO	egg	Australia	1970-71					ND				Best 1973
DDD	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); < 0.01								Campbell 1975
DDD	LEKE	adult	NC, USA	1991-92					subcut-aneous fat= 15.5-42.1 µg/kg		4.92- 11.4 µg/kg		Rybitski et al. 1995
DDD	LEKE	juvenile	NY, USA	1980-89					Range of Means= 15.5-57.9		Range of Means= 11.3-57.1		Lake et al. 1994
DDD	LIOL	egg	Australia	1970-71					ND-1.63				Best 1973
DDD	MAFL	adult	TX, USA	1971					Navasota area:>0.01 -0.1				Fleet et al. 1972
DDD	MOSV	egg	Australia	1970-71					ND				Best 1973
DDD	NEER	adult	TX, USA	1971					Navasota area: >0.01-0.6; Brazos area: >0.01-1.0				Fleet et al. 1972
DDD	NEMA	adult	ON, CAN	1988, 90			pooled= 1.7-24.8 ng/g ww						Bonin et al. 1995
DDD	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.005-0.02 ppm								Gendron et al. 1997
DDD	NERH	adult	TX, USA	1971					Navasota area: 0.2				Fleet et al. 1972
DDD	NERH	adult	LA, USA	1977-79			ND-0.07 ppm				<0.01-0.02		Sabourin et al. 1984
DDD	NESI	adult	TX, USA	1971					Navasota area: >0.01; Brazos area: 1.0-7.3				Fleet et al. 1972
DDD	NEXX	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.5; Range= ND-0.92						Ford and Hill 1991

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDD	PSAU	egg	Australia	1970-71					ND-0.48				Best 1973
DDD	PSCR	adult	ON, CAN	1983	µg/kg ww		26.49 (SE=14.8)						Russell et al. 1995
DDD	RACA	adult	CA, USA	1958					5 ppm in visceral fat				Hunt and Bischoff 1960 [k]
DDD	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDD	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDD	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
DDD	RAPR	adult	OR, USA	1974					live frog= 16.6-30.5 ww; dead frog= 155-487 ww				Kirk 1988
DDD	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDD	REGR	adult	TX, USA	1971					Brazos area: 0.6				Fleet et al. 1972
DDD	STMO	egg	Australia	1970-71					ND				Best 1973
DDD	SUSU	egg	Australia	1970-71					ND				Best 1973
DDD	THPR	adult	TX, USA	1971					Navasota area: 0.1; Brazos area: 0.01-5.2				Fleet et al. 1972
DDD	UROR	adult	TX, USA	<1970			0-0.01						Applegate 1970
DDD	UTST	adult	TX, USA	<1970			0-0.55						Applegate 1970
DDD	VAGI	egg	Australia	1970-71					ND				Best 1973
DDD	VAGO	egg	Australia	1970-71					ND				Best 1973
DDD	XXFR	adult	Greece	1992-93			Mean= 0.49; Range= ND-1.35						Albanis et al. 1996
DDE	ACCB	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.12- 0.17								Campbell 1975

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	AGCO	adult	TX, USA	1974-75					113.9 DDE/ DDT ratio= 229				Fleet and Plapp 1978
DDE	AGCO	adult	TX, USA	1971					Navosta area: 0.7; Brazos area: 57.2-156.0				Fleet et al. 1972
DDE	AGCO	adult	TX, USA	1976					11.2-17.7 ppm from Navasota, 0.4-4.2 ppm at Brazos.				Stafford et al. 1976
DDE	AGPI	adult	TX, USA	1974-75					216.2 DDE/ DDT ratio= 217				Fleet and Plapp 1978
DDE	AGPI	adult	TX, USA	1971					Brazos area: 363.3-1009.4				Fleet et al. 1972
DDE	AGPI	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 1.75; Range= 0.3-7.0						Ford and Hill 1991
DDE	AGPI	adult	TX, USA	1976					Brazos: 31.0-1102.3 ppm				Stafford et al. 1976
DDE	ALMI	adult	FL, USA	1985						0-0.06 (tail)			Delany et al. 1988

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 0.87, L. Griffin= 0.45, L. Apopka= 5.8. 1985: L. Griffin= 0.58, L. Apopka= 3.5							Heinz et al. 1991
DDE	AMBA	egg	Australia	1970-71					ND				Best 1973
DDE	BUAM	adult	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	BUFO	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.53								Campbell 1975
DDE	CACA	adult	NC, USA	1991-92					subcut-aneous fat=28.9-1210 µg/kg		4.03- 458 µg/kg ;		Rybitski et al. 1995
DDE	CACA	adult (12-34 yrs)	FL, USA	1983						1-45 ppb, Mean= 8 ppb	2-100 ppb, Means= 7-37 ppb		McKim and Johnson 1983
DDE	CACA	egg	FL, USA	1976		0.018-0.200							Clark and Krynitsky 1980
DDE	CACA	egg	FL, USA	1979		Mean= 0.099 (0.083-0.119), (n= 55)							Clark and Krynitsky 1985
DDE	CHMY	adult (2-7 yrs)	FL, USA	1983						Mean= 1.0 ppb	Mean= 1-10 ppb		McKim and Johnson 1983
DDE	CHMY	egg	FL, USA	1976		ND-0.005							Clark and Krynitsky 1980
DDE	CHMY	egg	UK	1972					0.01-0.08 ppm ww: 0.001-0.009 ppm				Thompson et al. 1974

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
DDE	CHPI	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	CHPI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.44								Campbell 1975
DDE	CHSE	adult	NJ, USA	1981-93	3% detection				ND (M), ND (F) control, ND (M), ND (F) brackish water, 0.13 (M) fresh water				Albers et al. 1986
DDE	CHSE	adult	NJ, USA	1981-98	63% detection				0.39 (M), 0.10 (F) control, 0.16 (M), 0.26 (F) brackish water, 2.03 (M) fresh water				Albers et al. 1986
DDE	CHSE	adult	ON, CAN	1995	blood: Range of Means= 0.2-21.7 ng/g ww (M)								de Solla et al. 1998
DDE	CHSE	adult	NY, USA	< 1983					1.972 ppm				Olafsson et al. 1983
DDE	CHSE	adult	NY, USA	< 1983					633.3 ppm				Olafsson et al. 1983
DDE	CHSE	adult	NY, USA	1976-78		Mean <0.18 ppm			Mean= <11.11 ppm	Mean= 0.093 ppm	Mean <1.39 ppm		Stone et al. 1980
DDE	CHSE	adult	NY, USA	1976-78					Mean 11.50 ppm	Mean <0.023 ppm	Mean 0.64 ppm		Stone et al. 1980
DDE	CHSE	adult & egg	IA, USA	1974	118								Punzo et al. 1979 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	CHSE	egg	ON, CAN	1986-89		1988-89: 8.0 (SD=6.4)-877 (SD=481) (ng/g ww)							Bishop et al. 1991
DDE	CHSE	egg	ON, CAN	1990		1.0-14.9, Mean= 5.9 mg/kg (lipid)							Bishop et al. 1994
DDE	CHSE	egg	ON, CAN	1981-91		0.04-10.65							Bishop et al. 1996
DDE	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 7.0-372.7 ng/g ww							Bonin et al. 1995
DDE	CHSE	egg	ON, CAN	1981, 84		Range= 0.01-0.43 mg/kg Great L.s; Hamilton Harbour 0.15-0.43 mg/kg; Algonquin Park 0.01-0.027 mg/kg							Struger et al. 1993
DDE	CNEX	adult/egg	IA, USA	1974	74								Punzo et al. 1979 [k]
DDE	CNNE	adult/egg	IA, USA	1974	227								Punzo et al. 1979 [k]
DDE	CNSP	adult	TX, USA	<1970			0-1.32						Applegate 1970
DDE	CNTI	adult	TX, USA	<1970			0.04-1.5						Applegate 1970
DDE	CNXX	adult	TX, USA	1965						0.1-7.2			Culley and Applegate 1966
DDE	CNXX	adult	TX, USA	1965	brain=0.3-3.8; Range of Means with n=5-6 each of 27	Mean= 16.4	Range of Means= 3.4 (n=8)	Range of Means= 0.1-4.7	Range of Means= 5.4-45.9	Range of Means= 0.1-7.2	Range of Means= 0.1-3.7		Culley and Applegate 1967

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	CNXX	adult	TX, USA	1983			Range= ND-104; Range of Means at 2 sites= 0.47-1.8						White and Krynitsky 1986
DDE	CNXX	adult	TX, USA	1965	gravid female					2.8			Culley and Applegate 1966
DDE	CNXX	adult	TX, USA	1965	gravid female					3.4			Culley and Applegate 1966
DDE	CNXX	egg	TX, USA	1965		7.3							Culley and Applegate 1966
DDE	COCO	egg	TX, USA	1974-75		161.4 DDE/ DDT ratio= 17							Fleet and Plapp 1978
DDE	COTE	adult	TX, USA	<1970			0.1-1.69						Applegate 1970
DDE	COTE	adult/egg	IA, USA	1974	2 (ND- 15)								Punzo et al. 1979 [k]
DDE	CRAC	egg	FL, USA	1979		0.37-1.5							Hall et al. 1979
DDE	CRNI	egg	Zimbabwe	1979		Range= 0.53-14.15 mg/kg ww for 15 sites							Wessels and Tannock 1980
DDE	CRNO	egg	Australia	1970-71					ND				Best 1973
DDE	CRPO	egg	Australia	1970-71					0.10				Best 1973
DDE	CRVI	adult	CO, USA	1971					0.20- 1.06 ppm				Bauerle et al. 1975
DDE	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.06								Campbell 1975
DDE	KISO	adult	AZ, USA	1989-93			< 0.01-0.035						Rosen and Lowe 1996
DDE	LAGE	adult	TX, USA	1974-75					596.6 DDE/ DDT ratio= 41				Fleet and Plapp 1978
DDE	LAGE	adult	TX, USA	1971					Navosta area: 1.5-4.9				Fleet et al. 1972

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	LEKE	adult	NC, USA	1991-92					subcut-aneous fat= 95.7-292 µg/kg		54.2- 56.8 µg/kg		Rybitski et al. 1995
DDE	LEKE	juvenile	NY, USA	1980-89					Range of Means= 232-386		Range of Means= 137-253		Lake et al. 1994
DDE	LIOL	egg	Australia	1970-71					0.37-11.00				Best 1973
DDE	MOSV	egg	Australia	1970-71					0.49				Best 1973
DDE	NECY	adult	LA, USA	1977-79			0.1-0.13 ppm						Sabourin et al. 1984
DDE	NECY	embryo	LA, USA	1977-79	embryo= 0.28 ppm								Sabourin et al. 1984
DDE	NEER	adult	TX, USA	1974-75					178.9 DDE/ DDT ratio= 63				Fleet and Plapp 1978
DDE	NEER	adult	TX, USA	1971					Navosta area: 1.7-4.3; Brazos area: 283.6-380.4				Fleet et al. 1972
DDE	NEER	adult	TX, USA	1976					Brazos: 67.2-1161.2 ppm, Hwy 21: 5.7-24.3 ppm, Navasota: 0.6-6.1 ppm				Stafford et al. 1976
DDE	NEFA	adult	TX, USA	1974-75					211.6 DDE/ DDT ratio= 29				Fleet and Plapp 1978
DDE	NEFA	adult	TX, USA	1976					617.1 and 724.7 ppm (Brazo)				Stafford et al. 1976
DDE	NEMA	adult	ON, CAN	1988, 90			0.3- 90.0 ng/g ww						Bonin et al. 1995

Table 1- Field Residues - 31

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	NEMA	adult	PQ, CAN	1992-93							1.66 mg/kg ww		Gendron et al. 1994
DDE	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.081-1.66 ppm								Gendron et al. 1997
DDE	NERH	adult	TX, USA	1971					Navosta area: 7.8 - 14.6				Fleet et al. 1972
DDE	NERH	adult	LA, USA	1977-79			0.10-0.22 ppm		1.92-4.66 ppm	0.01-0.02 ppm	0.08-0.21 ppm		Sabourin et al. 1984
DDE	NERH	adult	TX, USA	1976					Navasota: 0.9-6.8 ppm, Hwy21: 2.3-68.2 ppm				Stafford et al. 1976
DDE	NERH	embryo	LA, USA	1977-79	embryo= 0.31-0.53 ppm (Belle Helene)								Sabourin et al. 1984
DDE	NESI	adult	TX, USA	1971					Navosta area: 0.4-1.1; Brazos: 445.2-673.0				Fleet et al. 1972
DDE	NESI	adult	WI, USA	1978		1.6							Heinz et al. 1980
DDE	NESI	adult/egg	IA, USA	1974	79 (ND- 300)								Punzo et al. 1979 [k]
DDE	NEXX	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.99; Range = ND-19.0						Ford and Hill 1991
DDE	OPAE	adult	TX, USA	1974-75					29.0				Fleet and Plapp 1978
DDE	OPAE	adult	TX, USA	1971					Navosta area: 0.2				Fleet et al. 1972
DDE	OPVE	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	PICA	adult	CO, USA	1971					0.62 ppm				Bauerle et al. 1975
DDE	PSAU	egg	Australia	1970-71					ND-1.28				Best 1973
DDE	PSCR	adult	ON, CAN	1983	µg/kg ww		Mean= 1001.14						Russell et al. 1995
DDE	RABO	adult	CA, USA	1970					0.97- 5.38 pp’-DDE				Cory et al. 1970 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	RACA	adult	LA, USA	1980	Geometric Mean= 0.03- 0.25								Niethammer et al. 1984 [k]
DDE	RACL	adult	LA, USA	1980	Geometric Mean= 0.04- 0.05								Niethammer et al. 1984 [k]
DDE	RACL	adult	ON, CAN	<1997			Range= 0.58- 45.02						Russell et al. 1997
DDE	RAPE	adult	Spain	1985-86						0.02- 0.19			Rico et al. 1987 [k]
DDE	RAPE	egg	Spain	1983		0.02							Hernandez et al. 1987
DDE	RAPI	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	RAPR	adult	OR, USA	1974					live frog= 19.6-10.0 ww; dead frog= 0.096- 0.173 ww				Kirk 1988
DDE	RASP	adult	LA, USA	1980	Geometric Mean= 0.04- 0.64				% lipid 1.1- 3.3				Niethammer et al. 1984 [k]
DDE	REGR	adult	TX, USA	1974-75					271.3 DDE/ DDT ratio= 97				Fleet and Plapp 1978
DDE	REGR	adult	TX, USA	1971					Brazos area: 118.8				Fleet et al. 1972
DDE	SCGR	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	SCJA	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	SCUN	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	STDE	adult	TX, USA	1974-75					6.2 DDE/ DDT ratio= 8				Fleet and Plapp 1978
DDE	STDE	adult	TX, USA	1971					Navosta area: 1.2; Brazos area: 36.5				Fleet et al. 1972
DDE	STMO	egg	Australia	1970-71					0.42				Best 1973
DDE	SUSU	egg	Australia	1970-71					ND				Best 1973

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDE	THPR	adult	TX, USA	1974-75					129.5 DDE/ DDT ratio= 32				Fleet and Plapp 1978
DDE	THPR	adult	TX, USA	1971					Navosta area: 1.3; Brazos area: 263.2-870.0				Fleet et al. 1972
DDE	THSI	adult	WI, USA	1978			0.24-0.78 (F)						Heinz et al. 1980
DDE	THSI	adult	WI, USA	1978			0.22- 0.6 (M)						Heinz et al. 1980
DDE	THSI	adult/egg	IA, USA	1974	36								Punzo et al. 1979 [k]
DDE	TRSP	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.72								Campbell 1975
DDE	UROR	adult	TX, USA	<1970			ND						Applegate 1970
DDE	UROR	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	UTST	adult	TX, USA	<1970			0.05-0.52						Applegate 1970
DDE	UTST	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
DDE	VAGI	egg	Australia	1970-71					ND				Best 1973
DDE	VAGO	egg	Australia	1970-71					0.04-0.33				Best 1973
DDE	XXFR	adult	Greece	1992-93			Mean= 0.29; Range= ND-0.64						Albanis et al. 1996
DDMU	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDMU	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDMU	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDT	ACCB	adult	TX, USA	1968			<0.1						Flickinger and King 1972
DDT	ACCB	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); ND								Campbell 1975
DDT	ACCR	adult	OH, USA	1963			1.3						Meeks 1968

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	AGCO	adult	TX, USA	1974-75					0.8 DDE/ DDT ratio= 229				Fleet and Plapp 1978
DDT	AGCO	adult	TX, USA	1971					Navasota area: 0.4; Brazos area: 1.3-1.4				Fleet et al. 1972
DDT	AGKI	adult	Zimbabwe	1989-90					no DDT treatment area=0.24 ppm lipid; 2 or more treatments=0.54 ppm				Lambert 1994b
DDT	AGPI	adult	TX, USA	1974-75					1.0 DDE/ DDT ratio= 217				Fleet and Plapp 1978
DDT	AGPI	adult	TX, USA	1971					Brazos area: 4.7-8.0				Fleet et al. 1972
DDT	ALMI	adult	FL, USA	1985						0.02-0.12 (tail)			Delany et al. 1988
DDT	ALMI	adult	FL, USA	< 1994									Guillette et al. 1994
DDT	ALMI	egg	FL, USA	1984-85		1985: L. Griffin= ND, L. Apopka= 0.02							Heinz et al. 1991
DDT	AMBA	adult	Australia	1972	.				ND in stomach fat				Birks and Olsen 1987
DDT	AMBA	egg	Australia	1970-71					ND				Best 1973
DDT	ANCA	adult	FL, USA	1988	carcass		ND- 0.15 µg/g ww						Clark et al. 1995
DDT	BUWF	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.02- 0.04								Campbell 1975
DDT	BUXX	adult	CO, USA	1960	found dead		8 ppm						Finley and Pillmore 1963 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	CACA	adult	NC, USA	1991-92					subcut-aneous fat=< 2-10.8 µg/kg		< 2 µg/kg		Rybitski et al. 1995
DDT	CACA	egg	FL, USA	1976		ND-0.048							Clark and Krynitsky 1980
DDT	CACA	egg	GA, USA	< 1974		total DDT: 0.058-0.305 ppm							Hillestad et al. 1974
DDT	CHMY	egg	FL, USA	1976		ND-0.042							Clark and Krynitsky 1980
DDT	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
DDT	CHPI	tadpole	OH, USA	1963	testes=2.7 ppm; other tissues < 1.0 ppm								Meeks 1968
DDT	CHSE	adult	NJ, USA	1981-92	ND								Albers et al. 1986
DDT	CHSE	adult	OH, USA	1963	testes=2.2				16.5 after 15 mos		2.7		Meeks 1968
DDT	CHSE	adult	ON, CAN	1988-89						164.60± 135.36 ng/g ww			Hebert et al. 1993b
DDT	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= ND-2.8 ng/g ww							Bonin et al. 1995
DDT	CLGU	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.01								Campbell 1975
DDT	CNGU	adult	TX, USA	1988	carcass		ND- 15 µg/g ww						Clark et al. 1995
DDT	CNSE	adult	FL, USA	1988	carcass		ND- 9.6 µg/g ww						Clark et al. 1995
DDT	CNSP	adult	TX, USA	<1970			0-0.62						Applegate 1970
DDT	CNTI	adult	TX, USA	<1970			0-0.63						Applegate 1970
DDT	CNXX	adult	TX, USA	1965						0.1-4.7			Culley and Applegate 1966
DDT	CNXX	adult	TX, USA	1965	brain=0-4.7; all values are a Range of Means with n=5-6 each of 27	10.7 Mean	Range of Means= 2.0- 2.1 (n=8)	0-4.2	0-43.0	0-4.7	0.1-2.7		Culley and Applegate 1967
DDT	CNXX	adult	TX, USA	1965	gravid female					0.8			Culley and Applegate 1966

Table 1- Field Residues - 36

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	CNXX	adult	TX, USA	1965	gravid female					2.1			Culley and Applegate 1966
DDT	CNXX	egg	TX, USA	1965		5.6							Culley and Applegate 1966
DDT	COCO	egg	TX, USA	1974-75		9.6			9.6 DDE/ DDT ratio= 17.				Fleet and Plapp 1978
DDT	COTE	adult	TX, USA	<1970			0-0.61						Applegate 1970
DDT	CRAC	egg	FL, USA	1979		0.02-0.23							Hall et al. 1979
DDT	CRNI	adult	Zimbabwe	< 1987	total DDT in body fat				8.47-46.79 mg/kg				Phelps et al. 1989
DDT	CRNI	egg	Zimbabwe	1981-82		DDT + metabolites = 3.14-25.91 mg/kg dw							Phelps et al. 1986
DDT	CRNI	egg	Kenya	< 1991		total DDT= 0.55 mg/kg ww DDT/DDE= 0.08							Skaare et al. 1991
DDT	CRNI	egg	Zimbabwe	1979		total DDT Range= 0.01-5.63 mg/kg ww for 15 sites							Wessels and Tannock 1980
DDT	CRNI	egg	Zimbabwe	1979		Range= 0.23-4.5 mg/kg ww for 15 sites							Wessels and Tannock 1980
DDT	CRNO	egg	Australia	1970-71					ND				Best 1973
DDT	CRPO	egg	Australia	1970-71					ND				Best 1973
DDT	CRVI	adult	CO, USA	1971					0.01- 0.05 ppm				Bauerle et al. 1975
DDT	ELVU	tadpole	OH, USA	1963			ND-1.0		0.1-5.1		0.1-2.5	Range= ND-6.7	Meeks 1968

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	EMBL	tadpole	OH, USA	1963					4.8-5.8 ppm				Meeks 1968
DDT	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.01- 0.05								Campbell 1975
DDT	KIFL	adult	TX, USA	1968-71			1.2						Flickinger and King 1972
DDT	LAGE	adult	TX, USA	1974-75					14.6 DDE/ DDT ratio= 41				Fleet and Plapp 1978
DDT	LAGE	adult	TX, USA	1971					Navasota area: 0.5-0.8				Fleet et al. 1972
DDT	LEKE	adult	NC, USA	1991-92					subcut-aneous fat=< 2-5.19 µg/kg		< 2 µg/kg		Rybitski et al. 1995
DDT	LEKE	juvenile	NY, USA	1980-89					Range of Means= 10.3-14.1		Range of Means= ND-11.1		Lake et al. 1994
DDT	LIOL	egg	Australia	1970-71					0.13-39.8				Best 1973
DDT	LIPG	adult	India	1991			0.52-1.4 ng/g ww						Ramesh et al. 1992
DDT	LITA	adult	Australia	1972	DDE = 0.1 mg/kg ww DDT plus metabolites = 0.1 mg/kg ww								Birks and Olsen 1987
DDT	LITA	juvenile	Australia	1972	DDE = 0.5 mg/kg ww DDT plus metabolites = 0.5 mg/kg ww								Birks and Olsen 1987
DDT	MAQU	adult	Zimbabwe	1989-90					no DDT treatments=0.31 ppm lipid, one or more treatments=1.22 ppm				Lambert 1994b
DDT	MAST	adult	Zimbabwe	1989-90	Total DDT rose significantly with treatments				up to 263 µg/g lipid (7 µg/g ww bw) after 3-6 yrs				Lambert 1993

Table 1- Field Residues - 38

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	MAST	adult	Zimbabwe	1989-90	63% of total DDT was DDE in lizards from unsprayed areas and 56 % of DDT in lizards from sprayed areas				total DDT ranged from 1.32-25.44 ppm lipid				Lambert 1994b
DDT	MOBO	adult	Australia	1972	DDE = 0.1 mg/kg ww DDT plus metabolites = 0.1 mg/kg ww								Birks and Olsen 1987
DDT	MOSV	egg	Australia	1970-71					ND				Best 1973
DDT	NASI	tadpole	OH, USA	1963			Range= ND-0.9		1.4-36.4		0.4-5.3	Range= ND-7.3	Meeks 1968
DDT	NECY	adult	LA, USA	1977-79			ND-0.04 ppm						Sabourin et al. 1984
DDT	NECY	embryo	LA, USA	1977-79		0.07 ppm							Sabourin et al. 1984
DDT	NEER	adult	TX, USA	1974-75					2.8 DDE/ DDT ratio= 63				Fleet and Plapp 1978
DDT	NEER	adult	TX, USA	1971					Navasota area: 0.1-0.8 Brazos area: 8.5-37.9				Fleet et al. 1972
DDT	NEER	adult	TX, USA	1968-71			0.3						Flickinger and King 1972
DDT	NEFA	adult	TX, USA	1974-75					7.0 DDE/ DDT ratio= 29				Fleet and Plapp 1978
DDT	NEFA	adult	TX, USA	1968-71			3.9						Flickinger and King 1972
DDT	NELE	adult	NC, USA	< 1985			DDT= ND; DDE= 0.06; DDD= 0.04						Hall et al. 1985 [k]
DDT	NEMA	adult	ON, CAN	1988, 90			pooled was 0.5-8.3 ng/g ww						Bonin et al. 1995
DDT	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= ND-0.17 ppm								Gendron et al. 1997

Table 1- Field Residues - 39

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	NERH	adult	TX, USA	1971					Navosta area: 0.7-1.2				Fleet et al. 1972
DDT	NERH	adult	LA, USA	1977-79			ND-0.11 ppm		0.14-1.77				Sabourin et al. 1984
DDT	NESI	adult	TX, USA	1971					Navasota area: 0.1-0.4; Brazos area: 8.3-37.4				Fleet et al. 1972
DDT	NESI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); < 0.01- 0.01								Campbell 1975
DDT	OPAE	adult	TX, USA	1971					Navasota area: 0.1				Fleet et al. 1972
DDT	PICA	adult	CO, USA	1971					ND				Bauerle et al. 1975
DDT	PLCI	adult	ME, USA	1970-72			Total DDT= 0.020-0.440						Banasiak 1974 [k]
DDT	PLCI	adult	ME, USA	1966-67	up to 9 years after treatment		0.011-2.057 (pooled)						Dimond et al. 1968 [k]
DDT	PSAU	egg	Australia	1970-71					ND-1.56				Best 1973
DDT	PSCR	adult	ON, CAN	1983	µg/kg ww		160.57 (SE=98.8)						Russell et al. 1995
DDT	RACA	adult	IL, USA	1969	all individuals positive for DDT residues								Jaskoski and Kinders 1974
DDT	RACA	adult	LA, USA	1980	Geometric Mean= ND- 0.03								Niethammer et al. 1984 [k]
DDT	RACA	tadpole	OH, USA	1963	testes= 1.5				1.7	0.2	1.8	1.8	Meeks 1968
DDT	RACL	adult	ME, USA	1966-69			Range of Means= 0.08-0.76						Diamond et al. 1975
DDT	RACL	adult	IL, USA	1969	6 of 7 F and 23 of 44 M tested positive for DDT								Jaskoski and Kinders 1974
DDT	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
DDT	RACL	tadpole	OH, USA	1963			ND 11 mo after treatment						Meeks 1968

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	RACL	tadpoles	ME, USA	1966-69			Range of Means= 0.28-1.47						Diamond et al. 1975
DDT	RAPE	adult	Spain	1984-86						0.04- 0.55			Rico et al. 1987 [k]
DDT	RAPE	egg	Spain	1983		0.01							Hernandez et al. 1987
DDT	RAPI	adult	CO, USA	1960	found dead		Range= <0.5- 4.0 ppm						Finley and Pillmore 1963 [k]
DDT	RAPI	adult	IL, USA	1969	3 M and 0 F tested positive for DDT residues								Jaskoski and Kinders 1974
DDT	RAPI	tadpole	OH, USA	1963			Range= 0.1-2.5: 8h-12 mo; Mean 1 d after 1.3ppm						Meeks 1968
DDT	RAPR	adult	OR, USA	1974					live frog= 56.3-132 ww; dead frog= 13.2-413 ww				Kirk 1988
DDT	RASP	adult	LA, USA	1980	ND				% lipid 1.1- 3.3				Niethammer et al. 1984 [k]
DDT	REGR	adult	TX, USA	1974-75					2.8 DDE/ DDT ratio= 97				Fleet and Plapp 1978
DDT	REGR	adult	TX, USA	1971					Brazos area: 0.7				Fleet et al. 1972
DDT	SCOC	adult	CA, USA	1988	carcass		ND						Clark et al. 1995
DDT	STDE	adult	TX, USA	1974-75					0.8 DDE/ DDT ratio= 8				Fleet and Plapp 1978
DDT	STDE	adult	TX, USA	1971					Navasota area: 1.5; Brazos area: 5.8				Fleet et al. 1972
DDT	STMO	egg	Australia	1970-71					0.03				Best 1973
DDT	SUSU	egg	Australia	1970-71					ND				Best 1973

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
DDT	THPR	adult	TX, USA	1974-75					4.1 DDE/ DDT ratio= 32				Fleet and Plapp 1978
DDT	THPR	adult	TX, USA	1971					Navasota area: 0.6; Brazos area: 6.5-38.5				Fleet et al. 1972
DDT	THPR	adult	TX, USA	1968-71			0.6						Flickinger and King 1972
DDT	TRSC	adult	TX, USA	1968-71		0.2	<0.1						Flickinger and King 1972
DDT	UROR	adult	TX, USA	<1970			0-0.01						Applegate 1970
DDT	UTST	adult	TX, USA	<1970			0-0.01						Applegate 1970
DDT	UTST	adult	CA, USA	1988	carcass		ND						Clark et al. 1995
DDT	VAGI	egg	Australia	1970-71					ND				Best 1973
DDT	VAGO	egg	Australia	1970-71					ND-0.03				Best 1973
DDT	VAXX	adult	India	1987			4.1-7.7 ng/g ww						Ramesh et al. 1992
DDT	XXAA	adult	NY, USA	1972	DDT, DDD, DDE total = 6.8 (34.2 ppm dw) In water: DDT= 0.32 ppb; DDD= 0.042 ppb.								Kuhr et al. 1974
DDT	XXAA	tadpole	NY, USA	1972	DDT, DDE, DDD total = 3.3 (30.6 ppm dw) In water: DDT= 0.32 ppb; DDD= 0.042 ppb								Kuhr et al. 1974
DEF	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
demeton	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Diazinon	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Diazinon	RACL	adult & young of the year	ON, CAN	1993-95	found at site 1 at 0.22-0.78 µg/L; site 4 at 0.09-0.18µg/L								Harris et al. 1998
Diazinon	RAPI	adult & young of the year	ON, CAN	1993-95	ND at all of the orchard sites								Harris et al. 1998
dichlorvos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
dicofol	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
dicofol	CNGU	adult	TX, USA	1988	carcass		ND-12 µg/g ww						Clark et al. 1995
dicofol	CNSE	adult	FL, USA	1988	carcass		ND- 0.20 µg/g ww						Clark et al. 1995

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
dicofol	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
dicofol	SCOC	adult	CA, USA	1988	carcass		ND						Clark et al. 1995
dicofol	UTST	adult	CA, USA	1988	carcass		ND						Clark et al. 1995
dicrotophos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
dieldrin	ACCB	adult	TX, USA	1968			<0.1-0.1						Flickinger and King 1972
dieldrin	ACCB	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.02								Campbell 1975
dieldrin	AGCO	adult	TX, USA	1971					Navasota area: 0.1; Brazos area: 1.7				Fleet et al. 1972
dieldrin	AGPI	adult	TX, USA	1971					Brazos area: 9.7				Fleet et al. 1972
dieldrin	AGPI	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.02; Range = ND-0.09						Ford and Hill 1991
dieldrin	ALMI	adult	FL, USA	1985	tail muscle					0.02-0.08 (tail)			Delany et al. 1988
dieldrin	ALMI	egg	FL, USA	1984-85		1984: L. Okeechobee= ND, L. Griffin= 0.06, L. Apopka= 0.24. 1985: L. Griffin= 0.05, L. Apopka= 0.11							Heinz et al. 1991
dieldrin	AMBA	egg	Australia	1970-71					ND				Best 1973
dieldrin	BUAM	adult/egg	IA, USA	1974	8 (ND-14)								Punzo et al. 1979 [k]
dieldrin	BUWF	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.01- 0.3 ppm								Campbell 1975
dieldrin	CACA	egg	FL, USA	1976		ND-0.028							Clark and Krynitsky 1980

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
dieldrin	CACA	egg	GA, USA	< 1974		trace-0.0564 ppm							Hillestad et al. 1974
dieldrin	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
dieldrin	CHPI	adult/egg	IA, USA	1974	18								Punzo et al. 1979 [k]
dieldrin	CHSE	adult	NJ, USA	1981-94	13% detection				0.03 (M), ND (F) control, ND (M), ND (F) brackish water, 0.07 (M) fresh water				Albers et al. 1986
dieldrin	CHSE	adult	ON, CAN	1995	blood: Range of Means= ND- 3.8 (M) ng/g ww								de Solla et al. 1998
dieldrin	CHSE	adult	NY, USA	1976-78		Mean <0.035 ppm			Mean= <8.45 ppm	Mean 0.008 ppm	Mean 0.038 ppm		Stone et al. 1980
dieldrin	CHSE	adult	NY, USA	1976-78					Mean 4.24 ppm	Mean <0.038 ppm	Mean 0.17 ppm		Stone et al. 1980
dieldrin	CHSE	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	CHSE	egg	ON, CAN	1986-89		1988-89: 0.6- 20 ng/g ww							Bishop et al. 1991
dieldrin	CHSE	egg	ON, CAN	1990	egg lipid	0.09-0.8, Mean= 0.49 mg/kg							Bishop et al. 1994
dieldrin	CHSE	egg	ON, CAN	1981-91		0.01-0.94							Bishop et al. 1996
dieldrin	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 2.5-44.6 ng/g ww							Bonin et al. 1995
dieldrin	CHSE	egg	ON, CAN	1981, 84		<0.02 mg/kg at most sites; Max= 0.11 mg/kg							Struger et al. 1993

Table 1- Field Residues - 44

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
dieldrin	CNEX	adult/egg	IA, USA	1974	34								Punzo et al. 1979 [k]
dieldrin	CNNE	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	COTE	adult/egg	IA, USA	1974	5 (ND- 43)								Punzo et al. 1979 [k]
dieldrin	CRAC	egg	FL, USA	1979		ND-0.03							Hall et al. 1979
dieldrin	CRNI	egg	Kenya	< 1991		0.03 mg/kg ww							Skaare et al. 1991
dieldrin	CRNI	egg	Zimbabwe	1979		Mean= 1.19 mg/kg ww for 15 sites							Wessels and Tannock 1980
dieldrin	CRNO	egg	Australia	1970-71					ND				Best 1973
dieldrin	CRPO	egg	Australia	1970-71					ND				Best 1973
dieldrin	CRVI	adult	CO, USA	1971					< 0.01-0.12 ppm				Bauerle et al. 1975
dieldrin	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.05- 0.6								Campbell 1975
dieldrin	KIFL	adult	TX, USA	1968-71			0.06						Flickinger and King 1972
dieldrin	KIFL	adult	TX, USA	1974	carcass		47						Flickinger and Mulhern 1980
dieldrin	LAGE	adult	TX, USA	1971					Navasota area: 0.1				Fleet et al. 1972
dieldrin	LIOL	egg	Australia	1970-71					ND-1.50				Best 1973
dieldrin	LITA	adult	Australia	1972	0.4 mg/kg ww								Birks and Olsen 1987
dieldrin	MOSV	egg	Australia	1970-71					ND				Best 1973
dieldrin	NECY	adult	LA, USA	1977-79			0.03-0.06 ppm						Sabourin et al. 1984
dieldrin	NECY	embryo	LA, USA	1977-79	embryo= 0.09 ppm								Sabourin et al. 1984
dieldrin	NEER	adult	TX, USA	1971					Navasota area: >0.01; Brazos area: 1.3-2.9				Fleet et al. 1972
dieldrin	NEER	adult	TX, USA	1968-71			0.1						Flickinger and King 1972
dieldrin	NEFA	adult	TX, USA	1968-71			5.7						Flickinger and King 1972

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
dieldrin	NELE	adult	NC, USA	< 1985	0.02								Hall et al. 1985 [k]
dieldrin	NEMA	adult	ON, CAN	1988, 90			pooled= ND-25.7 ng/g ww						Bonin et al. 1995
dieldrin	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.0034-0.020 ppm								Gendron et al. 1997
dieldrin	NERH	adult	TX, USA	1971					Navasota area: >0.01-0.2				Fleet et al. 1972
dieldrin	NERH	adult	LA, USA	1977-79			0.02-0.08 ppm		0.24-0.58 ppm	<0.01-0.03 ppm	0.01-0.13 ppm		Sabourin et al. 1984
dieldrin	NERH	embryo	LA, USA	1977-79	embryo= 0.09-0.12 ppm								Sabourin et al. 1984
dieldrin	NESI	adult	TX, USA	1971					Navasota area: >0.01 Brazos area: 2.3-7.0				Fleet et al. 1972
dieldrin	NESI	adult/egg	IA, USA	1974	Mean= 50; Range= ND- 161								Punzo et al. 1979 [k]
dieldrin	NEXX	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.02; Range= ND-0.12						Ford and Hill 1991
dieldrin	OPVE	adult/egg	IA, USA	1974	116								Punzo et al. 1979 [k]
dieldrin	PICA	adult	CO, USA	1971					0.03 ppm				Bauerle et al. 1975
dieldrin	PISA	adult	MO, USA	1965-67	aldrin and dieldrin combined 12.35 ppm								Korschgen 1970 [k]
dieldrin	PSAU	egg	Australia	1970-71					ND-1.91				Best 1973
dieldrin	PSCR	adult	ON, CAN	1983	µg/kg ww		Mean= 199.82						Russell et al. 1995
dieldrin	RACA	adult	TX, USA	1960			3.6 ppm						DeWitt et al. 1960
dieldrin	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
dieldrin	RACL	adult	TX, USA	1960			23.2 ppm						DeWitt et al. 1960
dieldrin	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
dieldrin	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
dieldrin	RAPI	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
dieldrin	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
dieldrin	RAXX	adult	LA, USA	1978	0.01 ppm in legs		< 0.05 ppm						Dowd et al. 1985 [k]
dieldrin	REGR	adult	TX, USA	1971					Brazos area: >0.01				Fleet et al. 1972
dieldrin	SCGR	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	SCJA	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	SCUN	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	STDE	adult	TX, USA	1971					Navasota area 0.3; Brazos area >0.01				Fleet et al. 1972
dieldrin	STDE	not specified	TX, USA	1960			77.5 ppm						DeWitt et al. 1960
dieldrin	STMO	egg	Australia	1970-71					0.04				Best 1973
dieldrin	SUSU	egg	Australia	1970-71					ND				Best 1973
dieldrin	THPR	adult	TX, USA	1971					Navasota area >0.01; Brazos area: 12.0				Fleet et al. 1972
dieldrin	THPR	adult	TX, USA	1968-71			1.3						Flickinger and King 1972
dieldrin	THRA	adult/egg	IA, USA	1974	112								Punzo et al. 1979 [k]
dieldrin	THSI	adult	WI, USA	1978			ND-0.19 (F)						Heinz et al. 1980
dieldrin	THSI	adult	WI, USA	1978			ND-0.11 (M)						Heinz et al. 1980
dieldrin	THSI	adult	MO, USA	1965-67	aldrin and dieldrin combined 12.35 ppm								Korschgen 1970 [k]
dieldrin	THSI	adult/egg	IA, USA	1974	99								Punzo et al. 1979 [k]
dieldrin	TRSC	adult	TX, USA	1968-71		2.8	1.2						Flickinger and King 1972
dieldrin	UROR	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	UTST	adult/egg	IA, USA	1974	ND								Punzo et al. 1979 [k]
dieldrin	VAGI	egg	Australia	1970-71					0.03				Best 1973
dieldrin	VAGO	egg	Australia	1970-71					ND-0.03				Best 1973

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
dieldrin	XELA	adult	TX, USA	1960			11.9 ppm						DeWitt et al. 1960
dieldrin	XXSN	adult	TX, USA	1960			9.8 ppm						DeWitt et al. 1960
dimethoate	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
dioxathion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
dioxins	CHSE	egg	ON, CAN	1989		Range: ND- 95 mg/kg ww							Norstrom and Simon 1990
dioxins	RACL	adult	PQ, CAN	1988			ND-404 µg/kg cont. sites; 27-108 µg/kg control						Phaneuf et al. 1995
disulfoton	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
endosulfan	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
endosulfan	CRNI	adult	Botswana	1978	brain <0.01 ppm; spleen <0.01			0.783		0.047 ppm	0.12 ppm		Matthiessen et al. 1982
endosulfan	RACL	adult & young of the year	ON, CAN	1993-95	site 1: 0.53 µg/L								Harris et al. 1998
endosulfan	RAPI	adult & young of the year	ON, CAN	1993-95	ND at all orchard sites								Harris et al. 1998
endrin	AMBA	egg	Australia	1970-71					ND				Best 1973
endrin	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
endrin	CHSE	adult	NJ, USA	1981-95	ND								Albers et al. 1986
endrin	CRNO	egg	Australia	1970-71					ND				Best 1973
endrin	CRPO	egg	Australia	1970-71					ND				Best 1973
endrin	KIFL	adult	TX, USA	1974	carcass		1.3						Flickinger and Mulhern 1980
endrin	LIOL	egg	Australia	1970-71					ND				Best 1973
endrin	MOSV	egg	Australia	1970-71					ND				Best 1973
endrin	NERH	embryo	LA, USA	1977-79	embryo= ND-0.01 ppm								Sabourin et al. 1984
endrin	PSAU	egg	Australia	1970-71					ND-0.60				Best 1973
endrin	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
endrin	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
endrin	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]

Table 1- Field Residues - 48

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
endrin	STMO	egg	Australia	1970-71					ND				Best 1973
endrin	SUSU	egg	Australia	1970-71					ND				Best 1973
endrin	VAGI	egg	Australia	1970-71					ND				Best 1973
endrin	VAGO	egg	Australia	1970-71					ND				Best 1973
ethion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
ethoprop	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Fe	ACJA	adult	Papua New Guinea	1980-81						7.1			Yoshinaga et al. 1992
Fe	ALMI	adult	FL, USA	1985						4.56-22.76 (tail)			Delany et al. 1988
Fe	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 13, L. Griffin= 13, L. Apopka= 11							Heinz et al. 1991
Fe	CACA	adult	Japan	1990-91						Mean= 20.1, Range= 11.3-35.2	Mean= 649, Range= 226-1260	Mean= 35.9, Range= 11.4-110	Sakai et al. 1995
Fe	CACA	egg	FL, USA	1977		71.27-74.67 µg/g							Stoneburner et al. 1980
Fe	CHMY	adult	Japan	1990-91							Mean= 1170, Range= 92.8-2450	Mean= 43.3, Range= 8.8-179	Sakai et al. 1995
Fe	CHMY	adult	Papua New Guinea	1980-81						48.9			Yoshinaga et al. 1992
Fe	CHMY	juvenile	HI, USA	< 1994							Range= 92.8-2450		Aguirre et al. 1994
Fe	CHXX	adult	Papua New Guinea	1980-81						34.7			Yoshinaga et al. 1992
Fe	CRPO	adult	Papua New Guinea	1980-81						8.8			Yoshinaga et al. 1992
Fe	LEOL	adult	Ecuador	1981	Range of Means= 78.5-309 µg/g (bone)								Witkowski and Frazier 1982
Fe	RAES	adult	Czecho-slovakia	1982-84			74.7-397.8 ppm dw						Pavel and Kucera 1986 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Fe	RAES	adult	Hungary	< 1997	Range of Means= 71.2-389 mg/kg (ovary)								Puky and Oertel 1997
Fe	RAES	egg	Hungary	< 1997		Range of Means= 78.2-313 mg/kg							Puky and Oertel 1997
Fe	VAXX	adult	Papua New Guinea	1980-81						22.7			Yoshinaga et al. 1992
fenamiphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
fenitrothion	BUAM	larvae	PQ, CAN	1984	< 0.005- 0.123								Mamarbachi et al. 1987 [k]
fenitrothion	RASY	tadpole	ON, CAN	1075	0.61 after 1 h (185 times the water conc.); 0.04 at 2 d (18 times the water conc.)								Lyons et al. 1976 [k]
fensulfothion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
fenthion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
fenthion	PSTR	adult	WY, USA	< 1982	ND 1- 3 d after treatment. Detection limit= 0.01 ppm								Powell et al. 1982 [k]
fenvalerate	BUWF	adult	AR, USA	1979			0.02 ppm						Bennett et al. 1983 [k]
fenvalerate	PSCR	adult	AR, USA	1979			< 0.01 ppm						Bennett et al. 1983 [k]
fenvalerate	RACL	adult	AR, USA	1979			< 0.01 ppm						Bennett et al. 1983 [k]
fenvalerate	RAUT	adult	AR, USA	1979			< 0.01 ppm						Bennett et al. 1983 [k]
fonophos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
fuel oil	RACA	adult	CA, USA	1971	Fuel oil No. 2								Hagen et al. 1973 [k]
furans	CHSE	adult	NY, USA	1984	pg/g ww				Range= 6.0- 330		ND- 74		Ryan et al. 1986
furans	CHSE	egg	ON, CAN	1989		Ranged from trace to 41 mg/kg ww							Norstrom and Simon 1990
HCH, alpha, lindane	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
HCH, alpha, lindane	LIPG	adult	India	1991			5.5-15 ng/g ww						Ramesh et al. 1992

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
HCH, alpha, lindane	NEMA	adult	ON, CAN	1988, 90			pooled= 0.4-6.8 ng/g ww						Bonin et al. 1995
HCH, alpha, lindane	PSCR	adult	ON, CAN	1993	µg/kg ww		Mean= 0.37						Russell et al. 1995
HCH, alpha, lindane	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
HCH, alpha, lindane	VAXX	adult	India	1987			17-170 ng/g ww						Ramesh et al. 1992
HCH, beta, lindane	CHSE	adult	ON, CAN	1995	blood: Range of Means= 0.5-1.4 (M) ng/g ww								de Solla et al. 1998
HCH, beta, lindane	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= ND-2.9 ng/g ww							Bonin et al. 1995
HCH, beta, lindane	CHSE	egg	ON, CAN	1981, 84		Range= ND-0.020 mg/kg							Struger et al. 1993
HCH, beta, lindane	CRNI	egg	Zimbabwe	1979		Range= 1.01-24.5 mg/kg ww for 15 sites							Wessels and Tannock 1980
HCH, beta, lindane	PSCR	adult	ON, CAN	1983	µg/kg ww		Mean= 1.37						Russell et al. 1995
HCH, beta, lindane	XXFR	adult	Greece	1992-93			Mean= 3.64; Range= ND-30.9						Albanis et al. 1996
heptachlor	ACCB	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.02								Campbell 1975
heptachlor	ALMI	adult	FL, USA	1985						0.04-0.14 (tail)			Delany et al. 1988
heptachlor	BUWF	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.01								Campbell 1975
heptachlor	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
heptachlor	CHSE	egg	ON, CAN	1986-89		1988-89: 0.2- 5.6 ng/g ww							Bishop et al. 1991
heptachlor	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); < 0.01								Campbell 1975
heptachlor	NERH	adult	LA, USA	1977-79			ND-0.01 ppm						Sabourin et al. 1984

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
heptachlor	NESI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); <0.01- 0.04								Campbell 1975
heptachlor	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
heptachlor	XXFR	adult	Greece	1992-93			Mean= 1.46; Range= ND-3.82						Albanis et al. 1996
heptachlor epoxide	BUAM	adult	TX, USA	1960			3.1 ppm						DeWitt et al. 1960
heptachlor epoxide	BUXX	adult		1962	found dead 1 mo after spraying		19.4 ppm						DeWitt et al. 1962 k
heptachlor epoxide	CACA	egg	FL, USA	1976		ND-0.006							Clark and Krynitsky 1980
heptachlor epoxide	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
heptachlor epoxide	CHSE	adult	NJ, USA	1981-96	25% detection				0.17 (M), 0.04 (F) control, ND (M), ND (F) brackish water, 0.38 (M) fresh water				Albers et al. 1986
heptachlor epoxide	CHSE	adult	ON, CAN	1995	Blood: Range of Means = ND-1.5 ng/g ww (M)								de Solla et al. 1998
heptachlor epoxide	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range = 0.4-10.0 ng/g ww							Bonin et al. 1995
heptachlor epoxide	CHSE	egg	ON, CAN	1981, 84		Range = ND-0.010 mg/kg							Struger et al. 1993
heptachlor epoxide	CRAC	egg	FL, USA	1979		ND-0.04							Hall et al. 1979
heptachlor epoxide	CRVI	adult	CO, USA	1971					0.02 ppm				Bauerle et al. 1975
heptachlor epoxide	HEXX	adult	TX, USA	1960			4.2 ppm						DeWitt et al. 1960
heptachlor epoxide	NECY	adult	LA, USA	1977-79			0.05 ppm						Sabourin et al. 1984

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
heptachlor epoxide	NEER	adult	TX, USA	1960			11.3 ppm						DeWitt et al. 1960
heptachlor epoxide	NEMA	adult	ON, CAN	1988, 90			pooled= ND-7.1 ng/g ww						Bonin et al. 1995
heptachlor epoxide	NERH	adult	LA, USA	1977-79			0.03-0.22 ppm		0.21-0.70 ppm	<0.01-0.03	0.02-0.09		Sabourin et al. 1984
heptachlor epoxide	NERH	embryo	LA, USA	1977-79	embryo= 0.13-1.76 ppm								Sabourin et al. 1984
heptachlor epoxide	PSCR	adult	ON, CAN	1983	µg/kg ww		Mean= 1.98						Russell et al. 1995
heptachlor epoxide	RACA	adult		1962	found dead 1 mo after spraying		13.5 ppm						DeWitt et al. 1962 k
heptachlor epoxide	RACL	adult	TX, USA	1960			ND						DeWitt et al. 1960
heptachlor epoxide	RACL	adult		1962	found dead 1 mo after spraying		1.5 ppm						DeWitt et al. 1962 k
heptachlor epoxide	RAPE	egg	Spain	1983		ND							Hernandez et al. 1987
heptachlor epoxide	RAPI	adult		1962	found dead 1 mo after spraying		13.0 ppm						DeWitt et al. 1962 k
heptachlor epoxide	TATO	adult	BC, CAN	1980			14 d after treatment = 0.343; 279 d after exposure= ND	0.072 in stomach					Albright et al. 1980 k
heptachlor epoxide	XELA	adult	TX, USA	1960			20.9 ppm						DeWitt et al. 1960
Hg	ACCB	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.04- 0.05								Campbell 1975
Hg	ACCR	tadpole	TX, USA	1994			<0.5						Clark et al. 1998
Hg	ACJA	adult	Papua New Guinea	1980-81						1.306			Yoshinaga et al. 1992
Hg	ALMI	adult	FL, USA	1985						0.04-0.61 (tail)			Delany et al. 1988

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Hg	ALMI	adult	FL, USA	1989	Range= 0.78- 3.58 (M) and 0.46- 3.88 ppm (conservation area). Urban canals: 0.17- 2.15 (M); 0.21- 2.52 ppm (F). Meat: 0.13- 0.90 ppm								Hord et al. 1990
Hg	ALMI	adult	SC, USA	1994						Mean= 4.08 (vs. 5.43-5.68 in Ever-glades)	Mean= 17.73 (vs. 39.75- 42.15 in Ever-glades)		Yanochko et al. 1997
Hg	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
Hg	AMEX	adult	Puerto Rico	1988	ND								Burger et al. 1992
Hg	BOBO	adult	Hungary	< 1997	kidney~=muscle>skin>muscle> liver>stomach>>ovary (F)								Puky and Oertel 1997
Hg	BOVA	adult	Yugoslavia	1975	lungs= 0.11 (M)					0.37 (M)	2.07 (M)	0.93 (M)	Byrne et al. 1975 [k]
Hg	BUBU	adult	Yugoslavia	1975	lungs= 0.17 (M); 0.14 (F)					0.17 (M) 0.14 (F)	1.51 (M); 0.94 (F)	1.24 (M); 0.60 (F)	Byrne et al. 1975 [k]
Hg	BUBU	adult	Yugoslavia	1975	lungs= 1.11- 1.70	1.25- 2.30				1.39- 3.44	22.5- 25.5	Range= 21.0- 25.3	Byrne et al. 1975 [k]
Hg	BUBU	adult	Finland	< 1984	lungs= 0.06					0.04	0.12	0.08	Terhivuo et al. 1984 [k]
Hg	BUTE	adult	GA, USA	1972-73						ND- 0.18			Cumbie 1975 [k]
Hg	BUWF	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.01- 0.09								Campbell 1975
Hg	BUXX	adult	MD, USA	< 1984		0.04- 0.14							Hall and Mulhern 1984 [k]
Hg	CACA	adult	Japan	1990-91						Mean= 0.108, Range= 0.053- 0.189	Mean= 1.51, Range= 0.253- 8.15	Mean= 0.247, Range= 0.04- 0.441	Sakai et al. 1995
Hg	CACA	egg	GA, USA	< 1974		0.02-0.09 ppm in yolks; 0.01-0.03 ppm in alb							Hillestad et al. 1974

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Hg	CACA	egg	Japan	1990-91		Mean= 1.05, Range= 0.772-1.31							Sakai et al. 1995
Hg	CACA	egg	FL, USA	1977		0.41- 1.39 μg/g							Stoneburner et al. 1980
Hg	CHMY	adult	Papua New Guinea	1980-81						0.002			Yoshinaga et al. 1992
Hg	CHPI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); < 0.01- 0.39								Campbell 1975
Hg	CHSE	adult	NJ, USA	1981-86							0.46-1.28 for all sites	0.44 (M), 0.56 (F) control, 0.55 (M), 0.41 (F) brackish water, 0.39 (M) fresh water	Albers et al. 1986
Hg	CHSE	adult	MN, USA	1981					Range < 0.02- 0.04 Mean= 0.024 mg/kg	Range= 0.05- 0.3 (red meat) Mean= 0.145 mg/kg			Helwig and Hora 1983
Hg	CHSE	adult	TN, USA	1988						0.17± 0.02 Bq/g ww		1.30± 0.34 Bq/g ww	Meyers-Schöne et al. 1993
Hg	CHSE	adult	MN, USA	1981					Range <0.02-0.04 mg/kg	Range= 0.05-0.30 mg/kg			Minnesota Pollution Control Agency 1982
Hg	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 50-180 ng/g ww							Bonin et al. 1995
Hg	CHSE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.09- 0.39								Campbell 1975
Hg	CHXX	adult	Papua New Guinea	1980-81						0.038			Yoshinaga et al. 1992
Hg	CLGU	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.03								Campbell 1975

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Hg	CRAC	egg	FL, USA	1980		shell= 0.21 µg/g; yolk/alb= 0.66 µg/g							Stoneburner 1984
Hg	CRNI	egg	Zimbabwe	1981-82		0.02- 0.535 mg/kg dw							Phelps et al. 1986
Hg	CRPO	adult	Papua New Guinea	1980-81						0.131			Yoshinaga et al. 1992
Hg	DECO	adult	Ireland	1988					0.11± 0.02 µg/g dw	0.12± 0.06 µg/g dw (pectoral)	0.39± 0.04 µg/g dw		Davenport and Wrench 1990
Hg	DECO	adult	Japan	1990-91						0.12	0.39		Sakai et al. 1995
Hg	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.09								Campbell 1975
Hg	HYCI	adult	GA, USA	1972-73						0.03			Cumbie 1975 [k]
Hg	HYXX	tadpoles	Greece	1993-94	Moderate levels were reported								Goutner and Furness 1997
Hg	KIFL	adult	TX, USA	1968-71			0.12						Flickinger and King 1972
Hg	NEMA	adult	ON, CAN	1988, 90			pooled= 70-290 ng/g ww						Bonin et al. 1995
Hg	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.048- 0.19 ppm								Gendron et al. 1997
Hg	NESI	adult	WI, USA	1978		0.45							Heinz et al. 1980
Hg	NESI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.17- 0.44								Campbell 1975
Hg	PIME	hatchling	NJ, USA	1985-90	skin= 280± 47		130± 27						Burger 1992
Hg	RAAR	adult	Yugoslavia	1975	lungs= 0.47 (F)					0.48 (F)	1.96 (F)	0.63 (F)	Byrne et al. 1975 [k]
Hg	RACA	adult	GA, USA	1972-73						0.05- 0.26	0.09- 0.44		Cumbie 1975 [k]
Hg	RACA	adult	ON, CAN	1970	carcass		< 0.10 (M/F)				0.51 (M); 0.28 (F)		Dustman et al. 1972 [k]
Hg	RACA	tadpole	MD, USA	< 1984		0.05- 0.10							Hall and Mulhern 1984 [k]
Hg	RACL	tadpole	TX, USA	1994			<0.5						Clark et al. 1998
Hg	RACL	tadpole	MD, USA	< 1984		0.04- 0.10							Hall and Mulhern 1984 [k]

Table 1- Field Residues - 56

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Hg	RADA	adult	Yugoslavia	1975	lungs: 0.25 (M)					0.30 (M)	0.67 (M)	1.01 (M)	Byrne et al. 1975 [k]
Hg	RAES	adult	Hungary	< 1997	ovary: Range of Means= 3.8-107 µg/kg (F)	Range of Means= 3.8-107 µg/kg							Puky and Oertel 1997
Hg	RAES	egg	Hungary	< 1997		Range of Means= 0-35.2 µg/kg							Puky and Oertel 1997
Hg	RAPE	adult	Spain	1984-86						0.08- 0.15			Rico et al. 1987 [k]
Hg	RAPI	adult	GA, USA	1972-73						Range= 0.07-0.10; Mean= 0.25			Cumbie 1975 [k]
Hg	RAPI	adult	ON, CAN	1970	carcass		(F) 0.18; (M) < 0.1				(F) 0.61; (M) < 0.1		Dustman et al. 1972 [k]
Hg	RARI	adult	Greece	1993-94	Marsh frogs higher levels of mercury than tree frog tadpoles								Goutner and Furness 1997
Hg	RASP	tadpole	TX, USA	1994			<0.5						Clark et al. 1998
Hg	RATE	adult	Yugoslavia	1975	lungs= 1.54	1.25				3.44	25.9	16.2	Byrne et al. 1975 [k]
Hg	RATE	adult	Finland	< 1984	lungs= 0.04- 0.08	0.02	0.01			0.03- 0.07	0.05- 0.19	0.03- 0.08	Terhivuo et al. 1984 [k]
Hg	RAXX	adult	MD, USA	< 1984		< 0.01-0.14							Hall and Mulhern 1984 [k]
Hg	RAXX	tadpole	SC, USA	1973-74	total Hg 2.08- 6.41; methyl Hg 0-0.03; % methyl Hg 0.48- 0.69								Cox et al. 1975 [k]
Hg	THSI	adult	WI, USA	1978			0.14-0.41 (F)						Heinz et al. 1980
Hg	THSI	adult	WI, USA	1978			0.3-0.4 (M)						Heinz et al. 1980
Hg	TRSC	adult	TX, USA	1968-71		ND	0.08						Flickinger and King 1972
Hg	TRSC	adult	TN, USA	1987						Mean= 0.10± 0.04 µg/g ww		Mean= 0.64± 0.33 µg/g ww	Meyers-Schöne et al. 1993
Hg	TRSC	egg	SC, USA	1996		Contents= 40, Shell= ND ppb dw							Burger and Gibbons 1998

Table 1- Field Residues - 57

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Hg	VAXX	adult	Papua New Guinea	1980-81						0.175			Yoshinaga et al. 1992
isofenphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
lindane	AMBA	egg	Australia	1970-71					ND				Best 1973
lindane	CHSE	adult	ON, CAN	1995	Blood: Range of Means = ND-0.3 ng/g ww (M)								de Solla et al. 1998
lindane	CRNO	egg	Australia	1970-71					0.03				Best 1973
lindane	CRPO	egg	Australia	1970-71					ND				Best 1973
lindane	LIOL	egg	Australia	1970-71					ND-0.04				Best 1973
lindane	MOSV	egg	Australia	1970-71					ND				Best 1973
lindane	NEMA	adult	ON, CAN	1988, 90			pooled= ND-1.4 ng/g ww						Bonin et al. 1995
lindane	PSAU	egg	Australia	1970-71					ND-0.04				Best 1973
lindane	RAPE	adult	Spain	1986						0.01			Rico et al. 1987 [k]
lindane	RAPE	egg	Spain	1983		0.01							Hernandez et al. 1987
lindane	STMO	egg	Australia	1970-71					ND				Best 1973
lindane	SUSU	egg	Australia	1970-71					ND				Best 1973
lindane	VAGI	egg	Australia	1970-71					ND				Best 1973
lindane	VAGO	egg	Australia	1970-71					ND-0.12				Best 1973
malathion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
merphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
metals	APXX	adult	AZ, USA	1993-94			Mean of Bo, Cr, Se, Sr and Zn sig. higher in turtles from Quito. Springs than softshell turtles from the highly cont. Gila River						Rosen and Lowe 1996
metals	CACA	adult	TX, USA	1990	heavy metals in liver and kidney (Zn, Fe, Se, Pb, Cu, Cd) were within previously reported ranges								Sis et al. 1993

Table 1- Field Residues - 58

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
metals	KISO	adult	AZ, USA	1989-93			``						Rosen and Lowe 1996
metals	LEKE	adult	TX, USA	1990	heavy metal conc. in liver and kidney were within previously reported levels.								Sis et al. 1993
methamidophos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
methidathion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
methiocarb	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
methomyl	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
methoxychlor	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
methoxychlor	RACA	adult	IL, USA	1969	1 male and 1 female tested for residues								Jaskoski and Kinders 1974
methoxychlor	RACL	adult	IL, USA	1969	22 of 44 M and 5 of 7 F tested positive for methoxychlor								Jaskoski and Kinders 1974
methoxychlor	RAPI	adult	IL, USA	1969	all individuals had residues								Jaskoski and Kinders 1974
methyl-carbamate	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
metolachlor	RACL	adult & young of the year	ON, CAN	1993-95	site 2 only at 5.1-8.8 µg/L								Harris et al. 1998
metolachlor	RAPI	adult & young of the year	ON, CAN	1993-95	0.29 µg/L at site 2 only								Harris et al. 1998
mevinphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
mexacarbate	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
mexacarbate	RACL	tadpole	NB, CAN	1985	10 ppb ww								Sundaram et al. 1986 [k]
mexacarbate	RACL	tadpoles	NB, CAN	< 1995			ND						Sundaram 1995
Mg	ACJA	adult	Papua New Guinea	1980-81						189			Yoshinaga et al. 1992
Mg	CHMY	adult	Papua New Guinea	1980-81						241			Yoshinaga et al. 1992
Mg	CHXX	adult	Papua New Guinea	1980-81						287			Yoshinaga et al. 1992
Mg	CRPO	adult	Papua New Guinea	1980-81						273			Yoshinaga et al. 1992
Mg	RACA	tadpole	MD, USA	< 1984		58- 160							Hall and Mulhern 1984 [k]
Mg	RACL	tadpole	MD, USA	< 1984		14- 29							Hall and Mulhern 1984 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Mg	RATE	adult	Finland	< 1974							male = 294 (wintering)- 604.2 (feeding); female = 335 (pre-emerging) - 749 (feeding) ppm dw		Pasanen and Koskela 1974
Mg	VAXX	adult	Papua New Guinea	1980-81						147			Yoshinaga et al. 1992
mirex	ACGR	adult	MS, USA	1970			5 d post-spray 0.03; 6 mo 2.8; 16 mo 0.05						Collins et al. 1973 [k]
mirex	ACGR	adult	GA, USA	1971-72	found dead		3.01 (1 mo post-spray)						Wojcik et al. 1975 [k]
mirex	ANCA	adult	LA, USA	1971-72			pre-spray= ND; 1 mo. Mean= 0.183; 1 yr Mean= 0.017						Collins et al. 1974
mirex	BUQU	adult	FL, USA	1972-74		0.04- 0.78							Wheeler et al. 1977 [k]
mirex	BUQU	adult	GA, USA	1971-72	found dead		0.08 (12 mo post-spray)						Wojcik et al. 1975 [k]
mirex	BUTE	adult	LA, USA	1971-72			pre-spray= ND; 1 mo. Mean= 0.144; 1yr Mean= 0.008						Collins et al. 1974

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
mirex	BUTE	adult	FL, USA	1972-74	9 mo= 0.09								Wheeler et al. 1977 [k]
mirex	BUTE	adult	GA, USA	1971-72	found dead		0.02- 0.94						Wojcik et al. 1975 [k]
mirex	CACA	egg	FL, USA	1976		ND-0.005							Clark and Krynitsky 1980
mirex	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
mirex	CHSE	adult	ON, CAN	1995	Blood: Range of Means = 0.2-10.0 ng/g ww (M)								de Solla et al. 1998
mirex	CHSE	adult	ON, CAN	1988-89						0.05± 0.05-3.95± 1.29 ng/g ww			Hebert et al. 1993b
mirex	CHSE	adult	NY, USA	< 1983					15.0 ppm				Olafsson et al. 1983
mirex	CHSE	adult	NY, USA	< 1983					87.6 ppm				Olafsson et al. 1983
mirex	CHSE	egg	ON, CAN	1986-89		1988-89: 0.5- 143 ng/g ww							Bishop et al. 1991
mirex	CHSE	egg	ON, CAN	1990		Range= 1.4-2.7, Mean= 1.4 mg/kg (lipid)							Bishop et al. 1994
mirex	CHSE	egg	ON, CAN	1981-91		0.003-2.12							Bishop et al. 1996
mirex	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.4-133.5 ng/g ww							Bonin et al. 1995
mirex	CHSE	egg	ON, CAN	1981, 84	mirex were higher in egg from L. Ontario relative to other sites								Struger et al. 1993
mirex	COCP	adult	LA, USA	1971-72			pre-spray= ND; 3 mo= 0.053; 1 yr. Mean= 0.111						Collins et al. 1974
mirex	CRAC	egg	FL, USA	1979		ND-0.02							Hall et al. 1979

Table 1- Field Residues - 61

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
mirex	ENPL	adult	LA, USA	1971-72			post-spray 2 wk. Mean= 0.002; 6 mo. Mean= 0.078						Collins et al. 1974
mirex	EUFA	adult	LA, USA	1971-72			post-spray 1 mo. Mean= 0.658; 1 yr. Mean= 0.216						Collins et al. 1974
mirex	GACA	adult	LA, USA	1971-72			post-spray 2 wk. Mean= 0.044; 1 yr. Mean= 0.074						Collins et al. 1974
mirex	GACA	adult	FL, USA	1972-74	0.01- 0.52								Wheeler et al. 1977 [k]
mirex	GACA	adult	GA, USA	1971-72	found dead		0.12- 3.46						Wojcik et al. 1975 [k]
mirex	GOPO	adult	LA, USA	1971-72			pre-spray= 0.001; 1 mo. Mean= ND; 1 yr. Mean= ND						Collins et al. 1974
mirex	HYCI	adult	FL, USA	1972-74	ND								Wheeler et al. 1977 [k]
mirex	HYFE	adult	FL, USA	1972-74	0.08								Wheeler et al. 1977 [k]
mirex	KISU	adult	LA, USA	1971-72			post-spray 2 wk. Mean= 0.015; 9 mo= 0.273						Collins et al. 1974

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
mirex	NEMA	adult	ON, CAN	1988, 90			pooled= ND-8.0 ng/g ww						Bonin et al. 1995
mirex	NEMA	adult	ON, CAN	1988, 90			pooled= ND-19.9 ng/g ww						Bonin et al. 1995
mirex	NERH	adult	LA, USA	1971-72			pre-spray= 0.005; 2 wk. Mean= ND; 1 yr. Mean= 0.054						Collins et al. 1974
mirex	PLGG	adult	LA, USA	1971-72			pre-spray= ND; 3 mo. Mean= 0.828; 1 yr Mean= 0.02						Collins et al. 1974
mirex	PSOR	adult	GA, USA	1971-72	found dead		0.10 (6 mo post-spray)						Wojcik et al. 1975 [k]
mirex	RAAE	adult	FL, USA	1972-74	0.14								Wheeler et al. 1977 [k]
mirex	RACA	adult	LA, USA	1971-72			post spray 2 wk. Mean= ND; 9 mo Mean= 0.001						Collins et al. 1974
mirex	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
mirex	RACA	adult	FL, USA	1972-74	0.02- 0.04								Wheeler et al. 1977 [k]
mirex	RACA	adult	GA, USA	1971-72	found dead		0.03- 0.15						Wojcik et al. 1975 [k]
mirex	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]

Table 1- Field Residues - 63

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
mirex	RAGR	tadpole	MS, USA	1972	< 6 mo after application	0.12							Naqvi and de la Cruz 1973 [k]
mirex	RAHC	adult	FL, USA	1972-74	0.02- 0.28								Wheeler et al. 1977 [k]
mirex	RAPI	adult	LA, USA	1971-72			post-spray 2 wk. Mean= 0.002; 1 mo. Mean= 0.015						Collins et al. 1974
mirex	RAPI	adult	FL, USA	1972-74	0.01- 0.13								Wheeler et al. 1977 [k]
mirex	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
mirex	RASP	adult	GA, USA	1971-72	found dead		0.08- 0.56						Wojcik et al. 1975 [k]
mirex	RAXX	tapdole	FL, USA	1972-74		ND							Wheeler et al. 1977 [k]
mirex	SCHO	adult	FL, USA	1972-74	0.02- 0.05								Wheeler et al. 1977 [k]
mirex	SCUU	adult	LA, USA	1971-72			post-spray 2 wk. Mean= 0.003; 3 mo. Mean= 0.191; 1yr Mean= 0.025						Collins et al. 1974
mirex	SCXY	adult	LA, USA	1971-72			pre-spray= ND; 3 mo. Mean= 0.032; 1 yr. Mean= 0.042						Collins et al. 1974
mirex	TECA	adult/egg	MS, USA	1970-77		Range= 1.4-2.5 ppm dw							Holcomb and Parker 1979

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
mirex	TECM	adult	LA, USA	1971-72			pre-spray Mean= ND; 2 wk. Mean= ND; 1 mo. Mean= 0.009						Collins et al. 1974
mirex	TRSC	adult/egg	MS, USA	1970-77		Range= 0.04-2.2 ppm dw					Range= 0.01-2.1 ppm dw		Holcomb and Parker 1979
mirex	XXFR	tadpole	LA, USA	1971-72			pre-spray= 0.016; 3 mo. Mean= 0.024						Collins et al. 1974
mirex (p-mirex)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 0.1-49.5 ng/g ww							Bonin et al. 1995
Mn	ACJA	adult	Papua New Guinea	1980-81						0.57			Yoshinaga et al. 1992
Mn	AGSS	adult	Greece	< 1997	carcass; ppm dw		41-61.1				41-52		Loumbourdis 1997
Mn	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 0.14, L. Griffin= 0.15, L. Apopka= 0.14							Heinz et al. 1991
Mn	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						3.68-11.0		Lee and Stuebing 1990
Mn	CACA	adult	Japan	1990-91						Mean= 0.300, Range= 0.129-0.446	Mean= 2.07, Range= 1.44-2.94	Mean= 1.57, Range= 0.808-1.97	Sakai et al. 1995
Mn	CHMY	adult	Japan	1990-91							Mean= 1.60, Range= 0.15-2.79	Mean= 0.96, Range= 0.48-1.39	Sakai et al. 1995
Mn	CHMY	adult	Papua New Guinea	1980-81						0.34			Yoshinaga et al. 1992

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Mn	CHMY	juvenile	HI, USA	< 1994							Range= 0.15-2.79		Aguirre et al. 1994
Mn	CHXX	adult	Papua New Guinea	1980-81						0.38			Yoshinaga et al. 1992
Mn	CRPO	adult	Papua New Guinea	1980-81						0.77			Yoshinaga et al. 1992
Mn	LEOL	adult	Ecuador	1981	Bone: Range of Means = 8.4-35.7 µg/g								Witkowski and Frazier 1982
Mn	PIME	hatchling	NJ, USA	1985-90	skin= 3840± 558		15039± 1100						Burger 1992
Mn	RACA	tadpole	MD, USA	< 1984		14- 42							Hall and Mulhern 1984 [k]
Mn	RACL	tadpole	MD, USA	< 1984		1.1							Hall and Mulhern 1984 [k]
Mn	RAES	adult	Italy	1974	highest in male skin 69.7 ppm dw. Females have higher Mn in gonads 53.0 ppm dw								Baudo 1976
Mn	RAES	adult	Czechoslovakia	1982-84			23.4- 51.9 ppm dw						Pavel and Kucera 1986 [k]
Mn	RAES	juvenile	Italy	1974			25.0 ppm dw						Baudo 1976
Mn	RAES	tadpole	Italy	1974			avg= 454 ppm dw						Baudo 1976
Mn	TRSC	egg	SC, USA	1996		contents= 4477, shell= 3490 ppb dw							Burger and Gibbons 1998
Mn	VAXX	adult	Papua New Guinea	1980-81						0.56			Yoshinaga et al. 1992
Mn	XXXA	tadpole	MO, USA	1972			500-5650 µg/g dw						Gale et al. 1973 [k]
Mo	AGSS	adult	Greece	< 1997	carcass; ppm dw		1.24-1.39				7.5-8.3		Loumbourdis 1997
Mo	CACA	egg	FL, USA	1977		2.66-17.93 µg/g							Stoneburner et al. 1980
Mo	CHMY	juvenile	HI, USA	< 1994							0.1-0.6		Aguirre et al. 1994
Mo	CRAC	egg	FL, USA	1980		shell= 25.43 µg/g; yolk/alb= 2.37 µg/g							Stoneburner 1984

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Molybdenum	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
monocrotophos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
myclobutanil	RAPI	adult & young of the year	ON, CAN	1993-95	ND at all of the orchard sites								Harris et al. 1998
naled	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Ni	AGSS	adult	Greece	< 1997	carcass; ppm dw		34-48				3.60-7.33		Loumbourdis 1997
Ni	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 0.07, L. Griffin= 0.05, L. Apopka= 0.09.							Heinz et al. 1991
Ni	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						1.01-21.4		Lee and Stuebing 1990
Ni	CACA	adult	Japan	1990-91						<0.03-0.116	<0.03	<0.03-0.27	Sakai et al. 1995
Ni	CACA	egg	FL, USA	1977		0.25- 0.27 µg/g							Stoneburner et al. 1980
Ni	CHMY	juvenile	HI, USA	< 1994								0.5-1.0	Aguirre et al. 1994
Ni	CHSE	adult	NJ, USA	1981-87							0.13-0.99 for all sites	0.35 (M), 0.43 (F) Control, 1.24 (M), 1.07 (F) brackish water, 0.45 (M) fresh water	Albers et al. 1986
Ni	CRAC	egg	FL, USA	1980		shell= 22.04 µg/g; yolk/alb= 2.35 µg/g							Stoneburner 1984
Ni	DECO	adult	Ireland	1988					0.07± 0.02	1.62± 0.21, (pectoral)	2.13± 0.16		Davenport and Wrench 1990
Ni	DECO	egg shell	Mexico	1992-93		7.60 mg/kg							Vazquez et al. 1997

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Ni	ERIM	adult	Saudi Arabia	1983						2.59	4.93		Sadiq & Zaidi 1984
Ni	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= 1.0	1.6 µg/g ww		Linder et al. 1991
Ni	XXSS	adult	Saudi Arabia	1983						1.7- 5.38	1.87- 4.73		Sadiq & Zaidi 1984
nonachlor	CACA	egg	FL, USA	1976		ND-0.009							Clark and Krynitsky 1980
nonachlor	CHSE	adult	ON, CAN	1995	blood: Range of Means= ND-10.8 ng/g ww (M)								de Solla et al. 1998
nonachlor	CHSE	egg	ON, CAN	1986-89		1986-87: <0.01-136; 1988-89: 1.6- 249 ng/g ww							Bishop et al. 1991
nonachlor	CHSE	egg	ON, CAN	1981, 84		Range was ND-0.030 mg/kg							Struger et al. 1993
nonachlor	CRAC	egg	FL, USA	1979		ND-0.04							Hall et al. 1979
nonachlor	CRAC	egg	FL, USA	1979		ND-0.03							Hall et al. 1979
nonachlor	LEKE	juvenile	NY, USA	1980-89					Range of Means= 48.9-129		Range of Means= 27.5-86.0		L. et al. 1994
nonachlor	NELE	adult	NC, USA	< 1985	0.04								Hall et al. 1985 [k]
nonachlor	NELE	adult	NC, USA	< 1985	< 0.01 ppm								Hall et al. 1985 [k]
nonachlor	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= 0.0051-0.070 ppm								Gendron et al. 1997
nonachlor	NESI	adult	WI, USA	1978		0.25 (F)							Heinz et al. 1980
nonachlor	PSCR	adult	ON, CAN	1983	µg/kg ww		0.73 (SE= 0.082)						Russell et al. 1995
nonachlor	RACL	adult	ON, CAN	<1997			Range= 0.02-0.72						Russell et al. 1997
nonachlor	TATO	adult	BC, CAN	< 1980			0.31-0.01 from 279-1036 d post-spray				0.373 to 0.016 279- 1036 d post-spray		Albright et al. 1980 k

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
nonachlor	TATO	adult	BC, CAN	< 1980			14- 1036 d post-spray; 0.959-0.090;				14-1036 d post-spray; 3.210-0.160		Albright et al. 1980 k
nonachlor	THSI	adult	WI, USA	1978			0.12-0.33 (F)						Heinz et al. 1980
nonachlor	THSI	adult	WI, USA	1978			0.1-0.21 (M)						Heinz et al. 1980
nonachlor (cis-nonachlor)	CHSE	adult	NJ, USA	1981-98	59% detection					0.59 (M), 0.31 (F) control, 3.53 (M), 0.64 (F) brackish water, 0.31 (M) fresh water			Albers et al. 1986
nonachlor (cis-nonachlor)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 1.1-85.7 ng/g ww							Bonin et al. 1995
nonachlor (cis-nonachlor)	NEMA	adult	ON, CAN	1988, 90			pooled= 0.7-9.3 ng/g ww						Bonin et al. 1995
nonachlor (cis)	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee ND, L. Griffin= ND, L. Apopka= 0.07							Heinz et al. 1991
nonachlor (trans-nonachlor)	CHSE	adult	NJ, USA	1981-98	53% detection					0.87 (M), 0.34 (F) control, 4.01 (M), 0.93 (F) brackish water, 0.68 (M) fresh water			Albers et al. 1986

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
nonachlor (trans-nonachlor)	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 2.4-198.6 ng/g ww							Bonin et al. 1995
nonachlor (trans-nonachlor)	NEMA	adult	ON, CAN	1988, 90			pooled= 1.7-27.3 ng/g ww						Bonin et al. 1995
nonachlor (trans)	ALMI	egg	FL, USA	1984-85		1984: L. Okeechobee ND, L. Griffin= 0.05, L. Apopka= 0.11. 1985: L. Griffin= 0.09, L. Apopka= 0.15							Heinz et al. 1991
OCB	RACL	adult	SC, USA	1992-93	2.37- 3.88 ppm (ref= 0.02 ppm)								Fontenot et al. 1995a
OCS	CACA	adult	TX, USA	1990		levels below those considered dangerous for human intake							Sis et al. 1993
OCS	CHSE	adult	ON, CAN	1995	blood: Range of Means= ND-0.4 ng/g ww (M)								de Solla et al. 1998
OCS	CHSE	adult	ON, CAN	1988-89						0- 1.26± 0.63 ng/g ww			Hebert et al. 1993b
OCS	LEKE	adult	TX, USA	1990		levels below those considered dangerous for human intake							Sis et al. 1993
OCS	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means= ND-0.28 ppm								Gendron et al. 1997

Table 1- Field Residues - 70

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
OCS	RARI	adult	USSR	< 1987						0.0017-0.002 pond, 0.156-0.160 rice (F); 0.0017-0.002 pond, 0.155-0.156 rice			Zhukova 1987 [k]
oxamyl	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
PAH	CACA	adult	TX, USA	1990	visceral fat				ND				Sis et al. 1993
PAH	LEKE	adult	TX, USA	1990	visceral fat				ND				Sis et al. 1993
parathion	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
parathion	CNSP	adult	TX, USA	<1970			0.57-1.5						Applegate 1970
parathion	CNTI	adult	TX, USA	<1970			0-1.4						Applegate 1970
parathion	CNXX	adult	TX, USA	1965						0.1-4.6			Culley and Applegate 1966
parathion	CNXX	adult	TX, USA	1965	brain=0-2.8; Range of Means with n=5-6 each of 27	8.5	1.4-2.1	0.1-1.7	0-4.1	0-4.6	0.1-1.8		Culley and Applegate 1967
parathion	CNXX	adult	TX, USA	1965	gravid female					3.4			Culley and Applegate 1966
parathion	CNXX	adult	TX, USA	1965	gravid female					1.4			Culley and Applegate 1966
parathion	CNXX	egg	TX, USA	1965		16.4							Culley and Applegate 1966
parathion	COTE	adult	TX, USA	<1970			0-1.61						Applegate 1970
parathion	UROR	adult	TX, USA	<1970			0-0.1						Applegate 1970
parathion	UTST	adult	TX, USA	<1970			0-0.7						Applegate 1970
parathion-methyl	CNSP	adult	TX, USA	<1970			0-0.16						Applegate 1970
parathion-methyl	CNTI	adult	TX, USA	<1970			0-0.55						Applegate 1970
parathion-methyl	CNTI	adult	TX, USA	<1970			0-0.54						Applegate 1970
parathion-methyl	CNXX	adult	TX, USA	1965						0.1-501			Culley and Applegate 1966
parathion-methyl	CNXX	adult	TX, USA	1965	brain=0.1-1.5; Range of Means with n=5-6 each of 27	11.6 Mean	2.3-2.5	0.1-1.9	0-4.2	0.1-4.9	0.1-1.5		Culley and Applegate 1967
parathion-methyl	CNXX	adult	TX, USA	1965	gravid female					2.1			Culley and Applegate 1966

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
parathion-methyl	CNXX	adult	TX, USA	1965	gravid female					2.5			Culley and Applegate 1966
parathion-methyl	CNXX	egg	TX, USA	1965		8.5							Culley and Applegate 1966
parathion-methyl	COTE	adult	TX, USA	<1970			0-0.77						Applegate 1970
parathion-methyl	UROR	adult	TX, USA	<1970			ND						Applegate 1970
Pb	ACCR	adult	IL, USA	< 1977			2.7 ppm dw						Rolfe et al. 1977 [k]
Pb	ACJA	adult	Papua New Guinea	1980-81						ND			Yoshinaga et al. 1992
Pb	AGSS	adult	Greece	< 1997	carcass; ppm dw		12.81-15.65				6.79-13.32		Loumbourdis 1997
Pb	ALMI	adult	FL, USA	1985						0.04-0.12 (tail)			Delany et al. 1988
Pb	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 0.14, L. Griffin= 0.22, L. Apopka= ND							Heinz et al. 1991
Pb	BUAM	adult	PA, USA	1979			Range= 7.1-15 mg/kg dw						Beyer et al. 1985 [k]
Pb	BUAM	adult	IL, USA	< 1977			3.0- 3.5 ppm dw						Rolfe et al. 1977 [k]
Pb	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						1.35-12.8		Lee and Stuebing 1990
Pb	BUWO	adult	PA, USA	1979			Range= 5.7-13 mg/kg dw						Beyer et al. 1985 [k]
Pb	BUXX	adult	MD, USA	< 1984	carcass		21 ppm				2.1- 2.6	4.9	Hall and Mulhern 1984 [k]
Pb	CACA	egg	GA, USA	< 1974		Mean= 2.87 ppm in yolk & 12.0 in alb							Hillestad et al. 1974
Pb	CACA	egg	FL, USA	1977		1.23- 2.18 µg/g							Stoneburner et al. 1980

Table 1- Field Residues - 72

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Pb	CACC	adult	Brazil	1985-92	34.4% of CACC and CAYA residues found to be between 500 ppb and 2000 ppb, 14.5% were above 2000 ppb.								Brazaitis et al. 1996
Pb	CAYA	adult	Brazil	1985-92	``								Brazaitis et al. 1996
Pb	CHMY	adult	Papua New Guinea	1980-81						0.033			Yoshinaga et al. 1992
Pb	CHSE	adult	NJ, USA	1981-85							ND-0.12	41% detection: 0.07 (M), 0.16 (F) control, 0.19 (M), ND (F) brackish water, 0.10 (M) fresh water	Albers et al. 1986
Pb	CHSE	adult	MO, USA	< 1988	Below tailings dam: carapace: 13.7µ/g, blood; 5.6µg/g. Above tailings dam: carapace: 8.4 µg/g, blood: 1.1 µg/g. Upstream: carapace: 0.6 µg/g, blood: 0.1 µg/g.								Krajicek and Overmann 1988
Pb	CHSE	adult	MO, USA	< 1995	0.166-0.292 (brain), 0.280-2.514 (blood), 0.977-33.013 (carapace), 1.015-114.563 (bone) µg/g ww					Range= 0.126-0.264 µg/g ww	Range= 0.177-0.490 µg/g ww		Overmann and Krajicek 1995
Pb	CHXX	adult	Papua New Guinea	1980-81						0.062			Yoshinaga et al. 1992
Pb	CRAC	egg	FL, USA	1980		shell= 16.42 µg/g; yolk/alb- 3.35 µg/g							Stoneburner 1984
Pb	CRNI	egg	Zimbabwe	1981-82		1.250-10.21 mg/kg dw							Phelps et al. 1986
Pb	CRPO	adult	Papua New Guinea	1980-81						0.036			Yoshinaga et al. 1992
Pb	CRVI	adult	CO, USA	1971							0.003-659 ppm		Bauerle et al. 1975

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Pb	DECO	adult	Ireland	1988					0.04± 0.03	0.31± 0.03 (pectoral)	0.12± 0.02		Davenport and Wrench 1990
Pb	DECO	egg	Mexico	1992-93		13.9 mg/kg (shell)							Vazquez et al. 1997
Pb	LEOL	adult	Ecuador	1981	Bone: Range of Means = 41.5-97.2 µg/g								Witkowski and Frazier 1982
Pb	NAXX	adult	India	1988	Rural area: 5.0± 1.2 µg/g dw Urban site: 200.53± 20.0 dw (skin)								Kaur 1988
Pb	NOVI	adult	PA, USA	1987			max= 2.3						Storm et al. 1994
Pb	PICA	adult	CO, USA	1971	ND								Seigel 1993
Pb	PIME	hatchling	NJ, USA	1985-90	skin= 1331± 256		607± 67						Burger 1992
Pb	PLCI	adult	PA, USA	1979			Range= 11-28 mg/kg dw						Beyer et al. 1985 [k]
Pb	PLCI	adult	PA, USA	1987			Range of Means= 0.9-1.7						Storm et al. 1994
Pb	PLGL	adult	PA, USA	1979			Range= 11-13 mg/kg dw						Beyer et al. 1985 [k]
Pb	POXX	adult	India	1988	Rural areas: 7.00± 2.3 µg/g dw Urban areas: 150.53± 10.0 µg/g dw (skin)								Kaur 1988
Pb	RACA	adult	MO, USA	1981-82			0.97 upstream-14.0 down-stream from tailings pond						Niethammer et al. 1985 [k]
Pb	RACA	tadpole	MD, USA	1982			14 mg/kg dw						Birdsall et al. 1986 [k]
Pb	RACA	tadpole	MD, USA	< 1984		2.5- 3.2							Hall and Mulhern 1984 [k]

Table 1- Field Residues - 74

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Pb	RACA	tadpole	SC, USA	1995-96			Mean for ash site= 11.4; Mean for ref site= 14.1 dw						Rowe et al. 1996
Pb	RACL	adult	NJ, USA	1992 ?	femur 1728 µg/g dw							96.2 µg/g	Stansley and Roscoe 1996
Pb	RACL	tadpole	MD, USA	1982			14 mg/kg dw						Birdsall et al. 1986 [k]
Pb	RACL	tadpole	MD, USA	<1984		1.4- 1.5							Hall and Mulhern 1984 [k]
Pb	RACL	tadpole	PA, USA	1987			Range of Means= 2.3-5.0						Storm et al. 1994
Pb	RAES	adult	Italy	1974	3.66 ppm dw (M) (higher than female)						7.56 ppm dw (F) (higher than male)		Baudo 1976
Pb	RAES	juvenile	Italy	1974			0.88 ppm dw						Baudo 1976
Pb	RAES	tadpole	Italy	1974			avg= 0.97 ppm dw						Baudo 1976
Pb	RAPI	adult	VT, USA	< 1968							1.0- 6.2	Range= 1.3- 8.2	Schoeder and Tipton 1968 [k]
Pb	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= ND	ND		Linder et al. 1991
Pb	RASY	adult	PA, USA	1979			Range= 6.4-14 mg/kg dw						Beyer et al. 1985 [k]
Pb	RASY	adult	VT, USA	< 1968							14.8- 31.3	10.2	Schoeder and Tipton 1968 [k]
Pb	RAXX	adult	MD, USA	< 1984			0.88- 3.2						Hall and Mulhern 1984 [k]
Pb	TECA	adult	MO, USA	1977	Range of Means= 21.73-135.86 µg/g ww (bone); 0.24-0.47 µg/g (skin); 0.10-0.34 µg/g (lung)						9.12- 46.95 µg/g ww	Range= 8.45- 52.24 µg/g	Beresford et al. 1981
Pb	TRSC	egg	SC, USA	1996		contents= 687, shell= 219 ppb dw							Burger and Gibbons 1998

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Pb	TRVU, RAES, RATE, PEFU and BUVI	adult	Poland	1975	pooled results		124.8-461 ppm dw						Dmowski and Karolewski 1979 [k]
Pb	VAXX	adult	Papua New Guinea	1980-81						0.007			Yoshinaga et al. 1992
Pb	XXXA	tadpole	MO, USA	1972			36- 1590 µg/g dw						Gale et al. 1973 [k]
Pb	XXXA	tadpole	MO, USA	< 1979	intestine= 4419-7329 ppm		4139 ppm				22 ppm		Jennett et al. 1979 [k]
PCB	ACCB	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.10- 0.16								Campbell 1975
PCB	ACCR	juvenile	IL, USA	1995			Range of Means= ND-0.81						Reeder et al. 1998
PCB	AGCO	adult	TX, USA	1976					ND				Stafford et al. 1976
PCB	AGPI	adult	TX, USA	1976					ND at Brazos				Stafford et al. 1976
PCB	ALMI	adult	SC, USA	< 1997					Range of Means= 711-1671 ng/g				Cobb et al. 1997
PCB	ALMI	adult	FL, USA	1985						0.01-0.04 (tail)			Delany et al. 1988
PCB	ALMI	egg	SC, USA	< 1997		Range of Means= 281-4228 ng/g							Cobb et al. 1997
PCB	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee ND, L. Griffin= 0.08, L. Apopka= 0.17							Heinz et al. 1991
PCB	BUWF	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.09- 1.34								Campbell 1975

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
PCB	CACA	adult	FL, USA	1983						Range= 5-46, Mean= 13 ppb	Range= 8-182, Range of Means= 32-40		McKim and Johnson 1983
PCB	CACA	adult	NC, USA	1991-92					subcut-aneous fat= 82.9-1140 µg/kg		7.46- 514 µg/kg		Rybitski et al. 1995
PCB	CHMY	adult	FL, USA	1983						Range= 5.4-9.4 ppb, Mean= 6.8 ppb	Range= 43-80 ppb, Range of Means= 57-80 ppb		McKim and Johnson 1983
PCB	CHMY	egg	UK	1972					0.24-1.81 : 0.02-0.12				Thompson et al. 1974
PCB	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
PCB	CHPI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 3.51								Campbell 1975
PCB	CHSE	adult	NJ, USA	1981-98	100% detection					41.2 (M), 36.17 (F) control, 291.13 (M), 34.07 (F) brackish water, 23.55 (M) fresh water			Albers et al. 1986
PCB	CHSE	adult	NY, USA	< 1987	Reference: 1.6 (testes), 1.0 (brain), 0.64 (heart), 1.2 (pancreas), 0.41 (lungs). Cont: 100 (testes), 82 (brain), 49 (heart), 48 (pancreas), 13 (lungs)				4.2 (control); 1600 (cont.)		1.0 (control); 72 (cont.)	1.2 (control); 48 (cont.)	Bryan et al. 1987a
PCB	CHSE	adult	ON, CAN	1995	blood: Range of Means= 18.2-414.8 ng/g ww (M)								de Solla et al. 1998

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
PCB	CHSE	adult	ON, CAN	1988-89						Range= 7.41-655.28 ng/g ww			Hebert et al. 1993b
PCB	CHSE	adult	MN, USA	1981					Range < 0.2- 60.5; Mean= 21.7 mg/kg	Range: <0.025-0.086 mg/kg			Helwig and Hora 1983
PCB	CHSE	adult	MN, USA	1981					Range < 0.2- 60.5; Mean= 21.7 mg/kg	Range: <0.025-0.086 mg/kg			Minnesota Pollution Control Agency 1982
PCB	CHSE	adult	NY, USA	< 1983					3608.3 ppm (total PCBs)				Olafsson et al. 1983
PCB	CHSE	adult	NY, USA	< 1983					28.3 ppm				Olafsson et al. 1983
PCB	CHSE	adult	NY, USA	1976-78		Mean= 28.9 ppm			Mean= 2990.6 ppm	Mean= 4.24 ppm	Mean= 66.05 ppm		Stone et al. 1980
PCB	CHSE	adult	NY, USA	1976-78					Mean= 464.16 ppm	Mean= 0.44 ppm	Mean= 7.77 ppm		Stone et al. 1980
PCB	CHSE	egg	ON, CAN	1986-89		1988-89: 28- 3322 ng/g ww							Bishop et al. 1991
PCB	CHSE	egg	ON, USA	1990		13.3-96.4, Mean= 54.3 mg/kg (lipid)							Bishop et al. 1994
PCB	CHSE	egg	ON, CAN	1981-91		0.32-54.4							Bishop et al. 1996
PCB	CHSE	egg	ON, PQ, CAN; NY, USA	1989-90		Range= 106-5094 ng/g ww							Bonin et al. 1995

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
PCB	CHSE	egg	NY, USA	?		Yolk: 0.016- 1.89 ppm; White & Shell: 0.00268- 0.272 ppm							Bryan et al. 1987b
PCB	CHSE	egg	ON, CAN	1981, 84		Range= 0.057- 4.76 mg/kg ww control: 0.187 mg/kg ww							Struger et al. 1993
PCB	CLGU	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 0.52- 0.60								Campbell 1975
PCB	CRAC	egg	FL, USA	1979		0.11-0.86							Hall et al. 1979
PCB	CRNI	egg	Zimbabwe	1981-82		0.02- 1.53 mg/kg dw							Phelps et al. 1986
PCB	EMBL	adult	ON, CAN	1980							ND		Ryan et al. 1986
PCB	EMBL	adult	ON, CAN	1980							ND		Ryan et al. 1986
PCB	GRGE	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 3.10								Campbell 1975
PCB	LEKE	adult	NC, USA	1991-92					subcut-aneous fat 281- 904 µg/kg		158- 6.0 µg/kg		Rybitski et al. 1995
PCB	LEKE	juvenile	NY, USA	1980-89					Range of Means= 476-1250		Range of Means= 218-738		Lake et al. 1994
PCB	LIPG	adult	India	1991			3.4-6.9 ng/g ww						Ramesh et al. 1992
PCB	MACR	adult	?	< 1983							Mean= 23 ppm		Yawetz et al. 1983
PCB	NAFF	adult	SC, USA	< 1995							13.70 ppm		Fontenot et al. 1995b
PCB	NECY	adult	LA, USA	1977-79			0.27-0.28 ppm						Sabourin et al. 1984

Table 1- Field Residues - 79

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
PCB	NEER	adult	TX, USA	1976					Hwy 21: 17.0 and 57.4 ppm (n=2). ND for other sites				Stafford et al. 1976
PCB	NEFA	adult	TX, USA	1976					ND (Brazos)				Stafford et al. 1976
PCB	NELE	adult	NC, USA	< 1985			0.39						Hall et al. 1985 [k]
PCB	NEMA	adult	ON, CAN	1988, 90	PCB 1254		pooled= 113-1082 ng/g ww						Bonin et al. 1995
PCB	NEMA	adult	PQ, CAN	1992-93							58.2 mg/kg ww		Gendron et al. 1994
PCB	NEMA	adult	ON, CAN	1992-93	gonad: Range of Means: 0.410-58.2 ppm								Gendron et al. 1997
PCB	NERH	adult	LA, USA	1977-79			0.25-0.58 ppm		5.15-13.65 ppm	ND-0.05 ppm	0.17-0.65 ppm		Sabourin et al. 1984
PCB	NERH	adult	TX, USA	1976					Hwy21: 11.7-123.3 ppm; ND at Navasota)				Stafford et al. 1976
PCB	NESI	adult	SC, USA	1992-93	watershed= 13.70 ppm; waste site = 2.29 ppm (ref sites 1.23- 2.50 ppm)								Fontenot et al. 1995a
PCB	NESI	egg	WI, USA	1978		4.3							Heinz et al. 1980
PCB	NESI	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 1.93- 6.58								Campbell 1975
PCB	RACA	adult	SC, USA	1992-93	2.26- 2.33 ppm (ref site 0.05 ppm)								Fontenot et al. 1995a
PCB	RACA	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
PCB	RACL	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]

Table 1- Field Residues - 80

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
PCB	RACL	adult	PQ, CAN	1988			50-112 µg/kg (cont sites) vs. 7 µg/kg at control						Phaneuf et al. 1995
PCB	RACL	adult	ON, CAN	<1997			Range= 0.03-3.28						Russell et al. 1997
PCB	RAPE	adult	Spain	< 1987						0.05- 1.08			Rico et al. 1987 [k]
PCB	RASP	adult	LA, USA	1980	ND								Niethammer et al. 1984 [k]
PCB	RAXX	adult	LA, USA	1978	0.017 ppm in legs		ND (< 0.1 ppm)						Dowd et al. 1985 [k]
PCB	RAXX	adult	SC, USA	< 1995							2.26- 3.88 ppm		Fontenot et al. 1995b
PCB	THSI	adult	WI, USA	1978			1.7-5.8 (F)						Heinz et al. 1980
PCB	THSI	adult	WI, USA	1978			1.3-3.5 (M)						Heinz et al. 1980
PCB	TRSP	various	ON, CAN	< 1975	(egg, hatchling, liver and/or muscle; see paper); 5.48- 5.68								Campbell 1975
PCB	VAXX	adult	India	1987			4.7-13 ng/g ww						Ramesh et al. 1992
pentachlorophenol	RACA	tadpole	ON, CAN	1980			19 ppb						Metcalfe et al. 1984 [k]
petroleum	CHMY	adult	Mexico	1979	Total resolved hydrocarbons (µg/g): 2.51 (control LEKE), 10.9 (oiled LEKE), 2,932 (pollutant oil).					0.36-0.38	0.39-0.58	2.04	Hall et al. 1983
pH, Al	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 13.6- 16.9; Al alone= 12.7- 13.0; low pH alone= 13.1- 13.5 µg/g dw		Range of Means= 10.6-14.7 µg/g dw						Sparling and Lowe 1996b
pH, Al	HYVE	tadpole	MD, USA	1991			Mean= 634 cg/gdw	Mean= 20.8 µg/g dw					Sparling and Lowe 1996b
pH, Al	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH) =8.5- 11.5; Al alone=3.5- 9.0; low pH alone=7.1 µg/g dw		Range of Means= 4.2-8.1 µg/g dw						Sparling and Lowe 1996b

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
pH, Al, As	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH) =15.5- 22.0; Al alone=18.8- 19.8; low pH alone=14.2- 18.2 µg/g dw		Range of Means= 11.5-22.6 µg/g dw						Sparling and Lowe 1996b
pH, Al, As	HYVE	tadpole	MD, USA	1991			Mean= 2 µg/g dw	Mean= 6.3 µg/g dw					Sparling and Lowe 1996b
pH, Al, As	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 11.3- 14.0; Al alone= 1.9- 9.8; low pH alone= 9.2 µg/g dw		Range of Means= 7.6-9.5 µg/g dw						Sparling and Lowe 1996b
pH, Al, Ba	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 143- 169; Al alone= 110- 296; low pH alone= 114- 153 µg/g dw		Range of Means= 73-160 µg/g dw						Sparling and Lowe 1996b
pH, Al, Ba	HYVE	tadpole	MD, USA	1991			Mean= 90 µg/g dw	Mean= 210 µg/g dw					Sparling and Lowe 1996b
pH, Al, Ba	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 0.093- 0.123; Al alone= 0.09- 0.14; low pH alone= 0.06 mg/g dw		Range of Means= 93.9-97.4 µg/g dw						Sparling and Lowe 1996b
pH, Al, Be	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 0.40- 0.44; Al alone= 0.25- 0.30; low pH alone= 0.13- 0.38 µg/g dw		Range of Means= 0.15-0.19 µg/g dw						Sparling and Lowe 1996b
pH, Al, Be	HYVE	tadpole	MD, USA	1991			Mean= 0.07 µg/g dw	Mean= 0.81 µg/g dw					Sparling and Lowe 1996b
pH, Al, Be	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 0.21- 0.38; Al alone= 0.05- 0.18; low pH alone= 0.19 µg/g dw		Range of Means= 0.14-0.22 µg/g dw						Sparling and Lowe 1996b
pH, Al, Cr	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 16.5- 17.9; Al alone= 15.3- 16.1; low pH alone= 15.7- 17.7 µg/g dw		Range of Means= 12.3-14.5 µg/g dw						Sparling and Lowe 1996b
pH, Al, Cr	HYVE	tadpole	MD, USA	1991			Mean= 1.9 µg/g dw	Mean= 8.4 µg/g dw					Sparling and Lowe 1996b

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
pH, Al, Cr	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 9.5- 14.8; Al alone= 4.0- 9.8; low pH alone= 8.6 µg/g dw		Range of Means= 6.2-9.3 µg/g dw						Sparling and Lowe 1996b
pH, Al, Cu	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)=11.2- 15.7; Al alone= 9.8- 12.6; low pH alone= 12.8- 15.0 µg/g dw		Range of Means= 11.1-12.5 µg/g dw						Sparling and Lowe 1996b
pH, Al, Cu	HYVE	tadpole	MD, USA	1991			Mean= 1.7 µg/g dw	Mean= 2.0 µg/g dw					Sparling and Lowe 1996b
pH, Al, Cu	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)=10.9- 12.0; Al alone= 7.4- 11.0; low pH alone= 12.6 µg/g dw		Range of Means= 11.8-12.0 µg/g dw						Sparling and Lowe 1996b
pH, Al, Fe	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)=14.1- 22.9; Al alone= 18.4- 20.9; low pH alone= 19.8- 20.3 µg/g dw		Range of Means= 14.7-30.2 µg/g dw						Sparling and Lowe 1996b
pH, Al, Fe	HYVE	tadpole	MD, USA	1991			Mean= 6.7 µg/g dw	Mean= 21.5 µg/g dw					Sparling and Lowe 1996b
pH, Al, Fe	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)=12.2- 21.6; Al alone= 9.1- 14.3; low pH alone= 14.2 µg/g dw		Range of Means= 16.5-21.4 µg/g dw						Sparling and Lowe 1996b
pH, Al, Mg	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)=1.7- 1.9; Al alone= 1.5- 1.7; low pH alone= 1.4- 1.7 µg/g dw		Range of Means= 1.2-1.8 µg/g dw						Sparling and Lowe 1996b
pH, Al, Mg	HYVE	tadpole	MD, USA	1991			Mean= 1.6 µg/g dw	Mean= 33.5 µg/g dw					Sparling and Lowe 1996b
pH, Al, Mg	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)=1.5- 1.6; Al alone= 1.3- 1.4; low pH alone= 1.2 µg/g dw		Range of Means= 1.3-1.4 µg/g dw						Sparling and Lowe 1996b
pH, Al, Mn	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 0.25- 2.3; Al alone= 0.43- 0.79; low pH alone= 0.27- 0.53 µg/g dw		Range of Means= 0.4-1.1 µg/g dw						Sparling and Lowe 1996b

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
pH, Al, Mn	HYVE	tadpole	MD, USA	1991			Mean= 927 µg/g dw	Mean= 1.9 µg/g dw					Sparling and Lowe 1996b
pH, Al, Mn	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 0.33- 4.6; Al alone= 0.35- 0.51; low pH alone= 0.11 µg/g dw		Range of Means= 0.27-2.3 µg/g dw						Sparling and Lowe 1996b
pH, Al, Ni	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 7.3- 9.4; Al alone= 4.6- 5.4; low pH alone= 4.6- 10 µg/g dw		Range of Means= 2.4-3.7 µg/g dw						Sparling and Lowe 1996b
pH, Al, Ni	HYVE	tadpole	MD, USA	1991			Mean= 405 µg/g dw	Mean= 16.4 µg/g dw					Sparling and Lowe 1996b
pH, Al, Ni	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 7.1- 7.5; Al alone= 2.0- 5.0; low pH alone= 4.4 µg/g dw		Range of Means= 3.0-4.6 µg/g dw						Sparling and Lowe 1996b
pH, Al, Pb	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 9.8- 13.4; Al alone= 9.7- 17.1; low pH alone= 8.5- 19.7 µg/g dw		Range of Means= 6.7-15.1 µg/g dw						Sparling and Lowe 1996b
pH, Al, Pb	HYVE	tadpole	MD, USA	1991			Mean= 4.7 µg/g dw	Mean= 19.2 µg/g dw					Sparling and Lowe 1996b
pH, Al, Pb	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 5.2- 25.4; Al alone= 1.1- 22.0; low pH alone= 17.2 µg/g dw		Range of Means= 17.5-26.2 µg/g dw						Sparling and Lowe 1996b
pH, Al, Se	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 37- 54.8; Al alone= 44.3- 49.8; low pH alone= 43.1- 43.8 µg/g dw		Range of Means= 31.8-74.0 µg/g dw						Sparling and Lowe 1996b
pH, Al, Se	HYVE	tadpole	MD, USA	1991			Mean= 3.1 µg/g dw	Mean= 11.0 µg/g dw					Sparling and Lowe 1996b
pH, Al, Se	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 24.2- 42.7; Al alone= 20.0- 28.2; low pH alone= 26.9 µg/g dw		Range of Means= 34-55.5 µg/g dw						Sparling and Lowe 1996b

Table 1- Field Residues - 84

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
pH, Al, Sr	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 25.8-27.3; Al alone= 17.9-38.8; low pH alone= 12.5-16.8 µg/g dw		Range of Means= 10.8-12.7 µg/g dw						Sparling and Lowe 1996b
pH, Al, Sr	HYVE	tadpole	MD, USA	1991			Mean= 16.7 µg/g dw	Mean= 50.6 µg/g dw					Sparling and Lowe 1996b
pH, Al, Sr	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 16.6-31.4; Al alone= 17.6-51.5; low pH alone= 13.7 µg/g dw		Range of Means= 12.2-16.7 µg/g dw						Sparling and Lowe 1996bb
pH, Al, V	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 27.5-28.0; Al alone= 23.2-23.5; low pH alone= 24.1-24.2 µg/g dw		Range of Means= 20.2-24.7 µg/g dw						Sparling and Lowe 1996b
pH, Al, V	HYVE	tadpole	MD, USA	1991			Mean= 11.0 µg/g dw	Mean= 99.3 µg/g dw					Sparling and Lowe 1996b
pH, Al, V	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH) =15.9-21.8; Al alone =7.0-17.2; low pH alone =14.4 µg/g dw		Range of Means= 8-17.7 µg/g dw						Sparling and Lowe 1996b
pH, Al, Zn	ACCC	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 78-80.4; Al alone= 69.7-103.1; low pH alone =59-61.6 µg/g dw		Range of Means= 59.6-66.9 µg/g dw						Sparling and Lowe 1996b
pH, Al, Zn	HYVE	tadpole	MD, USA	1991			Mean= 58.1 µg/g dw	Mean= 78.8 µg/g dw					Sparling and Lowe 1996b
pH, Al, Zn	RACL	tadpole	MD, USA	1991	Range of Means for control (no metals, reg. pH)= 70.6-71.9; Al alone= 59.4-65.6; low pH alone= 60.1 µg/g dw		Range of Means= 59.1-62.1 µg/g dw						Sparling and Lowe 1996b
phorate	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
phosalone	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
phosmet	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
phosmet	RAPI	adult & young of the year	ON, CAN	1993-95	ND at all orchard sites								Harris et al. 1998
phosphamidon	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
propetamphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
propoxur	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Pu	COCO	adult	CO, USA	< 1977	Lung: <0.11 dpm/g, bone: 0.3 dpm/g.						0.27 dpm/g		Geiger and Winsor 1977
Pu	CRVI	adult	CO, USA	< 1977	Lung: <0.08 dpm/g, bone: <0.04 dpm/g.						0.09 dpm/g		Geiger and Winsor 1977
Pu	PIME	adult	CO, USA	< 1977	Lung: <0.02 dpm/g, bone: 0.05 dpm/g						0.03 dpm/g		Geiger and Winsor 1977
ronnel	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
Ru	AGSS	adult	Greece	< 1997	carcass; ppm dw		31-34				34-35		Loumbourdis 1997
Se	ACCR	tadpole	TX, USA	1994			<0.23						Clark et al. 1998
Se	ALMI	egg	FL, USA	1984-85		0.30- 0.37							Heinz et al. 1991
Se	CHMY	juvenile	HI, USA	< 1994							Range= 0.136-3.39		Aguirre et al. 1994
Se	CRNI	egg	Zimbabwe	1981-82	see paper for residues								Phelps et al. 1986
Se	DECO	adult	Ireland	1988					< 0.05	3.61 (±0.48) (pectoral)	1.4±0.02		Davenport and Wrench 1990
Se	PIME	adult	CA, USA	1984 -85							Cont. sites: 10.9 (1984); 11.4 (1989); ref sites: 1.5 - 2.1 (1984); 2.1 - 3.6 (1989) µg/g dw		Ohlendorf et al. 1988
Se	PIME	hatchling	NJ, USA	1985-90	skin= 1947± 220		2745± 441						Burger 1992
Se	RACA	adult	CA, USA	1984 -85							45.0 (25-88); 2 ref sites= 6.22 µg/g dw		Ohlendorf et al. 1988
Se	RACA	tadpole	SC, USA	1995-96			Mean (ash site)= 25.7; Mean (ref site)= 3.4 dw						Rowe et al. 1996
Se	RACL	tadpole	TX, USA	1994			<0.23						Clark et al. 1998

Table 1- Field Residues - 86

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Se	RASP	tadpole	TX, USA	1994			<0.23						Clark et al. 1998
Se	TRSC	egg	SC, USA	1996		Contents = 417, shell = 36 ppb dw							Burger and Gibbons 1998
Sr	ACJA	adult	Papua New Guinea	1980-81						0.15			Yoshinaga et al. 1992
Sr	AGSS	adult	Greece	< 1997	carcass; ppm dw		163-396				17-40		Loumbourdis 1997
Sr	CACA	egg	FL, USA	1977		66.12-74.03 µg/g							Stoneburner et al. 1980
Sr	CHMY	adult	Papua New Guinea	1980-81						1.02			Yoshinaga et al. 1992
Sr	CHSE	adult	TN, USA	1988	cont. site: (Bq/g ww): 16.5 ± 3.91 (bone), 16.6 ± 3.37 (carapace)								Meyers-Schöne et al. 1993
Sr	CHXX	adult	Papua New Guinea	1980-81						0.37			Yoshinaga et al. 1992
Sr	CRAC	egg	FL, USA	1980		shell= 529.5 µg/g; yolk/alb= 45.65 µg/g							Stoneburner 1984
Sr	CRPO	adult	Papua New Guinea	1980-81						0.17			Yoshinaga et al. 1992
Sr	PSSC	adult	USA	1983	Seasonal rate constants for overall elimination of Strontium ranged from <0.001-0.006/d								Scott et al. 1986
Sr	TRSC	adult	SC, USA	< 1991	Sig dif found between control sites and cont. sites in total body burdens: (Bq/g body mass)		Range: 462.6-5098.3, Mean= 1878.7 (cont sites); Mean=< 0.26 (controls)						Lamb et al. 1991
Sr	TRSC	adult	TN, USA	1987	Mean cont.site (Bq/g ww): $4.26x10^2 \pm 4.01x10^2$ (bone), $3.66x10^2 \pm 3.37x10^2$ (carapace)								Meyers-Schöne et al. 1993
Sr	VAXX	adult	Papua New Guinea	1980-81						0.11			Yoshinaga et al. 1992
TCDD	APSE	adult	TX, USA	1977		ND			ND	ND	ND	ND	Harris 1978

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
TCDD	BUTE	adult	FL, USA	1973-79		1360 ppt							Young and Cockerham 1982 [k]
TCDD	BUXX	adult	Italy	1980			0.2 ppb 2 yrs after exposure						Fanelli et al. 1980 [k]
TCDD	CHSE	adult	NY, USA	1984	pg/g ww				Range= 232- 474		Range= ND- 107		Ryan et al. 1986
TCDD	CHSE	egg	ON, CAN	1981, 84		5 found, major component 2378-TCDD at 67 ng/kg. Others at 1-6 ng/kg							Struger et al. 1993
TCDD	CNSE	adult	FL, USA	1973-79	trunk= 370- 420 ppt		360 ppt						Young and Cockerham 1982 [k]
TCDD	COXX	adult	MO, USA	< 1990			80-1344 ppt ww		857-17000 ppt ww		97-3300 ppt ww		Lower et al. 1990
TCDD	MAFL	adult	FL, USA	1973-79	skin= 20 ppt			148 ppt	ND				Young and Cockerham 1982 [k]
TCDD	PIME	juvenile	FL, USA	1973-79		ND							Young and Cockerham 1982 [k]
TCDD	RACA	adult	AR, USA	1984-85	skin: Range of Means= 217-1710 ppt; oviduct: Range of Means= 148-2050 ppt; ovaries: Range of Means= 2700- 10400 ppt				Mean= 68,000 ppt	Range of Means= 87- 637 ppt			Korfmacher et al. 1986a [k]
TCDD	RACA	adult	AR, USA	1984-85							1.2- 48 (F); 0.64-11.0 (M) ppb ww		Korfmacher et al. 1986b [k]
TCDD	THSI	adult	MO, USA	< 1990			320 ppt ww						Lower et al. 1990
TCDD	TRSC	adult	TX, USA	1977		ND-10			ND-176	ND	ND-18	ND	Harris 1978
TCDD	XXSN	adult	FL, USA	1973-79		420 ppt							Young and Cockerham 1982 [k]
terbufos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
tetrachlorvinphos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
thalium	CHMY	juvenile	HI, USA	< 1994							Range= 0.8-1.1		Aguirre et al. 1994
Thallium	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
toxaphene/ camphechlor	AGPI	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.03; Range= ND-1.30						Ford and Hill 1991
toxaphene/ camphechlor	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee= ND, L. Griffin= 0.06, L. Apopka= 0.09. 1985: L. Griffin= 1.1, L. Apopka= 2.4							Heinz et al. 1991
toxaphene/ camphechlor	AMTI	larvae	MT, USA	1959			Range= 15-100ppm						Finley 1960
toxaphene/ camphechlor	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
toxaphene/ camphechlor	CHPI	juvenile	MT, USA	1959			pooled= 154						Finley 1960
toxaphene/ camphechlor	CHSE	adult	NJ, USA	1981-97						ND			Albers et al. 1986
toxaphene/ camphechlor	CRNI	egg	Zimbabwe	1981-82		Toxaphene recorded in eggs							Phelps et al. 1986
toxaphene/ camphechlor	KIFL	adult	TX, USA	1974	carcass		0.3						Flickinger and Mulhern 1980
toxaphene/ camphechlor	NEER	adult	TX, USA	1968-71			0.5						Flickinger and King 1972
toxaphene/ camphechlor	NEFA	adult	TX, USA	1968-71			3.0						Flickinger and King 1972
toxaphene/ camphechlor	NEXX	adult	MS, USA	1988	carcass; mg/kg ww		Mean= 0.33; Range= ND-27.0						Ford and Hill 1991

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
toxaphene/ camphechlor	RACA	adult	LA, USA	1980	0.09								Niethammer et al. 1984 [k]
toxaphene/ camphechlor	RACL	adult	LA, USA	1980	1.1								Niethammer et al. 1984 [k]
toxaphene/ camphechlor	RAPI	adult	MT, USA	1959			Range= 68-520						Finley 1960
toxaphene/ camphechlor	RASP	adult	LA, USA	1980	0.21								Niethammer et al. 1984 [k]
toxaphene/ camphechlor	THPR	adult	TX, USA	1968-71			<0.1						Flickinger and King 1972
triazophos	CHMY	juvenile	HI, USA	< 1994	brain= ND	ND			ND		ND	ND	Aguirre et al. 1994
V	CHMY	juvenile	HI, USA	< 1994							Range= 0.2-1.5		Aguirre et al. 1994
V	ERIM	adult	Saudi Arabia	1983						< 1	6.50		Sadiq & Zaidi 1984
V	XXSS	adult	Saudi Arabia	1983						<1.0- 2.36	1.0- 6.64		Sadiq & Zaidi 1984
Vanadium	ALMI	egg	FL, USA	1984-85		1984: ND							Heinz et al. 1991
Zn	ACCR	tadpole	TX, USA	1994			Mean= 283 Range= 231- 359						Clark et al. 1998
Zn	ACJA	adult	Papua New Guinea	1980-81						17.6			Yoshinaga et al. 1992
Zn	AGSS	adult	Greece	< 1997	carcass; ppm dw		609-643				615-794		Loumbourdis 1997
Zn	ALMI	adult	FL, USA	1985						14.2-36.0 (tail)			Delany et al. 1988
Zn	ALMI	egg	FL, USA	1984-85		1984: L. Okeecho-bee 6.7, L. Griffin= 7.6, L. Apopka= 5.6.							Heinz et al. 1991
Zn	BUAM	adult	PA, USA	1979			Range= 56-100 mg/kg dw						Beyer et al. 1985 [k]
Zn	BUJU	adult	Malaysia	1990	Range of site means; µg/g dw						94.1-166		Lee and Stuebing 1990

Table 1- Field Residues - 90

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Zn	BUWO	adult	PA, USA	1979			Range= 52-55 mg/kg dw						Beyer et al. 1985 [k]
Zn	BUXX	adult	MD, USA	< 1984			25- 94						Hall and Mulhern 1984 [k]
Zn	CACA	adult	Japan	1990-91						Mean= 24.2, Range= 19.5-31.0	Mean= 27.9, Range= 23.2-35	Mean= 25.8, Range= 19.2-30.4	Sakai et al. 1995
Zn	CACA	egg	GA, USA	< 1974		Mean= 32.25 ppm in yolk; Mean= 26 ppm in alb							Hillestad et al. 1974
Zn	CACA	egg	Japan	1990-91		Mean= 11.5, Range= 10.5-13.7							Sakai et al. 1995
Zn	CACA	egg	FL, USA	1977		73.53-80.50 µg/g							Stoneburner et al. 1980
Zn	CHMY	adult	Japan	1990-91							Mean= 30.6, Range= 15.1-45.8	Mean= 22.3, Range= 12.5-38.1	Sakai et al. 1995
Zn	CHMY	adult	Papua New Guinea	1980-81						20.4			Yoshinaga et al. 1992
Zn	CHMY	juvenile	HI, USA	< 1994							Range= 15.1-45.8		Aguirre et al. 1994
Zn	CHSE	adult	NJ, USA	1981-88							27.7-50.4 for all sites	8.8 (M), 9.6 (F) control, 9.93 (M), 9.79 (F) brackish water, 10.5 (M) fresh water	Albers et al. 1986
Zn	CHXX	adult	Papua New Guinea	1980-81						15.7			Yoshinaga et al. 1992

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Zn	CRNI	egg	Zimbabwe	1981-82		26.55-47.5 mg/kg dw							Phelps et al. 1986
Zn	CRPO	adult	Papua New Guinea	1980-81						5.8			Yoshinaga et al. 1992
Zn	DECO	adult	Ireland	1988					0.08± 0.01	1.89± 0.1 (pectoral)	2.62± 0.15		Davenport and Wrench 1990
Zn	DECO	adult	Japan	1990-91						1.89	2.62		Sakai et al. 1995
Zn	DECO	egg shells	Mexico	1992-93		11.9 mg/kg							Vazquez et al. 1997
Zn	LEOL	adult	Ecuador	1981	bone: Range of Means: 575-955 µg/g								Witkowski and Frazier 1982
Zn	NOVI	adult	PA, USA	1987			max= 189.6						Storm et al. 1994
Zn	PLCI	adult	PA, USA	1979			Range= 67-130 mg/kg dw						Beyer et al. 1985 [k]
Zn	PLCI	adult	PA, USA	1987			Range of Means= 62.9-116.7						Storm et al. 1994
Zn	PLGL	adult	PA, USA	1979			Range= 140-170 mg/kg dw						Beyer et al. 1985 [k]
Zn	RACA	adult	MO, USA	1981-82			20.9- 42.7						Niethammer et al. 1985 [k]
Zn	RACA	tadpole	TX, USA	1994	carcass= 93.7 (n=1)								Clark et al. 1998
Zn	RACA	tadpole	MD, USA	< 1984		9.7- 15							Hall and Mulhern 1984 [k]
Zn	RACL	tadpole	TX, USA	1994			Range= 24.9- 118						Clark et al. 1998
Zn	RACL	tadpole	MD, USA	< 1984		3.7- 6.0							Hall and Mulhern 1984 [k]
Zn	RACL	tadpole	PA, USA	1987			Range of Means= 23.1-117.0						Storm et al. 1994
Zn	RAES	adult	Czechoslovakia	1982-84			128.1-181.7 ppm dw						Pavel and Kucera 1986 [k]

Contaminant [a]	Species Code [b]	Lifestage	Location [c]	Collection Date	Other Residues [d]	Egg [e]	Whole Body [e]	Viscera [e]	Fat [e]	Muscle [e]	Liver [e]	Kidney [e]	Reference [k]
Zn	RAES	adult	Hungary	< 1997	ovary: Range of Means= 52.2-590 mg/kg (F)	Range of Means= 52.2-590 mg/kg							Puky and Oertel 1997
Zn	RAES	egg	Hungary	< 1997		Range of Means= 1798-2736 mg/kg							Puky and Oertel 1997
Zn	RAPE	adult	Spain	1984-86						7.65-31.07			Rico et al. 1987 [k]
Zn	RAPR	adult	MT, USA	< 1991	µg/g ww					thigh= 10.4	46.5 µg/g ww		Linder et al. 1991
Zn	RASP	tadpole	TX, USA	1994	carcass= 118 (n=1)		Mean= 22.1 Range= 9.77- 66.0						Clark et al. 1998
Zn	RASY	adult	PA, USA	1979			Range= 59-130 mg/kg dw						Beyer et al. 1985 [k]
Zn	RATE	adult	Finland	1971-72							45- 90.9 (M); 61.0- 88.8 (F)		Pasanen and Koskela 1974
Zn	RAXX	adult	MD, USA	< 1984			6.2- 31						Hall and Mulhern 1984 [k]
Zn	TRVU, RAES, RATE, PEFU and BUVI	adult	Poland	1975	pooled results	180.8-533.5 near mill; control = 202.2 ppm dw							Dmowski and Karolewski 1979 [k]
Zn	VAXX	adult	Papua New Guinea	1980-81						16.9			Yoshinaga et al. 1992
Zn	XXXA	tadpole	MO, USA	1982			160-265 µg/g dw						Gale et al. 1973 [k]
Zn	XXXA	tadpole	MO, USA	< 1979	intestine (with contents): 6926-4696 ppm		2808 ppm				67 ppm		Jennett et al. 1979 [k]

Table 2: Field studies not including residue values

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
2,4-D iso-octyl ester	CNTI	adult	ENVIRON	POPSUR	1.56 kg/ha	Mt. Laguna, San Diego Co., CA, USA	1974	Mechanical damage (bulldozing of forests etc.) is more detrimental to small vertebrate populations than herbicides.	Lillywhite 1977
2,4-D iso-octyl ester	EUSK	adult	ENVIRON	POPSUR	1.56 kg/ha	Mt. Laguna, San Diego Co., CA, USA	1974	“	Lillywhite 1977
2,4-D iso-octyl ester	PHCO	adult	ENVIRON	POPSUR	1.56 kg/ha	Mt. Laguna, San Diego Co., CA, USA	1974	“	Lillywhite 1977
2,4-D iso-octyl ester	SCOC	adult	ENVIRON	POPSUR	1.56 kg/ha	Mt. Laguna, San Diego Co., CA, USA	1974	“	Lillywhite 1977
2,4-D iso-octyl ester	UTST	adult	ENVIRON	POPSUR	1.56 kg/ha	Mt. Laguna, San Diego Co., CA, USA	1974	“	Lillywhite 1977
acephate	AMLA	tadpole	PESTAPP	MORT	0.56 - 1.6 kg/ha	mixed wood forest, Larose forest, ON, CAN	1975	No mortality.	Buckner and McLeod 1975 c
acephate	BUXX	adult	PESTAPP	PHYSIO	8oz ai into 64oz/acre	Lily Bay, Bomantown, Allagash, and T17R13, ME, USA	1977	Mean cholinesterase level for toads collected 1 d post-spray (mean=0.672, range=0.62-0.72 µM) were higher than for frogs collected 30 d post-spray (mean=0.595, range=0.48-0.68 µM), dif. not sig.	Sassaman 1978
acephate	PSCR	tadpole	PESTAPP	MORT	0.56 - 1.6 kg/ha	mixed wood forest, Larose forest, ON, CAN	1975	No mortality.	Buckner and McLeod 1975 k
acephate	RASY	tadpole	PESTAPP	MORT	0.56 - 1.6 kg/ha	mixed wood forest, Larose forest, ON, CAN	1975	No mortality.	Buckner and McLeod 1975 k
acephate	RAXX	adult	PESTAPP	PHYSIO	8oz ai into 64oz/acre	Lily Bay, Bomantown, Allagash, and T17R13, ME, USA	1977	Mean cholinesterase level for frogs collected 1 d post-spray (mean=0.672, range=0.62-0.72 µM) were higher than for frogs collected 30 d post-spray (mean=0.595, range=0.48-0.68 µM), dif. not sig.	Sassaman 1978
agricultural fertilizers	XXXA	larvae	ENVIRON	POPSUR		ponds, Turew, Wielkopolska, Poland	1977-85		Berger 1989
Al	AMMA	embryo	IMMER	MORT		temporary woodland pond, coastal region, MD, USA	< 1987	Embryonic survival negatively correlated with Al conc. in water.	Albers and Prouty 1987 [k]
aldrin	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	field tests, CA, USA	< 1962	Toxic to tadpoles.	Mulla 1962 [k]
aldrin	RACA	tadpole	PESTAPP	MORT	89.9 L/ha	pond, (0.025 ha), CA, USA	1962	Appl. rate (ai) 0.11 kg/ha: 30 % mortality 5 d after treatment; 100 % mortality at 0.56 kg/ha (ai) 2 d after treatment.	Mulla 1963 [k]

Table 2 - Field Studies - 2

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
algicide	PSCR	adult	ENVIRON	POPSUR		farm pond, MS, USA	< 1984	Annual emigration increased from 18 % to 61 % of the population during the study, seemingly as a result of algicides eliminating the population's potential food. Males emigrated farther than females.	Parker 1984
allethrin	AGBB	adult	PESTAPP	MORT	50-80 g/s (5 appl.)		< 1994	10-20 min after, head vibrations occurred. Snakes died after 4 h.	Abe et al. 1994
allethrin	TRFL	adult	PESTAPP	MORT	50-80 g/s (5 appl.)		< 1994	Habu snakes had 80% mortality after 4 h and 100% mortality after 8 h.	Abe et al. 1994
ambithion	XXFR	adult	PESTAPP	MORT		rice fields, India	< 1973	90 % mortality.	Thirumurthi et al. 1973 [k]
aminocarb	BUAM	adult	PESTAPP	BEHAV	175 g ai in 2.24 L/ha	mixed forest, Laurentians, PQ, CAN	1978-79	Activity decreased during 2 mos post-spray possibly related to reduced prey availability.	Bracher and Bider 1982 [k]
aminocarb	RACL	tadpole	PESTAPP	MORT	0.11 kg/ha	Richibucto, NB, CAN	< 1974	Mortality in caged tadpoles, no other effects noted.	Rick and Price 1974 [k]
aminocarb	RAPI	adult	PESTAPP	BEHAV	175 g ai in 2.24 L/ha	mixed forest, Laurentians, PQ, CAN	1978-79	No sig. change in activity over short term	Bracher and Bider 1982 [k]
aminocarb	RASY	adult	PESTAPP	BEHAV	175 g ai in 2.24 L/ha	mixed forest, Laurentians, PQ, CAN	1978-79	No sig. change in activity over short term.	Bracher and Bider 1982 [k]
aminocarb	XXXA	adult	PESTAPP	MORT			< 1977	No effects.	Pearce and Price 1977 [k]
aminocarb	XXXA	larvae	PESTAPP	MORT			< 1977	No effects.	Pearce and Price 1977 [k]
ammonium nitrate	RATE	adult	PESTAPP	MORT	10.8-19.9 g/m^2	setup in wheat and grass fields	< 1997	5-110 min after appl., toxic effects can be observed. It remains to be seen whether fertilizers are responsible for population declines.	Oldham et al. 1997
anti-flea product	LAXX	adult	PESTAPP	PATH			< 1984	Noticed eye lesions from a commercial anti-flea product appl.	Frye and Gillespie 1984
arco	RACL	adult	PESTAPP	MORT	22.4 L/ha	ponds, Butte Co., CA, USA	1971	No mortality.	Rick and Price 1974 [k]
artificial light	CACA	egg	RAD	HATSUC		Göksu delta, Turkish Mediterranean coast, Turkey	1992	Total tracks counted represented 75% of all possible tracks per nest (low emergence rates occurred). Of all tracks counted only 37% of tracks faced seaward.	Peters and Verhoeven 1994
atrazine	ACCR	adult	ENVIRON	POPSUR		IL, USA	1995	Sufficient conc. of atrazine in water and sediment to account for observed evidence of damage to plant populations which are utilized by tadpoles.	Beasley et al. 1995
atrazine	HYCH	tadpoles	PESTAPP	DEVOBS	0,81,192 ppb	University of Mississippi Field Station, MS, USA	< 1998	Number of tadpoles decreased with increasing atrazine conc.	Britson and Threlkeld 1998

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
atrazine	RACL	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 1 were 95 and 20-95% in 1993 and 1994 respectively; site 2 were 50-97 and 7-75%; site 3: 50-100 and 45-92% and site 4 90-100 and 42-97%.	Harris et al. 1998
atrazine	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	A sig. dif. was found between corn crop treated fields and control group in genotoxic effects (chromosomal fragmentation and DNA profile abnormalities).	Lowcock et al. 1997
atrazine	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	A difference was found between corn crop treated fields and control groups in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
atrazine	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 1: 90-100 and 70-75% in 1993 and 1994 respectively; site 2: 5-70/0-62%; site 3: 85-100 and 70-85% and site 4: 85-87 and 63-85%.	Harris et al. 1998
atrazine	RAPI	tadpole	PESTAPP	DEVOBS	15-25 mg/L		< 1996	No sig. growth effects from treatments after 41 d of exposure.	Detenbeck et al. 1996
atrazine	XXFR	tadpole	PESTAPP	HATSUC		Canon Slade Grammar School, Bolton, Lancaster, UK	1967	Breeding pattern appeared normal, however, no eggs hatched for two successive yrs. Embryos were found to have malformations including twisted spines, and lower body weights.	Hazelwood 1970
azinphos-methyl	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond, (0.025 ha), CA, USA	< 1963	No mortality after 24 h	Mulla 1963 [k]
azinphos-methyl	RACA	tadpole	PESTAPP	MORT	0.45 kg/ha	field tests, unknown	< 1962	“Safe” to tadpoles	Mulla 1962 [k]
azinphos-methyl	RACL	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 1 were 95 and 20-95% in 1993 and 1994 respectively.	Harris et al. 1998
azinphos-methyl	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997

Table 2 - Field Studies - 4

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
azinphos-methyl	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
azinphos-methyl	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Azinophos-methyl was non-detectable at all of the orchard sites; hatching success ranged from 5-100%; survival ranged from 0-95%.	Harris et al. 1998
azinphos-methyl	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond, CA, USA	< 1963	No mortality after 24 h	Mulla 1963 [k]
Bayer 22408	RACA	tadpole	PESTAPP	MORT	0.56, 2.24 aikg/ha	pond (0.025 ha),	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
Bayer 29952	RACA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond (0.025 ha),	< 1963	5 % mortality after 24 h at 0.45 kg/ha appl.	Mulla et al. 1963 [k]
Bayer 34042	RACA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond (0.025 ha), unknown	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
Bayer 37289	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” for these appl. rates.	Mulla 1962 [k]
Bayer 37289	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond (0.025 ha),	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
Bayer 37289	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” at these appl. rates.	Mulla 1962 [k]
Bayer 37289	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond (0.025 ha), unknown	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
Bayer 38920	RACA	tadpole	PESTAPP	MORT	0.56 kg/ha	field tests, CA, USA	< 1962	100 % mortality to tadpoles.	Mulla 1962 [k]
Bayer 38920	RACA	tadpole	PESTAPP	MORT	0.56, 2.24 kg/ha	pond (0.025 ha), unknown	< 1963	100 % mortality at each of 0.56 and 2.24 kg/ha.	Mulla et al. 1963 [k]
Bayer 44831	RACA	tadpole	PESTAPP	MORT	0.22, 0.90 kg/ha	pond (0.025 ha), unknown	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
brodifacoum	CYAE	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	Numbers remained low and fell again after eradication program. An increase in captures did not occur until '90-91. No toxicity data is given on the direct effects of brodifacoum/flucoumafen.	Newman 1994
brodifacoum	CYMA	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	After 1989 (date of mouse eradication program) there was a sig increase in the number of individuals caught. No tox data is given on the direct effects of brodifacoum/flucoumafen.	Newman 1994

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
brodifacoum	HOMA	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	After 1989 (date of mouse eradication program) there was a sig increase in the number of individuals caught, numbers fluctuated after '90/91. Overall, since 1989 the numbers were higher than in previous trappings seasons. No toxicity data given.	Newman 1994
brodifacoum	LENI	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	"	Newman 1994
brodifacoum	LETE	adult	PESTAPP	BEHAV		Round Island, Mauritius	1986	Skinks were found to have a preference for brodifacoum-loaded pellets in jam and apple but not cabbage or lettuce (rabbit bait).	Merton 1987
brodifacoum	PHGU	adult	PESTAPP	BEHAV		Round Island, Mauritius	1986	"	Merton 1987
brodifacoum	UTPA	adult	PESTAPP	BEHAV		Northwestern Islands off of Mexican coast, Mexico	< 1994	This study determined if this lizard would be attracted to poison rat baits of some colours and not others Some colours were less likely to be eaten by this non-target organism than others.	Tershy and Breese 1994
butylate	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	A sig. difference was found between corn crop treated fields and control group in genotoxic effects (chromosomal fragmentation and DNA profile abnormalities).	Lowcock et al. 1997
butylate	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	A difference was found between corn crop treated fields and control groups in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
carbaryl	RAPI	tadpoles	PESTAPP	MORT		Walborn Ranch, Tullock Creek, MT, USA	1959	No adverse effects observed.	Finley 1960
carbofuran	ACCB	adult	PESTAPP	BEHAV	0.56 kg/ha (6 appl.)	rice fields, TX, USA	1970-75	Frogs found paralysed or exhibited abnormal behaviour 15 min after treatment. Only 1 death recorded.	Flickinger et al. 1980 [k]
carbofuran	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	A sig. difference was found between corn crop treated fields and control group in genotoxic effects (chromosomal fragmentation and DNA profile abnormalities).	Lowcock et al. 1997

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
carbofuran	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	A difference was found between corn crop treated fields and control groups in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
carbofuran	XXFR	adult	PESTAPP	MORT	1 kg ai/ha	Fanaye Diéri, Senegal	1985	In the fields frogs showed abnormal behaviour within 4h after appl. After 24h a number of dead frogs were found.	Mullie et al. 1991
carbophenothion	RACA	tadpole	PESTAPP	MORT	0.45 kg/ha	field tests, CA, USA	< 1962	100 % mortality of tadpoles.	Mulla 1962 [k]
carbophenothion	RACA	tadpole	PESTAPP	MORT	0.45, 1.79 kg/ha	pond (0.025 ha), unknown	< 1963	10 % mortality after 24 h at both rates.	Mulla et al. 1963 [k]
carbophos	XXXR	not specified	PESTAPP	MORT	0.6-0.8 L ai/ha	Ukraine	< 1978	Even ultra-low volume sprays (0.6 L ai/ha) caused mortality of birds, reptiles and mammals.	Karpenko and Myasoedov 1978
chlordane	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	field tests, CA, USA	< 1962	Deemed to be "safe" to tadpoles.	Mulla 1962 [k]
chlordane	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	pond, CA, USA	1962	30 % mortality at 0.56 kg/ha appl. rate after 2 d. No mortality at 0.11 kg/ha after 6 d.	Mulla 1963 [k]
chloropyrifos	HYCH	tadpoles	PESTAPP	DEVOBS	0, 25, 51 ppb	University of Mississippi Field Station, MS, USA	< 1998	Tadpoles took more time to develop and increased leg malformations were present.	Britson and Threlkeld 1998
chlorothalonil	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
chlorothalonil	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
Cl	AMLJ	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	Negative correlation found between population and chloride.	Hecnar and M'Closkey 1996a
Cl	AMMA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	BUAM	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	HYVE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
Cl	NOVI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	PSCR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	PSTR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	RACA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	RACL	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	RAPA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	RAPI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	RASE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Cl	RASY	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Co	BUBO	adult	SUBDERM	MORT	40 uc	mountain meadow, Yosemite, CA, USA	< 1957	Survived.	Karlstrom 1957 [k]
Co	BUCN	adult	SUBDERM	MORT	20-30 uc	mountain meadow, Yosemite, CA, USA	< 1957	3 toads survived one year. (original number tagged not given).	Karlstrom 1957 [k]
copper sulfate	RAXX	adult	PESTAPP	MORT		pond, Rhodesia and Zimbabwe	< 1961	*Rana* spp. not killed in 20 ppm treatment.	Shif and Garnett 1961
copper sulfate	XELA	adult	PESTAPP	MORT		pond, Rhodesia and Zimbabwe	< 1961	XELA not killed by 20 ppm copper sulfate but died rapidly in other treatments.	Shif and Garnett 1961
crude oil	LEKE	egg	ENVIRON	POPSUR	30,000 barrels/d	Rancho Nuevo beach, Gulf of Mexico, Tamaulopus, Mexico	1979	70% hatching success with relocated eggs. Hatching success in the following year 90%.	Delikat 1981
Cs	ELOB	adult	ENVIRON	POPSUR		Savannah R. site, Aiken, SC, USA	1972-80	11 snakes were found in 1972; 8 snakes were found in 1976 and 21 were found in 1980.	Bagshaw and Brisbin 1984
Cs	NATA	adult	ENVIRON	POPSUR		Savannah R. site, Aiken, SC, USA	1972-80	12 snakes were found in 1972; 26 snakes were found in 1976 and 50 snakes were found in 1980.	Bagshaw and Brisbin 1984
Cs	PSSC	adult	ENVIRON	PHYSIO		Savannah R. site, Aiken, SC, USA	< 1988	Radiocesium elimination rate constants ranged from 0.0028-0.0138/d.	Peters and Brisbin 1988

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
Cs, Sr, ^3H	TRSC	adult	ENVIRON	PHYSIO		Savannah R. site, GA, USA	< 1988	All turtles from the basin complexes had elevated Thyac readings (mean=7598 counts/min) whereas no control animals registered above background. Aquatic turtles inhabiting seepage basins had significantly greater variation in DNA content in blood cells.	Bickham et al. 1988
cypermethrin	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
cypermethrin	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
DDC	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Dithiocarbamate was non-detectable at all of the orchard sites; hatching success ranged from 5-100%; survival ranged from 0-95%.	Harris et al. 1998
DDD	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
DDE	AGCO	adult	ENVIRON	PHYSIO		Brazos R., Navasota R., and Hwy21, central Texas, TX, USA	1976	*Agkistrodon* spp. had several times the NADPH-dependent oxidative detoxifying activity of Natrix spp. No consistent differences between sexes in levels of detoxifying enzymes and enzyme activity were observed.	Stafford et al. 1976
DDE	AGPI	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	“	Stafford et al. 1976
DDE	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
DDE	NEER	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	*Agkistrodon* spp. had several times the NADPH-dependent oxidative detoxifying activity of Natrix spp. Oxidase activity was significantly higher in NAER and NAFA than in NARH.	Stafford et al. 1976
DDE	NEFA	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	"	Stafford et al. 1976
DDE	NERH	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	"	Stafford et al. 1976
DDT	AGPI	adult	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	Apparently unaffected by spraying.	Goodrum et al. 1949
DDT	ALMI	adult	ENVIRON	REPRO		L. Apopka, near EPA Superfund ord, FL, USA	< 1994	6 month old female ALMI had plasma estrodiol-17B conc. almost 2 times greater than normal females from control lake; abnormal ovarian morphology with large number of polyovular follicles and polynulear oocytes.	Guillette et al. 1994
DDT	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
DDT	ALMI	juvenile male and females	ENVIRON	PHYSIO		L. Apopka and L. Okeechobee, FL, USA	1995	Steroid hormones from female and male alligators were measured.	Crain et al. 1998b
DDT	ANCA	adult	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	Two chameleons were found affected by the spraying; one was dead, the other was experiencing tremors and paralysis.	Goodrum et al. 1949
DDT	BUBO	juvenile	PESTAPP	MORT	1.12, 2.24 kg/ha	golf course greens	< 1962	95 - 95% control of juvenile toads after 1 treatment.	Mulla 1962 [k]
DDT	COCO	adult	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	One snake was found completely paralyzed 72 h after spraying.	Goodrum et al. 1949
DDT	ELQU	adult	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	Apparently unaffected by the spraying possibly due to the fact that this is a closed canopy species and spraying was done by airplane.	Goodrum et al. 1949
DDT	HYCI	adult	PESTAPP	BEHAV	0.34 - 0.67 kg/ha (4 appl.)	open pond, FL, USA	< 1949	No symptoms.	Herald 1949 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
DDT	MAST	adult	PESTAPP	POPSUR	ground-sprayed	Siabuwa, Omay, and Matusadona National Park, NW Zimbabwe, Zimbabwe	1989-90	MAST *wahlbergii* declined significantly from 76% of lizards at untreated sites (n=8) through 72% after three annual treatments (n=4), to 48% after 4-6 treatments (n=6).	Lambert 1993
DDT	MAST	adult	ENVIRON	POPSUR		Matusadona National Park, Siabuwa, Omay Communal Area, Zimbabwe	1989-90	Frequency of occurrence of MAST relative to other species declined significantly with increasing number of spray treatments; abundance lower in sprayed areas; significantly more trees were occupied by MAST at unsprayed sites.	Lambert 1994b
DDT	NASI	adult	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	26 h after spraying, one snake was found unable to move and convulsing.	Goodrum et al. 1949
DDT	RACA	larvae	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	Larvae were found dead after spraying.	Goodrum et al. 1949
DDT	RACA	tadpole	PESTAPP	MORT	0.11, 1.121 kg/ha	pond, CA, USA	< 1963	0 % mortality at 0.11 kg/ha; 80 % mortality at 1.121 kg/ha after 2 d.	Mulla 1963 [k]
DDT	RAGR	adult	PESTAPP	BEHAV	0.34 - 0.67 kg/ha (4 appl.)	open pond, FL, USA	< 1949	Lack of coordination and death.	Herald 1949 [k]
DDT	RAPI	adult	PESTAPP	MORT	3 lbs/64 acres	Bull Island, Cape Romain National Wildlife Refuge, SC, USA	< 1949	Adult frogs were found dead after spraying.	Goodrum et al. 1949
DDT	RAPI	adult	PESTAPP	BEHAV	0.34 - 0.67 kg/ha (4 appl.)	open pond, FL, USA	< 1949	Lack of coordination, and death. Some showed signs of recovery.	Herald 1949 [k]
DDT	RASY	adult	PESTAPP	MORT		woodland pools, Hubbard Co., MN, USA	< 1957	2.5 d after spray dead frogs found on each pool. 2 -3 mos after spraying, no live frogs were found.	Fashingbauer 1957 [k]
DDT	RASY	adult	PESTAPP	MORT	up to 4.5 kg/ha	forest, N.E.ON, CAN	< 1949	"Very slight" effect on amphibians.	Speirs 1949 [k]
DDT	RATE	tadpole	PESTAPP	MORT	0.4-0.5 kg/ha	ditches, pools, gravel pit, UK	< 1973	Mortality, frantic behaviour, snout abnormalities.	Cooke 1973b [k]
DDT	XXFR	adult	PESTAPP	MORT	0.06, 0.45 kg/ha	coastal plain ponds, Savannah, GA, USA	< 1950	A few frogs were killed by DDT (0.11) as dust or emulsion. DDT emulsions more toxic than solutions and dusts.	Tarzwell 1950 [k]
DDT	XXSN	adult	PESTAPP	MORT	5 kg/km riverine forest	Guinea savanna zone, Lame Burra, Dan Bagudu, Rafin Dinya, Nigeria	1974	11 snake species were found dead or dying after spraying.	Wassersug and Hoff 1979

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
deltamethrin	AGAC	adult	ENVIRON	POPSUR		Omay Communal area, NW Zimbabwe, Zimbabwe	1990	No sig. difference in species composition before and after spray. Authors suggest that long term direct or indirect (prey) effects were unlikely.	Lambert 1994a
deltamethrin	LYCA	adult	ENVIRON	POPSUR		Omay Communal area, NW Zimbabwe, Zimbabwe	1990	No sig. difference in species composition before and after spray. Authors suggest that long term direct or indirect (prey) effects were unlikely.	Lambert 1994a
deltamethrin	LYCH	adult	ENVIRON	POPSUR		Omay Communal area, NW Zimbabwe, Zimbabwe	1990	"	Lambert 1994a
deltamethrin	MAQU	adult	PESTAPP	POPSUR	250 mg/ha (5 appl.)	Mutoko District, Zimbabwe	< 1987	No effects of deltamethrin on populations of Rainbow skinks were noted at treated sites.	Grant and Crick 1987
deltamethrin	MAQU	adult	ENVIRON	POPSUR		Omay Communal area, NW Zimbabwe, Zimbabwe	1990	No sig. differences in species composition before and after spray. Authors suggested that long term direct or indirect (prey) effects were unlikely.	Lambert 1994a
deltamethrin	MAST	adult	ENVIRON	POPSUR		Omay Communal Area, NW Zimbabwe, Zimbabwe	1990	"	Lambert 1994a
deltamethrin	MAVV	adult	ENVIRON	POPSUR		Omay Communal area, NW Zimbabwe, Zimbabwe	1990	"	Lambert 1994a
deltamethrin	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
deltamethrin	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
Diazinon	RACL	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 1 were 95 and 20-95% in 1993 and 1994 respectively; and site 4 90-100 and 42-97%.	Harris et al. 1998
Diazinon	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	NSD at all of the orchard sites; hatching success ranged from 5-100%; survival ranged from 0-95%.	Harris et al. 1998
Diazinon	XXSN	not specified	ENVIRON	MORT		Japan	< 1979	Pesticide kills Habu snake with use of "open traps" with adhesive seats containing pesticides without polluting the environment.	Kihara and Yamashita 1979

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
dichlobenil	BUBU	adult	PESTAPP	DEVOBS	1 mg/L granules	pond, UK	< 1977	No deaths or changes in activity or development within 32 d.	Cooke 1977 [k]
dichlobenil	RATE	adult	PESTAPP	DEVOBS	1 mg/L granules	pond, UK	< 1977	No death or changes in activity or development with 32 d.	Cooke 1977 [k]
dichlobenil	TRVU	adult	PESTAPP	DEVOBS	1 mg/l granules	pond, UK	< 1977	No deaths, changes in activity or development; continued to breed.	Cooke 1977 [k]
dicofol	ALMI	egg	ENVIRON	MORT		Apopka, Griffin, Jessup L., Okeechobee, FL, USA	1983-86	Clutch viability lower on L. Apopka and higher on L. Griffin than any other lake. Annual clutch viability declined on L. Apopka during the study.	Woodward et al. 1993
dicofol	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
dicofol	ALMI	juvenile	ENVIRON	MORT		Apopka, Griffin, Jessup L., Okeechobee, FL, USA	1980-87	Juvenile alligator density relatively stable during 1980-87 on Griffin and Jessup lakes, but plunged to 10 % of 1980 level on Apopka coincident with falling clutch viability.	Woodward et al. 1993
dicofol	ALMI	juvenile males and females	ENVIRON	PHYSIO		L. Apopka and L. Okeechobee, FL, USA	1995	Steroid hormones from female and male alligators were measured.	Crain et al. 1998b
dieldrin	ALMI	juvenile	IMMER	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
dieldrin	BOFU	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Rukuzi, Mwita and Jafulira, Zambia	1962-64	Snakes were caught and died later. Many other mammals and birds were either found dead or died after capture from this spraying.	Wilson 1972
dieldrin	CRHT	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Rukuzi, Zambia	1962-64	"	Wilson 1972
dieldrin	DITY	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Rukuzi and Mwita, Zambia	1962-64	"	Wilson 1972
dieldrin	HENO	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Rukuzi and Jafulira, Zambia	1962-64	"	Wilson 1972
dieldrin	LYCP	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Jafulira, Zambia	1962-64	"	Wilson 1972
dieldrin	MENY	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Rukuzi, Zambia	1962-64	"	Wilson 1972

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
dieldrin	RACA	tadpole	PESTAPP	MORT	0.11 - 0.56 kg/ha	field tests, CA, USA	< 1962	Complete tadpole kill.	Mulla 1962 [k]
dieldrin	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	pond	1962	100 % mortality after 1 d in each of 0.11 and 0.56 kg/ha appl. areas.	Mulla 1963 [k]
dieldrin	TESE	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Rukuzi and Chamatunda, Zambia	1962-64	Snakes were caught and died later. Many other mammals and birds were either found dead or died after capture from this spraying.	Wilson 1972
dieldrin	THKI	adult	PESTAPP	MORT	3.7% knap-sack spray	Chipangali area, Jafulira, Rukuzi and Chamatunda, Zambia	1962-64	"	Wilson 1972
dieldrin	XXSN	adult	PESTAPP	MORT	800 g/ha	Guinea savanna zone, Lame Burra, Dan Bagudu, Rafin Dinya, Nigeria	1974	11 snake species were found dead or dying after spraying.	Koeman et al. 1978
diesel	CLMA	juvenile-adult	ENVIRON	POPSUR	spill	Hayford Creek, Trinity R., CA, USA	1970	1 turtle found dead on bottom of one of the sections of the stream. 2 juvenile turtles found in poor condition. Eyes and necks of all three were swollen. Movements of live turtles were uncoordinated and they were unable to either swim or sink.	Bury 1972
diesel	RABO	tadpole	ENVIRON	POPSUR	spill	Hayford Creek, Trinity R., CA, USA	1970	1843 individuals were killed. Some were beginning the stages of metamorphosis. No adult frogs found dead.	Bury 1972
diesel	THCO	adult	ENVIRON	POPSUR	spill	Hayford Creek, Trinity R., CA, USA	1970	36 dead snakes found. Several snakes were seen that appeared to be noticeably sluggish in their movements.	Bury 1972
diflubenzuron	HYRE	tadpole	PESTAPP	MORT	0.04-0.045 lb ai/acre	foothills, CA, USA	1974	HYRE tadpoles tolerated the treatment.	Miura et al.,
diflubenzuron	SCHA	tadpole	PESTAPP	MORT	0.04-0.045 lb ai/acre	foothills, CA, USA	1974	SCHA tadpoles tolerated the treatment.	Miura et al.,
dioxins	GRFL	adult	ENVIRON	POPSUR		Pascagoula R., MS, USA	1995-96	Populations downstream from mill since dioxin release in 1991 have disappeared.	Mendonca et al. 1996
diquat	BUBU	adult	PESTAPP	DEVOBS	1 mg/L sprayed	pond, UK	< 1977	No death or changes in activity or development within 32 d.	Cooke 1977 [k]
diquat	RACA	tadpole	PESTAPP	BEHAV	0.5 ppm ai/acre	pond, USA	< 1977	No mortality.	Johnson and Gieke 1977
diquat	RATE	adult	PESTAPP	DEVOBS	1 mg/L sprayed	pond, UK	< 1977	No deaths or changes in activity or development within 32 d.	Cooke 1977 [k]
diquat	TRVU	adult	PESTAPP	DEVOBS	1 mg/L sprayed	pond, UK	< 1977	No death or changes in activity or development within 32 d; continued to breed.	Cooke 1977 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
diquat, nabam	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
diquat, nabam	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
endosulfan	BUBO	juvenile	PESTAPP	MORT	1.12 kg/ha	residential area, unknown	< 1962	98 % control of juvenile toads in 24 h.	Mulla 1962 [k]
endosulfan	CHXE	adult (caged ? not given)	PESTAPP	MORT	14 g a.i/ha	savanna woodland, Zimbabwe	< 1979	No deaths after 19 d post treatment.	Cockbill 1979 [k]
endosulfan	RACA	tadpole	PESTAPP	MORT	0.11 kg/ha	pond	< 1962	Complete die off of tadpoles.	Mulla 1962 [k]
endosulfan	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	pond, CA, USA	1962	60 % mortality at 0.11 kg/ha; 100 % mortality at 0.56 kg/ha.	Mulla 1963 [k]
endosulfan	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	pond, CA, USA	1962	100 % mortality 0.56 kg/ha after 1 d; 10 % mortality at 0.11 kg/ha after 1 d.	Mulla 1963 [k]
endosulfan	RACL	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 1 were 95 and 20-95% in 1993 and 1994 respectively and ref site 1 were 97-100 and 87-97%.	Harris et al. 1998
endosulfan	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Endosulfan was non-detectable at all of the orchard sites; hatching success ranged from 5-100%; survival ranged from 0-95%.	Harris et al. 1998
endosulfan	SCHA	juvenile	PESTAPP	MORT	1.12 kg/ha	residential area, unknown	< 1962	98 % control of toads in 24 h.	Mulla 1962 [k]
endosulfan	XXSN	adult	PESTAPP	MORT	800-1000 g/ha	Guinea savanna zone, Lame Burra, Dan Bagudu, Rafin Dinya, Nigeria	1974	11 snake species were found dead or dying after spraying.	Koeman et al. 1978
endrin	RACA	tadpole	PESTAPP	MORT	0.11 - 0.56 kg/ha	field tests, CA, USA	< 1962	Complete kill of tadpoles.	Mulla 1962 [k]
endrin	RACA	tadpole	PESTAPP	MORT	0.11 - 0.56 kg/ha	pond (0.025 ha), CA, USA	1962	90 % mortality after 5 d at 0.11 kg/ha; 100 % mortality after 1 d.	Mulla 1963 [k]
endrin	RAES	tadpole (without devel. limbs)	PESTAPP	MORT	0.047 mg/L	artificially evacuated pool, unknown	< 1979	Caged tadpoles alive only at most distant test stations after 72 h.	Wohlgemuth and Trnkova 1979 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
endrin	RATE	adult	PESTAPP	MORT	0.047 mg/L	artificially evacuated pool, unknown	< 1979	Wild population had strong leg cramps and paralysis of limbs and died. 7 weeks after treatment repopulated pond.	Wohlgemuth and Trnkova 1979 [k]
estradiol	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka and L.Woodruff, FL, USA	< 1995	Synthesis of 17ß-estradiol was sig. dif. when ovaries from the cont. and control lakes were compared *in vitro*. Additionally, testes obtained from the cont. lake, L. Apopka, synthesized significantly higher conc.	Guillette et al. 1995
ethyl guthion	RACA	tadpole	PESTAPP	MORT	0.22 , 0.90 kg/ha	pond (0.025 ha), unknown	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
fenitrothion	BUAM	not specified	PESTAPP	MORT	0.14 kg/ha	pond, NB, CAN	< 1969	No mortality.	Pearce and Teeple 1969 [k]
fenitrothion	RACA	tadpole	PESTAPP	MORT	0.14 kg/ha (2 appl.)	Fundy National Park, NB, CAN	< 1974	No mortality.	Rick and Price 1974 [k]
fenitrothion	RACL	not specified	PESTAPP	MORT	0.14 kg/ha	pond, NB, CAN	< 1969	No mortality.	Pearce and Teeple 1969 [k]
fenitrothion	RASE	adult	ENVIRON	POPSUR		northern NB, CAN	1991	Areas that have been heavily sprayed over the previous 5 yrs had a lower abundance of mink frogs.	McAlpine 1997a
fenitrothion	RASE	adult	PESTAPP	POPSUR	210 g /ha (2 appl.)	9 lakes and ponds within forested areas, Northern New Brunswick, NB, CAN	1991	Low spray areas (not sprayed after 1987): mean frog density=7.09 and 20.95; Medium spray areas (sprayed in 1990 only): mean frog density= 65.43 and 12.05; High spray areas: mean frog densities= 0.71, 3.52, 3.86, 3.99, 6.15.	McAlpine et al. 1998
fenitrothion	RASY	adult	PESTAPP	MORT	0.14 kg/ha (2 appl.)	Fundy National Park, NB, CAN	< 1974	No mortality.	Rick and Price 1974 [k]
fenitrothion	RASY	tadpole	PESTAPP	MORT	0.14 kg/ha (2 appl.)	Fundy National Park, NB, CAN	< 1974	No mortality.	Rick and Price 1974 [k]
fenitrothion	XXFR	adult	PESTAPP	MORT	0.5 kg/ha	rice fields, India	< 1973	100% mortality.	Thirumurthi et al. 1973 [k]
fenoprop	XXFR	adult	PESTAPP	POPSUR		Long Pond, NY, USA	1957	No obvious effect on local population of frogs, no change in abundance.	Pierce 1958
fenoprop	XXFR	adult	PESTAPP	POPSUR		Long Pond, NY, USA	1959	No effect noted in frogs, obvious population changes were not evident.	Pierce 1960
fenoprop	XXXT	adult	PESTAPP	POPSUR		Long Pond, NY, USA	1957	No obvious effect on local abundance of adults.	Pierce 1958
fenthion	XXFR	adult	PESTAPP	POPSUR	24 L/12 min.at150 km/h	Njoro Dam and Gicheha farm, E. Africa, Kenya	1988	Populations were not affected after treatments (7.7-15 ppb for 20 and 30 min).	Keith et al. 1994
fenthion	XXFR	adult	PESTAPP	MORT	0.5 kg/ha	rice field, India	< 1973	100 % mortality.	Thirumurthi et al. 1973 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
fenthion	XXFR	tadpole	PESTAPP	POPSUR	24 L/12 min at150 km/h	Njoro Dam and Gicheha farm, E. Africa, Kenya	1988	Tadpoles were not affected after treatments (17ppb exposure for 10 min).	Keith et al. 1994
FLII MLO	RACA	adult	PESTAPP	MORT	2.24 L/ha (4 sprays)	pond, Butte Co., CA, USA	1971	No mortality.	Hagen et al. 1973 [k]
flocoumafen	CYAE	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	Captures increased significantly between 85/86 and 86/87 then fell between 86/87 and 87/88; subsequently, numbers caught remained low and fell again between 89/90 and 90/91 but increased between 90/91 and 91/92.	Newman 1994
flocoumafen	CYMA	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	After 1989 (date of mouse eradication program) there was a sig. increase in the number of individuals caught. No toxicity data given.	Newman 1994
flocoumafen	HOMA	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	After 1989 (date of mouse eradication program) there was a sig. increase in the number of individuals caught. No toxicity data given.	Newman 1994
flocoumafen	LENI	adult	ENVIRON	POPSUR		Mana Island, New Zealand	1986-93	Capture rates were usually low, yet declined significantly between 1985/1986 and 86/87 and between 86/87 and 87/88. From 88/89 captures rose, but fell significantly again between 90/91 and 91/92. No tox data given.	Newman 1994
fluoranthene, UV	AMMA	larvae	IMMER	MORT		Corvallis, OR, USA	<1998	Larvae hatched already dead at 25 µg/L conc. of fluoranthene and UV exposure. Without UV exposure, <5% mortality.	Hatch and Burton 1998
fluoranthene, UV	RAPI	larvae	IMMER	MORT		Corvallis, OR, USA	<1998	At 125 µg/L fluoranthene and no UV exposure hatching success was 67% and larvae were otherwise unaffected. With UV exposure, 57% hatched yet all were dead upon hatching.	Hatch and Burton 1998
fluoranthene, UV	XELA	larvae	IMMER	MORT		Corvallis, OR, USA	<1998	At 25 µg/L fluoranthene conc., embryos hatched already dead, <5% mortality occurred when there was no UV exposure.	Hatch and Burton 1998
fluoride	AMMU	adult	ENVIRON	POPSUR		Tomago, NW of Newcastle, Hunter Valley, AUS	1994	No apparent effects on survival; vegetation and fluoride levels were related and often abundance was more likely attributed to lack or presence of certain vegetation.	Letnic and Fox 1997

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
fluoride	CATE	adult	ENVIRON	POPSUR		Tomago, NW of Newcastle, Hunter Valley, AUS	1994	"	Letnic and Fox 1997
fluoride	CTRO	adult	ENVIRON	POPSUR		Tomago, NW of Newcastle, Hunter Valley, AUS	1994	"	Letnic and Fox 1997
fluoride	CTTA	adult	ENVIRON	POPSUR		Tomago, NW of Newcastle, Hunter Valley, AUS	1994	"	Letnic and Fox 1997
fluoride	LADE	adult	ENVIRON	POPSUR		Tomago, NW of Newcastle, Hunter Valley, AUS	1994	"	Letnic and Fox 1997
fluoride	LAGU	adult	ENVIRON	POPSUR		Tomago, NW of Newcastle, Hunter Valley, AUS	1994	"	Letnic and Fox 1997
fuel oil	AMOP	larvae	IMMER	DEVOBS		Fort Stewart Army base, GA, USA	1994	Survival rates did not differ between treatments, however, impacted sites had animals that weighed less with shorter snout-vent lengths.	Lefcort et al. 1997
fuel oil	AMTI	10 wk hatchlings	IMMER	MORT		Fort Stewart Army Base, GA, USA	1994	LC24 was 31.63 ml/L water; LC48-LC96=19.88 ml/L water.	Lefcort et al. 1997
fuel oil	AMTI	6 wk hatchlings	IMMER	DEVOBS		Fort Stewart Army Base, GA, USA	1994	Effect of oil on growth is not sig.	Lefcort et al. 1997
fuel oil	RACA	adult	PESTAPP	MORT	112.1 L/ha (4 sprays)	pond, Butte Co., CA, USA	1971	No mortality.	Hagen et al. 1973 [k]
G-27365	RACA	tadpole	PESTAPP	MORT	0.22, 0.90 g/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
G-28029	RACA	tadpole	PESTAPP	MORT	0.45,1.79 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
G-30493	BUBO	tadpole	PESTAPP	MORT	0.22,0.90 kg/ha	field tests, CA, USA	< 1962	Deemed "safe" to tadpoles.	Mulla 1962 [k]
G-30493	BUBO	tadpole	PESTAPP	MORT	0.22 0.90 kg/ha	pond	< 1963	No mortality.	Mulla et al. 1963 [k]
G-30493	SCHA	tadpole	PESTAPP	MORT	0.22,0.90 kg/ha	field tests, CA, USA	< 1962	Deemed "safe" to tadpoles.	Mulla 1962 [k]
G-30493	SCHA	tadpole	PESTAPP	MORT	0.22,0.90 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
G-30494	BUBO	tadpole	PESTAPP	MORT	0.11,0.45 kg/ha	field tests, CA, USA	< 1962	Deemed "safe" to tadpoles.	Mulla 1962 [k]
G-30494	BUBO	tadpole	PESTAPP	MORT	0.11,0.45 kg/ha	pond	< 1963	5 % mortality at 0.45 kg/ha; no mortality at 0.11.	Mulla et al. 1963 [k]
G-30494	SCHA	tadpole	PESTAPP	MORT	0.11,0.45 kg/ha	field tests, CA, USA	< 1962	Deemed "safe" to tadpoles.	Mulla 1962 [k]
G-30494	SCHA	tadpole	PESTAPP	MORT	0.11,0.45 kg/ha	pond	< 1963	No mortality at 0.11; 5 % mortality at 0.45 kg./ha.	Mulla et al. 1963 [k]
GC-3582	RACA	tadpole	PESTAPP	MORT	0.45,1.8 kg/ha	field tests, CA, USA	< 1962	No morality at 0.45 kg/ha; 100 % mortality at 1.8 kg/ha.	Mulla 1962 [k]

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GC-3582	RACA	tadpole	PESTAPP	MORT	0.45,1.79 kg/ha	pond	< 1963	100 % mortality at 1.79 kg/ha; no mortality at 0.45 kg/ha.	Mulla et al. 1963 [k]
glyphosate	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	A sig. difference was found between corn crop treated fields and control group in genotoxic effects (chromosomal fragmentation and DNA profile abnormalities).	Lowcock et al. 1997
glyphosate	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	A difference was found between corn crop treated fields and control groups in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
glyphosate	RASY	egg masses	PESTAPP	HATSUC	0,1.44,1.8 kg/ha	Avis, Ivy, Jasper and Earl townships, ON, CAN	1997	Deformities were much greater for sites sprayed with VISION compared to control sites.	Glaser 1998
glyphosate	RASY	juvenile	PESTAPP	DEVOBS	0-1.8 kg/ha	Jasper, Ivy, Avis and Earl townships, ON, CAN	1997	Growth did not differ between VISION treatments yet juveniles were smaller than controls in VISION treated areas.	Glaser 1998
HCH, beta, lindane	RACA	tadpole	PESTAPP	MORT	0.11,0.56 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” to tadpoles.	Mulla 1962 [k]
HCH, beta, lindane	RACA	tadpole	PESTAPP	MORT	0.11,0.56 kg/ha	pond, CA, USA	1962	30 % mortality at 0.11 kg/ha after 6 d ; 10 % mortality after 1 d in 0.56 kg/ha with no additional mortality to 6 d.	Mulla 1963 [k]
heptachlor	CHSE	adult	PESTAPP	MORT	0.25 lb/acre (2 appl.)	N. Mississippi, MS, USA	1958-61	1 found dead.	Ferguson 1963b
heptachlor	EUXX	adult	PESTAPP	MORT	0.25-2.0 lb/acre	N. Mississippi, MS, USA	1958-61	Some species before applications but never after.	Ferguson 1963b
heptachlor	HAST	adult	PESTAPP	MORT	2.0 lb/acre	N. Mississippi, MS, USA	1958-61	1 found dead.	Ferguson 1963b
heptachlor	HEPL	adult	PESTAPP	MORT	0.25-2.0 lb/acre	N. Mississippi, MS, USA	1958-61	10 mos after appl. wrinkled and nearly dead.	Ferguson 1963b
heptachlor	LAGE	adult	PESTAPP	MORT	2.0 lb/acre	N. Mississippi, MS, USA	1958-61	1 found dead.	Ferguson 1963b
heptachlor	NEER	adult	PESTAPP	MORT	0.5 lb/acre	N. Mississippi, MS, USA	1958-61	2 found dead, attributed to consumption of cont. fish.	Ferguson 1963b
heptachlor	NERH	adult	PESTAPP	MORT	0.25 lb/acre	N. Mississippi, MS, USA	1958-61	1 found dead.	Ferguson 1963b
heptachlor	PSSC	adult	PESTAPP	MORT	0.25-2.0 lb/acre	N. Mississippi, MS, USA	1958-61	Species disappeared soon after the treatment.	Ferguson 1963b
heptachlor	RACA	adult	PESTAPP	MORT	2.0 lb/acre	N. Mississippi, MS, USA	1958-61	1 found dead.	Ferguson 1963b
heptachlor	RACA	tadpole	PESTAPP	MORT	0.11,0.56 kg/ha	field tests, CA, USA	< 1962	Deemed “toxic” to tadpoles.	Mulla 1962 [k]
heptachlor	RACA	tadpole	PESTAPP	MORT	0.11,0.56 kg/ha	pond, CA, USA	1962	No mortality in 0.11 kg/ha; 80 % mortality at 0.56 kg/ha after 2 d.	Mulla 1963 [k]
heptachlor	SCUN	adult	PESTAPP	MORT	2.0 lb/acre	N. Mississippi, MS, USA	1958-61	1 found dead.	Ferguson 1963b

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heptachlor	SCXX	adult	PESTAPP	MORT	0.25-2.0 lb/acre	N. Mississippi, MS, USA	1958-61	Some species before applications but never after.	Ferguson 1963b
heptachlor	TECA	adult	PESTAPP	MORT	2.0 lb/acre	N. Mississippi, MS, USA	1958-61	1 found dead, numerous others were found unharmed.	Ferguson 1963b
heptachlor	XXSN	adult	PESTAPP	MORT	0.25-2.0 lb/acre	N. Mississippi, MS, USA	1958-61	7 snakes of 4 species were seen before spraying and only one snake was found afterwards (COCO).	Ferguson 1963b
Hg	CACC	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	Metals are carried up through the food chain and detected in crocodile tissues at levels regarded as of serious concern.	Brazaitis et al. 1996
Hg	CALA	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	"	Brazaitis et al. 1996
Hg	CAYA	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	"	Brazaitis et al. 1996
Hg	HYCH	tadpoles	PESTAPP	DEVOBS	0.4 ppm to water column	University of Mississippi Field Station, MS, USA	< 1998	Tadpoles took more time to metamorphose.	Britson and Threlkeld 1998
Hg	MENI	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	Metals are carried up through the food chain and detected in crocodile tissues in levels regarded as of serious concern.	Brazaitis et al. 1996
Hg	PAPA	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	"	Brazaitis et al. 1996
Hg	PATI	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	"	Brazaitis et al. 1996
industrial effluent	BUAR	embryo stages 13, 18 and 25	ENVIRON	MORT		Reconquista river, Argentina	1994	LC50 of control site=0.0035, LC50 of downstream sites=0.0155; river water was approx. 10 times more toxic than a chosen reference point.	Herkovits et al. 1996
industrial effluent	PSCR	tadpole	IMMER	MORT		Delmarva Peninsula, E. coast of USA	1991	Tests were done in cold (12°C) and warm (20°C) test water situations (winter and summer). LC50=0.46 (cold) and >0.53 (warm) mg/L; NOEC 0.77 and >0.96 mg/L.	Diamond et al. 1993
industrial effluent	RAPI	larvae	IMMER	MORT		Delmarva Peninsula, E. coast of USA	1991	Tests were done in warm (20°C) test water situations. NOEC survival >0.35; growth=0.35 mg/L.	Diamond et al. 1993

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industrial effluent	RAPI	tadpole	IMMER	MORT		Delmarva Peninsula, E. coast of USA	1991	Tests were done in cold (12°C) and warm (20°C) test water situations (winter and summer). LC50=0.42 (cold) and 1.44 (warm) mg/L; NOEC 0.66 and 1.60 mg/L.	Diamond et al. 1993
kepone	RACA	tadpole	PESTAPP	MORT	0.11,0.56 kg/ha	field tests, CA, USA	< 1962	Deemed "safe" to tadpoles.	Mulla 1962 [k]
kepone	RACA	tadpole	PESTAPP	MORT	0.11,0.56 kg/ha	pond, CA, USA	1962	No mortality after 24 h.	Mulla 1963 [k]
leptophos	XXFR	not specified	PESTAPP	MORT	1.0 kg/ha	rice field, India	< 1973	100 % mortality 48 h after spraying.	Thirumurthi et al. 1973 [k]
Linuron	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
Linuron	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
malathion	ANCO	adult	PESTAPP	PHYSIO	4-6 oz/acre	Miragoane Valley, Haiti	1972	No measured adverse effect on lizards was demonstrated. Brain AChE levels were not inhibited.	McLean et al. 1975
malathion	PLGL	adult	PESTAPP	PHYSIO	5.6 kg/ha (10 appl.)	oak poplar forest, NC, USA	< 1985	No brain ChE inhibition, changes in abundance, effects on lipid storage patterns noted.	Baker 1985 [k]
malathion	PLGL	juvenile	PESTAPP	PHYSIO	5.6 kg/ha (10 appl.)	oak poplar forest, NC, USA	< 1985	"	Baker 1985 [k]
mancozeb	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
mancozeb	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
metalaxyl	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	"	Lowcock et al. 1997

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
metalaxyl	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	"	Lowcock et al. 1997
metals	RARI	adult	ENVIRON	PHYSIO	emissions	Ironwork area, Ironwork Katowice region, Poland	< 1980	Frogs collected from an area close to the factory had lower metabolic rates than those from farther away.	Pytasz et al. 1980 [k]
methomyl	XXSN	not specified	ENVIRON	MORT		Japan	< 1979	Pesticide kills Habu snake with use of "open traps" with adhesive seats containing pesticides without polluting the environment.	Kihara and Yamashita 1979
methylarsonic acid	HYCH	tadpoles	PESTAPP	DEVOBS	0,109,219 ppb	University of Mississippi Field Station, MS, USA	< 1998	Increased frequency of lordosis.	Britson and Threlkeld 1998
metolachlor	ACCR	adult	ENVIRON	POPSUR		IL, USA	1995	Sufficient conc. of metolachlor and/or atrazine in water to account for observed damage to plant populations utilized by ACCR tadpoles.	Beasley et al. 1995
metolachlor	RACL	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 2 were 50-95 and 7-87% in 1993 and 1994 respectively.	Harris et al. 1998
metolachlor	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Hatching success/survival rates at site 2 were 5-70 and 0-62% in 1993 and 1994 respectively.	Harris et al. 1998
metribuzin	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
metribuzin	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
mexacarbate	RACL	adult	PESTAPP	MORT	1 oz in 0.15 U.S.G./acre	NB, CAN	1969	Green frog counts in both control and experimental ponds followed similar patterns. Frog numbers at ponds either remained relatively stable or increased slightly, depending on age composition, numbers of frogs and other factors.	Pearce and Rick 1969
mexacarbate	RACL	tadpole	PESTAPP	MORT	0.007 kg/ha	Acadian Forest Experiment Station, NB, CAN	< 1974	No toxic effects noted.	Rick and Price 1974 [k]
mexacarbate	RACL	tadpoles	PESTAPP	MORT	2 sprays of 70 g/ha	NB, CAN	< 1995	After 3 d, no mexacarbate residues were found in pond sediment or tissue of frogs.	Sundaram 1995

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
mexacarbate	RASY	tadpole	PESTAPP	MORT	1 oz in 0.15 U.S.G./acre	NB, CAN	1969	Some mortality occurred in both control and treated cages but was attributed to natural causes. One treated pond had sig mortality; the pond consisted of a shallow ditch with a culvert connecting it to a pond, death was attributed to observed oil.	Pearce and Rick 1969
mexacarbate	RASY	tadpole	PESTAPP	MORT	0.007 kg/ha	Acadian Forest Experiment Station, NB, CAN	< 1974	Mortality noted in population.	Rick and Price 1974 [k]
Mg	AMLJ	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	Negative correlation found between population and magnesium.	Hecnar and M'Closkey 1996a
Mg	AMMA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	BUAM	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	HYVE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	NOVI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	PSCR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	PSTR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	RACA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	RACL	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	Negative correlation found between population and magnesium.	Hecnar and M'Closkey 1996a
Mg	RAPA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	RAPI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	RASE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
Mg	RASY	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
mine drainage	NECE	adult	ENVIRON	DEVOBS		Olympic Mine Dam, Roxby Downs, AUS	1992	Incidence of abnormality (usually ectrodactyly) ranged from 1.1-3.1% at different sites.	Read and Tyler 1994
mine drainage	RARI	not specified	ENVIRON	PHYSIO		Katowice Steel Plant area, Poland	1976-77	No adverse effects from steel plant found.	Zlotecka et al. 1979
myclobutanil	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Myclobutanil was non-detectable at all of the orchard sites; hatching success ranged from 5-100%; survival ranged from 0-95%.	Harris et al. 1998
naled	RACA	tadpole	PESTAPP	MORT	0.56 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
NaPCP	RAXX	adult	PESTAPP	MORT		pond, Rhodesia and Zimbabwe	< 1961	*Rana* spp. killed rapidly in treatment.	Shif and Garnett 1961
NaPCP	XELA	adult	PESTAPP	MORT		pond, Rhodesia and Zimbabwe	< 1961	XELA killed rapidly in treatment.	Shif and Garnett 1961
NH3	AMLJ	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	Negative correlation found between population and NO3.	Hecnar and M'Closkey 1996a
NH3	AMMA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	BUAM	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	HYVE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	NOVI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	PSCR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	PSTR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	RACA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	RACL	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	RAPA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	RAPI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	RASE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
NH3	RASY	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	Negative correlation found between population and NO3.	Hecnar and M'Closkey 1996a
Ni	ERIM	adult tissue	ENVIRON	PHYSIO		Arabian Gulf, Saudi Arabian coastline, Saudi Arabia	1983	Animals dead or dying; liver had higher conc. than muscle	Sadiq and Zaidi 1984
Ni	XXSS	adult tissue	ENVIRON	PHYSIO		Arabian Gulf, Saudi Arabian coastline, Saudi Arabia	1983	Animals dead or dying; muscle tissues generally had higher conc. than liver.	Sadiq and Zaidi 1984
niclosamide	RAXX	adult	PESTAPP	MORT		pond, Rhodesia and Zimbabwe	< 1961	*Rana* spp. killed rapidly in treatment.	Shif and Garnett 1961
niclosamide	XELA	adult	PESTAPP	MORT		pond, Rhodesia and Zimbabwe	< 1961	XELA killed rapidly in treatment.	Shif and Garnett 1961
niclosamide	XXXA	adult	PESTAPP	MORT	0.3-1.0 ppm	ponds, OH, USA	1967	Frogs were killed in all ponds treated with 1.0 ppm. Toxicity of pond remained for 2 to more than 6 weeks.	Stevenson and Addis 1967
niclosamide	XXXA	tadpole	PESTAPP	MORT	0.3-1.0 ppm	pond, OH, USA	1967	Tadpoles were killed in all treatment ponds.	Stevenson and Addis 1967
nitrate	AMLJ	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	No correlation between nitrate and population decline.	Hecnar and M'Closkey 1996a

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
nitrate	AMMA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	BUAM	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	No correlation between nitrate and population decline.	Hecnar and M'Closkey 1996a
nitrate	HYVE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	NOVI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	PSCR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	PSTR	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	RACA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	RACL	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	RAPA	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	RAPI	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	RASE	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nitrate	RASY	adult	ENVIRON	POPSUR		West of Niagara escarpment, ON, CAN	1992-94	"	Hecnar and M'Closkey 1996a
nonachlor	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
not applicable	NANA	adult	ENVIRON	DEVOBS		Vendee, France	< 1982	The bifurcation of the body was at 2 cm distance from the snout of the two heads. The division in two of the organs is more important in the half forebody than in the half backbody.	Naulleau 1982
not applicable	PLCI	male and female	ENVIRON	DEVOBS		Glascow Mntn., Parrsboro, NS, CAN	1982	High incidence of limb skeletal variation, 12 carpal, 12 tarsal patterns are described in paper.	Hanken 1983
not applicable	RATE	adult	ENVIRON	PATH		New Haw, Surrey, UK	1993	Large poxvirus-like particles were found in viscera and skin. Virus isolated from 16 of 17 animals.	Drury et al. 1995

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
not applicable	RATI	adult	ENVIRON	DEVOBS			< 1976	It was noted during a student demonstration that 15 of 75 male specimens had well developed vocal sacs, testis and nuptial pads, yet fully developed oviducts opening into the cloaca.	Acharjyo and Misra 1976
oxamyl	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
oxamyl	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
oxamyl	RATE	tadpole	ENVIRON	DEVOBS		ditches beside agricultural fields, UK	< 1981	Caged tadpoles maintained near potato field showed more deformities. No other fields treated with oxamyl.	Cooke 1981 [k]
paraquat	RATE	tadpole	PESTAPP	MORT		Dover Beck, River Trent, Oxton, Nottinghamshire, UK	1964-66	Some mortality did occur after appl. of the herbicide.	Way et al. 1971
parathion	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” to tadpoles.	Mulla 1962 [k]
parathion	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
parathion	RACA	not specified	PESTAPP	MORT	1.12, 0.11 kg/ha (6 appl.)	wetland habitats in agricultural areas, CA, USA	< 1966	1.12 kg/ha abundance or survival not seriously affected; 0.11 kg/ha no apparent effect on populations.	Mulla et al. 1966 [k]
parathion	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” to tadpoles.	Mulla 1962 [k]
parathion	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
parathion-methyl	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” to tadpoles	Mulla 1962 [k]
parathion-methyl	BUBO	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
parathion-methyl	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” to tadpoles.	Mulla 1962 [k]
parathion-methyl	SCHA	tadpole	PESTAPP	MORT	0.11, 0.45 kg/ha	pond	< 1963	No mortality after 24 h.	Mulla et al. 1963 [k]
pathogen	RATE	egg	OTHER	OTHER		Link Cove, Deepdale, Westmorland, UK	1973	Clumps of eggs were found spoiled.	Fryer 1973

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
Pb	CACC	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	Metals are carried up through the food chain and detected in crocodile tissues in levels regarded as of serious concern.	Brazaitis et al. 1996
Pb	CAYA	adult	ENVIRON	POPSUR		Rio deBanco,Rio Ajarahj, Rio Mucajai, N. Central Roraimo, Brazil	1985-92	"	Brazaitis et al. 1996
Pb	RACA	egg	IMMER	HATSUC			< 1997	260-1688 µg/L of lead had no effect on hatching success of tadpoles.	Stansley et al. 1997
Pb	RACA	tadpoles	IMMER	DEVOBS			< 1997	260-1688 µg/L lead had no acute effects on tadpoles of RACA.	Stansley et al. 1997
Pb	RAPA	egg	IMMER	HATSUC		Skeet Range, Sussex Co., NJ, USA	1996	25%-100% of range water (198-3150 µg/L) hatching success not affected.	Stansley et al. 1997
Pb	RAPA	tadpole	IMMER	DEVOBS		Skeet Range, Sussex Co., NJ, USA	1996	25%-100% range water (198-3150 µg/L lead), 100% mortality occurred after 10 d.	Stansley et al. 1997
PCB	ACCR	juvenile	ENVIRON	REPRO		Crab orchard national wildlife refuge, Carbondale, IL, USA	1995	One intersex individual found in control area only. sex ratios differed significantly between cont. and control sites.	Reeder et al. 1998
PCB	AGCO	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	*Agkistrodon* spp. had several times the NADPH-dependent oxidative detoxifying activity of *Natrix* spp. No consistent differences between sexes in levels of detoxifying enzymes and enzyme activity were observed.	Stafford et al. 1976
PCB	AGPI	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	"	Stafford et al. 1976
PCB	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
PCB	NAFF	adult	ORAL	PATH		cont watershed, SC, USA	< 1995	PCB contamination may have affected habitat quality of the cont. creek resulting in a depauperate snake helminth fauna.	Fontenot et al. 1995b
PCB	NEER	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	*Agkistrodon* spp. had several times the NADPH-dependent oxidative detoxifying activity of *Natrix* spp. Oxidase activity was significantly higher in NAER and NAFA than in NARH.	Stafford et al. 1976

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
PCB	NEFA	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	*Agkistrodon* spp. had several times the NADPH-dependent oxidative detoxifying activity of *Natrix* spp. Oxidase activity was significantly higher in NAER and NAFA than in NARH.	Stafford et al. 1976
PCB	NERH	adult	ENVIRON	PHYSIO		Brazos R., Navasota R. and Hwy21, central Texas, TX, USA	1976	"	Stafford et al. 1976
PCB	RAXX	adult	ORAL	PATH		contaminated watershed, SC, USA	< 1995	Frogs from a PCB-cont pond were heavily infected, while parasite levels in frogs from a PCB-cont creek were markedly lower than frogs from the cont pond and reference sites.	Fontenot et al. 1995b
perylene	AMTI	adult	ENVIRON	PATH			<1987	Perylene was not responsible for skin neoplasms in these salamanders.	Anderson and Anderson 1987
pesticides	ACCR	adult	ENVIRON	REPRO		Ponds throughout state of Illinois, IL, USA	1993-95	2.6% of individuals showed intersex prevalence (9 individuals) that may or may not be attributed to contamination of the areas.	Reeder et al. 1998
pesticides	BUAM	late tadpole or early juv.	ENVIRON	DEVOBS		St. Lawrence R. Valley, S. Quebec, PQ, CAN	1992-93	Malformations in hind limbs were found to be abundant in areas with agricultural use of pesticides compared to control areas.	Ouellet et al. 1997
pesticides	BUME	adult	PESTAPP	PHYSIO		water sources cont with pesticides, unknown	< 1984	Higher sister chromatid exchange frequency noted in field specimens exposed to same solution.	Chakrabarti et al. 1984 [k]
pesticides	RACA	late tadpole or early juv.	ENVIRON	DEVOBS		St. Lawrence R. Valley, S. Quebec, PQ, CAN	1992-93	Malformations in hind limbs were found to be abundant in areas with agricultural use of pesticides compared to control areas.	Ouellet et al. 1997
pesticides	RACL	late tadpole or early juv.	ENVIRON	DEVOBS		St. Lawrence R. Valley, S. Quebec, PQ, CAN	1992-93	"	Ouellet et al. 1997
pesticides	RAPI	late tadpole or early juv.	ENVIRON	DEVOBS		St. Lawrence R. Valley, S. Quebec, PQ, CAN	1992-93	"	Ouellet et al. 1997
pesticides	RARI	adult	PESTAPP	PHYSIO		rice field discharge canal, N. Caucasus, USSR	< 1962	Hemoglobin content increased, leucocytosis observed and number of stab-nuclear neutrophils and monocytes in the leucocytic formula of the blood increased in frogs from the rice field.	Zhukova 1987 [k]

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phorate	RACL	adult; 2nd and 3rd year	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles).	Lowcock et al. 1997
phorate	RACL	juvenile	PESTAPP	GENOTOX		PQ, CAN	1993	There was no difference between potato crop treated fields and control group in terms of genotoxic effects (chromosomal fragmentation and abnormal DNA profiles). Juveniles showed physical deformities and illnesses.	Lowcock et al. 1997
phosmet	RAPI	adult and young of the year	PESTAPP	MORT		Hamilton, Brantford , Guelph, ON, CAN	1993-95	Phosmet was non-detectable at all of the orchard sites; hatching success ranged from 5-100%; survival ranged from 0-95%.	Harris et al. 1998
phosphamidon	NTXX	not specified	PESTAPP	POPSUR	1.25 lb/acre	S. Louisiana, LA, USA	1961-62	There was no apparent harm to any of the various species of wildlife after control spraying for Forest Tent Caterpillars.	Oliver 1964
phosphamidon	RACA	not specified	PESTAPP	POPSUR	1.25 lb/acre	S. Louisiana, LA, USA	1961-62	"	Oliver 1964
phosphamidon	RAPI	not specified	PESTAPP	POPSUR	1.25 lb/acre	S. Louisiana, LA, USA	1961-62	"	Oliver 1964
phosphamidon	XXFR	adult	PESTAPP	MORT	0.25 kg/ha	rice field, India	< 1973	75 % mortality.	Thirumurthi et al. 1973 [k]
pollution	AMTI	adult	ENVIRON	PHYSIO		sewage and asphalt waste cont lake, Playa L., TX, USA	< 1978	Hepatic microsomal aryl hydrocarbon hydroxylases levels were elevated; bladder contents were mutagenic using Ames test.	Busbee et al. 1978 [k]
pollution	BUBU	adult	ENVIRON	DEVOBS		paper factory and municipal gutter cont areas, S. Sakhalin, USSR	< 1984	Developmental abnormalities and dysplasia.	Mizgireuv et al. 1984 [k]
pollution	BUBU	adult	ENVIRON	PHYSIO		waste water treatment, factory oxidation pond, Shanghai, China	< 1984	Sister chromatid exchange frequencies of samples were markedly higher than frequencies of controls.	Wen et al. 1984 [k]
pollution	CHMY	adult	ENVIRON	POPSUR		Tortuguero National Park, Oregon, Costa Rica	1985	Both natural and artificial objects occurred on the beach at the very high frequency of about 1 object every 64 cm.	Hirth 1987
pollution	DECO	adult	ENVIRON	POPSUR		Tortuguero National Park, Oregon, Costa Rica	1985	"	Hirth 1987
pollution	ERIM	adult	ENVIRON	POPSUR		Tortuguero National Park, Oregon, Costa Rica	1985	"	Hirth 1987

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
pollution	RAAM	adult	ENVIRON	DEVOBS		paper factory and municipal gutter cont areas, S. Sakhalin, USSR	< 1984	Developmental abnormalities and dysplasia.	Mizgireuv et al. 1984 [k]
pollution	RACH	adult	ENVIRON	DEVOBS		paper factory and municipal gutter cont areas, S. Sakhalin, USSR	< 1984	31 - 42 % animals with limb abnormalities; 5 - 11.5 % with chondrodysplasia lesions.	Mizgireuv et al. 1984 [k]
pollution	RATE	adult	ENVIRON	PHYSIO		Minsk and Berezinsky Reserve, USSR	< 1985	No difference in chromosome aberration frequencies in frogs in two regions.	Elisyeyeva et al. 1985 [k]
pollution	RATE	adult	ENVIRON	PHYSIO		polluted region, unknown	< 1986	Level of genetic damage in frogs from polluted regions was higher than in those from protected areas.	Kraskowski et al. 1986 [k]
ronnel	BUBO	tadpole	PESTAPP	MORT	0.22, 0.90 kg/ha	field tests, CA, USA	< 1962	Deemed “safe” to tadpoles.	Mulla 1962 [k]
ronnel	BUBO	tadpole	PESTAPP	MORT	0.22 , 0.9 kg/ha	pond,	< 1963	10 % mortality at 0.22; 0 % mortality at 0.90.	Mulla et al. 1963 [k]
ronnel	SCHA	tadpole	PESTAPP	MORT	0.22, 0.90 kg/ah	feild tests, CA, USA	< 1962	Deemed “safe” to tadpoles.	Mulla 1962 [k]
ronnel	SCHA	tadpole	PESTAPP	MORT	0.22, 0.90 kg/ha	pond,	< 1963	10 % mortality at 0.22; 0 % mortality at 0.90.	Mulla et al. 1963 [k]
rotenone	KISU	adult	PESTAPP	MORT	3 mg/L	L. Conroe, 8100 ha reservoir in Montgomery, TX, USA	1980-81	More than 10 dead or dying turtles were observed in 3 out of 6 coves after appl. of rotenone.	McCoid and Bettoli 1996
rotenone	RAPI	larvae	PESTAPP	MORT	0.05, 0.125 µl/L	shallow ponds, GA, USA	< 1982	Partial mortality of resident populations of larval frogs in 5 µl/L (0.125 µl/L) treatment.	Burress 1982 [k]
rotenone	TRCR	larvae	PESTAPP	POPSUR	pond conc 0.2 mg/L	British Chrome and Chemicals Ltd. Nature Reserve, Urlay Nook, Cleveland Co., UK	< 1992	Following piscicide appl., numerous sticklebacks (*Gasterosteus aculeatus*) were removed from the pond. Adult TRCR were observed in the pond with no apparent ill effects.	McLee and Scaife 1992
rotenone	TRVU	larvae	PESTAPP	POPSUR	pond conc 0.2 mg/L	British Chrome and Chemicals Ltd. Nature Reserve, Urlay Nook, Cleveland Co., UK	1992	Following piscicide appl., numerous fish were removed from the pond. Introduced aquatic plants provided cover for TRVU larvae which hatched in July of the same year.	McLee and Scaife 1992
rotenone	XXAA	adult	IMMER	MORT	1.0, 1.5, 2.0 ppm in pond	Fish Seed Multiplication Farm ponds, Jamalpur, Mymensiugh District, Pakistan	1970	There were a number of small frogs that died with Rotenone treatment but an equal number were found to rest on the shore along the water line. Attempts to drive them into the water were unsuccessful. (Note: temperature 26 - 34.5°C.)	Haque 1971

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
rotenone	XXAA	tadpole	PESTAPP	POPSUR		British Chrome and Chemicals Ltd. Nature Reserve, Urlay Nook, Cleveland Co., UK	1992	After the removal of the fish species the pond was restocked with toad tadpoles that grew and metamorphosed normally that same year.	McLee and Scaife 1992
rotenone	XXSN	adult	IMMER	MORT	1.0, 1.5, 2.0 ppm in pond	Fish Seed Multiplication Farm ponds, Jamalpur, Mymensiugh District, Pakistan	1970	One aquatic snake was found dead in the pond 48 h after piscicide treatment. At the same time another snake was noted entering the water with no apparent ill effect.	Haque 1971
sewage	AMTI	adult	ENVIRON	PHYSIO		sewage lagoon, Reese Air Force Base, Hurlwood, Lubbock Co., TX, USA	< 1977	AMTI inhabiting the sewage lagoon became neotenic, and approx. one-third developed neoplastic skin lesions including cancer.	Rose and Harshbarger 1977
sewage	MACR	adult	ENVIRON	POPSUR			< 1984	100-150 turtles were found living in various sewage lagoons and oxidated lagoons; this displayed outstanding adaptability of this species.	Gasith and Sidis 1984
sewage	MACR	adult	ENVIRON	BEHAV		Israel	< 1985	Turtles older than one year are opportunistic omnivores, younger turtles tend to be more carnivorous, changing to more herbivorous with age. In sewage cont. habitats saprobiontic material replaces vascular aquatic plants and filamentous algae eaten.	Sidis and Gasith 1985
tack trap	ELOB	adult	DERMAL	BEHAV		Rum Creek Widllife Management Area, Monroe Co., GA, USA	1978-79	Pine gum spread liberally on dressed pine boards supported in vertical position. Gum dried within a few h and was not effective; additive to prevent drying used (tack trap a.i. was polyisobutylene).	Johnson 1983
tannery wastes	XELA	larvae	ENVIRON	GENOTOX		Midi-Pyrenees, France	< 1997	Measured EROD activity in liver and number of micronucleated erythrocytes.	Bekaert et al. 1997
toxaphene/ camphechlor	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, FL, USA	1995	Significantly lower testosterone in plasma in alligators from cont. lakes than from control lakes, 17ß-estradiol did not vary; GAM aromatase activity was decreased in cont. lakes.	Crain et al. 1997
toxaphene/ camphechlor	AMTI	adult	PESTAPP	MORT		Walborn Ranch, Tullock Creek, MT, USA	1959	Found dead after spraying.	Finley 1960
toxaphene/ camphechlor	AMTI	larvae	PESTAPP	MORT		Walborn Ranch, Tullock Creek, MT, USA	1959	Found dead after spraying.	Finley 1960
toxaphene/ camphechlor	BUBO	juvenile	PESTAPP	MORT	1.12, 2.24 kg/ha	golf course greens	< 1962	95 - 98 % control of juvenile toads.	Mulla 1962 [k]

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toxaphene/ camphechlor	CHPI	adult	PESTAPP	MORT		Walborn Ranch, Tullock Creek, MT, USA	1959	74 were found alive 1 d after spraying, 67 were found alive 12 d after spraying, some displayed symptoms of poisoning , a lack of coordination, 15 were found dead (others may have been lost to a raccoon predator).	Finley 1960
toxaphene/ camphechlor	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	field tests, CA, USA	< 1962	100 % kill of tadpoles.	Mulla 1962 [k]
toxaphene/ camphechlor	RACA	tadpole	PESTAPP	MORT	0.11, 0.56 kg/ha	pond, CA, USA	1962	0 % mortality at 0.11 kg/ha; 100 % mortality at 0.56 kg/h after 1 d.	Mulla 1963 [k]
toxaphene/ camphechlor	RAPI	adult	PESTAPP	MORT		Walborn Ranch, Tullock Creek, MT, USA	1959	19 were found dead after spraying.	Finley 1960
toxaphene/ camphechlor	SCHA	juvenile	PESTAPP	MORT	1.12, 2.24 kg/ha	golf course greens	< 1962	95 - 98 % control of juvenile toads.	Mulla 1963 [k]
toxaphene/ camphechlor	THSI	adult	PESTAPP	MORT		Walborn Ranch, Tullock Creek, MT, USA	1959	2 were found dead after spraying.	Finley 1960
trichlorphon	GAGA	adult	PESTAPP	PHYSIO	10 kg/ha	Canary Islands, Spain	< 1993	High sensitivity to OP and extremely slow recovery of serum BChE with respect to other vertebrate species; high correlation found between the destructive biomarker brain AChE and the nondestructive biomarker serum BChE 24 h after treatment.	Fossi et al. 1995
UV	BUBO	egg	RAD	HATSUC		Cascade Mntns., OR, USA	< 1994	BUBO exhibited reduced hatching success compared to HYRE.	Blaustein et al. 1994b
UV	HYRE	egg	RAD	HATSUC		Cascade Mntns., OR, USA	< 1994	HYRE experienced greater hatching success than BUBO and RACS.	Blaustein et al. 1994b
UV	RACS	egg	RAD	HATSUC		Cascade Mntns., OR, USA	< 1994	RACS exhibited lower hatching success than HYRE.	Blaustein et al. 1994b
UV-B	AMGR	embryo	RAD	HATSUC		OR, USA	1994	The hatching success of AMGR was significantly greater under sunlight lacking UV-B than under unfiltered sunlight or sunlight filtered to remove shorter wavelengths but not UV-B.	Blaustein et al. 1995
UV-B	AMTI	egg	RAD	POPSUR		CO, USA	< 1996	Sig. mortality occurred at UV-B levels between 95.8 and 273 uW/cm^2.	Carey et al. 1996
UV-B	BUBO	embryo	RAD	HATSUC	280-340 nm UV-B	Rocky Mountain National Park, CO, USA	1994	No difference in hatching success for embryos exposed to 0-100% ambient UV-B radiation.	Corn 1998
UV-B	BUBU	embryo	RAD	MORT		Sierra de Gredos, Central Spain, Spain	1996	UV-B radiation had a detrimental effect on embryo survival.	Lizana and Pedraza 1998
UV-B	BUCA	embryo	RAD	MORT		Sierra de Gredos, Central Spain, Spain	1996	No difference found between treatments and controls.	Lizana and Pedraza 1998

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UV-B	BUWO	larvae	RAD	POPSUR		CO, USA	< 1996	BUBO had more tolerance to UV-B than BUWO between 95.8 and 273 uW/cm^2.	Carey et al. 1996
UV-B	BUWO	tadpoles	RAD	POPSUR		CO, USA	< 1996	95.8-273 uW/cm^2; toadlets had more tolerance than tadpoles for UV-B radiation.	Carey et al. 1996
UV-B	HYCA	embryo	RAD	HATSUC		Cold Creek, Santa Monica Mntns, Los Angeles, CA, USA	1996	Solar UV-B had dramatic effects on embryonic survival, no effect on hatching time for surviving embryos.	Anzalone et al. 1998
UV-B	HYRE	egg	RAD	MORT		Victoria, BC, CAN	1995	No sig. differences between treatments	Flamarique et al. 1998
UV-B	HYRE	egg	RAD	HATSUC		ponds outside Victoria, BC, CAN	1995	No differences in hatching success between treatments (blocked UV, ambient sunlight, and UV-B enhanced by 15-30%).	Ovaska et al. 1997
UV-B	HYRE	embryo	RAD	HATSUC		Cold Creek, Santa Monica Mntns, Los Angeles, CA, USA	1996	UV-B had no effect on hatching success or time to hatch.	Anzalone et al. 1998
UV-B	HYRE	larvae	RAD	MORT		ponds outside city, Victoria, BC, CAN	1995	Reduced survival occurred for enhanced UV-B (15-30%); treatments (18%) compared to ambient sunlight and control treatments.	Ovaska et al. 1997
UV-B	HYRE	tadpole	RAD	MORT		Victoria, BC, CAN	1995	1 month later: 18.4% survival, 16/20 had lens opacities.	Flamarique et al. 1998
UV-B	RAAU	egg	RAD	GENOTOX		Williamette Valley, OR, USA	1995	Hatching success was unaffected by UV-B; photolyase activity was high relative to other amphibians.	Blaustein et al. 1996
UV-B	RAAU	egg	RAD	MORT		Victoria, BC, CAN	1995	Significantly high increase in egg mortality with enhanced UV-B treatment.	Flamarique et al. 1998
UV-B	RAAU	egg	RAD	HATSUC		ponds outside city, Victoria, BC, CAN	1995	Sig. differences in hatching success between treatments (blocked UV, ambient sunlight) and the enhanced UV-B (15-30%) treatment. 56% hatched for UV-B enhanced and 90% hatched in ambient sunlight.	Ovaska et al. 1997
UV-B	RAAU	larvae	RAD	MORT		ponds outside city, Victoria, BC, CAN	1995	Reduced survival occurred for enhanced UV-B (15-30%); treatments (2.6%) compared to ambient sunlight and control treatments.	Ovaska et al. 1997
UV-B	RAAU	tadpole	RAD	MORT		Victoria, BC, CAN	1995	1 month later: 2.6% survival. 12/16 had lens opacities.	Flamarique et al. 1998

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UV-B	TATO	embryo	RAD	HATSUC		Cold Creek, Santa Monica Mntns, Los Angeles, CA, USA	1996	Solar UV-B had dramatic effects on embryonic survival, no effect on hatching time for surviving embryos.	Anzalone et al. 1998
Vanadium	ERIM	adult tissue	ENVIRON	PHYSIO		Arabian Gulf, Saudi Arabian coastline, Saudi Arabia	1983	Animals dead or dying; liver conc. higher than muscle.	Sadiq and Zaidi 1984
Vanadium	XXSS	adult tissue	ENVIRON	PHYSIO		Arabian Gulf, Saudi Arabian coastline, Saudi Arabia	1983	Animals dead or dying; liver conc. higher than muscle.	Sadiq and Zaidi 1984
various	ALMI	egg	ENVIRON	PHYSIO		L. Apopka, L. Woodruff, FL, USA	1995	Specimens had affected plasma conc, corticosterone and cortisol levels.	Guillette et al. 1997
various	ALMI	juvenile	ENVIRON	PHYSIO		L. Apopka, L. Woodruff, FL, USA	1995	Specimens had affected plasma conc, corticosterone and cortisol levels.	Guillette et al. 1997
various	ALOB	larvae	ENVIRON	MORT		Aragon R., Pyrennean mountains, Spain	1988	Bacteria-induced mortality; toxins involved?	Marquez et al. 1995
various	CHMY	hatchlings	ENVIRON	DEVOBS		coast, NC, USA	1980	Teratology observed.	Schwartz and Peterson 1984
various	RAPI	adult	ENVIRON	PATH		Ottertail Co. Iowa, USA	1966-75	11 frogs developed renal adenocarcinomas from Minnesota (50 frogs), yet none developed renal adenocarcinomas from Iowa (65 frogs).	Mckinnell 1982
various pesticides	CHRA	adult	PESTAPP	MORT	1-10 ppm total pesticides	Hargeisa, Marodijeh valley, Africa, Ethiopia	< 1997	Avoided heavily contaminated areas.	Lambert 1997b
various pesticides	CYPY	adult	ENVIRON	POPSUR		Japan	< 1988	Morphological abnormalities were noted in specimens at study sites.	Meyer-Rochow and Asashima 1988
various pesticides	GEPA	adult	PESTAPP	POPSUR	1-10 ppm of total pesticides	Hargeisa, Marodijeh valley, Africa, Ethiopia	< 1997	Avoided heavily contaminated areas.	Lambert 1997b
various pesticides	HEPA	adult	PESTAPP	MORT	1-10 ppm total pesticides	Hargeisa, Marodijeh valley, Africa, Ethiopia	< 1997	Avoided heavily contaminated areas.	Lambert 1997b
various pesticides	PSSM	adult	PESTAPP	MORT	1-10 ppm total pesticides	Hargeisa, Marodijeh valley, Africa, Ethiopia	< 1997	Avoided heavily contaminated areas.	Lambert 1997b
various pesticides	VAAM	adult	PESTAPP	MORT	1-10 ppm total pesticides	Hargeisa, Marodijeh valley, Africa, Ethiopia	< 1997	Avoided heavily contaminated areas.	Lambert 1997b
Zn	ACCC	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	ACCC	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	ACCC	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993

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Zn	AMJE	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	AMJE	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	AMJE	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	AMMA	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	AMMA	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	AMMA	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	AMOP	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	AMOP	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	AMOP	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	BUAM	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	BUAM	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	BUAM	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	BUWO	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	BUWO	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	BUWO	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	CRAA	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	CRAA	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	CRAA	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	DEFU	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	DEFU	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	DEFU	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	DEOC	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	DEOC	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993

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Zn	DEOC	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	EUBB	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	EUBB	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	EUBB	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	EULL	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	EULL	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	EULL	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	GYPO	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	GYPO	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	GYPO	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	HESC	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	HESC	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	HESC	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	HYVE	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	HYVE	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	HYVE	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	NOVV	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	NOVV	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	NOVV	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	PLCI	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	PLCI	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PLCI	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PLGG	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993

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Zn	PLGG	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PLGG	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PSCR	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	PSCR	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PSCR	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	PSRR	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	PSRR	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PSRR	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PSTR	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PSTR	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	PSTR	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	RACA	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RACA	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RACA	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RACL	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RACL	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RACL	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RAPA	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RAPA	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	RAPA	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RAPI	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	RAPI	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	RAPI	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Pesticide Appl. Rate	Location, Area, State, Country [c]	Study Date	Effects [de]	Reference [k]
Zn	RASY	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RASY	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	RASY	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Present	Storm et al. 1993
Zn	SCHH	adult	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	SCHH	egg	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
Zn	SCHH	larvae	ENVIRON	POPSUR		Aquashicola creek, Lehigh R., Palmerton, PA, USA	< 1993	Absent	Storm et al. 1993
ZnSO4	TEHE	adult	PESTAPP	BEHAV	1 mL of 2%	Italy	< 1981	Exposed did not exhibit normal homing behaviour and were located diffused around the release point.	Chelazzi et al. 1981

Table 3: Acute toxicity values from laboratory studies

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
1,1-dimethylhydrazine	AMMA	larvae		IMMER	20	>100, >135	55, >135	26, 108	LC50 given for hard (185 mg/L) and soft water (16 mg/L) respectively.	Slonim 1986 [k]
1,2-dimethyl-benzene	XELA	larvae (3-4 wk)		IMMER	20		73			Zwart and Slooff 1987 [k]
1,3,5-Cycloheptatriene	XELA	larvae (3-4 wk)		IMMER	20		41			Zwart and Slooff 1987 [k]
1,3-dichloropropane	XELA	larvae (3-4 wk)		IMMER	20		63			Zwart and Slooff 1987 [k]
1,3-dichloropropanol	XELA	larvae (3-4 wk)		IMMER	20		450			Zwart and Slooff 1987 [k]
1,5,9-Cyclododecatriene	XELA	larvae (3-4 wk)		IMMER	20		1.6			Zwart and Slooff 1987 [k]
1,5-Cyclo-octadiene	XELA	larvae (3-4 wk)		IMMER	20		24			Zwart and Slooff 1987 [k]
1-amino-2-propanol	XELA	larvae (3-4 wk)		IMMER	20		420			Zwart and Slooff 1987 [k]
1-methyl-4(tert)butylbenzene	XELA	larvae		IMMER	20		5.0			Birge et al. 1977 [k]
1R, aS-Cypermethrin	RACA	tadpoles		INJECT	20	trans= 0.20, cis= 0.04				Cole and Casida 1983 [k]
1R, aS-Cypermethrin	RAPI	adult		INJECT	20	trans= 0.65, cis= 0.16				Cole and Casida 1983 [k]
1RS-resmethrin	RACA	tadpoles		INJECT	20	trans= 5.6, cis= 1.2				Cole and Casida 1983 [k]
1RS-resmethrin	RAPI	adult		INJECT	20	trans=> 60, cis= 1.3				Cole and Casida 1983 [k]
2,2-DPA	ADBR	tadpole (1-2 wk)		IMMER	21-22	11.1 g/L	5.2 g/L	4.2 g/L		Johnson 1976 [k]
2,2-DPA	LIPE	tadpole (1-2 wk)		IMMER	21-22	3.3 g/L	2.5 g/L	2.0 g/L		Johnson 1976 [k]
2,4,5-T	ADBR	tadpole (1-2 wk)		IMMER	21-22	228	205	200		Johnson 1976 [k]
2,4,5-T	BUMA	tadpole (1-2 wk)		IMMER	21-22	425	382	340		Johnson 1976 [k]
2,4,5-T	LIPE	tadpole (1-2 wk)		IMMER	21-22	210	190	169		Johnson 1976 [k]

Table 3 - Acute Laboratory Data - 2

Contaminant [a]	Species Code[b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
2,4,6 trichlorophenol	XELA	tadpoles		IMMER	17.2			1.2		Holcombe et al. 1987 [k]
2,4-D	BUME	not specified		IMMER	25	13.77	9.03	8.05		Vardia et al. 1984 [k]
2,4-D amine	ADBR	tadpole (1-2 wk)		IMMER	21-22	255	228	200		Johnson 1976 [k]
2,4-D amine	BUMA	tadpole (2 wk)		IMMER	21-22	346	333	288		Johnson 1976 [k]
2,4-D amine	LIPE	tadpole (1-2 wk)		IMMER	21-22	321	300	287		Johnson 1976 [k]
2,4-D amine	PSTR	tadpole (1 wk)		IMMER	15.5	100		100		Sanders 1970 [k]
2,4-D amine	RALI	adult		IMMER			1498.36			Pan and Liang 1993
2,4-D butylate	RALI	adult		IMMER			33.73			Pan and Liang 1993
2,4-D iso-octyl ester	TRCR	adult		IMMER					Animals immersed in Agroxone 5 (37% 2,4-D; 63% diluents and emulsifiers) LT50 values (2,4-D): 150 ppm = 14 h (M); 125 ppm = 52 h (F); 75 ppm = 102 h (M), 132 h (F); 50 ppm = 440 h (M).	Zaffaroni et al. 1986a [k]
2,4-D sodium	BUBJ	tadpoles		IMMER			>40			Hashimoto and Nishiuchi 1981 [k]
2-butanol	XELA	larvae (3-4 wk)		IMMER	20		1530			Zwart and Slooff 1987 [k]
2-methyl-2-propanol	XELA	larvae (3-4 wk)		IMMER	20		2450			Zwart and Slooff 1987 [k]
3,5,5-trimethyl-1-hexanol	XELA	larvae (3-4 wk)		IMMER	24		13.5			Zwart and Slooff 1987 [k]
3,6-dioxo-1,8-octanediol	XELA	larvae (3-4 wk)		IMMER	20		3047			Zwart and Slooff 1987 [k]
3-bromopropylene	XELA	larvae (3-4 wk)		IMMER	20		0.66			Zwart and Slooff 1987 [k]
3-chloropropylene	XELA	larvae (3-4 wk)		IMMER	20		0.34			Zwart and Slooff 1987 [k]
4-aminopyridine	RASP	larvae		IMMER	16	7.2		2.4		Marking and Chandler 1981 [k]
4-methyl-2-pentanol	XELA	larvae (3-4 wk)		IMMER	20		656			Zwart and Slooff 1987 [k]

Table 3 - Acute Laboratory Data - 3

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
6-chloropicolinic acid	PSTR	tadpole (1 wk)		IMMER	15.5	18	12	6.0		Sanders 1970 [k]
9AA	CHSE	embryo		IMMER	20±2				TI50: 1.4 (swimming), 0.7 (pigmentation), 1.2 (malformation). EC50: 1.7 (swimming), 3.2 pigmentation.	Sabourin et al. 1985
acephate	AMGR	larvae (69 d)		IMMER	22			8816		Geen et al. 1984 [k]
acephate	RACL	tadpoles		IMMER	21	6433				Lyons et al. 1976 [k]
acetone	AMMA	adult		IMMER			20000			Slooff et al. 1983
acetone	AMME	adult		IMMER		logLC50= 5.54 µmol/L				Vaal et al. 1997
acetone	AMME	larvae (3-4 wk post hatch)		IMMER	20		20000			Slooff and Baerselman 1980 [k]
acetone	XELA	adult		IMMER			24000			Slooff et al. 1983
acetone	XELA	adult		IMMER		logLC50= 5.62 µmol/L				Vaal et al. 1997
acetone	XELA	tadpole (3-4 wk post hatch)		IMMER	20		24000			Slooff and Baerselman 1980 [k]
acridine	XELA	embryo (tail bud)		IMMER	room	13.2	7.1		72 h LC50= 5.5 mg/L.	Davis et al. 1981 [k]
acridine	XELA	larvae		IMMER	room	6.2	5.4	4.5	72 h LC50= 4.9 mg/L.	Davis et al. 1981 [k]
acrolein	XELA	tadpoles		IMMER	17			0.007		Holcombe et al. 1987 [k]
acrylonitrile	BUGR	tadpoles		IMMER			14.22 mg/L (n=2)	11.59 mg/L		Tong et al. 1996
adifenphos	RALI	adult		IMMER			1.88			Pan and Liang 1993
Aerozine-50	AMMA	larvae		IMMER	20-24	> 10	6.7	2.5		Slonim 1986 [k]
Aerozine-50	AMOP	larvae		IMMER	20-24	> 10	>10	5.2		Slonim 1986 [k]
Ag	BUME	tadpoles		IMMER	29-34	0.0073	0.0062	0.0041		Khangarot and Ray 1987 [k]
Al	AMJE	embryo	0.125-2.0 mg/L	pH+CONT	10			~0.38		Horne and Dunson 1994b
Al	BUAR	embryo		INJECT		0.5			LC10 (NOEC)= 0.3 mg/L; LC100= 0.7 mg/L.	Herkovits et al. 1997a

Table 3 - Acute Laboratory Data - 4

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
Al	GACA	embryo-larvae		IMMER					7 d LC50= 0.05 mg/L.	Birge et al. 1979a [k]
alachlor	BUAM	adult	0.1-1000 mg/L	IMMER	22	Means; early=5.7, late=4.3		Means; early=3.9, late=3.3	NOEC for early stage= 1.4 and late stage= 0.47.	Howe et al. 1998
alachlor	RAPI	tadpoles (stage 29 and 40)	0.1-1000 mg/L	IMMER	22	Means; early=14.9, late=7.3		Means; early=11.5, late=3.5	NOEC for early stage= 2.0 mg/L and late stage= 0.47.	Howe et al. 1998
aldrin	ACCR	young adult		IMMER	25.6-27.7				36 h LC50: 0.2- 0.75 mg/L.	Ferguson and Gilbert 1967
aldrin	ACGR	young adult		IMMER	25.6-27.7				36 h LC50: 0.2- 0.3 mg/L.	Ferguson and Gilbert 1967
aldrin	BUWO	tadpole (4-5 wk)		IMMER	15.5	2.0	0.68	0.15		Sanders 1970 [k]
aldrin	BUWO	young adult		IMMER	25.6-27.7				36 h LC50: 0.05-10.0 mg/L.	Ferguson and Gilbert 1967
aldrin	RAHE	adult		IMMER			2.4			Vijay and Jayantha Rao 1990a
aldrin	RAHE	adult	2.0-3.0	IMMER		2.6	2.4		Oral intubation: 24 h LD50= 2.2 mg/kg; 48 h LD50= 2.5 mg/kg.	Vijay and Jayantha Rao 1990b
aldrin	RATI	adult		ORAL	19-20	250				Srivastava et al. 1988
alkylbenzene sulfonate	XELA	tadpole (3-4 wk)		IMMER	21			56-100 mg/L		Canton and Slooff 1982b [k]
allylamine	AMMA	adult		IMMER			1.8			Slooff et al. 1983
allylamine	AMME	adult		IMMER		logLC50= 1.50 µmol/L				Vaal et al. 1997
allylamine	AMME	larvae (3-4 wk post hatch)		IMMER	20		1.8			Slooff and Baerselman 1980 [k]
allylamine	XELA	adult		IMMER			5			Slooff et al. 1983
allylamine	XELA	adult		IMMER		logLC50= 2.14 µmol/L				Vaal et al. 1997
allylamine	XELA	larvae (3-4 wk)		IMMER	20		12.4			Zwart and Slooff 1987 [k]
allylamine	XELA	tadpole (3-4 wk post hatch)		IMMER	20		1.8 -5.0			Slooff and Baerselman 1980 [k]
aminocarb	RACL	tadpoles		IMMER	21	247, 234	206	118		Lyons et al. 1976 [k]
amitrole	ADBR	tadpole (1-2 wk)		IMMER	21-22	5.2 g/L	5.0 g/L	3.0 g/L		Johnson 1976 [k]

Table 3 - Acute Laboratory Data - 5

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
ammonium nitrate	BUAM	tadpoles	25-50 mg/L	IMMER	20±2				LC50: 39.3 (38.75-39.82).	Hecnar 1995
ammonium nitrate	HYRE	embryo	ND- 32.4 mg/L	IMMER					10 d LC50= 25.0 mg/L.	Schuytema and Nebeker 1999
ammonium nitrate	PSTR	tadpoles	5-45 mg/L	IMMER	20±2				LC50: 17.0 (15.91-18.07).	Hecnar 1995
ammonium nitrate	RACL	tadpoles	10-50 mg/L	IMMER	20±2				LC50: 32.4 (29.66-35.25).	Hecnar 1995
ammonium nitrate	RAPI	tadpoles	10-35 mg/L	IMMER	20±2				LC50: 22.6 (21.63-23.58).	Hecnar 1995
ammonium nitrate	XELA	embryo	ND- 60 mg/L	IMMER					5 d LC50= 27.5 mg/L.	Schuytema and Nebeker 1999
amoben	RALI	adult		IMMER			2.86			Pan and Liang 1993
anilazine/ triazine	RALI	adult		IMMER			1.56			Pan and Liang 1993
aniline	AMMA	adult		IMMER			440			Slooff et al. 1983
aniline	AMME	adult		IMMER		logLC50= 3.67 µmol/L				Vaal et al. 1997
aniline	AMME	larvae (3-4 wk post hatch)		IMMER	20		440			Slooff and Baerselman 1980 [k]
aniline	XELA	adult		IMMER			560			Slooff et al. 1983
aniline	XELA	adult		IMMER		logLC50= 3.85 µmol/L				Vaal et al. 1997
aniline	XELA	embryo (tailbud)		IMMER	room	1620	1350	940	72 h LC50= 1150 mg/L.	Davis et al. 1981 [k]
aniline	XELA	larvae		IMMER	room		1400	150	72 h LC50= 540 mg/L.	Davis et al. 1981 [k]
aniline	XELA	larvae (3-4 wk post hatch)		IMMER	20		560			Slooff and Baerselman 1980 [k]
anthracene	RAPI	embryo (stage 25)		IMMER					LC50 from sunlight exp: 30 min= 0.065 mg/L; 5 h= 0.025 mg/L.	Kagan et al. 1984 [k]
As	GACA	embryo-larvae		IMMER					7 d LC50= 0.04 mg/L.	Birge et al. 1979a [k]
asomate	RALI	adult		IMMER			9.94			Pan and Liang 1993
asozine	RALI	adult		IMMER			0.931			Pan and Liang 1993
a-terthienyl	PSCR	tadpoles		IMMER		0.003				Kagan et al. 1987 [k]
a-terthienyl	RAPI	embryo (stage 25)		IMMER					30 min LC50= 0.11; 2 h LC50= 0.018.	Kagan et al. 1984 [k]

Table 3 - Acute Laboratory Data - 6

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
atrazine	BUAM	embryo	0.058-48.2 mg/L	IMMER					LC50 at 0 d post-hatch> 48 mg/L; 100 % hatchability at 0.058 mg/L to 80% at 48.2 mg/L; % survival of normal organisms at 4 d post hatch= 100% at 0.058 mg/ and 68% at 48.2 mg/L.	Birge et al. 1980
atrazine	BUAM	embyro	0.058-48.2 mg/L	IMMER		>48				Birge et al. 1983
atrazine	BUAM	tadpoles (stage 29 and 40)	0.1-1000 mg/L	IMMER	22	Means; early=66.4, late=15.8		Means; early=26.5, late=10.7.	NOEC for early stage= 1.9 mg/L and late stage= 0.69.	Howe et al. 1998
atrazine	RACA	embryo	0.051-45.8	IMMER					LC50 at 0 d post-hatch= 11.55 mg/L; % hatchability= 95 %; % survival of normal organisms at 4 d post hatching= 86 % at 0.051 mg/L and 0 % at 14.8 mg/L.	Birge et al. 1980
atrazine	RACA	embyro	0.051-45.8 mg/L	IMMER		0.41				Birge et al. 1983
atrazine	RAPA	embryo	0.16-33.9	IMMER					LC50 at 0 d post-hatch= 20.20 mg/L; 98 % hatchability at 16 mg/L; % survival of normal organisms= 98 % at 0.6 mg/L and 13 % at 33.9 mg/L; 4 d post hatching survival= 97 % at 0.17 and 4 % at 33.9 mg/L.	Birge et al. 1980
atrazine	RAPI	embryo	0.11-48.7	IMMER					LC50 at 0 d post-hatch= 22.89 mg/L; % survival of normal organisms at hatching= 98 % at 0.11 mg/L; 21 % at 48.7 mg/L; 4 d post hatching= 5 % at 48.7 mg/L.	Birge et al. 1980
atrazine	RAPI	tadpoles (stage 29 and 40)	0.1-1000 mg/L	IMMER	22	Means; early=69, late=45.3		Means; early=47.6, late=14.5	NOEC for early stage= 5.1 mg/L and late stage= 0.65.	Howe et al. 1998
atrazine, alachlor	BUAM	tadpoles (stage 29 and 40)	50:50 mixture: 0.1-1000 mg/L	IMMER	22	Means; early=4.4, late=2.9		Means; early=1.8, late=1.5	NOEC for early stage= 0.22 and late stage= 0.15.	Howe et al. 1998
atrazine, alachlor	RAPI	tadpoles (stage 29 and 40)	50:50 mixture: 0.1-1000 mg/L	IMMER	22	Means; early=12.1, late=5.9		Means; early=6.5, late=2.1	NOEC for early stage= 0.47 mg/L and late stage= 0.15.	Howe et al. 1998

Table 3 - Acute Laboratory Data - 7

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
azinphos-methyl	AMGR	larvae (6 wk old)	<0.01-3.6 mg/L	IMMER		Guthion 2S formulation =1.67				Nebeker et al. 1998
azinphos-methyl	AMMA	larvae	<0.01-3.6 mg/L	IMMER				Guthion 2S formulation = 1.90		Nebeker et al. 1998
azinphos-methyl	ANCA	adult	4.2-17.5	ORAL	20-30				LD50= 98 mg/kg. LD50 occurred at 45.5% ChE inhibition.	Hall and Clark 1982
azinphos-methyl	BUWO	tadpole (3-4 wk)		IMMER	15.5	0.68	0.31	0.13		Sanders 1970 [k]
azinphos-methyl	HYRE	tadpoles	0.01-9.67 mg/L	IMMER				4.14 mg/L	NOAEL= 1.78 mg/L; LOAEL= 9.67 mg/L.	Schuytema et al. 1995
azinphos-methyl	PSCR	tadpole (3-5 wk old)	<0.01-3.6 mg/L	IMMER				>3.60		Nebeker et al. 1998
azinphos-methyl	XELA	tadpoles	0.02-11.4 mg/L	IMMER				2.94 mg/L	NOAEL= 0.34 mg/L; LOAEL= 1.72 mg/L.	Schuytema et al. 1995
Bacillus sphaeris	RABU	tadpoles		IMMER		220, 440				Mathavan and Velpandi 1984 [k]
Bacillus sphaeris	RABU	tadpoles		IMMER		125, 300				Mathavan and Velpandi 1984 [k]
Be	AMMA	larvae		IMMER		18.2-21.2, >10	18.2, >1	18.2, 5.65 - 8.02	LC50 given for hard (400 mg/L) water and soft (20-25 mg/L) water respectively.	Slonim and Ray 1975 [k]
Be	AMOP	larvae		IMMER	23.5	31.5, 23.7	31.5, 4.21	31.5, 3.15	LC50 given for hard (400 mg/L) water and soft (20-25 mg/L) water respectively.	Slonim and Ray 1975 [k]
benlate	RALI	adult		IMMER			47.74			Pan and Liang 1993
benthiocarb/ thiobencarb	BUBJ	tadpoles		IMMER			3.5			Hashimoto and Nishiuchi 1981 [k]
benthiocarb/ thiobencarb	RALI	adult		IMMER			2.34-2.80			Pan and Liang 1993
benzene	AMMA	adult		IMMER			370			Slooff et al. 1983
benzene	AMME	adult		IMMER		logLC50= 3.68 µmol/L				Vaal et al. 1997
benzene	AMME	larvae (3-4 wk post hatch)		IMMER	20		370			Slooff and Baerselman 1980 [k]

Table 3 - Acute Laboratory Data - 8

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
benzene	RAPI	embryo-larvae		IMMER		3.66 mg/L				Birge and Cassidy 1983
benzene	XELA	adult		IMMER			190			Slooff et al. 1983
benzene	XELA	adult		IMMER		logLC50= 3.39 µmol/L				Vaal et al. 1997
benzene	XELA	larvae (3-4 wk post hatch)		IMMER	20		190			Slooff and Baerselman 1980 [k]
benzene	XELA	larvae (3-4 wk)		IMMER	20		190			Zwart and Slooff 1987 [k]
benzene hydrochloride	RAHE	tadpoles		IMMER	14-19	5.97 mg/L	5.97	3.97	LC12= 5.97, LC72= 5.97.	Khangarot et al. 1985
BHC	BUWO	tadpole (4-5 wk)		IMMER	15.5	13	7.1	3.2		Sanders 1970 [k]
bis(2-hydroxyethyl) ether	XELA	larvae (3-4 wk)		IMMER	20		3065			Zwart and Slooff 1987 [k]
bis(2-hydroxypropyl) amine	XELA	larvae (3-4 wk)		IMMER	20		410			Zwart and Slooff 1987 [k]
bis(2-propenyl) amine	XELA	larvae (3-4 wk)		IMMER	20		25.5			Zwart and Slooff 1987 [k]
bis(3-hydroxyethyl) ether	XELA	larvae (3-4 wk)		IMMER	20		3181			Zwart and Slooff 1987 [k]
BPMC	RALI	adult		IMMER			8.65			Pan and Liang 1993
buprofezin	RALI	adult		IMMER			284.05			Pan and Liang 1993
butachlor	RALI	adult		IMMER			1.621			Pan and Liang 1993
cadmium nitrate	AMMA	adult		IMMER			1.3			Slooff et al. 1983
cadmium nitrate	XELA	adult		IMMER			32			Slooff et al. 1983
calcium oxide	RALI	adult		IMMER			206.74			Pan and Liang 1993
CAMA	RALI	adult		IMMER			106.87			Pan and Liang 1993
Captan	BUBJ	tadpoles		IMMER			3.0			Hashimoto and Nishiuchi 1981 [k]
carbaryl	BUBJ	tadpoles		IMMER	15.5		7.2			Hashimoto and Nishiuchi 1981 [k]
carbaryl	BUBU	tadpoles (26-37 d)	0-35	IMMER	20	20.5 - 21.8	18.2 - 20.8	16.8 - 20.6		Marchal-Segault 1976 [k]

Table 3 - Acute Laboratory Data - 9

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
carbaryl	RAHE	tadpoles		IMMER	12-17	150	107.9 (94.19-119.8)	55.34 (42.73-69.07)	LC12= 150. LC72= 63.89 (51.65-77.49).	Khangarot et al. 1985
carbaryl	XELA	embryo	1-30	IMMER	18	4.7			24 h EC 50= 0.11 ppm.	Elliot-Feeley and Armstrong 1982
carbaryl, UV-B	HYVE	tadpoles							Carbaryl alone was 10 times less toxic than that tested with UV-B of 112.3 W/cm^2 (LD50).	Zaga et al. 1998
carbaryl, UV-B	XELA	tadpoles		IMMER					3.86-64 μW/m^2 severely affected swimming activity, LD50= 80.4 μW/m^2 for UV-B alone. With 65 μW/m^2, LC50 for carbaryl is 1.73 mg/L.	Zaga et al. 1998
carbendazim	RAHE	tadpoles		IMMER	12-17	26.3 (20.61-31.61)	22.73(19.0-28.81)	16.02 (12.62-19.90)	LC12= 26.30 (20.61-31.61). LC72= 21.52 (17.88-26.79).	Khangarot et al. 1985
carbendazim	RALI	adult		IMMER			173.79			Pan and Liang 1993
carbofuran	MIOR	embryo	1-120 mg/L	IMMER				44.23 (34.413-56.857)		Pawar and Katdare 1984
carbofuran	MIOR	tadpoles	1-60 mg/L	IMMER				13.47 (8.557-21.213)		Pawar and Katdare 1984
carbofuran	RAHE	tadpoles		IMMER	29			7.8	96 h LC100: 10.0 mg/L. Safe conc: 2.14 mg/L.	Andrews and George 1991
carbofuran	RAHE	tadpoles		IMMER	12-17	150	150	112.7 (97.88-128.4)	LC12= 150. LC72= 133.2 (118.0-150.1).	Khangarot et al. 1985
carbofuran	RALI	adult		IMMER			11.23			Pan and Liang 1993
carbophenothion	PSTR	tadpole (1 wk)		IMMER	15.5	0.1	0.05	0.028		Sanders 1970 [k]
carbophenothion	RAPI	adult		IMMER	24				15 d LC50= 155.	Kaplan and Glaczenski 1965 [k]
CCl4	BUFO	embryo	0.02-92.5 mg/L	IMMER					LC50 at 0 d post-hatch> 92 mg/L; 100 % hatchability at 0.02; 66 % hatch at 92.5 mg/L; 0 % normal embryo at 4 d post hatch at 92.5 mg/L.	Birge et al. 1980

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
CCl4	RACA	embryo	0.026-65.7 mg/L	IMMER					LC50 at 0 d post-hatch= 1.50 mg/L; 100 % hatchability at 0.026 mg/L; % survival of normal organisms at time of hatching= 100 % and at 4 d post hatching= 99 % at 0.026 mg/L; 0 % hatched at 65.7 mg/L.	Birge et al. 1980
CCl4	RAPA	embryo	0.02-92.5 mg/L	IMMER					LC50 at 0 d post-hatch= 3.62 mg/L; 96 % hatchability at 0.02 and 5 % at 92.5 mg/L; 0 % normal embryo hatched at 92.5 mg/L.	Birge et al. 1980
Cd	AMGR	larvae (3 mo)	0.505,0.193, 0.049, 0.0152 and < 0.002 mg/L	IMMER	21±1			468.4		Nebeker et al. 1995
Cd	AMME	adult		IMMER		logLC50= -0.26 µmol/L				Vaal et al. 1997
Cd	AMME	larvae (3-4 wk post hatch)		IMMER	20		1.3 mg/L			Slooff and Baerselman 1980 [k]
Cd	BUAR	tadpoles		IMMER	25	4.05 (3.47-5.11)	3.15 (2.8-3.63)	2.65 (2.31-3.11)	72 h LC50: 2.87 (2.52-3.33).	Ferrari et al. 1993
Cd	BUAR	tadpoles		IMMER	25	9.92 (8.76-11.30)	8.60 (7.62-9.75)	6.77 (5.97-7.65)	72 h LC50: 7.84 (6.95-8.93).	Ferrari et al. 1993
Cd	BUAR	tadpoles		IMMER	20±1	3.34 (2.94-3.38)	2.52 (2.22-2.86)	2.08 (1.83-2.40)	LC72= 2.23 (1.96-2.54).	Muino et al. 1990
Cd	BUME	tadpoles		IMMER	29-34	19.81 mg/L	11.91 mg/L	8.18 mg/L		Khangarot and Ray 1987 [k]
Cd	BURE	adult (F)		INJECT					24 h= 18; 48 h= 22; 96 h= 6.2.	Hilmy et al. 1986d [k]
Cd	GACA	embryo-larvae		IMMER					7 d LC50= 0.04 mg/L.	Birge et al. 1979a [k]
Cd	MIOR	tadpoles		IMMER	25.5-26	2.62 (2.4-2.8)	2.48 (2.0-2.8)	1.58 (1.4-1.8)	For 4 wk old tadpoles. LC24: 2.78 (2.4-3.0) mg/L; LC50: 2.66 (2.2-2.8) mg/L; LC96: 1.81 (1.4-2.0) mg/L.	Jayaprakash et al. 1987
Cd	MIOR	tadpoles		IMMER	25.5	2.62, 2.78	2.48, 2.66	1.58, 1.81	LC values for 1 wk old and 6 wk old tadpoles respectively.	Rao and Madhyastha 1987 [k]
Cd	RACA	tadpoles	0- 0.8 mg/L	INJECT				3.7		Zettergren et al. 1991a

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
Cd	RACL	tadpoles		IMMER		~52			Cd residues accumulated preferentially in the liver with a BCF of 3.41 after 25 d of exposure to 1 mg/L.	Richard 1993
Cd	RAES	adult	2.8 g i.p; 0.025 g in solution	INJECT					I.p. injection 2.8 g/kg body wt (close to LD50).	Biczycki and Czechowicz 1992
Cd	RALU	tadpoles	10,20,50	IMMER		22.49	16.59	15.81		Lefcort et al. 1998
Cd	RAPI	tadpoles	0.1- 0.8 mg/L	INJECT				3.7		Zettergren et al. 1991a
Cd	XELA	adult		IMMER		logLC50= 2.32 µmol/L				Vaal et al. 1997
Cd	XELA	larvae (3-4 wk post hatch)		IMMER	20		32 mg/L			Slooff and Baerselman 1980 [k]
Cd	XELA	tadpole (3-4 wk)		IMMER	20	4	3.2			Canton and Slooff 1982a [k]
Cd, Zn	BUAR	embryo	0.05 mg/L Zn; 0.025 mg/L Cd	IMMER					LC100=1 and less with Zn.	Herkovits and Pérez-Coll 1995
Cd, Zn	RALU	tadpoles	1,2.5,5,10	IMMER		5.6/5.9	4.53/4.72	4.44/4.52	LC values for Cd/Zn respectively.	Lefcort et al. 1998
CdCl2	XELA	embryo		IMMER	20±2				TI50: 1.0 (swimming), 1.1 (pigmentation), 1.3 (malformation). EC50: 1.3 (swimming), 1.2 pigmentation.	Sabourin et al. 1985
chemical manufacture plant	XELA	embryo	0.1, 1, 10, 50 and 100% effluent	IMMER	20.5				6 d LC50= 65.2%, LC1= 0.14%.	Birge et al. 1985
chlordimeform	RALI	adult		IMMER			39.64			Pan and Liang 1993
chlordimeform	RANI	adult	10^{-3} - 10^{-4} M	TISPREP					I.p injection of 300 mg/kg of 20 g adults produced 80% mortality within 24 h.	Watanabe et al. 1976 [k]
chlorobenzene	RAPI	embryo-larvae		IMMER		1.20 mg/L				Birge and Cassidy 1983
chloroform	BUFO	embryo	0.0075-40.0 mg/L	IMMER					LC50 at 0 d post-hatch> 40 mg/L; 99 % hatchability at 0.0075 mg/L and 76 % hatch at 40.0 mg/L.	Birge et al. 1980

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
chloroform	PSCR	embryo	0.0087-32.9 mg/L	IMMER					LC50 at 0 d post-hatch= 0.76 mg/L; 97 % hatchability at 0.0087 mg/L and 0 % hatched at 32.9 mg/L; 0 % normal embryos hatched at 32.9 mg/L.	Birge et al. 1980
chloroform	RAPI	embryo	0.013-26.9 mg/L	IMMER					LC50 at 0 d post-hatch= 4.56 mg/L; 100 % hatchability at 0.013; 18 % hatch at 26.9; 0 % survival of hatched normal embryos at 26.9 mg/L.	Birge et al. 1980
chloropyrifos	RALI	adult		IMMER			2.40			Pan and Liang 1993
chlorothalonil	RALI	adult		IMMER			0.25			Pan and Liang 1993
Citrex	XELA	tadpole (3-4 wk)		IMMER	21			10000, 18000 mg/L		Canton and Slooff 1982b [k]
Co	GACA	embryo-larvae		IMMER					7 d LC50= 0.05 mg/L.	Birge et al. 1979a [k]
Co	LITA	egg			25				LD50 values (Gy): 0.6 for fertilized egg (75 h); 3.3 for late cleavage.	Panter 1986 [k]
Co	LITA	larvae			25				LD50 values (Gy): tail bud (33h)= 9.9; heartbeat (3d)= 10.4; early limb bud (9-10 d)= 20.2; toe development (40-50 d)= 24.9 metamorphosis (60 d)= 18.3; young frog (80d)= 18.7.	Panter 1986 [k]
copper sulfate	RAPI	larval (post hatch)		IMMER	19.4				72 h LC50= 0.15.	Landé and Guttman 1973 [k]
copper sulfate	XELA	larvae (3-4 wk)		IMMER	20		1.7			Zwart and Slooff 1987 [k]
Cr	BUME	tadpoles		IMMER	29-34	57.97	53.43	49.29		Khangarot and Ray 1987 [k]
Cr	BUME	tadpoles		IMMER				224.91		Pant and Gill 1982
Cr	GACA	embryo-larvae		IMMER					7 d LC50= 0.03 mg/L.	Birge et al. 1979a [k]
cresol	AMMA	adult		IMMER			40			Slooff et al. 1983
cresol	AMME	adult		IMMER		logLC50= 2.57 µmol/L				Vaal et al. 1997
cresol	AMME	larvae (3-4 wk post hatch)		IMMER	20		40			Slooff and Baerselman 1980 [k]
cresol	XELA	adult		IMMER			38			Slooff et al. 1983

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
cresol	XELA	adult		IMMER		logLC50= 2.55 µmol/L				Vaal et al. 1997
cresol	XELA	larvae (3-4 wk post hatch)		IMMER	20		38			Slooff and Baerselman 1980 [k]
Cu	AMJE	embryo		pH+CONT	10			0.315±0.01		Horne and Dunson 1994b
Cu	BUME	tadpoles		IMMER	29-34	0.843	0.446	0.32		Khangarot and Ray 1987 [k]
Cu	GACA	embryo-larvae		IMMER					7 d LC50= 0.04 mg/L.	Birge et al. 1979a [k]
Cu	HYCH	tadpoles		IMMER				0.0245		Gottschalk 1995
Cu	MIOR	tadpoles		IMMER	25.5-26	5.61 (5.4-5.8)	5.31 (5.0-5.4)	5.04 (4.7-5.1)	For 4 wk old tadpoles. LC24: 6.04 (5.6-6.4) mg/L; LC50: 5.74 (5.4-6.2) mg/L; LC96: 5.38 (5.0-5.8) mg/L.	Jayaprakash et al. 1987
Cu	MIOR	tadpoles		IMMER	25.5-26	5.61, 6.04	5.31, 5.74	5.94, 5.38	LC values for 1 wk old and 6 wk old tadpoles respectively.	Rao and Madhyastha 1987 [k]
Cu	RAPI	tadpoles		IMMER				0.0761 - 0.0795		Gottschalk 1995
Cu	XELA	adult		IMMER		logLC50= 0.78 µmol/L				Vaal et al. 1997
Cyanatryn	RATE	tadpoles		IMMER				30		Haddow et al. 1974 [k]
cyanazine	BUBJ	tadpoles		IMMER			>100			Hashimoto and Nishiuchi 1981 [k]
cyhalothrin	RALI	adult		IMMER			0.004			Pan and Liang 1993
cypermethrin	RATE	tadpoles		IMMER					LC50= 0.0065 mg/L.	Paulov 1990
cytosine arabinoside	LAVI	embryo	15-40 µg	INJECT					LD50= 45-50 µg/egg.	Raynaud 1982
dairy effluent	BUBU	tadpoles	% dilutions	IMMER				30.59% (29.8-31.41)	96 h LC100: 40%. 96 h LC100: 24.4% (23.21-25.59 %). 96 h LC84: 36.5 % (35.34-37.70 %). Rate of respiratory activity: 0% effluent: 1.175, 6%: 0.939, 12%: 0.762, 18%: 0.528, 24%: 0.176.	Chockalingam and Balaji 1991
DDD	BUWO	tadpole (4-5 wk)		IMMER	15.5	0.70	0.32	0.14		Sanders 1970 [k]
DDD	PSTR	tadpole (1 wk)		IMMER	15.5	0.61	0.5	0.4		Sanders 1970 [k]

Table 3 - Acute Laboratory Data - 14

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
DDT	ACCR	young adult		IMMER	25.6-27.7				36 h LC50: 0.62-50.0 mg/L.	Ferguson and Gilbert 1967
DDT	BUBJ	tadpoles		IMMER			31			Hashimoto and Nishiuchi 1981 [k]
DDT	BUBU	tadpoles (26-37 d)	0.2-3.2	IMMER	20	0.7 - 1.3	0.5 - 0.8		LC72= 0.4 ppm.	Marchal-Segault 1976 [k]
DDT	BUWO	tadpole (1-7 wk)		IMMER	15.5	5.3, 5.4, 2.4, 2.2, 1.4	1.8, 1.3, 1.0, 0.41, 0.75	0.75, 1.0, 0.1, 0.03		Sanders 1970 [k]
DDT	BUWO	young adult		IMMER	25.6-27.7				36 h LC50: 0.4-50.0 mg/L.	Ferguson and Gilbert 1967
DDT	PSTR	tadpole (1 wk)		IMMER	15.5	1.4	0.9	0.8		Sanders 1970 [k]
DDT	RALI	adult		IMMER			0.38			Pan and Liang 1993
DDT	RATE	adult		ORAL	10-15			24	20 d LD50= 7.6 mg/L.	Harri et al. 1979 [k]
DEF	BUWO	tadpole (4-5 wk)		IMMER	15.5	1.2	0.76	0.42		Sanders 1970 [k]
deltamethrin	BUAR	tadpole (stage 26-27)	0- 0.02 mg/L	IMMER	20±1		0.011930 (0.00942-0.01639)	0.00437 (0.00372-0.00519)	LC72= 0.00709 (0.00628- 0.0081).	Salibian 1992
deltamethrin	BUAR	tadpole (stage 28-30)	0- 0.02 mg/L	IMMER	20±1		0.01684 (0.01425-0.02099)	0.0045 (0.00402-0.005)	LC72= 0.01204 (0.01059-0.01398).	Salibian 1992
Deltamethrin	RACA	tadpoles		INJECT	20	0.13				Cole and Casida 1983 [k]
deltamethrin	RALI	adult		IMMER			0.006			Pan and Liang 1993
Deltamethrin	RAPI	adult		INJECT	20	0.35				Cole and Casida 1983 [k]
deltamethrin	RATE	tadpoles		IMMER	18	13.35(8.45-21.03)	19.61(13.35-29.3)			Thybaud 1990
DFP	BUVI	adult		INJECT					7 d LD50= Parathion= 967 ppm LD50 Paraoxon= 188 ppm.	Edery and Schatzberg-Porath 1960 [k]
DFP	BUVI	adult		INJECT					7 d LD50= 1450 ppm.	Edery and Schatzberg-Porath 1960 [k]
di gu shuang	RALI	adult		IMMER			356.62			Pan and Liang 1993
diazinon	BUBJ	tadpoles		IMMER			14			Hashimoto and Nishiuchi 1981 [k]
diazinon	RALI	adult		IMMER			4.48- 11.48			Pan and Liang 1993

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
dicamba	ADBR	tadpole (1-2 wk)		IMMER	21-22	220	202	185		Johnson 1976 [k]
dicamba	LIPE	tadpole (1-2 wk)		IMMER	21-22	205	166	106		Johnson 1976 [k]
dichlorvos	RALI	adult		IMMER			6.70			Pan and Liang 1993
dieldrin	ACCR	young adult		IMMER	25.6-27.7				36 h LC50: 0.3- 0.85 mg/L.	Ferguson and Gilbert 1967
dieldrin	ACGR	young adult		IMMER	25.6-27.7				36 h LC50: 0.3- 0.4 mg/L.	Ferguson and Gilbert 1967
dieldrin	BUWO	tadpole (4-5 wk)		IMMER	15.5	1.1	0.4	0.15		Sanders 1970 [k]
dieldrin	BUWO	young adult		IMMER	25.6-27.7				36 h LC50: 0.1-5.4 mg/L.	Ferguson and Gilbert 1967
dieldrin	PSTR	tadpole (1 wk)		IMMER	15.5	0.23	0.22	0.10		Sanders 1970 [k]
dieldrin	RACA	tadpoles	<0.0001-0.182 mg/L	IMMER				0.0303	Mortality: NOAEL= 0.0123; Mortality: LOAEL= 0.0523 mg/L.	Schuytema et al. 1991
dieldrin	RACA	tadpoles	<0.0001-0.1799	IMMER				0.0087	Mortality: NOAEL= 0.004; Mortality: LOAEL= 0.0112 mg/L.	Schuytema et al. 1991
dieldrin	RALI	adult		IMMER			0.10			Pan and Liang 1993
dieldrin	RAPI	adult	0.05- 0.1	IMMER	25				Frogs in 200 cc solution for 30 d.	Kaplan and Overpeck 1964 [k]
dieldrin	RAPI	tadpoles	<0.0001-0.1705 mg/L	IMMER				0.0713		Schuytema et al. 1991
dieldrin	XELA	adult		IMMER		logLC50= -0.77 µmol/L				Vaal et al. 1997
dieldrin	XELA	juvenile	< 0.002-0.1069 mg/L	IMMER				0.0468	Mortality: NOAEL= 0.0174; Mortality: LOAEL= 0.01069 mg/L.	Schuytema et al. 1991
dieldrin	XELA	tadpoles	<0.002- 0.169 mg/L	IMMER				0.0495		Schuytema et al. 1991
dieldrin	XELA	tadpoles	<0.002-0.2009 mg/L	IMMER				0.0404	Mortality: NOAEL= 0.0316; Mortality: LOAEL= 0.0829 mg/L.	Schuytema et al. 1991
diethanolamine	XELA	larvae (3-4 wk)		IMMER	20		1174			Zwart and Slooff 1987 [k]
dimefox	BUVI	adult		INJECT	25				7 d LD50= 1,410.	Edery and Schatzberg-Porath 1960 [k]
dimefox	BUVI	adult		INJECT					7 d LD50= 1410 ppm injection into dorsal lymphatic sac.	Edery and Schatzberg-Porath 1960 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
dimethachlon	RALI	adult		IMMER			93.27			Pan and Liang 1993
dimethoate	RACY	adult		IMMER	23	30.0, 37.0	17.7, 24.0	8.0, 11.5		Mudgall and Patil 1987 [k]
dimethoate	RAHE	tadpoles		IMMER	12-17	0.00782 (0.00703- 0.00858)	0.00782 (0.00703- 0.00858)	0.00782 (0.00703- 0.00858)	LC12= 0.00812 (0.0073- 0.00887). LC72= 0.00782 (0.00703- 0.00758) mg/L.	Khangarot et al. 1985
dimethoate	RALI	adult		IMMER			2.25			Pan and Liang 1993
dinoseb	BUBJ	tadpoles		IMMER			0.55			Hashimoto and Nishiuchi 1981 [k]
diuron	HYRE	embryo	0-29.1 mg/L	IMMER					10 d LC50> 29.1 mg/L.	Schuytema and Nebeker 1998
diuron	HYRE	tadpoles	0-29.1 mg/L	IMMER					14 d LC50= 8.1-14.5 mg/L.	Schuytema and Nebeker 1998
diuron	RAAU	tadpoles	0-29.1 mg/L	IMMER					10-21 d LC50= 12.7->29.1 mg/L.	Schuytema and Nebeker 1998
diuron	RACA	tadpoles	0-29.1 mg/L	IMMER					14 d LC50= 10.8-19.6 mg/L.	Schuytema and Nebeker 1998
diuron	XELA	embryo	0-29.1 mg/L	IMMER					4 d LC50 => 29.1 mg/L.	Schuytema and Nebeker 1998
diuron	XELA	tadpoles	0-29.1 mg/L	IMMER					14 d LC50= 22 mg/L.	Schuytema and Nebeker 1998
DMSA	ADBR	tadpole (1-2 wk)		IMMER	21-22	600	525	453		Johnson 1976 [k]
DMSA	LIPE	tadpole (1-2 wk)		IMMER	21-22	324	310	271		Johnson 1976 [k]
DRC-1339	RASP	larvae		IMMER	16	63		44		Marking and Chandler 1981 [k]
DRC-1347	RASP	larvae		IMMER	16	41		32		Marking and Chandler 1981 [k]
DRC-2698	RASP	larvae		IMMER	16			>30		Marking and Chandler 1981 [k]
duo sai wan	RALI	adult		IMMER			5.36			Pan and Liang 1993
EBP	RALI	adult		IMMER			8.23-9.44			Pan and Liang 1993
emisan	RACY	adult (M)	5.5 mg/L	IMMER				27.5		Kanamadi and Saidapur 1992a
endosulfan	BUBJ	tadpoles		IMMER			9.0			Hashimoto and Nishiuchi 1981 [k]
endosulfan	BUME	larvae		IMMER	25	0.1419	0.1344	0.1230	Incipient lethal level= 0.105.	Vardia et al. 1984 [k]
endosulfan	RAHE	tadpoles		IMMER	29			0.509	96 h LC100: 0.7 mg/L. Safe conc: 12 mg/L.	Andrews and George 1991
endosulfan	RALI	adult		IMMER			0.012			Pan and Liang 1993
endosulfan	RATI	tadpoles		IMMER	20	0.0021	0.0020	0.0018	96 h NOEL: 0.00055.	Gopal et al. 1981 [k]
endothall	BUWO	tadpole (4-5 wk)		IMMER	15.5	3.2	1.8	1.2		Sanders 1970 [k]
endrin	ACCR	larvae		IMMER	20			0.010		Hall and Swineford 1981 [k]

Table 3 - Acute Laboratory Data - 17

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
endrin	ACCR	young adult		IMMER	25.6-27.7				36 h LC50: 0.04- 0.06 mg/L.	Ferguson and Gilbert 1967
endrin	ACGR	young adult		IMMER	25.6-27.7				36 h LC50: 0.02- 0.045 mg/L.	Ferguson and Gilbert 1967
endrin	AMMA	larvae		IMMER	20			0.056		Hall and Swineford 1981 [k]
endrin	AMOP	larvae		IMMER	20			0.018		Hall and Swineford 1981 [k]
endrin	BUAM	larvae		IMMER	20			0.010		Hall and Swineford 1981 [k]
endrin	BUBJ	tadpoles		IMMER			12			Hashimoto and Nishiuchi 1981 [k]
endrin	BUWO	tadpole (4-5 wk)		IMMER	15.5	0.57	0.46	0.12		Sanders 1970 [k]
endrin	BUWO	young adult		IMMER	25.6-27.7				36 h LC50: 0.03- 0.095 mg/L.	Ferguson and Gilbert 1967
endrin	PSTR	tadpole (1 wk)		IMMER	15.5	0.29	0.29	0.18		Sanders 1970 [k]
endrin	RACA	larvae		IMMER	20			0.002		Hall and Swineford 1981 [k]
endrin	RACA	tadpoles		IMMER	17.4-21.2				72 h LC50= 0.0025.	Thurston et al. 1985 [k]
endrin	RAHE	tadpoles		IMMER	12-17	0.00494 (0.00389-0.00689)	0.00085 (0.00067-0.00115)	0.00021 (0.000153-0.000285	LC12= 0.0066 (0.00591- 0.00753). LC72= 0.000372 (0.000229-0.000475) mg/L.	Khangarot et al. 1985
endrin	RASP	egg		IMMER	20			0.025	Exposed for 24 h, observed at 96 h.	Hall and Swineford 1981 [k]
endrin	RASP	juvenile		IMMER	20			0.005	Exposed for 24 h, observed at 96 h.	Hall and Swineford 1981 [k]
endrin	RASP	larvae		IMMER	20			0.006	Exposed for 24 h, observed at 96 h.	Hall and Swineford 1981 [k]
endrin	RASP	larvae		IMMER	20			0.009	Exposed for 24 h, observed at 96 h.	Hall and Swineford 1981 [k]
endrin	RASY	larvae		IMMER	20			0.034	Exposed for 24 h, observed at 96 h.	Hall and Swineford 1981 [k]
endrin	RATE	tadpoles		IMMER	20	0.9886-2.0086 (2-107 d)	0.0289 - 0.7098 (2-107 d)		Exposure to 2 - 107 d old tadpoles: 72 h LC50= 0.0147 - 0.4253 mg/L.	Wohlgemuth 1977 [k]
eptam	XXXA	tadpoles		IMMER	17-20		16.8			Perevozchenko 1975 [k]
esfenvalerate	RALI	adult		IMMER			0.028			Pan and Liang 1993
esfenvalerate	RAPI	tadpoles		IMMER	20			0.00729	EC50 for convulsive behaviour was 0.00485 mg/L.	Materna 1991

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
esfenvalerate	RAPI	tadpoles		IMMER	20			0.00729	EC50 for convulsive behaviour was 0.00485 mg/L; mortality after recovery period from 96 h exposure.	Materna et al. 1995
esfenvalerate	RASP	tadpoles	0- 11.5 µg/L	IMMER	18, 22				For convulsive behaviour: EC50(18°C): 0.00340, mortality < than 50% at 18°C. EC50 (22°C): 0.00614 mg/L, LC50 (22°C): 0.00729 mg/L.	Materna et al. 1995
ethanolamine	XELA	larvae (3-4 wk)		IMMER	20		220			Zwart and Slooff 1987 [k]
ethyl acetate	AMMA	adult		IMMER			145			Slooff et al. 1983
ethyl acetate	AMME	adult		IMMER		logLC50= 3.23 µmol/L				Vaal et al. 1997
ethyl acetate	AMME	larvae (3-4 wk post hatch)		IMMER	20		150			Slooff and Baerselman 1980 [k]
ethyl acetate	XELA	adult		IMMER			180			Slooff et al. 1983
ethyl acetate	XELA	adult		IMMER		logLC50= 3.31 µmol/L				Vaal et al. 1997
ethyl acetate	XELA	larvae (3-4 wk post hatch)		IMMER	20		180			Slooff and Baerselman 1980 [k]
ethyl propionate	AMMA	adult		IMMER			54			Slooff et al. 1983
ethyl propionate	AMME	larvae (3-4 wk)		IMMER	20		54 mg/L			Slooff and Baerselman 1980 [k]
ethyl propionate	XELA	adult		IMMER			56			Slooff et al. 1983
ethyl propionate	XELA	larvae (3-4 wk)		IMMER	20		56			Slooff and Baerselman 1980 [k]
ethylene glycol	XELA	larvae (3-4 wk)		IMMER	20		326			Zwart and Slooff 1987 [k]
ethylenediamine	XELA	tadpole (5-12 d)		IMMER	22				10 d LC50= 250 mg/L.	Birch and Mitchell 1986 [k]
ethylenethiourea	XELA	tadpole (5-12 d)		IMMER	22				10 d LC50= 100 mg/L.	Birch and Mitchell 1986 [k]
ethylpropionate	AMME	adult		IMMER		logLC50= 2.72 µmol/L				Vaal et al. 1997
ethylpropionate	XELA	adult		IMMER		logLC50= 2.74 µmol/L				Vaal et al. 1997
fei fu san	RALI	adult		IMMER			8.69			Pan and Liang 1993

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
fenitrothion	BUBJ	tadpoles		IMMER			9.0			Hashimoto and Nishiuchi 1981 [k]
fenitrothion	MIOR	embryo	1-13 mg/L	IMMER				3.21 (2.87-3.604)		Pawar and Katdare 1984
fenitrothion	MIOR	tadpoles	0.5-3 mg/L	IMMER				1.14 (0.822-1.603)		Pawar and Katdare 1984
fenitrothion	RACL	tadpoles		IMMER	21	9.9	7.8	4.9		Lyons et al. 1976 [k]
fenitrothion	RALI	adult		IMMER			11.72			Pan and Liang 1993
fenitrothion	RATE	adult (F)	0-2000	INJECT					LD50= 2220 mg/kg (Trevan's method), 2182 mg/kg (Reed and Muench method).	Gromysz-Kalkowska et al. 1993a
fenitrothion	RATE	adult (M)	0-2000	INJECT					LD50= 2400 mg/kg (Trevan's method), 2342 mg/kg (Reed and Muench method).	Gromysz-Kalkowska et al. 1993a
fenitrothion	XELA	embryo	10-30	IMMER	18, 25, 30	18-25°C= >10; 30°C= 0.33			EC50 at 18°C= 4.2; 25°C= 3.7; 30°C= 0.17 (embryo abnormalities that lead to post-hatching death).	Elliot-Feeley and Armstrong 1982
fenoprop	ADBR	tadpole (1-2 wk)		IMMER	21-22	77	60	54		Johnson 1976 [k]
fenoprop	BUMA	tadpole (2 wk)		IMMER	21-22	60	42	34		Johnson 1976 [k]
fenoprop	LIPE	tadpole (1-2 wk)		IMMER	21-22	35	27	22		Johnson 1976 [k]
fenpropathrin	RALI	adult		IMMER			0.002			Pan and Liang 1993
fenpropathrin	RAPI	adult		INJECT	20	0.27				Cole and Casida 1983 [k]
fenpropathrin	XELA	adult		TISPREP					Lateral line: 1 - 1.5 h at 5X 10^{-6} M; sciatic nerve 24 h at 10^{-5} M.	Vijverberg et al. 1982b [k]
fenthion	BUBU	tadpoles (26-37 d)	0-6	IMMER	20	2.1 - 2.6	2.0 - 2.2	1.8 - 2.2	LC72= 1.9 ppm.	Marchal-Segault 1976 [k]
fenthion	RAHE	tadpoles		IMMER	12-17	0.00142 (0.0008-0.00182)	0.00094 (0.00087-0.00137)	0.00084 (0.00078-0.00091)	LC12= 0.00156 (0.00086-0.00255). LC72= 0.00094 (0.00087- 0.00137) mg/L.	Khangarot et al. 1985
fentin-acetate	BUBJ	tadpoles		IMMER			0.33			Hashimoto and Nishiuchi 1981 [k]
fenvalerate	RALI	adult		IMMER			0.19			Pan and Liang 1993
fenvalerate	RAPI	adult		INJECT	20	0.13				Cole and Casida 1983 [k]

Table 3 - Acute Laboratory Data - 20

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
fenvalerate	XELA	adult	5 X 10^{-6} M lat. line; 10^{-5} M sciatic	TISPREP					Lateral line: 23 h exposure; sciatic nerve 10^{-5}M 24+ h exposure.	Vijverberg et al. 1982b [k]
ferbam	BUBJ	tadpoles		IMMER			0.42			Hashimoto and Nishiuchi 1981 [k]
FIT	RAAR	embryo		IMMER	18-22				At time of hatching: LC50= 3.79X 10^{-3} %, LC90= 5.01X 10^{-3} %.	Plotner and Gunther 1987
FIT	RAAR	tadpoles	0 - 3.5 X 10^{-3}	IMMER	18-22	% mortality at 24 h	% mortality at 48 h		1-24 h: 0.006%: TE50 was 8.08 h and the TE90 was 10.54 h.	Plotner and Gunther 1987
FIT	RADA	embryo		IMMER	18-22				At time of hatching: LC50= 1.62 X 10^{-3} %, LC90= 4.78 X 10^{-3} %.	Plotner and Gunther 1987
FIT	RARE	embryo		IMMER	18-22				At time of hatching: LC50= 3.68 X 10^{-3} %, LC90= 4.89X 10^{-3} %.	Plotner and Gunther 1987
FIT	RATE	embryo		IMMER	18-22				At time of hatching LC50= 4.97 X 10^{-3} %, LC90= 7.36 X 10^{-3} %.	Plotner and Gunther 1987
FIT	RATE	tadpoles		IMMER	18-22	3.81 X 10^{-3} %			24 h LC90= 5.11X 10^{-3} %.	Plotner and Gunther 1987
fluoranthene	RAPI	embryo (stage 25)		IMMER					1 h LC50= 0.09 mg/L.	Kagan et al. 1985 [k]
fluoroacetamide	BUBJ	tadpoles		IMMER			>40			Hashimoto and Nishiuchi 1981 [k]
Ge	GACA	embryo-larvae		IMMER					7 d LC50= 0.05 mg/L.	Birge et al. 1979a [k]
glyphosate	CRIN	adult	technical grade	IMMER	20±2	89.6 (73.6-108.9)	83.6 (67.4-103.6)	78.0 (62.9-96.6)	LC72= 72.0 (62.9-96.6). LC values are in mg/L.	Bidwell and Gorrie 1995
glyphosate	CRIN	adult	formulation (as glyphosate ai)	IMMER	20±2	52.6 (39.3-70.5)	49.4 (40.5-60.2)	39.7 (31.1-50.5)	LC72= 44.2 (34.7-56.3).	Bidwell and Gorrie 1995
glyphosate	CRIN	juvenile	formulation (as glyphosate ai)	IMMER	20±2	88.7 (68.6-114.6)	51.8 (42.1-63.8)			Bidwell and Gorrie 1995
glyphosate	CRIN	tadpoles	technical grade	IMMER	20±2				No effect up to 180.0 mg/L of glyphosate (technical) alone.	Bidwell and Gorrie 1995
glyphosate	CRIN	tadpoles	formulation (as glyphosate ai)	IMMER	20±2				100% mortality at 22.5 mg/L (48h) and at conc. above 45 mg/L (24h).	Bidwell and Gorrie 1995
glyphosate	LIMO	adult	technical grade	IMMER	20±2				No effect after 96 h of exposure. No LC50s calculated.	Bidwell and Gorrie 1995

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
glyphosate	LIMO	adult	formulation (as glyphosate ai)	IMMER	20±2		180			Bidwell and Gorrie 1995
glyphosate	LIMO	tadpoles	technical grade	IMMER	20±2	127.0 (90.0-180.0)	121.5 (111.2-132.9)	110.8 (95.2-128.4)	LC72= 116.0 (102.2-131.8) mg/L.	Bidwell and Gorrie 1995
glyphosate	LIMO	tadpoles	formulation (as glyphosate ai)	IMMER	20±2	12.7(9.0-18.0)	11.6 (10.3-13.1)	7.66 (6.1-9.6)	LC72= 10.6 (9.0-12.4) mg/L.	Bidwell and Gorrie 1995
glyphosate	RASY	tadpoles	0-5.7 mg/L	IMMER		100% mortality				Glaser 1998
HCH, beta, lindane	BUWO	tadpole (4-5 wk)		IMMER	15.5	14	5.4	4.4		Sanders 1970 [k]
HCH, beta, lindane	PSTR	tadpole (1 wk)		IMMER	15.5	4.0	3.8	2.7		Sanders 1970 [k]
HCH, gamma, lindane	BUBJ	tadpoles		IMMER			24			Hashimoto and Nishiuchi 1981 [k]
HCH, gamma, lindane	MIOR	embryo	1-70 mg/L	IMMER				23.37 (18.843-29.00)		Pawar and Katdare 1984
HCH, gamma, lindane	MIOR	tadpoles	1-60 mg/L	IMMER				7.27 (5.640-9.364)		Pawar and Katdare 1984
HCH, gamma, lindane	RALI	adult		IMMER			0.94			Pan and Liang 1993
HCH, gamma, lindane	RATE	tadpoles		IMMER	18	8.63 (7.58-9.84)	5.88 (5.39-6.43)			Thybaud 1990
heptachlor	BUWO	tadpole (4-5 wk)		IMMER	15.5	0.85	0.76	0.44		Sanders 1970 [k]
heptanol	AMME	adult		IMMER		logLC50= 2.65 µmol/L				Vaal et al. 1997
heptanol	XELA	adult		IMMER		logLC50= 2.58 µmol/L				Vaal et al. 1997
Hg	ACCR	embryo-larvae		IMMER	19-22				7 d LC50= 10.4 mg/L.	Birge et al. 1979b [k]
Hg	AMME	adult		IMMER		logLC50= 0.17 µmol/L				Vaal et al. 1997
Hg	AMME	larvae (3-4 wk)		IMMER	20		0.4			Slooff and Baerselman 1980 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
Hg	AMOP	embryo-larvae		IMMER	19-22				7 d LC50= 107.5 mg/L.	Birge et al. 1979b [k]
Hg	BUDD	embryo-larvae		IMMER	19-22				7 d LC50= 40 mg/L.	Birge et al. 1979b [k]
Hg	BUFO	embyro	0.001-10 mg/L	IMMER		65.9				Birge et al. 1983
Hg	BUME	tadpoles		IMMER	29-34	0.0528	0.0456	0.0436		Khangarot and Ray 1987 [k]
Hg	BUPU	embryo-larvae		IMMER	19-22				7 d LC50= 36.8 mg/L.	Birge et al. 1979b [k]
Hg	BURE	adult (F)		INJECT					I.m. injection.	Hilmy et al. 1986a [k]
Hg	GACA	embryo-larvae		IMMER					7 d LC50= 0.001 mg/L.	Birge et al. 1979a [k]
Hg	GACA	embryo-larvae		IMMER	19-22				7 d LC50= 1.3 mg/L.	Birge et al. 1979b [k]
Hg	HYCH	embryo-larvae		IMMER	19-22				7 d LC50= 2.4 mg/L.	Birge et al. 1979b [k]
Hg	HYGR	embryo-larvae		IMMER	19-22				7 d LC50= 2.5 mg/L.	Birge et al. 1979b [k]
Hg	HYSQ	embryo-larvae		IMMER	19-22				7 d LC50= 2.4 mg/L.	Birge et al. 1979b [k]
Hg	HYVE	embryo-larvae		IMMER	19-22				7 d LC50= 2.6 mg/L.	Birge et al. 1979b [k]
Hg	MIOR	embryo (gastrulation)		IMMER	21-25			0.1704		Ghate and Mulherkar 1980a [k]
Hg	MIOR	tadpole (1, 4 wk)		IMMER	25.5-26	2.04, 2.41	1.68, 2.07	1.12, 1.43	LC values for 1 wk old and 6 wk old tadpoles respectively.	Rao and Madhyastha 1987 [k]
Hg	MIOR	tadpole (8-10 wk)		IMMER	21-25			0.1184		Ghate and Mulherkar 1980a [k]
Hg	MIOR	tadpoles		IMMER	25.5-26	2.04 (1.8-2.2)	1.68 (1.4-1.8)	1.12 (0.9-1.3)	For 4 wk old tadpoles. LC24: 2.41(2.0-2.8) mg/L; LC48: 2.07 (1.8-2.4) mg/L; LC96: 1.43 (1.0-1.8) mg/L.	Jayaprakash et al. 1987
Hg	PSCR	embryo-larvae		IMMER	19-22				7 d LC50= 2.8 mg/L.	Birge et al. 1979b [k]
Hg	RAGR	embryo-larvae		IMMER	19-22				7 d LC50= 67.2 mg/L.	Birge et al. 1979b [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
Hg	RAHC	embryo-larvae		IMMER	19-22				7 d LC50= 65.9 mg/L.	Birge et al. 1979b [k]
Hg	RAHE	embryo-larvae		IMMER	19-22				7 d LC50= 59.9 mg/L.	Birge et al. 1979b [k]
Hg	RAPI	embryo-larvae		IMMER	19-22				7 d LC50= 7.3 mg/L.	Birge et al. 1979b [k]
Hg	RAPI	embyro	0.001-10 mg/L	IMMER		7.3				Birge et al. 1983
Hg	RATI	adult (F)		IMMER	23±1	19.02	18.95	18.3	72 h LC50: 18.5 mg/L.	Mudgall and Patil 1988
Hg	RATI	adult (M)		IMMER	23±	18.3	18.04	16.1	72 h LC50: 16.74 mg/L.	Mudgall and Patil 1988
Hg	XELA	adult		IMMER		logLC50= 0.46 µmol/L				Vaal et al. 1997
Hg	XELA	larvae (3-4 wk)		IMMER	20		0.1			Slooff and Baerselman 1980 [k]
Hg	XELA	larvae (3-4 wk)		IMMER	20		0.1			Zwart and Slooff 1987 [k]
hopcide	RALI	adult		IMMER			21.64			Pan and Liang 1993
hun mie wei	RALI	adult		IMMER			22.00			Pan and Liang 1993
hydrazine	AMMA	larvae		IMMER	22.2-24	>10, >10	8, 5.2	5.3, 2.3	LC50s given for hard (185-232 mg/L as $CaCO^3$) and soft water (16 - 18 mg/L $CaCO^3$) respectively.	Slonim 1986 [k]
hydroxyurea	CHSE	embryo		IMMER	20±2			>200	TI50: 2.8 (swimming), 2.9 (pigmentation), 4.5 (malformation). EC50: 197 (swimming), 192 pigmentation.	Sabourin et al. 1985
iprobenfos	BUBJ	tadpoles		IMMER			10			Hashimoto and Nishiuchi 1981 [k]
iprobenfos	RALI	adult		IMMER			6.31			Pan and Liang 1993
iron methanoarsenate	BUBJ	tadpoles		IMMER			>40			Hashimoto and Nishiuchi 1981 [k]
isobutyl alcohol	XELA	larvae (3-4 wk)		IMMER	20		18.3			Zwart and Slooff 1987 [k]
isocarbophos	RALI	adult		IMMER			9.32			Pan and Liang 1993
isoprocarb	RALI	adult		IMMER			4.34			Pan and Liang 1993
isoprothiolane	RALI	adult		IMMER			7.79- 21.70			Pan and Liang 1993
Kadethrin	RAPI	adult		INJECT	20	1.2				Cole and Casida 1983 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
Kasugamycin	BUBJ	tadpoles		IMMER			6.4			Hashimoto and Nishiuchi 1981 [k]
KCl	MIOR	egg	0.1- 0.7 %	IMMER	23-27	>0.5 %	0.3458 %	0.1414 %	72 h LC50= 0.2732 %.	Padhye and Ghate 1992
KCl	MIOR	tadpoles	0.1- 0.7 %	IMMER	23-27			0.25% (hindlimb)	8 d: 0.16%.	Padhye and Ghate 1992
MAFA	RALI	adult		IMMER			79.67			Pan and Liang 1993
malachite green	BUXX	larvae		IMMER		0.3555		0.0680		Bills et al. 1977 [k]
malachite green	NOVI	adult		IMMER	16	3.9		1.03		Bills et al. 1977 [k]
malachite green	RAPI	larvae		IMMER	16	0.38		0.173		Bills et al. 1977 [k]
malathion	ANCA	adult	4.2-17.5	ORAL	20-30				LD50= 2324 mg/kg. LD50 occurred at 44.4% ChE inhibition.	Hall and Clark 1982
malathion	BUAR	tadpole (15-20 d)	0 - 8 mg/L	IMMER				19.2±2.4	In combination with poly amines, malathion had the following LC50 values: putrescine (0.2 mM)= 18.4±0.7, putrescine (1.0mM)= 15.0, spermadine 0.2 mM)= 10.9±2.1, spermine (0.2 mM)= 14.5±3.2.	Venturino et al. 1992
malathion	BUWO	tadpole (4-5 wk)		IMMER	15.5	1.9	0.5	0.42		Sanders 1970 [k]
malathion	PSTR	tadpole (1 wk)		IMMER	15.5	0.56	0.32	0.20		Sanders 1970 [k]
malathion	RAHE	tadpoles		IMMER	29			4.14	96 h LC100: 6.00 mg/L. Safe conc: 0.65 mg/L.	Andrews and George 1991
malathion	RAHE	tadpoles		IMMER	12-17	0.000846 (0.000798-0.00094)	0.000613 (0.00055-0.00069)	0.00059 (0.00043-0.00078)	LC12= 0.00354 (0.00291-0.00430). LC72= 0.000613 (0.00055- 0.00069) mg/L.	Khangarot et al. 1985
malathion	RALI	adult		IMMER			2.27			Pan and Liang 1993
malathion	RAPI	adult		IMMER	24				15 d LC50= 150.	Kaplan and Glaczenski 1965 [k]
Maneb	TRCR	adult		IMMER	18				LT50: 125 mg/L= 84 h (M), 285 h (F); 100 mg/L= 28 h (M), 195 h (F); 75 mg/L= 19 h (M), 255 h (F); 50 mg/L= 76 h (M), 168 h (F); 25 mg/L= 255 h (M), no data for females.	Zaffaroni et al. 1978 [k]
MCPA	RALI	adult		IMMER			226.97			Pan and Liang 1993

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
mercury(II)chloride	AMMA	adult		IMMER			0.35			Slooff et al. 1983
mercury(II)chloride	RAHE	embryo	0-5.0 mg/L	IMMER	21±0.5				LC50/3h: 1.43 (1.24-1.52) mg/L.	Punzo 1993a
mercury(II)chloride	RAHE	juvenile	0-1.0 mg/L	IMMER	21±0.5			0.68 (0.47-0.71) mg/L		Punzo 1993a
mercury(II)chloride	XELA	adult		IMMER			0.1			Slooff et al. 1983
Mervinphos (OP)	BUAR	adult		INJECT				96 h LD50= 850		Juarez and Guzman 1984b [k]
MET	BUBU	tadpoles	0-100 mg/L	IMMER	22	15.6 mg/L	14.4 mg/L	9.1 mg/L	LC72= 11.0 mg/L.	Liu et al. 1996
metamidophos	RALI	adult		IMMER			27.16			Pan and Liang 1993
methiocarb	RASP	larvae		IMMER	16	8.5		8.7		Marking and Chandler 1981 [k]
methomyl	BUBJ	tadpoles		IMMER			>40			Hashimoto and Nishiuchi 1981 [k]
methoxychlor	BUWO	tadpole (4-5 wk)		IMMER	15.5	0.76	0.11			Sanders 1970 [k]
methoxychlor	PSTR	tadpole (1 wk)		IMMER	15.5	0.44	0.42	0.33		Sanders 1970 [k]
methylene chloride	BUFO	embryo	0.022-32.1 mg/L	IMMER					LC50 at 0 d post-hatch> 32 mg/L; 100 % hatchability at 0.022 and 80 % at 32.1 mg/L.	Birge et al. 1980
methylene chloride	RACA	embryo	0.017-46.8 mg/L	IMMER					LC50 at 0 d post-hatch= 30.61 mg/L; 100 % hatchability at 0.017 and 52 % hatch at 46.8 mg/L.	Birge et al. 1980
methylene chloride	RAPA	embryo	0.022-32.1 mg/L	IMMER					LC50 at 0 d post-hatch> 32 mg/L; 100 % hatchability at 0.022 mg/L and 72 % at 32.1 mg/L.	Birge et al. 1980
mexacarbate	RACA	adult (M)		INJECT					Estimated 14 d LD50= 283-800.	Tucker and Crabtree 1969 [k]
mie chu wei	RALI	adult		IMMER			12.40			Pan and Liang 1993
mine drainage	BUBO	zygote		IMMER					Mine Drainage: 260 mg/L Fe; 39 mg/L Zn; 3.7 mg/L Cu.	Porter and Hakanson 1976 [k]
Mipafox	RATI	adult		TISPREP					LD50= 3580 µmol/kg.	Chattopadhyay et al. 1986
Mn	GACA	embryo-larvae		IMMER					7 d LC50= 1.42 mg/L.	Birge et al. 1979a [k]
Mn	MIOR	tadpole (1, 4wk)		IMMER	25.5-26	16.62, 17.56	16.03, 16.52	14.84, 14.33	LC values for 1 wk old and 6 wk old tadpoles respectively.	Rao and Madhyastha 1987 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
Mn	MIOR	tadpoles		IMMER	25.5-26	16.62 (16.2-17.0)	16.03 (15.6-16.4)	14.84 (14.6-15.4)	For 4 wk old tadpoles. LC24: 17.56 (17.0-17.8) mg/L; LC50: 16.52 (16.0-16.8) mg/L; LC96: 14.33 (14.0-14.8) mg/L.	Jayaprakash et al. 1987
MO-338	RALI	adult		IMMER			6.195			Pan and Liang 1993
molinate	BUWO	tadpole (4-5 wk)		IMMER	15.5	33	28	14		Sanders 1970 [k]
molinate	RALI	adult		IMMER			34.98			Pan and Liang 1993
molinate	XXXA	tadpoles		IMMER	17-20		15.1			Perevozchenko 1975 [k]
MTMC	RALI	adult		IMMER			16.75			Pan and Liang 1993
nabam	XELA	tadpole (5-12 d)		IMMER	22				Treatment was continuous for 10 d; LC50 was determined at 10 d post exposure 10 d LC50= 2 ppm.	Birch and Mitchell 1986 [k]
NaCl	MIOR	egg	0.1- 0.7 %	IMMER	23-27	0.6482 %	0.5604 %	0.2711 %	72 h LC50= 0.4222 % NaCl.	Padhye and Ghate 1992
NaCl	MIOR	tadpoles	0.1- 0.7 %	IMMER	23-27			0.69% (hindlimb)	8 d: 0.50%.	Padhye and Ghate 1992
NaCl	XELA	adult		IMMER	20-23				LC50= 250-280 mM/L.	Romspert 1976
naled	PSTR	tadpole (1 wk)		IMMER	15.5	2.2	2.0	1.7		Sanders 1970 [k]
NaPCP	RALI	adult		IMMER			0.17			Pan and Liang 1993
naphthalene	XELA	larvae (3 wk)		IMMER	28			2.1		Edmisten and Bantle 1982 [k]
n-butanol	XELA	larvae (3-4 wk)		IMMER	20		1200			Zwart and Slooff 1987 [k]
nereistoxin	BUBJ	tadpoles		IMMER			5.6			Hashimoto and Nishiuchi 1981 [k]
nereistoxin	RALI	adult		IMMER			0.12- 0.14			Pan and Liang 1993
n-heptanol	AMMA	adult		IMMER			52			Slooff et al. 1983
n-heptanol	AMME	larvae (3-4 wk post hatch)		IMMER	20		52			Slooff and Baerselman 1980 [k]
n-heptanol	XELA	adult		IMMER			44			Slooff et al. 1983
n-heptanol	XELA	larvae (3-4 wk)		IMMER	20		44			Slooff and Baerselman 1980 [k]
n-propanol	AMMA	adult		IMMER			4000			Slooff et al. 1983
n-propanol	AMME	larvae (3-4 wk post hatch)		IMMER	20		4000			Slooff and Baerselman 1980 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
n-propanol	XELA	adult		IMMER			4000			Slooff et al. 1983
n-propanol	XELA	larvae (3-4 wk post hatch)		IMMER	20		4000			Slooff and Baerselman 1980 [k]
Ni	BUME	tadpoles		IMMER	29-34	53.21	34.3	25.32		Khangarot and Ray 1987 [k]
Ni	GACA	embryo-larvae		IMMER					7 d LC50= 0.05 mg/L.	Birge et al. 1979a [k]
Ni dinuthyldithiocarbamate san	RALI	adult		IMMER			261.18			Pan and Liang 1993
nifurpirinol	RAPI	larvae		IMMER	16	6.9		0.770		Marking et al. 1977 [k]
nitrite	AMTE	larvae		IMMER	25			1.09		Huey and Beitinger 1980b [k]
nitrobenzene	RAPI	embryo-larvae		IMMER		0.64 mg/L				Birge and Cassidy 1983
nitrofen	BUBJ	tadpoles		IMMER			3.8			Hashimoto and Nishiuchi 1981 [k]
nitrofen	RALI	adult		IMMER			40.06			Pan and Liang 1993
NPAN	RAPI	embryo	20-200 mg/L	IMMER					Estimated ED50= 4-5 mg/L.	Greenhouse 1976a [k]
NPAN	XELA	larvae		IMMER			2.1 - 2.3		EC50 (teratogenesis) for exposure from blastula to hatching= 4.6 - 4.8.	Greenhouse 1977 [k]
NTA	BUFO	embyro	1.19-451 mg/L	IMMER					LC50 at 0 d post-hatch> 451 mg/L; 102 % hatchability at 1.19 mg L and 73 % at 451 mg/L.	Birge et al. 1980
NTA	BUQU	embryo	99.3-547 mg/L	IMMER					LC50 at 0 d post-hatch= 271.8 mg/L; 100 % hatchability at 99.3 mg/L and 0 % at 547 mg/L.	Birge et al. 1980
NTA	RACA	embyro	1.19-451 mg/L	IMMER					LC50 at 0 d post-hatch= 237.9 mg/L; 105 % hatchability at 1.19 mg/L and 40 % at 451 mg/L.	Birge et al. 1980
NTA	RAPA	embryo	2.49-520 mg/L	IMMER					LC50 at 0 d post-hatch= 181.2 mg/L; 100 % hatchability at 2.49 mg/L and 0 at 520 mg/L.	Birge et al. 1980
NTA	RAPI	embyro	0.97-479 mg/L	IMMER					LC50 at 0 d post-hatch= 60.4 mg/L; 95 % hatchability at 0.97 mg/L and 0 % at 479 mg/L.	Birge et al. 1980
NTA	XELA	tadpole (3-4 wk)		IMMER	21			560-1000 mg/L		Canton and Slooff 1982b [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
omethoate	RALI	adult		IMMER			244.24			Pan and Liang 1993
OMPA	RAPI	adult		IMMER	24				15 d LC50= 2900.	Kaplan and Glaczenski 1965 [k]
PA-14	RASP	larvae		IMMER	12, 16, 22	7.5, 4.5, 2.6		5.9, 4.2, 2.3	Exposure at 3 temperatures, respectively.	Marking and Chandler 1981 [k]
paraoxon	BUVI	adult		INJECT	16				7 d LD50= 188.	Edery and Schatzberg-Porath 1960 [k]
paraoxon	BUVI	adult		INJECT					7 d exposure: Parathion LD50= 967 ppm; Paraoxon LD50= 188 ppm.	Edery and Schatzberg-Porath 1960 [k]
paraoxon	RAPI	adult (M)	1 µg/g body wt with 1 µg paraoxon/5µl solvent	INJECT		44.0				Potter and O'Brien 1963
paraoxon	RARI	adult		INJECT					7 d LD50= 91.	Edery and Schatzberg-Porath 1960 [k]
paraoxon	RATI	adult		TISPREP					LD50= 9.4 µmol/kg.	Chattopadhyay et al. 1986
paraquat	ADBR	tadpole (1-2 wk)		IMMER	21-22	320	315	262		Johnson 1976 [k]
paraquat	BUBJ	tadpoles		IMMER			14			Hashimoto and Nishiuchi 1981 [k]
paraquat	BUWO	tadpole (4-5 wk)		IMMER	15.5	54	25	26		Sanders 1970 [k]
paraquat	LIPE	tadpole (1-2 wk)		IMMER	21-22	204	153	100		Johnson 1976 [k]
paraquat	PSTR	tadpole (1 wk)		IMMER	15.5	43	37	28		Sanders 1970 [k]
paraquat	RAES	adult		INJECT					LD50 at 20°C= 260 mg/kg; LD100 at 20°C= 360 mg/kg.	Barabas et al. 1985 [k]
paraquat	RAPI	egg/embryo	0-10.0 mg/L	IMMER					LC50 values for formulation product: 0.5 (96 h), 1.6 (10 d), 1.6 (30 d) mg/L; technical grade product: 1.3 (96 h), 4.2 (10 d), 3.1 (30 d) mg/L.	Linder et al. 1990
paraquat	RAPI	not specified	technical grade a.i.	IMMER				1.5		Linder 1988
paraquat	SCNA	tadpoles (stage 25/26)	6.5-50 mg/L	IMMER	16	39	30	22	LC72= 25 mg/L.	Lajmanovich et al. 1998

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
parathion	ANCA	adult	4.2-17.5	ORAL	20-30				LD50= 8.9 (4.7-13.2) mg/kg. LD50 occurred at 22.7% ChE inhibition.	Hall and Clark 1982
parathion	BUAR	adult		INJECT				3352		Juarez and Guzman 1984b [k]
parathion	BUAR	embryo		IMMER					LC120= 20.2 mg/L.	Anguiano et al. 1994
parathion	BUAR	larvae		IMMER					LC120= 4.5 mg/L.	Anguiano et al. 1994
parathion	BUBJ	tadpoles		IMMER			7.2			Hashimoto and Nishiuchi 1981 [k]
parathion	BUVI	adult		INJECT	16				7 d LD50= 967.	Edery and Schatzberg-Porath 1960 [k]
parathion	BUVI	adult		INJECT	16				7 d exposure: Parathion LD50= 967 ppm; Paraoxon LD50= 188 ppm.	Edery and Schatzberg-Porath 1960 [k]
parathion	MACR	adult	3 drops in soybean oil	ORAL	27	LD50= 10				Yawetz et al. 1983
parathion	PSTR	tadpole (1 wk)		IMMER	15.5	1.6	1.4	1.0		Sanders 1970 [k]
parathion	RALI	adult		IMMER			4.74			Pan and Liang 1993
parathion	RAPI	adult		IMMER	24				15 d LC50= 10.	Kaplan and Glaczenski 1965 [k]
parathion-methyl	ANCA	adult	4.2-17.5	ORAL	20-30				LD50= 82.7 (56.2-187.9) mg/kg. LD50 occurred at 51.4% ChE inhibition.	Hall and Clark 1982
parathion-methyl	RACY	adult		IMMER	23	51.4	43.3, 46.3	39, 36		Mudgall and Patil 1987 [k]
parathion-methyl	RACY	tadpoles	3.0-10.0 mg/L	IMMER				8.75	96 h LC100= 9.5 mg/L. The safe level was determined to be 4.0 mg/L.	Noor Alam 1989
parathion-methyl	RALI	adult		IMMER			11.48			Pan and Liang 1993
parathion-methyl	RATI	tadpoles	4.0-10.5 mg/L	IMMER				9.5	96 h LC100 h= 10.25 mg/L.	Noor Alam and Shafi 1991
Pb	BUAR	embryo		IMMER	20-21		0.47-0.9			Perez-Coll et al. 1988
Pb	GACA	embryo-larvae		IMMER					7 d LC50= 0.04 mg/L.	Birge et al. 1979a [k]
Pb	RACY	adult (F)		IMMER	23±1	1895.8	1770.8	1632.3	72 h LC50: 1625.0 mg/L.	Mudgall and Patil 1988
Pb	RACY	adult (M)		IMMER	23±1	1687.5	1583.3	1540.7	72 h LC50: 1541.7 mg/L.	Mudgall and Patil 1988
pentachlorophenol	AMMA	adult		IMMER			0.3			Slooff et al. 1983
pentachlorophenol	AMME	adult		IMMER		logLC50= 0.05 µmol/L				Vaal et al. 1997
pentachlorophenol	AMME	larvae (3-4 wk post hatch)		IMMER	20		0.30			Slooff and Baerselman 1980 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
pentachlorophenol	BUBJ	tadpoles		IMMER			0.25			Hashimoto and Nishiuchi 1981 [k]
pentachlorophenol	RACA	tadpoles		IMMER	17.2-18.2			0.207		Thurston et al. 1985 [k]
pentachlorophenol	RAHE	tadpoles		IMMER	12-17	0.05799 (0.03848-0.0479)	37.58 (0.03053-0.0501)	0.01844 (0.01476-0.02402)	LC12= 0.0825 (0.06427- 0.1009). LC72= 0.0287 (0.02396- 0.03794) mg/L.	Khangarot et al. 1985
pentachlorophenol	XELA	adult	64.8-2604 µg/g of worm	ORAL	23				NOAEL: 638 µg/g (based on intake of approx. 8 µg/g/ frog/d). Threshold for adverse effects: 0.8 mg/L of waterborne pentachlorophenol.	Schuytema et al. 1993
pentachlorophenol	XELA	adult		IMMER			0.26			Slooff et al. 1983
pentachlorophenol	XELA	adult		IMMER		logLC50= -0.01 µmol/L				Vaal et al. 1997
pentachlorophenol	XELA	larvae (3-4 wk post hatch)		IMMER	20		0.26			Slooff and Baerselman 1980 [k]
permethrin	RACA	tadpoles		IMMER				7033 ppb		Jolly et al. 1977
permethrin	RACA	tadpoles		IMMER	24			7.033		Jolly et al. 1978 [k]
permethrin	RACA	tadpoles		IMMER	17.3-18			0.115		Thurston et al. 1985 [k]
permethrin	RAPI	adult		INJECT	20	trans= 7.5, cis= 0.14				Cole and Casida 1983 [k]
phenanthra-quinone	RALI	adult		IMMER			0.69			Pan and Liang 1993
phenazine	RALI	adult		IMMER			19.42			Pan and Liang 1993
phenol	BUAM	embyro	0.010- 0.89 mg/L	IMMER					LC50 at 0 d post-hatch> 0.089 mg/L; 102 % hatchability at 0.01 mg/L and 76 % at 0.89 mg/L.	Birge et al. 1980
phenol	BUFO	embyro	0.0009-10.2 mg/L	IMMER					LC50 at 0 d post-hatch> 10 mg/L; 98 % hatchability at 0.0009 mg/L and 68 % at 10.2 mg/L.	Birge et al. 1980
phenol	RACA	embyro	0.0009-10.2 mg/L	IMMER					LC50 at 0 d post-hatch= 0.60 mg/L; 100 % hatchability at 0.0009 mg/L and 14 % at 10.2 mg/L.	Birge et al. 1980
phenol	RAPA	embyro	0.0007-21.8 mg/L	IMMER					LC50 at 0 d post-hatch= 11.23 mg/L; 98 % hatchability at 0.0007 mg/L and 53 % at 21.8 mg/L.	Birge et al. 1980

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
phenol	RAPI	embryo-larvae		IMMER		0.04 mg/L				Birge and Cassidy 1983
phenol	RAPI	embyro	0.0047-11.5 mg/L	IMMER					LC50 at 0 d post-hatch= 0.05 mg/L; 94 % hatchability at 0.0047 mg/L and 0 at 1.09 mg/L.	Birge et al. 1980
phenol	RATE	adult	5	INJECT	20				0.5, 2, 4, 15 h observation.	Nagel and Urich 1981 [k]
phenol	XELA	tadpoles		IMMER	17.2			> 51		Holcombe et al. 1987 [k]
phenothrin	RAPI	adult		INJECT	20	trans=> 20, cis= 6.0				Cole and Casida 1983 [k]
phenyl mercury acetate	BUBJ	tadpoles		IMMER			0.12			Hashimoto and Nishiuchi 1981 [k]
phosdrin	RAPI	adult		IMMER	24				15 d LC50= 12.	Kaplan and Glaczenski 1965 [k]
phosphamidon	BUAR	adult		INJECT				1195		Juarez and Guzman 1984b [k]
phosphamidon	CAVE	adult (M)		IMMER					LD50= 1.1 mg/kg body wt.	Meenakshi et al. 1996b
phosphamidon	RALI	adult		IMMER			209.59			Pan and Liang 1993
phoxim	RALI	adult		IMMER			2.65			Pan and Liang 1993
picloram	ADBR	tadpole (1,2 and 4 wk)		IMMER	21-22	143, 210	123, 182	95, 154		Johnson 1976 [k]
picloram	LIPE	tadpole (1-2 wk)		IMMER	21-22	120	116	105		Johnson 1976 [k]
piperonyl butoxide	PSTR	tadpole (1wk)		IMMER	15.5	1.8 (0.40 - 8.2)	1.3 (0.30 - 12)	1.0 (9.0)		Sanders 1970 [k]
pirimiphos ethyl	RALI	adult		IMMER			0.38			Pan and Liang 1993
polyamines	BUAR	tadpole (15-20 d)	4 and 8mg/L	IMMER				19.2±2.4	In combination with poly amines, malathion had the following LC50 values: putrescine (0.2 mM)= 18.4±0.7, putrescine (1.0mM)= 15.0, spermadine 0.2 mM)= 10.9±2.1, spermine (0.2 mM)= 14.5±3.2.	Venturino et al. 1992
polyoxin	RALI	adult		IMMER			88.85			Pan and Liang 1993
procymidone	RALI	adult		IMMER			371.17			Pan and Liang 1993
prometryne	RALI	adult		IMMER			22.88			Pan and Liang 1993
propachlor	RALI	adult		IMMER			0.80-1.71			Pan and Liang 1993
propanil	BUBJ	tadpoles		IMMER			2.5			Hashimoto and Nishiuchi 1981 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
propanil	RALI	adult		IMMER			11.89-14.28			Pan and Liang 1993
propanoic acid butyl ester	BUWO	tadpole (4-5 wk)		IMMER	15.5	22	20			Sanders 1970 [k]
propanoic acid butyl ester	PSTR	tadpole (1 wk)		IMMER	15.5	20	18	10		Sanders 1970 [k]
propanolol	AMME	adult		IMMER		logLC50= 4.82 µmol/L				Vaal et al. 1997
propanolol	XELA	adult		IMMER		logLC50= 4.82 µmol/L				Vaal et al. 1997
propoxur	BUBJ	tadpoles		IMMER			35			Hashimoto and Nishiuchi 1981 [k]
pyrene	XELA	embryo (stage 25)		IMMER					1 h LC50= 0.14.	Kagan et al. 1985 [k]
pyrethrin	RAPI	adult		INJECT	20	5.8				Cole and Casida 1983 [k]
pyridaphenthion	RALI	adult		IMMER			3.81			Pan and Liang 1993
pyridine	AMMA	adult		IMMER			950			Slooff et al. 1983
pyridine	AMME	adult		IMMER		logLC50= 4.08 µmol/L				Vaal et al. 1997
pyridine	AMME	larvae (3-4 wk post hatch)		IMMER	20		950			Slooff and Baerselman 1980 [k]
pyridine	RAPI	embryo-larvae		IMMER		395 mg/L				Birge and Cassidy 1983
pyridine	XELA	adult		IMMER			1400			Slooff et al. 1983
pyridine	XELA	adult		IMMER		logLC50= 4.39 µmol/L				Vaal et al. 1997
pyridine	XELA	embryo (mid-late blastula)		IMMER	room	3800	2570		72 h LC50= 2340. Teratogenicity EC50: 24 h= 2190; 48 h= 1550; 72 h= 1350; 96 h= 1200.	Davis et al. 1981 [k]
pyridine	XELA	larvae		IMMER	room	1660	1590	1090	72 h LC50= 1200.	Davis et al. 1981 [k]
pyridine	XELA	larvae (3-4 wk post hatch)		IMMER	20		1400			Slooff and Baerselman 1980 [k]
pyridine	XELA	tailbud embryo		IMMER	room	9550	3390	2460	72 h LC50= 2820.	Davis et al. 1981 [k]
quinalphos/ chinalphos	RACY	tadpoles	4.0-9.5 mg/L	IMMER				8.0	96 h LC100= 9.0 mg/L. The safe level conc. was determined to be 5.0 mg/L.	Noor Alam 1989

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
quinalphos/ chinalphos	RATI	tadpoles	5.0-10.0	IMMER				8.75	96 h LC100= 9.5 mg/L.	Noor Alam and Shafi 1991
quinoline	XELA	larvae		IMMER	room	135	117	95	72 h LC50= 107.	Davis et al. 1981 [k]
quinoline	XELA	tailbud embryo		IMMER	room	200	148	129	72 h LC50= 129.	Davis et al. 1981 [k]
rotenone	AMTI	metamorphosis		IMMER					LC100= 100 gamma/L.	Hamilton 1941
rotenone	BUBJ	tadpoles		IMMER			0.33			Hashimoto and Nishiuchi 1981 [k]
rotenone	RAPI	metamorphosis		IMMER					LC100= 100 gamma/L.	Hamilton 1941
rotenone	RASP	larvae		IMMER	16	0.58		0.5		Chandler and Marking 1982 [k]
rotenone	XELA	tadpoles		IMMER	17.2			> 0.04		Holcombe et al. 1987 [k]
rubber effluent	XELA	embryo	0.1, 1, 10, 50 and 100% effluent	IMMER	20.5				LC50 (6d)= 22.9% effluent. LCI(6d)= 0.03%.	Birge et al. 1985
S	RALI	adult		IMMER			2560			Pan and Liang 1993
salicylaldehyde	AMMA	adult		IMMER			7.6			Slooff et al. 1983
salicylaldehyde	AMME	adult		IMMER		logLC50= 1.78 µmol/L				Vaal et al. 1997
salicylaldehyde	AMME	larvae (3-4 wk post hatch)		IMMER	20		7.0			Slooff and Baerselman 1980 [k]
salicylaldehyde	XELA	adult		IMMER			7.7			Slooff et al. 1983
salicylaldehyde	XELA	adult		IMMER		logLC50= 1.80 µmol/L				Vaal et al. 1997
salicylaldehyde	XELA	larvae (3-4 wk post hatch)		IMMER	20		7.7			Slooff and Baerselman 1980 [k]
s-bioallethrin	RAPI	adult		INJECT	20	1.7				Cole and Casida 1983 [k]
Sb	GACA	embryo-larvae		IMMER					7 d LC50= 0.3 mg/L.	Birge et al. 1979a [k]
Se	GACA	embryo-larvae		IMMER					7 d LC50= 0.09 mg/L.	Birge et al. 1979a [k]
Se	XELA	tadpoles	2-20	IMMER	23				72 h LC50= 8.04. Median survival time: 4.7 d in 2 ppm; 4.0 d in 5 ppm; 2.54 d in 10 ppm.	Browne and Dumont 1979 [k]

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
sha chong dan	RALI	adult		IMMER			9.151			Pan and Liang 1993
sha chong shuang	RALI	adult		IMMER			62.58			Pan and Liang 1993
Sn	GACA	embryo-larvae		IMMER					7 d LC50= 0.09 mg/L.	Birge et al. 1979a [k]
sodium aluminium silicate	XELA	tadpole (3-4 wk)		IMMER	21			5600-10000 mg/L		Canton and Slooff 1982b [k]
sodium arsenate	ADBR	tadpole (1-2 wk)		IMMER	21-22	152	119	96		Johnson 1976 [k]
sodium arsenate	BUMA	tadpole (1-2 wk)		IMMER	21-22	195	150	123		Johnson 1976 [k]
sodium arsenate	LIPE	tadpole (1-2 wk)		IMMER	21-22	108	92	60		Johnson 1976 [k]
sodium fluoracetate	LITA	adult		INJECT					LD50 for single injection approx. 60 ppm. Time to death 78.4 h (median).	McIlroy et al. 1985 [k]
sodium fluoracetate	RAPI	adult		INJECT					LD50= 150.	Chenoweth 1949 [k]
sodium fluoracetate	XELA	adult		INJECT					LD50> 500.	Chenoweth 1949 [k]
sodium fluorocrotonate	RAPI	adult		INJECT					LD50= 25.	Chenoweth 1949 [k]
sodium nitrate	HYRE	embryo	ND- 578 mg/L	IMMER					10 d LC50= 578 mg/L.	Schuytema and Nebeker 1999
sodium nitrate	XELA	embryo	ND- 871.6 mg/L	IMMER					5 d LC50= 438.4 mg/L.	Schuytema and Nebeker 1999
sodium thiocyanate	XELA	tadpole (5-12 d)		IMMER	22				10 d= 2000; treatment was continuous for 10 d. LC50 determined at 10 d post exposure.	Birch and Mitchell 1986 [k]
soman	RATI	adult		TISPREP					LD50= 1.38 mµmol/kg.	Chattopadhyay et al. 1986
Sr	GACA	embryo-larvae		RAD					7 d LC50= 0.16 mg/L.	Birge et al. 1979a [k]
sulfotep	RALI	adult		IMMER			0.53			Pan and Liang 1993
swep	RALI	adult		IMMER			10.36			Pan and Liang 1993

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp h	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
tar	XELA	embryo (blastula)		IMMER	room				Raw tar 96 h LC50= 3.13 mg/L (96 h EC50= 0.70 mg/L); ether soluble acid fraction 96 h LC50= 5.26 mg/L (96h EC50= 2.48 mg/L); ether soluble base fraction 96 h LC50= 5.34 mg/L (96 h EC50 - 1.02 mg/L) mono/di aromatic fraction 96 h LC50= 27.91 mg/L (96 h EC5.	Schultz et al. 1983 [k]
tar	XELA	embryo (mid-late blastula)		IMMER				0.83%	EC50= 0.48%.	Schultz et al. 1982
tar	XELA	juvenile		IMMER	room				Raw tar 96 h LC50= 163 mg/L; ether soluble acid fraction 96 h LC50= 425 mg/L; ether soluble base fraction 96 h LC50= 299 mg/L mono/di aromatic fraction 96 h LC50= 776 mg/L; poly aromatic fraction 96 h LC50= 529 mg/L.	Schultz et al. 1983 [k]
TEEP	RAPI	adult		IMMER	24				15 d LC50= 60.	Kaplan and Glaczenski 1965 [k]
TEPP	BUVI	adult		INJECT	25	540				Edery and Schatzberg-Porath 1960 [k]
TEPP	BUVI	adult		INJECT					7 d LD50= 540 ppm.	Edery and Schatzberg-Porath 1960 [k]
TEPP	RARI	adult		INJECT	25	34				Edery and Schatzberg-Porath 1960 [k]
tetrachloro-phthalide	BUBJ	tadpoles		IMMER			>40			Hashimoto and Nishiuchi 1981 [k]
tetrachloro-phthalide	RALI	adult		IMMER			1182.01			Pan and Liang 1993
tetrachlorvinphos	RATE	adult (m/f)	0-500	INJECT					LD50= 151-192; males> females.	Gromysz-Kalkowska et al. 1993b
tetramethrin	RAPI	adult		INJECT	20	trans=> 20, cis= 1.8				Cole and Casida 1983 [k]
TF128	RALI	adult		IMMER			1703.09			Pan and Liang 1993
TFM	HYVE	larvae		IMMER	17			1.98		Chandler and Marking 1975 [k]
TFM	RACA	adult	2.0 mg/L	IMMER	20				LC50= 12.99.	Kane et al. 1993

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
TFM	RACA	adult	12-15	SUBDERM					LC50= 15.35.	Kane et al. 1993
TFM	RACA	larvae		IMMER	17			3.55		Chandler and Marking 1975 [k]
TFM	RACA	larvae	2.0 mg/L	IMMER					LC50= 0.95.	Kane et al. 1993
TFM	RACA	larvae	12-15	SUBDERM					LC50= 11.62.	Kane et al. 1993
TFM	RACA	tadpoles		IMMER				1.39	96 h LC90= 2.31 mg/L.	Kane 1985
TFM	RAPI	larvae		IMMER	17			2.76		Chandler and Marking 1975 [k]
thalium	GACA	embryo-larvae		IMMER					7 d LC50= 0.11 mg/L.	Birge et al. 1979a [k]
thanite	RALI	adult		IMMER			2.59			Pan and Liang 1993
thiocyclam	RALI	adult		IMMER			0.059			Pan and Liang 1993
thiophanate-methyl	RALI	adult		IMMER			472.29			Pan and Liang 1993
thiram	XELA	not specified		IMMER	20	0.017, 0.025	0.014, 0.022	0.013, 0.021		Seuge et al. 1983 [k]
toluene	RAPI	embryo-larvae		IMMER		0.39 mg/L				Birge and Cassidy 1983
toxaphene/ camphechlor	ACCR	larvae		IMMER	20			0.076		Hall and Swineford 1981 [k]
toxaphene/ camphechlor	ACCR	young adult		IMMER	25.6-27.7				36 h LC50: 0.5-5.4 mg/L.	Ferguson and Gilbert 1967
toxaphene/ camphechlor	AMMA	larvae		IMMER	20			0.034	24 h EC50 (behavioural aberration)= 0.227.	Hall and Swineford 1981 [k]
toxaphene/ camphechlor	AMOP	larvae		IMMER	20			0.342	24 h EC50 (behavioural aberration)= 0.170.	Hall and Swineford 1981 [k]
toxaphene/ camphechlor	BUAM	larvae		IMMER	20			0.034	24 h EC50 (behavioural aberration)= 0.038.	Hall and Swineford 1981 [k]
toxaphene/ camphechlor	BUWO	tadpole (4-5 wk)		IMMER	15.5	0.60	0.29	0.14		Sanders 1970 [k]
toxaphene/ camphechlor	BUWO	young adult		IMMER	25.6-27.7				36 h LC50: 0.57-5.4 mg/L.	Ferguson and Gilbert 1967
toxaphene/ camphechlor	PSTR	tadpole (1 wk)		IMMER	15.5	1.7	0.70	0.50		Sanders 1970 [k]
toxaphene/ camphechlor	RACA	larvae		IMMER	20			0.099	24 h EC50 (behavioural aberration)= 0.312.	Hall and Swineford 1981 [k]
toxaphene/ camphechlor	RALI	adult		IMMER			0.012			Pan and Liang 1993

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
toxaphene/ camphechlor	RASP	larvae		IMMER	20			0.13	24 h EC50 (behavioural aberration)= 0.193.	Hall and Swineford 1981 [k]
toxaphene/ camphechlor	RASY	larvae		IMMER	20			0.195	24 h EC50 (behavioural aberration)= 0.036.	Hall and Swineford 1981 [k]
TPN	BUBJ	tadpoles		IMMER			0.16			Hashimoto and Nishiuchi 1981 [k]
triadimeform	RALI	adult		IMMER			12.96			Pan and Liang 1993
trichloroethylene	AMMA	adult		IMMER			48			Slooff et al. 1983
trichloroethylene	AMME	adult		IMMER		logLC50= 2.56 µmol/L				Vaal et al. 1997
trichloroethylene	AMME	larvae (3-4 wk post hatch)		IMMER	20		48			Slooff and Baerselman 1980 [k]
trichloroethylene	XELA	adult		IMMER			45			Slooff et al. 1983
trichloroethylene	XELA	adult		IMMER		logLC50= 2.53 µmol/L				Vaal et al. 1997
trichloroethylene	XELA	larvae (3-4 wk post hatch)		IMMER	20		45			Slooff and Baerselman 1980 [k]
trichlorphon	RALI	adult		IMMER			17.98			Pan and Liang 1993
tricyclazole	RALI	adult		IMMER			19.43			Pan and Liang 1993
tridemorph	RAHE	tadpoles		IMMER	12-17	0.78 (0.7- 0.84)	0.53 (0.46- 0.59)	0.41 (0.26- 0.7)	LC12= 0.82 (0.75- 0.88) LC72= 0.53 (0.46- 0.59).	Khangarot et al. 1985
trifluralin	BUBJ	tadpoles		IMMER			14			Hashimoto and Nishiuchi 1981 [k]
trifluralin	BUWO	tadpole (4-5 wk)		IMMER	15.5	0.18	0.17	0.10		Sanders 1970 [k]
tuzet	RALI	adult		IMMER			10.77			Pan and Liang 1993
UV	BUFO	adult	8.1 rad/s	RAD	20-24				30 d LD50= 2329 rad; 50 d LD50= 1780 rad.	Landreth et al. 1974
UV	BUFO	juvenile	8.1 rad/s	RAD	20-24				30 d LD50= 1000 rad; 50 d LD50= 100 rad.	Landreth et al. 1974
UV	BUFO	tadpoles	8.1 rad/s	RAD	20-24				30 d LD50= 1670 rad; 50 d LD50= 100 rad.	Landreth et al. 1974
UV	XXFR	tadpoles	1	RAD					LT50= 50 min with 1 ppm exposure.	Georgacakis et al. 1971
UV, dieldrin	XXFR	tadpoles	1	RAD					LT50= 30 min with 1 ppm exposure.	Georgacakis et al. 1971

Contaminant [a]	Species Code [b]	Lifestage	Contaminant Concentration [e]	Exposure Route [f]	Temp [h]	LC24 [e]	LC48 [e]	LC96 [e]	Other Mortality/Effects Data [de]	Reference [k]
VIN	CHSE	embryo		IMMER	20±2				TI50: 1.9 (swimming), 2.2 (pigmentation), 2.7 (malformation). EC50: 3.1 (swimming), 2.7 pigmentation.	Sabourin et al. 1985
W	GACA	embryo-larvae		IMMER					7 d LC50= 2.9 mg/L.	Birge et al. 1979a [k]
ye quing shuang	RALI	adult		IMMER			235.68			Pan and Liang 1993
yi ji dao fen san	RALI	adult		IMMER			1.53			Pan and Liang 1993
zinc methanearsonate	RALI	adult		IMMER			71.87			Pan and Liang 1993
zineb	BUBJ	tadpoles		IMMER					7 d LC 50= 40.	Hashimoto and Nishiuchi 1981 [k]
zineb	RALI	adult		IMMER			31.25			Pan and Liang 1993
Zn	BUME	tadpoles		IMMER	29-34				7 d LC50= 19.86- 47.26.	Khangarot and Ray 1987 [k]
Zn	GACA	embryo-larvae		IMMER					7 d LC50= 0.01 mg/L.	Birge et al. 1979a [k]
Zn	HYCH	tadpoles		IMMER				4.6960		Gottschalk 1995
Zn	MIOR	tadpole (1-4 wk)		IMMER	25.5-26				7 d LC50 ranged from 22.41 - 24.06 for 1 wk old tadpoles; 23.08 - 25.42 for 4 wk old tadpoles.	Rao and Madhyastha 1987 [k]
Zn	MIOR	tadpoles		IMMER	25.5-26	24.06 (23.6-24.4)	23.42 (23.0-23.8)	22.41 (22.0-22.8)	For 4 wk old tadpoles. LC24: 25.42 (24.8-25.6) mg/L; LC50: 24.38 (24.0-24.8) mg/L; LC96: 23.08 (22.6-23.4) mg/L.	Jayaprakash et al. 1987
Zn	RALU	tadpoles	25,50 100	IMMER		28.38	28.38	28.38	LC72= 28.38.	Lefcort et al. 1998
Zn	RAPI	adult		IMMER	24				15 d LC50= 155.	Kaplan and Glaczenski 1965 [k]
Zn	RAPI	tadpoles		IMMER				10.20-10.48		Gottschalk 1995

Table 4: Laboratory studies not including acute toxicity data

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
1,1-dimethylhydrazine	XELA	embryo	IMMER	DEVOBS			0- > 5 mg/L	> 5 mg/L teratogenic. Failure to elongate, tail kinks most common abnormalities observed.	Greenhouse 1976a [k]
1,1-dimethylhydrazine	XELA	embryo	IMMER	DEVOBS			1-20 mg/L	10 % malformation at 1 mg/L. 100 % malformation at 20 mg/L. Susceptible during neurulation.	Greenhouse 1976b [k]
1,1-dimethylhydrazine	XELA	larvae	IMMER	DEVOBS			0.1-1.0 mg/L	< 1 mg/L had no effect on survival or metamorphosis; higher conc. lethal.	Greenhouse 1976a [k]
1,2-dimethylhydrazine	XELA	embryo	IMMER	DEVOBS			0->50 mg/L	< 40 mg/L not toxic if embryo transferred to uncontaminated water prior to hatching; > 50 mg/L teratogenic.	Greenhouse 1976a [k]
1,2-dimethylhydrazine	XELA	embryo	IMMER	DEVOBS			10-80 mg/L	100 % malformation at >40 mg/L.	Greenhouse 1976b [k]
1,2-dimethylhydrazine	XELA	larvae	IMMER	DEVOBS			0.1-1 mg/L	100 % mortality in larvae at 1 mg/L within 7 d. Continuous contact with 0.1 mg/L allowed normal metamorphosis.	Greenhouse 1976a [k]
1-4-dichloronaphthalene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
1-chloronaphthalene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
2,4-D	ALMI	adult	TISPREP	DEVOBS				No interaction with estrogen receptors.	Vonier et al. 1996
2,4-D	ALMI	egg	DERMAL	PHYSIO			0.14-14	No effect on endocrine parameters.	Crain et al. 1997
2,4-D	RATE	tadpole (hindlimb)	IMMER	MORT				No mortality or behavioral changes at conc. up to 50 ppm for 48 h.	Cooke 1972b [k]
2,4-D	RATE	tadpoles	IMMER	DEVOBS				1 mg/L of Na salt and 2 mg/L of diethylamine salt sig. inhibited metamorphosis. Addition of thyroidin (1-5 mg/L) hinders action of the hormone stimulating metamorphosis.	Buslovich and Borushko 1976 [k]
2,4-D	RATE	tadpoles	IMMER	RESIDUE				Exposure for 48 h: ND at 0.1 µg detection limit.	Cooke 1972b [k]
2,4-D	XXXA	not specified	IMMER	MORT				In Russian, effects of 2, 4-D butyl ester on amphibians given.	Skokova and Lobanov 1973
2,4-dichloroaniline	XELA	tadpoles	IMMER	MORT	20			100 d NOEL: mortality/growth= 1; development= 0.32 mg/L.	Slooff and Canton 1983 [k]
2-AAF	RACA	tadpoles	IMMER	PHYSIO	16	8.7	10^{-8} - 5 x10^{-5}M	Increasing frequency of micronuclei and rubricytes in blood cells.	Krauter 1993
2-AF	RACA	tadpoles	IMMER	PHYSIO			0- 5 x10^{-6}M	2-AF more toxic than 2AAF on red blood cells, cell lysis eventually occurred.	Krauter 1993
2-methoxyethanol	XELA	adult	IMMER	MORT			0-15000 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>3.	Daston et al. 1991
2-methoxyethanol	XELA	embryo	IMMER	MORT			0-10000 mg/L	Defects were noted in embryos exposed for four days post-fertilization.	Daston et al. 1991
2-phenoxyethanol	NOVV	adult	IMMER	PHYSIO			0.5 %	Sig. bradycardia when the newts were exposed to anesthetic.	Pitkin and Pettyjohn 1992
3-methylcholanthrene	ALMI	juvenile	SUBDERM	MORT				3-MC treated alligators showed greater rates of enzyme activity and greater rates of induction of specific enzymes that may protect against toxicity of 3-MC.	Jewell et al. 1989

Table 4 - Laboratory Studies - 2

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
3-methylcholanthrene	PLWA	larvae	IMMER	GENOTOX			0.5	Frequency of micronucleated erythrocytes= 315/1000.	Fernandez et al. 1989
3-methylcholanthrene	PLWA	not specified	INJECT	PHYSIO				An increase in metabolism of hydroxycoumarin and resorufin derivatives occurred. Microsomal protein content and ratio of liver and body weights are presented.	Marty et al. 1992
4,4'-dichlorobiphenyl	RAES	adult	INJECT	PHYSIO			250	After 10 d of holding frogs in water, four metabolites of 4-4'-dichlorobiphenyl were found in water samples that were similar to those found from rat or rabbit metabolism.	Tulp et al. 1976
4,4'-dichlorobiphenyl	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
4-chlorobiphenyl	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
acephate	AMGR	egg/larvae	IMMER	HATSUC				Egg hatch not sig. affected by conc. up to 798 mg/L; effect in first wk post hatch mortality. Growth rate decreased and abnormalities increased in larvae exposed to 382 and 798 mg/L.	Geen et al. 1984 [k]
acephate	RACA	tadpoles	IMMER	MORT				All tadpoles exposed to 5 ppm survived.	Hall and Kolbe 1980 [k]
acephate	RACL	larvae	IMMER	BEHAV	21			Sig. decrease in mean activity time recorded at 1000 ppm but not at 500 ppm.	Lyons et al. 1976 [k]
acephate	RACL	tadpoles	IMMER	RESIDUE			1	Approximately 0.6 ppm after 1 d (identical to conc. in water).	Lyons et al. 1976 [k]
acetone	ACGR	tadpoles	IMMER	DEVOBS			0-50 mg/L	Conc. dependent enhanced metamorphosis in acetone-treated animals. At 50 mg/L rate of precocious metamorphosis was not sig. dif from that produced by 0.1 mg/L thyroxin. DMSO showed no effect.	Pollard and Adams 1988
acetone	RATE	tadpoles	IMMER	DEVOBS				> 400 ppm= 100% mortality; 300 ppm= 50% mortality; 200 ppm no lethal effect during 1 wk observation. At 10 ppm accelerated metamorphosis by 2 d in 80% animals; 20% did not complete metamorphosis and were malformed.	Paulov and Paulovova 1983 [k]
acridine orange	PLWA	larvae	IMMER	GENOTOX			0.2-2	Frequency of micronucleated erythrocytes: 0.2 ppm= 12/1000; 2 ppm= 74/1000.	Fernandez et al. 1989
Ag	RAJA	adult	TISPREP	PHYSIO	20-22		10 µM	It was concluded that Ag activates the Ca channel by acting on SH groups in a Ca channel protein.	Aoki et al. 1993
AH5183	RANI	adult	TISPREP	PHYSIO			5-20 µM	Results indicate that mobilization of the ACh quanta readily available for release might be a common mechanism underlying both frequency facilitation and two components of PTP (augmentation and potentiation).	Maeno and Shibuya 1988
Al	RATE	tadpoles	IMMER	DEVOBS			800, 1600	Results not extracted from paper.	Cummins 1986a [k]
Al	XELA	adult	TISPREP	MORT		7.4-7.6	20-100 µg/mL	Atrial muscle membrane potentials were examined.	Meiri and Shimoni ?
alachlor	ALMI	adult	TISPREP	DEVOBS			27.4	IC50= 27.4, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996

Table 4 - Laboratory Studies - 3

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
alachlor	ALMI	adult (F)	TISPREP	PHYSIO				Estrogen receptors from alligator oviductal tissue tested with various environmental chemicals and with 17ß-estradiol.	Arnold et al. 1997
alachlor	BUVU	embryo	IMMER	PHYSIO			0.312- 5 %	Very toxic to embryo and tadpole developmental stages.	Constantini and Panella 1975
aldrin	ACCR	adult	IMMER	MORT	21-24			Frogs collected from areas treated or untreated with pesticide and exposed to 0.03 or 0.05 g/mL. Percent mortality lower in frogs from treated fields than those collected from no or minimal treatment.	Vinson et al. 1963 [k]
aldrin	ACGR	adult	IMMER	MORT				0.01 g/mL= 40% mortality; 0.05 g/mL= 70% mortality in 36 h.	Vinson et al. 1963 [k]
aldrin	BUAR	embryo	IMMER	MORT				5 ppm= 100% mortality at 15 d, 15 ppm= 100% mortality at 10 d. 1 ppm not toxic.	Juarez and Guzman 1984a [k]
aldrin	GRGE	adult (F)	TISPREP	PHYSIO			0.53, 5.3 and 53 µM	Inhibition of Na-, K-, and Mg-dependent ATPase may have been related to cell membrane alteration.	Wells et al. 1974
aldrin	RACY	adult	IMMER	DEVOBS	19-26	7.9		% conc. ranged from 0.006 (215 min) to 0.125 (55 min) ppm where “time” is time until death.	Rane and Mathur 1978 [k]
aldrin	RAES	adult	TISPREP	PHYSIO	18			Motor end plate: 10^{-5} and 10^{-4} M exerted both pre-and post-synaptic actions; caused increase in end-plate potential frequency and decrease in amplitude.	Akkermans et al. 1974 [k]
aldrin	RAES	adult	TISPREP	PHYSIO	18			Sartorius nerve muscle: 25 $x10^{-5}$M produced increase in end-plate potential to 4 times control level at 20 min, after which amplitude declined and transmission completely blocked.	Akkermans et al. 1975b [k]
aldrin	RAHE	adult	IMMER	PHYSIO				Glycogen increased; lipid increased; cholesterol increased; pyruvate decreased; lactate increased in kidney.	Vijay and Jayantha Rao 1991
aldrin	RAHE	adult	IMMER	PHYSIO				Glycogen increased; lipid increased; cholesterol increased; pyruvate decreased; lactate increased in liver.	Vijay and Jayantha Rao 1991
aldrin	RAHE	not specified	IMMER	PHYSIO			0.24 mg/L	Effects after 1 wk exposure were: depletion of protein in brain, muscle, kidney and intestine; after 2 wks exposure there was an increase in amino acid levels and 4 wks of exposure showed enhanced protease activity and amino transferases.	Joseph and Rao 1991
aldrin	RAPI	adult	IMMER	BEHAV	25	5.68-5.90	0.15- 0.30	At 30 d exposure, 8 dead in 0.30 ppm; at 0.23 and 0.15, 0 frogs dead.	Kaplan and Overpeck 1964 [k]
aldrin	RAPI	adult	IMMER	RESIDUE			11 ppb	Decreasing rate of accumulation by abdominal skin vs time.	Kaiser and Dunham 1972 [k]
aldrin	RAPI	adult	TISPREP	PHYSIO				In abdominal skin, no changes in short circuit current at 2 x 10^{-4} M.	Webb et al. 1979 [k]
aldrin	RAPI	adult	TISPREP	PHYSIO				Microsomal metabolism in liver (apparent Vmax and Km values): Vmax= 0.056 nmol/min/mg; Km= 43 nmol/mg.	Ronis and Walker 1985 [k]
aldrin	RAPI	adult	TISPREP	PHYSIO	18			Motor end plate: 10^{-5} and 10^{-4} exerted both pre- and post-synaptic actions; caused increase in end-plate potential frequency and decrease in their amplitude.	Akkermans et al. 1974 [k]

Table 4 - Laboratory Studies - 4

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
aldrin	RATE	adult	TISPREP	PHYSIO	18			Motor end plate: 10^{-5} and 10^{-4} exerted both pre- and post-synaptic actions; caused increase in end-plate potential frequency and decrease in their amplitude.	Akkermans et al. 1974 [k]
aldrin	RATE	adult	TISPREP	PHYSIO	18			Sartorious nerve-muscle 25 x 10^{-5} M produced an increase in end-plate potential to 4 times control levels at 20 min, after which amplitude declined and transmission completely blocked.	Akkermans et al. 1975b [k]
aldrin	XELA	adult	TISPREP	PHYSIO	19-21			Lateral-line organ: 25 x 10^{-6} and 75 x 10^{-6} M failed to induce repetitive activity.	Akkermans et al. 1975a [k]
aldrin	XELA	adult	TISPREP	PHYSIO	10			Spinal cord: application of 1 x 10^{-5} M in vitro caused potentiation of spinal reflex activity, increase in spontaneous activity of ventral and dorsal roots and reduction of spinal inhibitory mechanisms.	Akkermans et al. 1975c [k]
allethrin	RAES	adult	TISPREP	PHYSIO			10^{-7} M	Motor end plate: negative temp. coefficient.	Wouters et al. 1977 [k]
allethrin	RAES	adult	TISPREP	PHYSIO				Peripheral nervous system studied.	van den Bercken 1977 [k]
allethrin	RAPI	adult	TISPREP	PHYSIO	22		10^{-6} - 10^{-4}	Nerve muscle studied.	Takeno et al. 1977 [k]
allethrin	RATE	adult	TISPREP	PHYSIO			10^{-7} M	Motor end plate: negative temp. coefficient.	Wouters et al. 1977 [k]
allethrin	RATE	adult	TISPREP	PHYSIO				Peripheral nervous system studied.	van den Bercken et al. 1973a [k]
allethrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-5}	1-4 end plate potentials and no repetitive activity with respect to action potentials.	Ruigt and Van den Bercken 1986
allethrin	XELA	adult	IMMER	BEHAV			5, 1	Excitation and convulsions within 10 min at 5 ppm. Excitation at 1 ppm.	van den Bercken et al. 1973a [k]
allethrin	XELA	adult	TISPREP	PHYSIO			2	Lateral line organ studied. Similarity between aldrin and DDT noted.	van den Bercken et al. 1973a [k]
allethrin	XELA	adult	TISPREP	PHYSIO	15		2 x10^{-5}M	Myelinated fibre of sciatic nerve.	van den Bercken et al. 1980 [k]
allethrin	XELA	adult	TISPREP	PHYSIO				Peripheral nervous system studied.	van den Bercken 1977 [k]
allethrin	XELA	adult	TISPREP	PHYSIO	20-24		0.33-3.3 x10^{-6}M	Pronounced repetitive activity in sensory fibres; similar results in cutaneous touch receptors and lateral line organ.	van den Bercken and Vijverberg 1979
allethrin	XELA	adult	TISPREP	PHYSIO				Repetitive activity induced by 1-3 ppm for 20 - 40 min in lateral line. Cutaneous touch receptors produced repetitive activity after 5 min exposure to 10 $^{-5}$ M or 15 min to 10^{-6} M.	Akkermans et al. 1975a [k]
allethrin	XELA	adult	TISPREP	PHYSIO	15		10-40 µM	Sodium channel gating and reduced selectively the rate of closing of the activation gate in myelinated nerve fibre.	Vijverberg et al. 1982a

Table 4 - Laboratory Studies - 5

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
amaranth	HYGR	tadpoles	IMMER	BEHAV			0, 0.00125%	Authors suggest the effects of staining on growth can severely bias long-term mark-recapture studies or studies on the relationship of growth rate to other variables which use stained animals.	Travis 1981
amaranth	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc. = 25000 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
aminocarb	RACL	larvae	IMMER	BEHAV	21		5, 10	Results not extracted from paper.	Lyons et al. 1976 [k]
ammonium carbonate	THRA	adult	DERMAL	BEHAV				Investigative behaviour described, animals that immersed their heads quickly began to show signs of distress such as foaming at the mouth, gaping and rubbing the side of the head on the floor of the cage.	Secoy 1979
ammonium hydroxide	THRA	adult	DERMAL	BEHAV				Investigative behaviour described, contact with liquid ammonium on the head resulted in distress such as foaming at the mouth, gaping and rubbing side of the head along the floor of the cage.	Secoy 1979
ammonium nitrate	PSTR	tadpoles	IMMER	BEHAV	20±2	7.5-8.0	0, 2.5, 5 and 10 mg/L	Some mortality by 3-7 d; survival decreased sig. over time; behavioural and morphological abnormalities within 24-48 h.	Hecnar 1995
ammonium nitrate	RACL	tadpoles	IMMER	BEHAV	20±2	7.5-8.0	0, 2.5, 5 and 10 mg/L	Some mortality by 3-7 d. Survivorship decreased over time.	Hecnar 1995
ammonium nitrate	RAPI	tadpoles	IMMER	BEHAV	20±2	7.5-8.0	0, 2.5, 5 and 10 mg/L	Some mortality by 3-7 d. Survivorship decreased over time.	Hecnar 1995
ammonium nitrate	RATE	adult	DERMAL	MORT			49.4 g/m^2	EC50= 107 min in dry soil and 84 min in moist soils.	Oldham et al. 1997
ammonium nitrate	RATE	adult	IMMER	MORT			6.2-12.4 g/m^2	EC50= 6.9 g/m^2, effects usually lead to eventual death. This study concluded that it is uncertain whether fertilizers contribute to population declines.	Oldham et al. 1997
ammonium nitrate	RATE	adult	DERMAL	BEHAV				Results not extracted from paper.	Oldham et al. 1993
ammonium nitrate	RATE	adult (M)	DERMAL	BEHAV				EC50= 1.9 g/m^2; acutely toxic; markedly reduced activity and change in ventilation pattern.	Oldham and Hilton-Brown 1992
ammonium nitrate	TRVU	larvae	IMMER	MORT			50-500 mg/L	Larvae exposed to 50 mg/L showed no sig. dif. to control larvae in feeding rate, mass at metamorphosis or time to metamorphosis.	Watt and Oldham 1995
aniline	XELA	tadpole (stage 38)	IMMER	MORT			1-10000 ppm	2 wk and 90 d exposure.	Dumpert 1987 [k]
ansar	SCCO	adult	IMMER	MORT			100-100000 ppm	10000 ppm toxic to adults; 100000 ppm toxic to all adults within 2 h.	Judd 1977 [k]
ansar	SCCO	juvenile	IMMER	MORT			100-100000 ppm	100 ppm not toxic to juveniles; 1000 ppm toxic to juveniles but not adults; 100 % mortality at 72 h at 10000 ppm.	Judd 1977 [k]
arginine vasotocin	AMTI	adult	IMMER	PHYSIO				Arginine vasotocin sig. increased dehydration in AMTI adults, which was also true for larvae but not for neotenes.	Norman 1981
arginine vasotocin	AMTI	larvae	IMMER	PHYSIO				Arginine vasotocin induces water loss in larvae (similar to results for adults but not similar to neotene response).	Norman 1981

Table 4 - Laboratory Studies - 6

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
arginine vasotocin	AMTI	neotene	IMMER	PHYSIO				Arginine vasotocin did not sig. decrease dehydration in neotenes, which was not the case for adults and larvae.	Norman 1981
Aroclor 1242	ALMI	adult	TISPREP	DEVOBS			37.2	IC50= 37.2 (inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor).	Vonier et al. 1996
Aroclor 1254	CHPI	adult	INJECT	PHYSIO			100	4-5 fold increase in P4501A in hepatic microsomes.	Yawetz et al. 1997
Aroclor 1254	CHPI	adult	INJECT	PHYSIO				Purified turtle P450 fractions may be useful in further studies of the catalytic function of the inducible proteins.	Yawetz et al. ?
Aroclor 1254	MACR	adult	ORAL	RESIDUE			750	Liver conc. was found to be ~690ppm; 30 times higher than that found in environment.	Yawetz et al. 1983
Aroclor 1254	MACR	adult	INJECT	PHYSIO			100	Low but sig. increase in P4501A in hepatic microsomes.	Yawetz et al. 1997
Aroclor 1254	PLWA	larvae	IMMER	GENOTOX			0.025- 0.05	Frequency of micronucleated erythrocytes= 4/1000 for all treatments.	Fernandez et al. 1989
Aroclor 1254	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
Aroclor 1260	RACA	tadpoles	IMMER	PHYSIO	4		0.1 µg/g	Antibodies usually produced in response to heat shock were produced by contaminant stress.	Dunlap and Matsumura 1997
Arosurf 66-E2	HYCI	tadpoles	IMMER	DEVOBS			0.68 mg/m^2	Results not extracted from paper.	Webber and Cochran 1984 [k]
As	PICA	adult	ORAL	MORT			fed avg. of 2.00 Mg (6 rats)	7 snakes regurgitated, 6 had no observable effects.	Brock 1965
As	RACA	tadpoles	IMMER	RESIDUE				Results not extracted from paper.	Burger and Snodgrass 1998
ASA	RACA	adult	IMMER	PHYSIO		3.0-6.0	10-20 mM	ATP and phosphocreatine content decreased rapidly after exposure.	Spenney and Brown 1977
ASA	RATE	adult	TISPREP	PHYSIO			3 mM	Unionized weak acid form of acetylsalicylic acid increased gastric mucosal permeation of ions above a threshold conc. of 3 mM.	Flemstrom 1979
ascorbic acid	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc.= 250 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
atrazine	ACCR	tadpoles	IMMER	DEVOBS			30-600 ppb	No sig. difs among treatments.	Gucciardo and Farrar 1996
atrazine	ALMI	adult	TISPREP	DEVOBS			20.7	IC50= 20.7 (inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor).	Vonier et al. 1996
atrazine	ALMI	egg	DERMAL	PHYSIO			0.14-14	Induced aromatase activity in male hatchlings.	Crain et al. 1997
atrazine	BUVU	embryo	IMMER	PHYSIO			1.25- 30 %	Very toxic to embryo and tadpole developmental stages. Exposed individuals exhibited histochemical modifications involving either cholinesterases or phosphatases.	Constantini and Panella 1975
atrazine	PLWA	larvae	IMMER	GENOTOX	20	5-8	0.3	No effect on erythrocytes under all conditions tested (dif. pH, light and dark).	L'Haridon et al. 1993
atrazine	RASY	tadpoles	IMMER	DEVOBS			30-600 ppb	No sig. dif. among treatments.	Gucciardo and Farrar 1996
atrazine	XELA	tadpoles	IMMER	DEVOBS			0.08-10	None of the tadpoles that survived 10 ppm completed metamorphosis.	Blandin and Ramsdell 1995

Table 4 - Laboratory Studies - 7

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
atrazine (n-nitrosoatrazine)	PLWA	larvae	IMMER	GENOTOX	20	8	0-3.75-15	51-93/1000 micronucleated erythrocytes.	L'Haridon et al. 1993
atropine, soman	RACA	adult	TISPREP	PHYSIO	22-23		10µM (soman and atropine)	Neuron membrane potentials were measured; effects are mediated by activation of muscarinic receptors.	Heppner and Fiekers 1992
Ba	RACA	adult	TISPREP	PHYSIO				K stimulated pNPPase seems to be completely dependent on magnesium; Barium is a completely insufficient substitute for Mg in this respect.	Ray 1980
Ba	RANI	adult	IMMER	PHYSIO			3-5 mM	Mobilization of the ACh quanta readily available for release might be a common mechanism underlying both frequency facilitation and two components of PTP in muscle tissue (augmentation and potentiation).	Maeno and Shibuya 1988
BaP	PLWA	larvae	IMMER	GENOTOX			0.025- 0.1	Fequency of micronucleated erythrocytes: 0.025 ppm= 27; 0.1 ppm= 304.	Fernandez et al. 1989
BaP	PLWA	larvae	IMMER	RESIDUE			0.075- 0.3 $x10^{-3}$	Ratio of BaP in larvae to that in surrounding water after 12 h was approximately 200; not dependent on dose; maximal levels attained after 12 h. Contaminated larvae placed in uncontaminated water lost 99% contaminant after 100 h.	Grinfeld et al. 1986 [k]
BaP	PLWA	larvae (stage 23)	TISPREP	PHYSIO			0.01- 0.75	Increase incidence of micronucleated erythrocytes after >2 d of exposure.	Grinfeld et al. 1986 [k]
BaP	PLWA	newt	INJECT	PHYSIO			0.166 mg-150 $x10^{+6}$ cpm in 200 µl DMSO	Organosoluble- and water-soluble compounds were collected in the medium of injected animals demonstrating the capability of PAWL to metabolize BaP into hydroxylated products.	Marty et al. 1995
BaP	RAPI	adult	TISPREP	GENOTOX			0.01 mg/mL	Three fold increase in sister chromatid exchange at 0.01 mg/mL in ambient water. Mitotic index reduced and cell cycling time lengthened in dose-dependent manner.	Geard and Soutter 1986 [k]
BaP	XELA	tadpoles	IMMER	PHYSIO	22		0-4.0 mg/L	Frequency of micronucleated erythrocytes increased with increasing conc. (68/1000 at 0.5 mg/L; stage 50); a decrease in micronucleated erythrocytes was observed at doses higher than 0.5 mg/L (26/1000 at 1.0 mg/L).	Van Hummelen et al. 1989
BaP	XELA	tadpoles	IMMER	DEVOBS			31-248 nM BaP	Mean numbers of micronucleated erythrocytes were 1.7, 6.3 and 16.4/1000 after exposure to BaP. Levels of both DNA adducts and micronuclei were greatly reduced in animals exposed previously to 31 and 248 BaP, but assayed at metamorphosis.	Sadinski et al. 1995
BaP	XXFR	adult	TISPREP	GENOTOX			< 20.0 µg/mL	No evidence of genotoxicity after 1 wk in eye lens epithelium.	Kung et al. 1987 [k]
Be	XXFR	embryo	IMMER	DEVOBS				Development interfered with at N/5000 to N/1000.	Dilling and Healey 1926 [k]

Table 4 - Laboratory Studies - 8

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
benthiocarb/ thiobencarb	THEL	adult	ORAL	MORT				No mortalities were observed for either field or lab trials. Author determined that direct acute effect is minimal since no mortality was observed with doses as high as 48 mg (623 mg/kg).	Littrell 1983
benzene	RAPI	adult	TISPREP	PHYSIO			0.1% v/v	Benzene has a rapid and reversible effect on ISC, causing a decrease in ISC and net NA+ transport.	Blankemeyer and Bowerman 1993
benzene	TRCR	adult	IMMER	PHYSIO			250	Results not extracted from paper.	Garavini and Seren 1978 [k]
benzomate	EUOS	adult	INHAL	MORT			1-2%	1 h lethal time to survival past 3 d at 1% conc.	Kihara and Yamashita 1978
benzpyrene	XELA	adult	SUBDERM	PATH			1.5 mg (crystal)	Lymphosarcomas developed in 11 animals between 86 and 288 d.	Balls 1964
benzpyrene	XELA	juvenile	SUBDERM	PATH				9 animals developed lymphoid tumours of liver, kidney, spleen or abdominal wall muscle.	Balls 1964
benzpyrene	XELA	juvenile	INJECT	PATH				Tumours were found in the kidneys (5), liver (6) and spleen (6).	Balls 1964
BHC	RAPI	adult	IMMER	BEHAV	25	5.82-6.23	6.0-17.0	At 170 ppm 3 frogs dead after 30 d exposure, at each 80 and 60 ppm no mortality.	Kaplan and Overpeck 1964 [k]
BHC	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
bioresmethrin	XELA	adult	TISPREP	PHYSIO			5 $x10^{-6}$ M	Lateral line sense organ exposure from 2-3 h in vivo caused weak repetitive activity. Peripheral nerve exposure caused repetitive activity within first 2 h of exposure.	Vijverberg and van den Bercken 1982 [k]
bioresmethrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-5}	This conc. caused a max number of 2 end plate potentials and 1 action potential in muscle fiber.	Ruigt and Van den Bercken 1986
bis(2-hydroxypropyl) amine	XELA	larvae (3-4 wk)	IMMER	PHYSIO				Destruction of mature erythrocytes which stimulated differentiation and proliferation of erythrocytes in blood.	Zwart and Slooff 1987 [k]
boron	AMJE	egg	IMMER	HATSUC			0-100 mg/L	High boron caused body deformities and swimming difficulties.	Laposata and Dunson 1998
boron	AMMA	egg	IMMER	HATSUC			0-100 mg/L	High boron caused body deformities and swimming difficulties.	Laposata and Dunson 1998
boron	BUAM	egg	IMMER	HATSUC			0-100 mg/L	High boron caused body deformities and swimming difficulties.	Laposata and Dunson 1998
boron	RASY	egg	IMMER	HATSUC			0-100 mg/L	High boron caused body deformities and swimming difficulties.	Laposata and Dunson 1998
BPMC	EUOS	adult	INHAL	MORT			2%	72 h lethal time to survival past 3 d.	Kihara and Yamashita 1978
BTH14	RATE	tadpoles	IMMER	DEVOBS			10 mg/L	Delayed metamorphosis.	Paulov 1987c [k]
BTH14	RATE	tadpoles	IMMER	MORT				No mortality; weight gain and time to metamorphosis increased.	Paulov 1985
butanol (n-butanol)	AMTI	adult	DERMAL	BEHAV				Lavage with n-butanol had no effect on response to presentations of either cyclohexanone or dimethyl disulfide.	Mason and Morton 1982

Table 4 - Laboratory Studies - 9

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
butylated hydroxyanisole	PLWA	larvae	IMMER	GENOTOX			0.5-1.5	Frequency of micronucleated erythrocytes= 7- 8/1000 for all treatments.	Fernandez et al. 1989
Ca, pH	RATE	tadpoles	IMMER	DEVOBS		4-7	1-16mg Ca	Calcium had no effect on limb deformities but development rate increased at 16 mg Ca. With a different diet, growth rate decreased at pH= 4.	Cummins 1986b
cadmium sulfate	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc= 1 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al ?
caffeine	RACA	adult	TISPREP	PHYSIO			10mM	Caffeine prolonged the after hyperpolarization of an action potential, reduced the amplitude of ACh potential and induced slow rhythmic hyperpolarizations in a 20mM solution of calcium.	Fujimoto et al. 1980
caffeine	RAPI	adult	TISPREP	PHYSIO	15	7.0-7.2	5 mM	High lactate and glucose-6-phosphate conc. and a reduced phosphocreatine conc. were noted after caffeine.	Nassar-Gentina et al. 1981
caffeine	RAPI	adult	TISPREP	PHYSIO		7.1-7.2	5 mM	The distribution of precipitate in muscles exposed to caffeine indicate that this alkaloid acts at some site other than the sarcoplasmic reticulum.	McCallister and Hadek 1973
caffeine	XELA	adult	IMMER	MORT			0-350 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio= 20.	Daston et al. 1991
caffeine	XELA	embryo	IMMER	MORT			0-800 mg/L	Defects were noted in embryos exposed for four days postfertilization.	Daston et al. 1991
calcium chloride	RABR	tadpoles	IMMER	MORT		5.6-7.7	1-10 g/L	Mortality occurs after 24 h= 3 g/L or after 8 h= 5 g/L.	Mahajan et al. 1979
calcium chloride	RACA	tadpoles	IMMER	PHYSIO	25		2.5-5.0 mM	An increase in calcium exposure resulted in no effect on serum Ca.	Sasayama et al. 1983
calcium chloride	RANI	tadpoles	IMMER	PHYSIO	25		2.5-5.0 mM	An increase in calcium exposure resulted in no effect on serum Ca.	Sasayama et al. 1983
calcium chloride	RAPI	adult	TISPREP	PHYSIO				Radioactive calcium determines distribution and transport of calcium in cells.	Diecke and Stout 1981
calcium chloride	RATE	adult	TISPREP	PHYSIO				An increase of calcium resulted in increased inhibition of ion transport on frog skin and decrease in net sodium transport.	Curran and Gill 1962
calcium chloride	TRSC	adult	IMMER	PHYSIO				Elimination rates were not affected by the dietary treatment.	Hinton and Whicker 1992
caprolactam	PLWA	larvae	IMMER	GENOTOX			50-105	Frequency of micronucleated erythrocytes: 50 ppm= 10/1000; 100 ppm= 18/1000.	Fernandez et al. 1989
carbaryl	RABL	tadpoles	IMMER	BEHAV			3.5, 5.0, 7.2 mg/L	Tadpole activity diminished by 90% at 3.5 mg/L, activity completely ceased at 7.2 mg/L as early as 24 h after immersion.	Bridges 1997
carbaryl	RAES	adult	TISPREP	PHYSIO	22±2		10^{-3} M carbaryl	Carbaryl affects the permeability of Cl-; does not affect permeabiility of Na+ and thiourea across skin.	Lippe et al. 1992
carbaryl	RAES	adult	TISPREP	PHYSIO	22±2	8.1		Carbaryl increased the short-circuit current across the isolated frog skin in a dose-dependent manner. This effect was due to the stimulation of sodium absorption and chloride secretion.	Ardizzone et al. 1990
carbaryl	RAPI	adult	DERMAL	RESIDUE			1	Half time rate of dermal penetration 64 min.	Shah et al. 1983 [k]

Table 4 - Laboratory Studies - 10

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
carbaryl	RAPI	adult	TISPREP	PHYSIO			2 x10^{-4}M	Sig. increases in the short-circuit current and decreases in the resistance in abdominal skin.	Webb et al. 1979 [k]
carbaryl	RATE	tadpole (stage 25)	IMMER	BEHAV			0.1- 0.001%	Exposure to 0.001 - 0.005 % caused death within 10 - 24 h; short exposure (30, 15 min) caused frantic swimming.	Rzehak et al. 1977 [k]
carbaryl	RATI	adult	IMMER	PHYSIO			0.002- 0.006 %	Exposure had no effect on amylase or lipase activities.	Deshmukh and Keshhavan 1987 [k]
carbaryl	RATI	adult	IMMER	PHYSIO			0.004- 0.006 %	Hepatic vitamin A storage sig. reduced and serum vit A elevated.	Keshavan and Deshmukh 1984 [k]
carbaryl	RATI	tadpoles	IMMER	BEHAV			0-5 mg/L	Feeding and excretion increased with increasing conc. Mortality during metamorphosis sig. at 2 mg/L.	Peter Marian et al. 1983 [k]
carbaryl	XELA	tadpole (stage 19-20)	IMMER	PHYSIO			0.0001%- 0.1%	High conc. resulted in contraction and separation of muscle fibres, lower conc. resulted in bent tails, oedema, inhibited growth and development and up to 65% mortality.	Rzehak et al. 1977 [k]
carbaryl	XELA	tadpoles	IMMER	MORT	25		0.1-10	0.1 ppm erratic swimming and severe uncoordination; 10 ppm some stopped swimming completely; all recovered from exposure - 2 wks later: > 90% survived normally in all exposure conc. groups.	Elliot-Feeley and Armstrong 1982
carbaryl, UV-B	XELA	embryo	IMMER	HATSUC			0.88-293 µW/m^2 alone or with carbaryl	65 µW/cm^2- 100% mortality within 24 h with carbaryl yet <10% mortality without carbaryl.	Zaga et al. 1998
carbofuran	RAPI	adult	TISPREP	PHYSIO	22		10^{-3} - 10^{-5}M	Muscle contraction evoked by nerve or muscle stimulation were suppressed Response to indirect nerve stimulation was suppressed more effectively than response to direct muscle stimulation at 25 x 10^{-4} M.	Takeno et al. 1977 [k]
carbon disulfide	MIOR	embryo	IMMER	DEVOBS			0-20 µL/100mL	12 µL/100 mL induces abnormal morphogenesis of notochord and embryonic oedema, no mortality occurred. 16µL/100mL caused 90% mortality in 24 h and 100% mortality in 48 h.	Ghate 1985b
carbophenothion	RAPI	adult	IMMER	PHYSIO			120-200	Progressive anaemia, decreased white cell count, neutropenia, lymphcytosis, flaccid paralysis, extensive skin shedding.	Kaplan and Glaczenski 1965 [k]
Cd	AMGR	larvae	IMMER	DEVOBS	20±1	6.8	< 0.002- 0.5045 mg/L	Mean limb regeneration decreased as Cd increased after 24 d exposure.	Nebeker et al. 1994
Cd	AMGR	larvae (3 mo)	ORAL	RESIDUE	21±1	7.2	1173, 548,305,146,88,33 and 26 µg/g	No growth effects were seen in larval feeding. Tissues did increase in Cd conc. with increase in food exposure conc., but bioaccumulation did not occur in the larvae within the exposure time.	Nebeker et al. 1995
Cd	AMGR	larvae (3 mo)	IMMER	MORT	21±1	6.8	0.535,0.227,0.106,0.0045,0.013, <0.002 mg/L	No mortality occurred but growth was sig. reduced at 0.535 and 0.227 mg/L. LOAEL= 0.227 mg/L, NOAEL= 0.106 mg/L. The tissue conc. increased from 0.79 µg/g at 0.013 mg/L to 4.13 µg/g at 0.535 mg/L.	Nebeker et al. 1995

Table 4 - Laboratory Studies - 11

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Cd	AMGR	metamorphosis (18 mo)	ORAL	RESIDUE			5701, 2458,and 982 µg/g	No effects on growth occurred. Tissues did increase in Cd conc. with increase in food exposure conc., but food retention was low at the two higher food conc. because of regurgitation of the pellets.	Nebeker et al. 1995
Cd	AMTI	larvae	TISPREP	PHYSIO	17-25		0.1-10 mM	Decrease in photocurrent; Cd with Ca blocked the entry of ions.	Menini and Rispoli 1988
Cd	BUAR	embryo	IMMER	DEVOBS	20, 30		6 $x10^{-7}$ - 1.5 $x10^{-5}$M	At high conc. of Cd early malformations are sig. increased whereas at low conc. higher temp. prevents alterations.	Perez-Coll et al. 1986
Cd	BUAR	embryo	IMMER	MORT	18-21		0.1-4 mg/L	Results not extracted from paper.	Herkovits and Pérez-Coll 1993
Cd	BUAR	embryo (2 cell stage)	IMMER	DEVOBS			0.03-4.0	High mortality; delayed development; alterations in gastrulation and neurulation processes.	Perez-Coll et al. 1985 [k]
Cd	BUAR	embryo (stage 5-25)	IMMER	RESIDUE			0.06- 0.50 mg/L for 15-240 min	Similar uptake levels were found in all stages of embryos. Range of uptake after 60 min of exposure was 0.0002- 0.006 µg/embryo and 0.004- 0.023 µg/embryo after 240 min of exposure.	Perez-Coll and Herkovits 1996
Cd	BUAR	tadpoles	IMMER	PHYSIO	20±1	5.3-6.8	1.0 mg/L Cd	There is evidence that inorganic ions have a protective action on the toxic effects of Cd.	Muino et al. 1990
Cd	BURE	adult (F)	INJECT	RESIDUE			6.2	Conc. determined after 24 - 96 h. Highest in liver 127 mg/g after 48 h, dropped to 101 after 96 h; 72 mg/g in muscle after 24 h dropped to 14 mg/g after 96 h; heart 13 - 21; kidney 29-47; lung 5 - 18; spleen 1 - 3; blood 2 - 17.	Hilmy et al. 1986b [k]
Cd	CYPY	adult	TISPREP	PHYSIO			10^{-4} M - 10^{-7} M	10^{-7} M - 10 $^{-5}$M did not affect electrical properties of stomach mucous epithelial cells. 10^{-4} M decreased membrane potential to 66% of control.	Kanno et al. 1978 [k]
Cd	GACA	egg	IMMER	DEVOBS		7.5-8.0	1.34-122.8	Conc. effect at hatching and post hatching mortality.	Birge et al. 1977 [k]
Cd	NOVI	adult	IMMER	DEVOBS			2.25-6.75	Increased mortality with increased Cd conc. to 80% at 675 ppm Cd after 51 d. Onset of limb regeneration delayed in all exposure groups.	Manson and O'Flaherty 1978 [k]
Cd	RACA	adult	TISPREP	PHYSIO			2 mM	413 % increase in short circuit current with epidermal application; no change in SCC when externally applied to abdominal skin.	Takada and Hayashi 1978a [k]
Cd	RACA	adult	INJECT	RESIDUE			0.5 once + 1.0 body wt repeated	Cd conc. (SD): 24.3 (9.5) µg/g ww, 181 µg/g whole tissue for liver; 21.8 (6.7) µg/g ww, 22.5 µg/g whole tissue; metallothionein was induced in liver and kidney tissue.	Suzuki and Akitomi 1983
Cd	RACA	adult	TISPREP	PHYSIO			2 mM	Decreased skin resistance upon epidermal application.	Arita et al. 1979 [k]
Cd	RACA	adult	IMMER	PHYSIO			5.0-12.5µM	Eyes: depressed rod receptor potential 50% in high Cd while leaving cone response unaffected.	Fox and Sillman 1979 [k]

Table 4 - Laboratory Studies - 12

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Cd	RACA	adult	TISPREP	PHYSIO			1 mM	Increase short circuit current to 126%. Cd uncompetitive on the binding reaction of Na with a Na entry channel in abdominal skin. No interaction between Cd and ouabain effects on Na transport.	Takada and Hayashi 1981a [k]
Cd	RACA	adult	TISPREP	PHYSIO			10 µM	Reduced acetylcholine release from cardiac nerve. Did not alter compound action potential of nerve trunk or affect pacemaker activity.	Hayashi and Takayama 1978 [k]
Cd	RACA	adult	TISPREP	PHYSIO			5-50 µM	Synaptic transmission sensitive to the toxic effects of lead and cadmium.	Kober 1977b
Cd	RACA	adult	TISPREP	PHYSIO			10^{-7} - 2 mM	Uptake into abdominal skin 150 µM/kg ww with 2 mM treatment for 20 min. Conc. effect in activity of ouabain-sensitive and ouabain-insensitive ATPase inhibition.	Takada and Hayashi 1978b [k]
Cd	RACA	tadpoles	IMMER	RESIDUE				Results not extracted from paper.	Burger and Snodgrass 1998
Cd	RACA	tadpoles	IMMER	RESIDUE				66.8 (5.6) µg/kg= whole body mean conc. (standard deviation).	Burger and Snodgrass 1998
Cd	RACA	tadpoles	INJECT	RESIDUE			0.5 body wt repeated	Cd conc. in liver (SD): 12.1 (3.4) µg/g ww, 8.1 (0.74) µg/g whole tissue; metallothionein induction in liver.	Suzuki and Akitomi 1983
Cd	RACL	tadpoles	IMMER	RESIDUE				Residues accumulated preferentially in the liver with a BCF of 3.41 after 25d of exposure to 1 mg/L.	Richard 1993
Cd	RAHE	adult (M)	INJECT	PHYSIO			0.5 mg	Male reproductive effects; enzyme activities altered.	Kasinathan et al. 1987
Cd	RAJA	adult	INJECT	RESIDUE			0.225 Cd/kg	Liver: Cd= 53.5; Cu= 175 Kidney: Cd= 65.7; Cu= 9.04.	Suzuki et al. 1986 [k]
Cd	RAJA	adult	INJECT	PHYSIO			0.225	No effect on conc. of 10 elements in livers and kidneys except Cu.	Suzuki et al. 1986 [k]
Cd	RANI	adult	INJECT	RESIDUE			0.225 Cd/kg	Liver: Cd= 53.9; Cu= 48.2 Kidney: Cd= 56.8; Cu= 10.	Suzuki et al. 1986 [k]
Cd	RANI	adult	INJECT	PHYSIO			0.225	No effect on 10 element conc. except Cu.	Suzuki et al. 1986 [k]
Cd	RANI	egg	IMMER	DEVOBS			4	Partial reduction in primordial germ cells at the 9-12 mm body length stage.	Hah 1978 [k]
Cd	RANI	tadpoles	IMMER	DEVOBS			4	Abnormalities in many embryos.	Hah 1978 [k]
Cd	RAPI	adult	TISPREP	PHYSIO			10^{-3} M	No inhibition of Na transport across isolate epithelial tissue, however, inhibition transport across frog urinary bladder and large intestine.	Hillyard et al. 1979 [k]
Cd	RAPI	embryo	IMMER	MORT	21.1-22.2		0-2.5	Increased survival with exposure occurring during later developmental stages and lower Cd conc.	Birge and Just 1975b [k]
Cd	RAPI	embryo-larvae	IMMER	MORT			1.0-76.5 in water	99% survival after exposure to enriched sediments.	Francis et al. 1984 [k]
Cd	RAPI	larvae	IMMER	RESIDUE			1.04-1074 sediment	Results not extracted from paper.	Francis et al. 1984 [k]

Table 4 - Laboratory Studies - 13

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Cd	RARI	adult (F)	IMMER	RESIDUE			200	4 groups of frogs were analyzed according to number of days left in detoxification after exposure (range= 10-30 d); liver, kidney, skin and muscle residues.	Vogiatzis and Loumbourdis 1997
Cd	RATE	adult	TISPREP	PHYSIO				Changes in the potential dif. across the skin; suggested to be a reversible effect.	Natochin and Jones 1992
Cd	RATE	adult	INJECT	RESIDUE			0.12- 0.24 mg/100 g/d for 10 d	Sig. accumulation in liver and kidney. Within 10 d of exposure to > 0.002 % $CdCl_2$ in the aquatic environment, sig. amounts of Cd found in skin; small amounts in liver and kidney.	Vail'eva et al. 1987 [k]
Cd	RATE	adult	INJECT	PHYSIO			0.12- 0.24 mg/100g/d	Subcutaneous injections for 10 d.	Vail'eva et al. 1987 [k]
Cd	RAXX	tadpole (mid-limb bud stage)	IMMER	PHYSIO				Developing liver and mesonephros are involved in responses to toxic metals, accumulation of Cd ions are present after aqueous Cd exposure.	Zettergren et al. 1991b
Cd	RHSC	adult	INJECT	PHYSIO				Injection of 0.225 mg Cd/kg 11 times during 15 d induced metallothionein (single isoform).	Suzuki et al. 1986 [k]
Cd	TRSC	juvenile	INJECT	PHYSIO			10 body wt/d for 6 d	Cadmium in liver was bound to metallothioneins which had a composition similar to those MTs found in mammalian liver.	Thomas et al. 1994
Cd	TRSP	adult	ORAL	RESIDUE			2 mg	Authors suggest that softshell turtles are able to tolerate relatively large conc. of Cd initially and over long periods of time.	Robinson and Wells 1975
Cd	XELA	adult	IMMER	RESIDUE			29	100 d exposure: whole body: 3.77; liver 4.02; kidney 8.22.	Canton and Slooff 1982a [k]
Cd	XELA	adult	TISPREP	PHYSIO				Decreased permeability constant in K and Na systems in myelinated nerve fibres; reversibly shifted Na activation curve in positive direction along potential nerve axis.	Arhem 1980 [k]
Cd	XELA	adult	TISPREP	PHYSIO			0.3	Histopathological lesions on lung.	Canton and Slooff 1982a [k]
Cd	XELA	adult	ORAL	RESIDUE	24			Low accumulation without affecting essential metal levels: approx. 2.2 mg Cd/frog (liver and kidney: 1.0 and 0.5 µg respectively). Intramuscular administration: accumulation of Cd in kidney and liver by inducing a Cd-binding protein.	Suzuki and Tanaka 1983
Cd	XELA	embryo	IMMER	DEVOBS				Embryos cannot tolerate >2 ppm Cd, stages of organogenesis are most sensitive.	Ramusino 1980 [k]
Cd, Mg	XELA	embryo	IMMER	DEVOBS	18		0.001-10	High Mg during Cd exposure resulted in reduced effects. Low Mg and Cd exposure lead to increased severity in deformation conc. effect with Cd exposure.	Miller and Landesman 1978 [k]
Cd, Zn	BUAR	embryo	IMMER	DEVOBS			0.25 mg/L Cd; 0,2,4 mg/L Zn	80% survival and 15% malformed when exposed to Cd alone; 92% survival and 11% malformed when exposed to Cd and 2mg/L Zn.	Herkovits and Pérez-Coll 1990
Cd, Zn	BUAR	embryo	IMMER	MORT			1 mg/L	This study showed that by employing potentized microdose solutions it is possible to reduce the lethal effects of cadmium on BUAR embryos to varying degrees.	Herkovits and Pérez-Coll 1991b

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
$CdCl_2$	ALMI	adult	INJECT	PHYSIO			1.0 body wt	Cadmium was found in liver bound to proteins.	Bell and Lopez 1985
$CdCl_2$	RATI	adult	INJECT	PHYSIO			200 µg	Decreased ovarian and oviduct weight / 100 g body wt. Ovaries contained large number of yolk atretic follicles.	Pramoda and Saidapur 1986 [k]
$CdCl_2$	XELA	adult	IMMER	MORT			0-1.0 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>100.	Daston et al. 1991
$CdCl_2$	XELA	embryo	IMMER	MORT			0-10.0 mg/L	Defects were noted in embryos exposed for four days postfertilization.	Daston et al. 1991
$CdCl_2$	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc.= 1 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
$CdCl_2$	XELA	tadpole (stage 54-58)	IMMER	MORT			50-100 mg/L	Pretreatment with Cd or Zn resulted in decreased mortality with subsequent exposure to Cd conc. effect with Cd exposure.	Woodall et al. 1988 [k]
cekapur	RAES	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	100 % mortality in all exposure groups.	Gunther and Plotner 1986
chloranil	XELA	embryo (tail bud)	IMMER	PHYSIO			0-2	5% survival at 2 ppm after 24 h. Surviving embryos showed alterations in the development of the otolith, optic cup and pigmentation. Movement was sporadically convulsive.	Anderson and Prahlad 1976 [k]
chlordane	ALMI	adult	TISPREP	DEVOBS				No interaction with estrogen receptors.	Vonier et al. 1996
chlordane	ALMI	adult (F)	TISPREP	PHYSIO				Estrogen receptors from alligator oviductal tissue tested with various environmental chemicals and with 17ß-estradiol.	Arnold et al. 1997
chlordane	BUAR	embryo	IMMER	MORT			1-15	100 % mortality at 5 and 15 ppm on day 20 and 14 respectively. 1 ppm not toxic.	Juarez and Guzman 1984a [k]
chlordane	RAPI	adult	IMMER	BEHAV		5.7-5.79	0.25- 0.5	Mortality= 8 of 20 frogs at 0.5 ppm. No mortality at 0.38 or 0.25 ppm. Neuromuscular changes produced excessive thrashing and abnormal reaction to stimulation.	Kaplan and Overpeck 1964 [k]
chlordane	RAPI	adult	TISPREP	PHYSIO			2 $x10^{-4}$ M	No sig. changes in short circuit current or resistance in abdominal skin.	Webb et al. 1979 [k]
chlordane	XELA	adult	IMMER	RESIDUE			5 ppb	Time for max absorption was 96 h exposure (biomass 80g/8L); bioaccumulation factor for cis-chlordane was 108; max conc. accumulated was 0.207 ppm; half-life 3.3 wks.	Khan et al. 1979b
chlordane	XELA	adult	IMMER	PHYSIO			1	Vitellogenin induction was not dif. between chlordane treated frogs and controls.	Palmer et al. 1998
chlordimeform	BURE	adult	ORAL	PHYSIO			90	Liver neoplastic lesions (lymphocarcinomas) appeared in 15 of 82 animals. Chlordimeform is liver carcinogen in BURE.	El-Mofty et al. 1982
chlordimeform	RACA	adult	TISPREP	PHYSIO			10^{-3} - 10^{-5}M	Caused slow contraction and inhibited ACh-induced contraction in noncompetitive manner. K+ induced contraction was also inhibited in non-competitive manner.	Watanabe et al. 1975 [k]
chlordimeform	RANI	adult	TISPREP	PHYSIO			10^{-3} - 10^{-5}M	Contraction and inhibition of ACh-induced contraction in non-competitive manner.	Watanabe et al. 1975 [k]
chlordimeform	RAPI	adult	TISPREP	PHYSIO			0.1 - 1 mM	0.1 mM suppressed amplitude of spontaneous miniature end-plate potentials. 1 mM blocked end-plate potential completely.	Wang et al. 1975 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
chlordimeform	XXFR	adult	TISPREP	PHYSIO				Local anesthetic activity (0.6 X procaine) on isolated frog sciatic nerves.	Yim et al. ?
chloroaniline	XELA	embryo	IMMER	DEVOBS			<0.1-100	All embryos in 100 ppm died within 3 wks. 85 % and 20 % of animals held at 1 and 10 ppm respectively had completed larval development after 13 wks.	Dumpert 1987 [k]
chlorobenzene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
chloroform	RAPA	embyro	IMMER	MORT			0.0075-40.0 mg/L	100 % hatch at 0.0075 mg/L; 58 % hatch at 40.0 mg/L.	Birge et al. 1980
chloropyrifos	BUBO	juvenile	IMMER	PHYSIO	23-24		30 ppb	Exposure of hydrated toads lowered temp tolerance.	Johnson and Prine 1976 [k]
chloropyrifos	EUOS	adult	INHAL	MORT			1-2%	24-72 h lethal time.	Kihara and Yamashita 1978
chloropyrifos	HYRE	tadpole (3 wk)	IMMER	PHYSIO			25-500 ppb	Temp. tolerance sig. lowered.	Johnson 1980a [k]
chloropyrifos	RAPI	adult	IMMER	PHYSIO			10^{-9} - 10^{-5}M	Acetylcholine in ciliated epithelial cultures was measured in frog palate and frequency of ciliary beats decreased with exposure to the compounds.	Swann et al. 1996
chloropyrifos	TRVU	adult	IMMER	MORT	18		96	EC50 was greater than conc. measured for locomotion defects or mortality.	van Wijngaarden et al. 1993
chlorpyrifos-methyl	BUBO	juvenile	IMMER	PHYSIO	23-24		30 ppb	Exposure of hydrated toads sig. lowered temp tolerance.	Johnson and Prine 1976 [k]
chromium salts	PLWA	larvae	IMMER	GENOTOX			125 ml/L, 250 ml/L of river water	High numbers of micronucleated erythrocytes (22/1000 erythrocytes).	Gauthier et al. 1993
cismethrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-5}	1-4 end plate potentials and no repetitive activity with respect to action potentials.	Ruigt and Van den Bercken 1986
cismethrin	XELA	adult	TISPREP	PHYSIO	8-22		1-5 x10^{-6} M	5 x 10^{-6} M caused repetitive activity within the first 2 h of exposure.	Vijverberg et al. 1982b [k]
Cl	RAPI	embryo	IMMER	DEVOBS			0- 0.9 mg/L	Prior to hatching (stage 19) no dif. observed between treated and controls. At stages 19-25: at 0.9 and 0.6 mg/L there was 100% mortality post-hatch. At 0.3 and 0.04 mg/L there was slower development and reduced survival.	Tarnowski 1977
$ClNO_2$	RACA	tadpoles	IMMER	PHYSIO	25	7.3	13:1 and 5.2:1 ratio Cl:NO_2	Methemoglobin levels were not elevated above control levels.	Huey and Beitinger 1980a
Co	CYPY	adult	TISPREP	PHYSIO			10^{-7} - 10^{-4} M	No affect on electrical properties of the stomach epithelial cells.	Kanno et al. 1978 [k]
Co	XELA	adult	TISPREP	PHYSIO				Decreased permeability constant in K and Na systems, reversibly shifted Na activation curve in positive direction along potential nerve axis.	Arhem 1980 [k]
Congo red	XELA	adult	IMMER	MORT			0-1000 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>10.	Daston et al. 1991

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Congo red	XELA	embryo	IMMER	MORT			0-1000 mg/L	Death and defects were noted in embryos exposed for 4 d post-fertilization.	Daston et al. 1991
copper sulfate	RACY	adult	INJECT	PHYSIO			100-200 µg	Progressive reduction in total number of blood cells following i.m. injection of 100 and 200 µg $CuSO_4$ for 40 d. White blood cells increased for first 7 d then gradually decreased. Hemoglobin reduced.	Patil and Shivaraj 1984 [k]
copper sulfate	RAPI	adult	IMMER	MORT		4.9-5.7	0.0001- 0.1 %	100 % mortality > 0.005%; 100% survival < 0.0015 %.	Kaplan and Yoh 1961 [k]
copper sulfate	RAPI	egg	INJECT	MORT			0.04-1.56 mg/L	No effect.	Landé and Guttman 1973 [k]
copper sulfate	RAPI	tadpoles	INJECT	MORT			0.04-1.56 mg/L	0.31 mg/L was fatal to tadpoles. Weights of tadpoles grown in 0.06 or 0.16 mg/L were lower than controls.	Landé and Guttman 1973 [k]
copper sulfate	XELA	adult (F)	IMMER	MORT	22	5.2-5.7	0.0005% - 0.10%	At conc. of 0.0015%: 11/16 died within 24 d; at conc. of 0.002%: 100% mortality occurred within 15 d.	Fingal and Kaplan 1963
copper sulfate	XXXA	juvenile	IMMER					<0.2 mg/L resulted in 100% mortality; Spanish paper.	de la Torre and Lopez Revol 1991
CORT	KASE	tadpoles	IMMER	DEVOBS			1.1 µM	After 5 d, frogs developed a hole in the snout, loss of connective tissue and epidermis, shorter bodies and hind limbs. These effects are similar to those of DDT.	Hayes et al. 1997
coumaphos	THRA	adult	DERMAL	BEHAV				Investigative behaviour noted.	Secoy 1979
cow manure	RATE	adult (M)	DERMAL	BEHAV				Frogs exposed to wet cow manure exhibited high lung and buccal ventilation rates within 15 min. Exposure to dry manure did not result in these effects.	Oldham et al. 1993
Cr	PLXX	larvae	IMMER	GENOTOX			0-10 mg/L	At 1 mg/L, sig. number of micronucleated red blood cells formed.	Godet et al. 1996
Cr	RACA	tadpoles	IMMER	RESIDUE				Results not extracted from paper.	Burger and Snodgrass 1998
Cr	RATI	tadpoles	IMMER	PHYSIO			2	100 % mortality after 72 h > 2 ppm. Abnormalities observed in pigmentation, tail fin and alimentary canal.	Abbasi and Soni 1984 [k]
Cr, Zn, Fe	PLXX	larvae	IMMER	GENOTOX			0-2.5 mg/L (Cr)/0-25 mg/L (Fe)/0- 0.75 mg/L (Zn)	Sig. number of genotoxicity effects, more dramatic than when metals were tested alone.	Godet et al. 1996
crude oil	CACA	juvenile	ENVIRON	BEHAV				Results not extracted from paper.	Vargo et al. 1986
crude oil	CHMY	juvenile	ENVIRON	BEHAV				Limited ability to avoid oil slicks; respiration, skin, blood chemistry and salt gland function sig. affected. Oil in ears, eyes, esophagus and feces.	Vargo et al. 1986
crude oil	RAAR	embryo	IMMER	DEVOBS			0.25-1.00 ml/L	Highest embryonic mortality at 0.75 ml/L. All hatched larvae died within a few days 0.25 ml/L 88% of larvae died within first wk.	Pyastolova and Danilova 1986 [k]
Cs	COCO	adult	RAD	PHYSIO				Results not extracted from paper.	Staton et al. 1974
Cs	ELOB	adult	RAD	PHYSIO				Results not extracted from paper.	Staton et al. 1974
Cs	LAGE	adult	RAD	PHYSIO				Results not extracted from paper.	Staton et al. 1974

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Cs	MAFL	adult	RAD	PHYSIO				Results not extracted from paper.	Staton et al. 1974
Cs	NATA	adult	RAD	PHYSIO				Results not extracted from paper.	Staton et al. 1974
Cs	NESI	adult	RAD	PHYSIO				Results not extracted from paper.	Staton et al. 1974
Cs	PHPL	adult	RAD	MORT				Female sterility owing to regression of ovaries was judged to be the cause of the population decline.	Medica et al. 1973
Cu	BUAM	tadpoles	IMMER	BEHAV				Avoided 0.10 mg/L; attracted to 0.93 mg/L.	Birge et al. 1993
Cu	BUBO	larvae	IMMER	DEVOBS			0.02-3.7 mg/L	High conc.: 100 % mortality within 12 h. Low conc.: all metamorphosed.	Porter and Hakanson 1976 [k]
Cu	CYPY	adult	TISPREP	PHYSIO			10^{-7} - 10^{-4} M	10^{-4} M Cu decreased membrane potential to 67% of control. Effect of ion increased as conc. increased. Slight changes in effective membrane resistance and electrical coupling.	Kanno et al. 1978 [k]
Cu	RAPI	adult	TISPREP	PHYSIO			10^{-6} M	10^{-6} M Cu little effect. 10^{-6} M Cu and 10^{-5} ACh cause larger contractions than ACh alone. Exposure to Cu and ACh for 10-15 min resulted in spontaneous spasmodic contraction.	Miller and MacKay 1983 [k]
Cu	RATE	tadpoles	IMMER	DEVOBS			0.01- 0.05 %	Inhibited growth, accumulation of pigment in liver and stomach cells; high mortality; after transfer to tap water some survivors returned to normal.	Jordan et al. 1977 [k]
Cu	XELA	adult	INJECT	RESIDUE			1	Residues, Cu sig. accumulated in kidney with i.m. injection.	Suzuki et al. 1983 [k]
Cu	XELA	adult	TISPREP	PHYSIO				Slowed kinetics of K system; decreased permeability in K and Na systems, reversibly shifted Na activation curve in positive direction along potential nerve axis in myelinated nerve.	Arhem 1980 [k]
Cu	XXFR	embryo	IMMER	MORT			N/500000 (see paper for details)	Few tadpoles survived many days after leaving the spawn.	Dilling and Healey 1926 [k]
Cu, Zn	RAPI	tadpoles	IMMER	BEHAV				All mixture experiments with Cu and Zn resulted in 100 % mortality within 9 h of exposure indicating synergistic action.	Gottschalk 1995
cyanatryn	RATE	tadpoles	IMMER	BEHAV			0.2-200	Animals exhibited lethargy, spasmodic twitching, lack of feeding with exposure at various conc.	Scorgie and Olsen 1979 [k]
cyanazine	ALMI	adult	TISPREP	DEVOBS			19	IC50= 19, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
cyanide	RAPI	adult	TISPREP	BEHAV		7.4	10^{-1} - 10^{-3}	Rapid decline in sciatic nerve response occurred at 10^{-1} but very little inactivation noted for 10^{-2}, 10^{-3}.	Beck et al. 1982
cyclohexanone	AMTI	adult	DERMAL	BEHAV			0.1- 0.5 M	Lavage with cyclohexanone decreased response to cyclohexanone. 0.05 M produce more persistent response decrements than 0.01 M.	Mason and Morton 1982
cyclohexanone	DEXX	adult	DERMAL	BEHAV			2, 16 and 25	Hyperactivity; weight loss; no mortality immediately after exposure.	Whitaker 1993
cycloheximide	CAXX	adult	INJECT	PATH			1-10	Mortality occurred after 9, 16 and 21 d for 3 of the lizards after 1mg/kg injections.	Coulson and Hernandez 1971

Table 4 - Laboratory Studies - 18

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
cyclophosphamide	PLWA	larvae	IMMER	GENOTOX			0.5-10	Frequency of micronucleated erythrocytes: 0.5 ppm= 12/1000; 10 ppm= 171/1000.	Fernandez et al. 1989
cyfluthrin	AGAG	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
cyfluthrin	AGCA	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
cyfluthrin	BOCO	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
cypermethrin	RAES	adult	TISPREP	PHYSIO			1,10.100,200, 500 µM	No depolarization of axon membrane occurred; dif. results than those found for deltamethrin and fenvalerate.	Tippe 1987
cypermethrin	RATE	adult	IMMER	RESIDUE				Results not extracted from paper.	Edwards and Millburn 1985 [k]
cypermethrin	RATE	adult	TISPREP	PHYSIO	15			Biotransformation accounts for some of the observed dif. in the susceptibility of these four species to pyrethroids.	Edwards et al. 1987
cypermethrin	RATE	adult (m/f)	IMMER	RESIDUE			300 in water	Mean conc. of cis-cypermethrin in brain associated with toxic effects: 0.08.	Edwards et al. 1986
cypermethrin	RATE	tadpoles	IMMER	DEVOBS	20		0.001- 0.025	Clastogenic activity and increase in number of micronucleated red blood cells.	Rudek and Rozek 1992
cypermethrin	XELA	adult	TISPREP	PHYSIO	20-24			Frequency-dependent suppression of action potential, no repetitive activity.	van den Bercken and Vijverberg 1979
cypermethrin	XELA	adult	TISPREP	PHYSIO				In lateral line organs long trains of impulses in vitro at 1-5 x 10^{-6} M for 3 h; in sciatic nerve up to 10^{-5} M for more than 24 h did not induce repetitive activity after a single stimulus.	Vijverberg et al. 1982b [k]
cypermethrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-4} - 10^{-6}	No repetitive activity with respect to end plate potentials were observed, however, up to 60 action potentials occurred.	Ruigt and Van den Bercken 1986
cypermethrin	XELA	tadpoles	IMMER	DEVOBS	20		0.001- 0.025	0.015- 0.025 ppm: clastogenic activity and increase in number of micronucleated red blood cells.	Rudek and Rozek 1992
cypermethrin	XXFR	adult	IMMER	PHYSIO				Fenvalerate and cypermethrin inhibit Na transport in frog skin.	Yu et al. 1986
cytosine arabinoside	LAVI	egg/embryo	INJECT	DEVOBS	25		900-1200 mg	Various developmental defects observed.	Raynaud and Wolff 1981
DDA	ALMI	adult	TISPREP	DEVOBS				No interaction with estrogen receptors.	Vonier et al. 1996
DDC	MIOR	embryo	IMMER	DEVOBS			0.5	Oxidative damage to embryonic cells; biproducts and chelating agents effects also reported.	Ghate 1985a
DDCN	RATE	tadpoles (stages 5-13)	IMMER	RESIDUE	21-32		0.001-1.0	Abnormal behaviour; whole body residues from exposure to 1.0 ppm increased up to 48 h then decreased by 120 h; no mortality occurred.	Cooke and Zoro 1975
DDD	ALMI	adult	TISPREP	DEVOBS			>50	IC50>50, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
DDD	ALMI	adult (F)	TISPREP	PHYSIO				Displaced estrogen at binding sites.	Crain et al. 1998a
DDD	ALMI	egg	TISPREP	DEVOBS				DDE in combination with DDD in eggs interacted with 17ß-estradiol and reduced binding.	Vonier et al. 1996

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DDD	CHPI	adult	ORAL	RESIDUE	23-27		100 body wt	3, 6, 12, 24 h and 3 wks, respectively: Liver: 0.165, 0.070, 0.040, ND, 0.610. Brain: ND, 0.208, ND, ND, 1.502. Fat: ND, ND, ND, ND, 5.295. Excrement: 0.002, 0.028, 0.143, 0.081, 0.083 (ppm).	Owen and Wells 1976
DDD	RAPI	adult	TISPREP	PHYSIO			2 x10^{-4}M	Decrease in skin resistance and increase in short-circuit current.	Webb et al. 1979 [k]
DDD	TRSC	adult	ORAL	RESIDUE	23-27		100 body wt	3, 6, 12, 24 h and 3 wks, respectively: Liver: 0.014, 0.204, 0.244, 0.141, 0.109. Brain: 3.166, 2.041, 2.333, ND, 17.194. Fat: ND, ND, ND, ND, 55.55. Excrement: 0.049, 0.041, 0.049, 0.048, 0.221.	Owen and Wells 1976
DDD	TRSC	adult	TISPREP	PHYSIO			53, 106 and212 µM	Sig. inhibition of brain cell membranes and soluble and light microsomes, as well as highly sig. inhibition of all other fractions occurred at 212 µM.	Witherspoon and Wells 1975
DDD	TRSC	adult (F)	TISPREP	PHYSIO				Displaced estrogen at binding sites.	Crain et al. 1998a
DDE	ALMI	adult	TISPREP	DEVOBS			>50	IC50>50, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
DDE	ALMI	adult (F)	TISPREP	PHYSIO				Displaced estrogen at binding sites.	Crain et al. 1998a
DDE	ALMI	egg	TISPREP	DEVOBS				DDE in combination with DDD in eggs interacted with 17ß-estradiol and reduced binding.	Vonier et al. 1996
DDE	CHPI	adult	ORAL	RESIDUE	23-27		100 body wt	3, 6, 12, 24 h and 3 wks, respectively: Liver: 0.064, 0.182, 0.163, 0.171, 0.786. Brain: ND, 0.277, ND, 0.179, 0.30. Fat: 1.084, 1.036, 2.553, 2.406, 6.576. Excrement: ND, ND< 0.001, 0.003, 0.018.	Owen and Wells 1976
DDE	TRSC	adult	ORAL	RESIDUE	23-27		100 body wt	3, 6, 12, 24 h and 3 wks, respectively: Liver: 0.256, 0.292, 0.361, 0.237, 0.230. Brain: 0.284, 0.423, 0.411, 0.007, 0.725. Fat: 7.682, 14.104, 9.003, 8.343, 7.580. Excrement: 0.001, 0.004, ND, 0.001, 0.038.	Owen and Wells 1976
DDE	TRSC	adult	TISPREP	PHYSIO			53, 106 and 212 µM	In vitro treatment with 212 µM resulted in inhibition of all cellular fractions of the brain. 106 µM had similar effects, except in myelin and cell membranes, where little effect was noted.	Witherspoon and Wells 1975
DDE	TRSC	adult (F)	TISPREP	PHYSIO				Displaced estrogen at binding sites.	Crain et al. 1998a
DDOH	ALMI	adult	TISPREP	DEVOBS			11.1	IC50= 11.1, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
DDT	ACCR	adult	DERMAL	MORT	21.1-23.9		0.01- 0.05 g/mL	Field observations following treatment suggested selective pressures appeared sufficient to have forced expression of resistant genotypes if present in the population.	Boyd et al. 1963
DDT	ACGR	adult	DERMAL	MORT	21.1-23.9		0.01- 0.05 g/mL	Field observations following treatment suggested selective pressures appeared sufficient to have forced expression of resistant genotypes if present in the population.	Boyd et al. 1963
DDT	AGPI	juvenile	DERMAL	PATH				Behavioural abnormalities; recovery after 1 wk.	Munro 1949

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DDT	ALMI	adult	TISPREP	DEVOBS			>50	IC50>50, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
DDT	ALMI	adult (F)	TISPREP	PHYSIO				DDT had the greatest binding affinity to estrogen sites.	Crain et al. 1998a
DDT	BUAM	adult	IMMER	PHYSIO			35	After 1-3 h, a slight increase in short-circuit current was observed in transepithilial tissue in toad bladder. Oxygen consumption was also low and a loss of intracellular potassium occurred.	Sides and Finn
DDT	BUAR	embryo	IMMER	DEVOBS	room		1, 5, 15	5 and 15 ppm produced 100 % mortality on day 16 and 12 respectively. 1 ppm reduced time to metamorphosis.	Juarez and Guzman 1984a [k]
DDT	BUAR	tadpole (31 d)	IMMER	PHYSIO			1	Activity of beta-glucuronidase in tail fin treated with 21 ppm DDT. Activity in treated toads sig. greater than in control.	Juarez and Guzman 1986 [k]
DDT	BUBU	tadpoles	IMMER	RESIDUE			0.005- 0.5	0.09 - 478 DDT; 0.22 - 5.1 DDE (24-48h exposure).	Cooke 1972b [k]
DDT	BUBU	tadpoles	IMMER	BEHAV				BUBU more resistant than RATE. BUBU survived despite tissue conc. of > 300 ppm. Tadpoles most susceptible just before or just after developing hind limb buds.	Cooke 1972b [k]
DDT	BUXX	adult	IMMER	MORT				Mortality occurred in: 1 of 4 taking poisoned insects; 2 of 3 receiving capsules; 1 of 2 sprayed;1 of 2 treated with drops of standard spray on water. Total mortality of the 11 toads was 45%.	Logier 1949
DDT	CHPI	adult	ORAL	RESIDUE	23-27		100 body wt	3, 6, 12, 24 h and 3 wks, respectively: Liver: 0.336, 0.883, 0.044, ND, 3.936. Brain: ND, 2.828, ND, 2.890, 2.890. Fat: 0.454, ND, ND, ND, 33.068. Excrement: 0.045, 0.028, 0.143, 0.081, 0.237.	Owen and Wells 1976
DDT	CRNI	juvenile	ORAL	RESIDUE			1 (83.4µCi/kg)	High levels of radioactivity are present in yolk sac, bile and liver. Strong radiolabeling in the bile and liver indicate that the hatchlings possess the ability to excrete substantial amounts of 14C-DDT derived radioactivity via bile.	Skaare et al. 1991
DDT	EUOS	adult	INHAL	MORT			1-2%	48 h lethal time for both conc.	Kihara and Yamashita 1978
DDT	RACA	adult	IMMER	MORT				One fed 6 poisoned flies, developed slight symptoms for 1 d and recovered. One was dusted with DDT and remained unaffected. One was fed two capsules in the stomach of a small frog; it developed symptoms in 20 h and died in 2 d.	Logier 1949
DDT	RACA	tadpole (limb bud)	IMMER	DEVOBS				Reduced tail regeneration in all exposed groups Decrease tail regeneration (mm) in higher DDT conc.	Weis 1975 [k]
DDT	RACL	adult	IMMER	MORT				Mortality occurred in: 3 of 4 fed poisoned insects, 1 of 1 fed one capsule, 1 of 1 immersed shoulder-deep in emulsion for 2 h, 1 of 1 treated with 1 drop of standard spray on water for 2.5 h.	Logier 1949
DDT	RAHE	adult	TISPREP	PHYSIO				10 min exposure time.	Rajendra et al 1980 [k]
DDT	RAPI	adult	IMMER	RESIDUE				Results not extracted from paper.	Kaiser and Dunham 1972 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DDT	RAPI	adult	TISPREP	PHYSIO			2 x10^{-4} M	Exposure did not produce a short circuit current or resistance in abdominal skin.	Webb et al. 1979 [k]
DDT	RAPI	adult	DERMAL	RESIDUE			1	Half time of dermal penetration 703 mins.	Shah et al. 1983 [k]
DDT	RAPI	adult	INJECT	BEHAV			100	Increased activity, violent leg extensions after 6 h maintained till death.	Isaacon 1968 [k]
DDT	RAPI	adult	IMMER	MORT				Mortality occurred in: 2 of 3 fed poisoned insects, 1 of 1 sprayed with 1 drop DDT on water, 1 of 2 sprayed with standard spray.	Logier 1949
DDT	RAPI	tadpole (limb bud)	IMMER	DEVOBS			5, 25 ppb	Tail regeneration (mm) reduced at higher DDT conc. All exposed individuals exhibited reduced regeneration.	Weis 1975 [k]
DDT	RARI	adult	TISPREP	PHYSIO			5 x10^{-4}	Prevented Ca binding in globular phospholipidic micelles and facilitated Ca removal from the laminar phospholipidic micelles.	Craciun et al. 1981 [k]
DDT	RASE	adult	IMMER	MORT				100% mortality occurred within 9 d.	Logier 1949
DDT	RASY	adult	IMMER	MORT				One specimen was fed 5 poisoned insects but was unaffected.	Logier 1949
DDT	RASY	adult	IMMER	RESIDUE			0.001- 0.003 ppm	Only trace residues found in head, lung, gut and rest of body. High conc. in liver and fat.	Licht 1976a [k]
DDT	RASY	embryo	IMMER	HATSUC			0.025 ppm	No abnormal effects on morphology or hatching success of embryos in stages 13, 16, or 18 to 0.025 ppm for 24 h; signs of DDT poisoning observed in embryos treated at stage 20.	Licht 1985 [k]
DDT	RASY	embryo	IMMER	RESIDUE	9-21		0.025 ppm	Stage 13= 0.188 at 9°C - 0.167 at 21°C; stage 16= 0.142 - 1.58; stage 18=.145 - 0.160; stage 20= 0.956 - 1.57 Jelly content= 0.015 - 0.019.	Licht 1985 [k]
DDT	RASY	tadpoles	IMMER	RESIDUE	15-21		0.001- 0.003 ppm	Liver tissue levels reached max at 24 h.	Licht 1976b [k]
DDT	RATE	adult	INJECT	BEHAV				Behavioural abnormalities.	Cooke 1974 [k]
DDT	RATE	adult	IMMER	RESIDUE				Exposure for 1 h. Residues: DDT= 1.3 - 16 % of that originally present in test medium.	Cooke 1970 [k]
DDT	RATE	adult	INJECT	RESIDUE			12	Liver 16.9 ppm; muscle 1.4 ppm.	Cooke 1974 [k]
DDT	RATE	adult	ORAL	RESIDUE				Residues: tissue DDT conc. was correlated with fat conc. of tissues; strong accumulation in fat body, liver, gall bladder, ovary, spleen and bones; minimal accumulation in spinal cord; no activity in kidney, oviduct, heart or skeletal muscle.	Harri et al. 1979 [k]
DDT	RATE	adult	ORAL	PHYSIO			5 ppm	Single dose of DDT did not affect the activities of hepatic mixed function oxidase components.	Harri 1980
DDT	RATE	egg (spawn)	IMMER	BEHAV			0.5	Hyperactive 8 - 13 d after hatching. Development and weight gain were retarded. Exposure to 0.5 ppm when ova beginning to elongate or when head and body of each tadpole distinguishable had no effect.	Cooke 1972b [k]

Table 4 - Laboratory Studies - 22

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DDT	RATE	tadpoles	IMMER	RESIDUE			0.005- 0.5	19.4 ppm detected in tadpole hatched from fresh spawn exposed to DDT.	Cooke 1972b [k]
DDT	RATE	tadpoles	IMMER	DEVOBS			0.1	48 h exposure: 29% developed snout abnormalities; 3% died; all affected individuals that reached tail resorption stage died; disrupted development and hyperactivity.	Osborn et al. 1981 [k]
DDT	RATE	tadpoles	IMMER	PHYSIO			µnknown	Behavioural abnormalities induced by exposure to DDT was hyperactivity and general lack of coordination.	Osborn 1980
DDT	RATE	tadpoles	IMMER	MORT	20		0.01-10	Hind limb bud stage 20 % mortality at 10 ppm; 70% mortality at 10 ppm. Small-medium hind legs stages: 10 % mortality at 10 ppm, 50 % mortality at 10 ppm.	Cooke 1970 [k]
DDT	RATE	tadpoles	IMMER	BEHAV			0.1	No toxic effects in tadpoles; hyperactivity, tendency to float near surface; deformities in small tadpoles.	Cooke 1979 [k]
DDT	RATE	tadpoles	IMMER	RESIDUE			0.1	Residues: large tadpoles= 2.5; small tadpoles= 7.5.	Cooke 1979 [k]
DDT	RATE	tadpoles	IMMER	RESIDUE			0.05	Residues: pp'-DDT 0.50 - 1.2 µg; pp'-DDE < 0.001 - 0.01 µg.	Cooke 1971 [k]
DDT	RATE	tadpoles	IMMER	RESIDUE			0.0001- 0.001	Residues: exposed to 0.0001 ppm= pp'-DDE ND - 0.82; 0.001 ppm exposure= ND - 4.3, No mortality at body levels of 2 - 5 ppm. Acute exposure, tissue levels of 2 ppm can cause hyperactivity in tadpoles and death in small frogs.	Cooke 1973a [k]
DDT	RATE	tadpoles	IMMER	BEHAV				Tadpoles more susceptible either just before or just after developing hind limb buds and at these and later stages they become hyperactive when tissues contained 2-4 ppm. Abnormal snouts noted in RATE treated with 0.02 or 0.5 ppm for 48 h.	Cooke 1972b [k]
DDT	RATE	tadpoles	IMMER	BEHAV				Treated tadpoles became hyperactive. Newts (TRCR) made sig. more lunges at hyperactive RATE tadpoles than at controls.	Cooke 1971 [k]
DDT	RATI	adult	IMMER	PHYSIO			0.1- 0.3 %	Decreased Vit A storage in liver, greater decrease with increased exposure time (24 - 96 h). Increased serum Vit A levels with increased DDT noted.	Keshavan and Deshmukh 1984 [k]
DDT	RATI	adult	TISPREP	PHYSIO			0.1, 0.2, 0.3 %	Enzyme activity sig. decreased.	Deshmukh and Keshhavan 1987 [k]
DDT	STOC	adult	IMMER	MORT				Two animals were sprayed with standard spray, one very lightly. Both developed symptoms the next day and died within 2 d. A control sprayed with oils only died within 5 d.	Logier 1949
DDT	THXX	adult	IMMER	MORT				Mortality occurred in: 1 of 3 that were fed frogs that had taken poisoned insects, 2 of 2 fed capsules, 2 of 3 sprayed with standard spray. Another snake sprayed with standard spray developed poisoning symptoms but recovered after one wk.	Logier 1949
DDT	TRCR	adult	IMMER	BEHAV				Results not extracted from paper.	Cooke 1971 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DDT	TRCR	adult	ORAL	RESIDUE				Residues: DDT= 0.23 - 0.65; DDE= < 0.002 - 1.38.	Cooke 1971 [k]
DDT	TRSC	adult	ORAL	RESIDUE	23-27		100 body wt	3, 6, 12, 24 h and 3 wks, respectively: Liver: 0.179, 1.077, 0.112, 0.202, 1.063. Brain: 2.727, 1.723, ND, ND, 1.656. Fat: ND,3.625, ND, ND, 34.805. Excrement: 0.116, 0.190, 0.094, 0.096, 0.616.	Owen and Wells 1976
DDT	TRSC	adult	TISPREP	PHYSIO			53, 106 and 212 µM	Highly sig. inhibition of the Na+, K+ and Mg^{+2} dependent ATPase in all cellular fractions of the brain occurred with 212 µM.	Witherspoon and Wells 1975
DDT	TRSC	adult (F)	TISPREP	PHYSIO				DDT had the greatest binding affinity to estrogen sites.	Crain et al. 1998a
DDT	TRSC	adult (M)	INJECT	PHYSIO	21			Estradiol and DES treatments induced the most vitellogenin; DDT treatments induced smaller amounts of vitellogenin in a dose-dependent fashion.	Palmer and Palmer 1995
DDT	TRVU	larvae	IMMER	BEHAV			0.005, 0.5	0.5 ppm exposure resulted in 10 % mortality after 24 h and 35 % mortality after 48 h. Tadpoles appeared frantic at 0.005 after 48 h.	Cooke 1972b [k]
DDT	TRVU	larvae	IMMER	RESIDUE			0.005- 0.5	4 leg stage= 1.5 - 116 DDT; 0.13 - 2.7 DDE.	Cooke 1972b [k]
DDT	XELA	adult	TISPREP	PHYSIO				Increase in amplitude of negative after-potential and slowing down of the falling phase of action potential without affecting resting potential; no repetitive activity.	van den Bercken et al. 1973b
DDT	XELA	adult	TISPREP	PHYSIO	15		10-40 µM	Modified sodium channel gating selectively reduced the rate of closing of the activation gate in myelinated nerve fibre.	Vijverberg et al. 1982a
DDT	XELA	adult	TISPREP	PHYSIO	15			Myelinated nerve fibre from sciatic nerve exposed to 4 $x10^{-5}$M induced a Na tail current which was similar to that induced by exposure to allethrin.	van den Bercken et al. 1980 [k]
DDT	XELA	adult	TISPREP	PHYSIO	20-24		5 $x10^{-4}$M	Pronounced repetitive activity in sensory fibres only, depolarizing following action potential; repetitive activity similar in cutaneous touch receptor and lateral line organ.	van den Bercken and Vijverberg 1979
DDT	XELA	adult	TISPREP	PHYSIO	19-21		2-5, 10^{-5}M	Repetitive activity recorded after 2-5 ppm exposure.	Akkermans et al. 1975a [k]
DDT	XELA	adult (M)	INJECT	PHYSIO	21			A protein identified as vitellogenin was extractable from the plasma of treated frogs but it was not extractable from the plasma of control specimens.	Palmer and Palmer 1995
DDT	XXFR	adult	INJECT	MORT			15-70	3.3%-93.3% mortality occurred for these two conc. of DDT.	Tripod 1947
DDT	XXFR	adult	INJECT	MORT			150	All frogs died within 4 - 72 h after injection into dorsal lymph sac. Some died after injection of 10 mg/kg.	Ellis et al. 1944 [k]
DDT	XXFR	adult	TISPREP	PHYSIO			5 $x10^{-4}$	Membrane hyperpolarization reduced and delayed in K free medium in presence of 5 x 10^{-4}.	Craciun and Agrigoroaei 1978 [k]
defenuron	RATE	tadpole (2 d)	IMMER	DEVOBS				Development delayed in 100 ppm for 80 d. Developed forelegs at 50 d only. 40% underwent complete metamorphosis, 40% developed into giant tadpoles without forelegs, 20 % died.	Paulov 1977b [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DEHP	RAAR	embryo (2-3 d)	IMMER	HATSUC				Hatching success decreased with increased DEHP levels; approx. 50 % hatched when exposed to sediments with 150 mg/g weight. Survival of tadpoles did not differ; no abnormalities; no delayed hatching observed.	Larsson and Thuren 1987 [k]
DEHP	RAAR	tadpoles	IMMER	RESIDUE			10-800	Exposure for 60 d. DEHP accumulated in tadpoles at conc. ranging from 0.28 - 246.80 ppm ww.	Larsson and Thuren 1987 [k]
deltamethrin	AGAG	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
deltamethrin	AGCA	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
deltamethrin	BOCO	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
deltamethrin	PELI	adult	ORAL	MORT				Spray used for locust control. Study was done to determine risk in animals that eat locusts. Results showed that highest risk are for those subadults feeding on early instar locusts.	Stewart and Seesink 1996
deltamethrin	PENA	adult	ORAL	MORT				Spray used for locust control. Study was done to determine risk in animals that eat locusts. Results showed that highest risk are for those subadults feeding on early instar locusts.	Stewart and Seesink 1996
deltamethrin	RAES	adult	TISPREP	PHYSIO			1,10.100,200, 500 µM	Depolarization of axon membrane occurred.	Tippe 1987
deltamethrin	RAES	adult	TISPREP	PHYSIO				Open current conditions: 10^{-6} did not provoke changes in Na fluxes; at 10^{-5} M a slight inhibition of the Na after 30 min noted, no change in Cl fluxes.	Salibian 1983 [k]
deltamethrin	XELA	adult	TISPREP	PHYSIO	20-24			Failed to induce repetitive activity, small long lasting depolarization after potential.	van den Bercken and Vijverberg 1979
deltamethrin	XELA	adult	TISPREP	PHYSIO			10^{-6} M	Frequency dependent depression of the action potential.	Vijverberg and van den Bercken 1979 [k]
deltamethrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-4} - 10^{-6}	No repetitive end plate potentials for R-cis, S-cis and trans and R-trans and R-cis were able to produce up to 60 action potentials.	Ruigt and Van den Bercken 1986
deltamethrin (des-cyano-deltamethrin)	XELA	adult	TISPREP	PHYSIO	18	7.3	3 $x10^{-5}$	15-30 end plate potentials and 2-18 action potentials.	Ruigt and Van den Bercken 1986
DES	TRSC	adult (M)	INJECT	PHYSIO	21			Estradiol and DES treatments induced the most vitellogenin; DDT treatments induced smaller amounts of vitellogenin in a dose-dependent fashion.	Palmer and Palmer 1995
DES	XELA	adult (F)	IMMER	PHYSIO			1 ppm for 11 d	Exposed animals showed substantial induction of serum vitellogenin, indicating that the frogs are capable of responding to estrogenic agents present in the environment.	Palmer et al. 1998
DES	XELA	adult (M)	INJECT	PHYSIO	21			A protein identified as vitellogenin was extractable from the plasma of treated frogs but it was not extractable from the plasma of control specimens.	Palmer and Palmer 1995
DFP	RAXX	adult	TISPREP	PHYSIO	22	8.0		Results not extracted from paper.	Wang and Murphy 1982
DFP	RAXX	adult	TISPREP	PHYSIO	22	8.0		Results not extracted from paper.	Wang and Murphy 1982
DFP	RAXX	adult	TISPREP	PHYSIO	22	8.0		Results not extracted from paper.	Wang and Murphy 1982

Table 4 - Laboratory Studies - 25

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DFP	RAXX	adult	TISPREP	PHYSIO	22	8.0		Results not extracted from paper.	Wang and Murphy 1982
DFP	RAXX	adult	TISPREP	PHYSIO	22	8.0		Results not extracted from paper.	Wang and Murphy 1982
DFP	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977
diazepam	RAPI	adult	TISPREP	PHYSIO	20-22		1 $x10^{-5}$M	Effects of DMSO and ethanol (1%) were analysed. DMSO (0.22 M) increased rate of efflux of diazepam and ethanol (0.55 M) had no sig. effect on rate of efflux. No dramatic effect was noted for either solvent.	Degroof 1979
diazepam	RAPI	adult	TISPREP	PHYSIO		7.3	5 $x10^{-5}$- 5 $x10^{-6}$ M	The sartorius muscle was not affected by diazepam, however, twitch tension was increased and tetanus tension decreased. An increase in the calcium pool was also observed.	Degroof et al. 1980
diazinon	EUOS	adult	INHAL	MORT			3%	3-6 h lethal time.	Kihara and Yamashita 1978
dichlone	XELA	embryo (tail bud)	IMMER	DEVOBS			0.075-> 0.2	100 % survival at 0.075 ppm; 0 % survival > 0.2 ppm.	Anderson and Prahlad 1976 [k]
dichlorfenthion	RAPI	adult	TISPREP	PHYSIO	22		0 - 10^{-3} M	Only small suppressive effect on muscle contraction evoked by direct or indirect stimulation at 1 $x10^{-3}$ M No effect at lower conc.	Takeno et al. 1977 [k]
dichlorobenzene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
dichlorobenzene	THRA	adult	DERMAL	BEHAV				Investigative behaviour noted.	Secoy 1979
dichloroglyoxime	XXFR	adult	TISPREP	PHYSIO	37			Dose related inhibition of acetylcholine-stimulated contraction of the rectus abdominis muscle.	Zmeili and Khalili 1990
dichlorvos	RAHE	tadpoles	IMMER	DEVOBS			0.75, 1.5 and 37.5 mg/L	Arrested growth at 10 wks. Mortality began to occur at 12 wks. Delayed metamorphosis. Total body protein and liver glycogen was less than controls. Decreased body weight.	Raj et al. 1988
dichlorvos	RATI	tadpoles	TISPREP	PHYSIO	22			Locomotor/behavioural effects, increased heart rate observed. Lighter pigmentation observed at higher doses. Shrinking of the melanophore occurred at all doses.	Tomar and Pandey 1988
dichlorvos	XXFR	adult	TISPREP	PHYSIO			10 mM	Eliminated response to carbamylcholine almost completely. Amount of inhibition was strongly dependent upon conc. of OP and temp.	Dekin et al. 1978 [k]
dicofol	ALMI	adult	TISPREP	DEVOBS			45.6	Cis-nonachlor: IC50= 45.6, inhibitor conc. necessary for 50% inhibition. of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
dicofol	EUOS	adult	INHAL	MORT			1-2%	6-12 h lethal time.	Kihara and Yamashita 1978
dicrotophos	XXFR	adult	TISPREP	PHYSIO				Inhibition of membrane voltage response of muscle to carbamylcholine which was dependent upon conc. and temp.	Dekin et al. 1978 [k]
dieldrin	ALMI	adult	TISPREP	DEVOBS				No interaction with estrogen receptors.	Vonier et al. 1996
dieldrin	ALMI	adult (F)	TISPREP	PHYSIO				Estrogen receptors from alligator oviductal tissue tested with various environmental chemicals and with 17ß-estradiol.	Arnold et al. 1997

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
dieldrin	BUAR	embryo	IMMER	PHYSIO			0.02-2 mg/L	Embryos developed in 0.2 and 20 mg/L died between 20 -2 5 d: 25-30% of those developed in 0.02 mg/L had front legs earlier than controls.	de Llamas et al. 1985 [k]
dieldrin	BUAR	embryo-tadpole	IMMER	RESIDUE			0.02-2.0 mg/L	Behavioural abnormalities; decreased phospholipid content and altered morphology; no effect on body weight, protein content and enzyme activities.	Gauna et al. 1991
dieldrin	BUAR	larvae	IMMER	PHYSIO			0.02-2.0 mg/L	Hyperactivity in larvae, change in AChE activity.	de Llamas et al. 1985 [k]
dieldrin	BUAR	oocytes	IMMER	PHYSIO			4 mg/L	Authors suggest that after agonist-dependent hydrolysis of phosphonositides, PIP and PIP2 kinases are activated in control but not in dieldrin-treated oocytes.	Fonovich De Schroeder et al. 1991
dieldrin	BUAR	oocytes	TISPREP	PHYSIO	0-50	6-10	10^{-5}- 10^{-12} M	Phospholipase C activity interacted with dieldrin. Enhanced degradative activity was noticed for doses from 10^{-9} to 10^{-7} M.	deSchroeder and d'Angelo 1995
dieldrin	BUBU	tadpoles	IMMER	RESIDUE			0.02- 0.5	3.4 - 138 ppm (24-48 h).	Cooke 1972b [k]
dieldrin	BUBU	tadpoles	IMMER	BEHAV			0.5	No mortality; behaviour and snout abnormalities.	Cooke 1972b [k]
dieldrin	EUOS	adult	INHAL	MORT			1-2%	24 h lethal time to survival past 3 d at 1% conc.	Kihara and Yamashita 1978
dieldrin	GRGE	adult (F)	TISPREP	PHYSIO			0.53, 5.3 and 53 µM	Inhibition of Na, K and Mg dependent ATPase may have been related to cell membrane alteration.	Wells et al. 1974
dieldrin	LITA	embryo	IMMER	DEVOBS			0.01- 0.1	Otolith, otic capsule and cephalic pigmentation abnormalities after exposure to 0.1 ppm for 7 h; acceleration of growth relative to controls. No effects at 0.01 ppm.	Brooks 1981 [k]
dieldrin	RACA	embryo	IMMER	MORT			<0.002-0.1548 mg/L	Mortality increased with conc. and time: 96.2% at 0.0648 mg/L, 100% at 0.1548 mg/L. Deformities increased with conc. and time: 11.2% at 0.0648 mg/L, 23.8% at 0.1548 mg/L. Generally not smaller than controls.	Schuytema et al. 1991
dieldrin	RAES	adult	TISPREP	PHYSIO			10^{-5}- 10^{-4} M	No sig. effects on frequency and amplitude of end-plate potentials, or on end-plate membrane potential.	Akkermans et al. 1974 [k]
dieldrin	RAPI	adult	IMMER	RESIDUE			110 ppb	Decreasing rate of accumulation by skin over time.	Kaiser and Dunham 1972 [k]
dieldrin	RAPI	adult	DERMAL	RESIDUE			1	Half time rate of dermal penetration= 3766 mins.	Shah et al. 1983 [k]
dieldrin	RAPI	adult	TISPREP	PHYSIO			10^{-5}- 10^{-4} M	No sig. effects on frequency and amplitude of end-plate potentials, or on end-plate membrane potential.	Akkermans et al. 1974 [k]
dieldrin	RAPI	adult	IMMER	MORT			0.0107-0.1675 mg/L	Results not extracted from paper.	Schuytema et al. 1991
dieldrin	RAPI	adult	TISPREP	PHYSIO			2 $x10^{-4}$M	Sig. increases in short circuit current while decreasing the resistance.	Webb et al. 1979 [k]
dieldrin	RAPI	juvenile	IMMER	MORT			<0.0001-0.167.5 mg/L	6.2% mortality at 0.0212 mg/L, 100% at 0.1675 mg/L. Convulsions, body and rear leg rigidity, lethargy and bloating at 0.1675 mg/L. Appetite lessened after 14 d.	Schuytema et al. 1991

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
dieldrin	RAPI	tadpoles	IMMER	DEVOBS	22		0.0008-0.0021 mg/L	0.6 µg/g (bioconc. factor= 690 ±190) at 0.0008 mg/L and 0.8 µg/g (bioconc. factor= 390 ±40) at 0.0021 mg/L.	Schuytema et al. 1991
dieldrin	RAPI	tadpoles	IMMER	MORT			< 0.0001-0.0261 mg/L	Mortality increased with conc. and time: 52.5% at 0.0101 mg/L, 100% at 0.0261 mg/L. Survivors at higher conc. were larger than controls.	Schuytema et al. 1991
dieldrin	RATE	adult	TISPREP	PHYSIO			10^{-5}- 10^{-4} M	No sig. effect on frequency and amplitude of end-plate potentials, or on end-plate membrane potential.	Akkermans et al. 1974 [k]
dieldrin	RATE	tadpoles	IMMER	RESIDUE			0.0008- 0.5	0.17 - 42.9 ppm (24-48h).	Cooke 1972b [k]
dieldrin	RATE	tadpoles	IMMER	BEHAV			0.02- 0.5	0.5 produced 5 % mortality and abnormal behaviour after 24 h, 47% mortality after 48 h. Snout abnormalities noted. 0.02 ppm had no effect.	Cooke 1972b [k]
dieldrin	TRSC	adult	INJECT	RESIDUE	28		20	Rate of absorption in tissue after injection was slow and erratic; Residues: Body fat 445-1329 > Liver 46-117 > Kidney 13-59 > Brain 8-27 > Muscle 4-7 > Plasma 3-7. Values are ranges in tissue after 70d.	Pearson et al. 1973
dieldrin	XELA	adult	TISPREP	PHYSIO	10		0-5 $x10^{-5}$M	Application failed to produce any sig. effects in spinal cord.	Akkermans et al. 1975c [k]
dieldrin	XELA	adult	IMMER	PHYSIO			1	Dieldrin treated frogs showed sig. levels of vitellogenin induction.	Palmer et al. 1998
dieldrin	XELA	adult	TISPREP	PHYSIO				Increase in amplitude of negative after-potential; slowing of falling phase of action potential; no effect on resting potential; no repetitive activity.	van den Bercken et al. 1973b
dieldrin	XELA	adult	TISPREP	PHYSIO			5 $x10^{-4}$ M, 3-5	Preparation taken from animals showing severe symptoms of poisoning after exposure to 3-5 ppm.	Akkermans et al. 1975a [k]
dieldrin	XELA	juvenile	IMMER	MORT			0.0021 mg/L	Results not extracted from paper.	Schuytema et al. 1991
dieldrin	XELA	tadpoles	IMMER	DEVOBS			075-6.0 ppb	Highest dieldrin conc. retarded development.	Blandin and Ramsdell 1995
dieldrin	XELA	tadpoles	IMMER	MORT			<0.0001-0.0247 mg/L	Mortality increased with conc. and time: 56.2% at 0.0097 mg/L, 100% at 0.0247 mg/L. No sig. dif. in size. Increase in size with increase in conc. noted but not found to be sig. dif. due to variability within replicates.	Schuytema et al. 1991
dieldrin	XELA	tadpoles	IMMER	MORT			<0.001-0.0225 mg/L	Mortality increased with conc. and time: 82.5% at 0.010 mg/L, 100% at 0.0225 mg/L. No sig. dif. in size observed between treated and control animals.	Schuytema et al. 1991
dieldrin	XELA	tadpoles	IMMER	MORT			<0.001-0.0482 mg/L	Mortality increased with conc. and time: 93.8% at 0.0205 mg/L and 100% at 0.0482 mg/L. Sig. smaller rate of growth than controls.	Schuytema et al. 1991
dieldrin	XELA	tadpoles	IMMER	MORT			0.0023 mg/L	Not determined.	Schuytema et al. 1991
diethanolamine	PLWA	larvae	IMMER	GENOTOX	20	5-8	75	No effect under all conditions; (dif. pH, light and dark).	L'Haridon et al. 1993
dimethoate	BUME	tadpoles	IMMER	PHYSIO			0.05	Melanophore size increased sig. in tadpole tails, puncto-stellate melanophores were visible and developed dendritic processes and branching.	Pandey and Tomar 1985 [k]

Table 4 - Laboratory Studies - 28

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
dimethoate	RATI	egg	IMMER	DEVOBS	30-38		0.0001- 0.001 %	Delayed and deceased incidence of metamorphosis in exposed eggs; < 0.0002 % no effects.	Mohanty-Hejmadi and Dutta 1981 [k]
dimethoate	RATI	egg	IMMER	DEVOBS	30-38		0.0001- 0.0009 %	Eggs treated with 0.0001 - 0.0009 % exhibited increased time to metamorphosis, decreased average larval length at metamorphosis and conc. dependent mortality. No eggs treated with 0.001 - 0.009 % dimethoate reached metamorphosis.	Dutta and Mohanty-Hejmadi 1978 [k]
dimethoate	RATI	tadpole (limb bud)	IMMER	DEVOBS	30-38			80% metamorphosed at 0.001 %; < 0.001 no effect. Delayed metamorphosis at 0.0001 - 0.001 %.	Mohanty-Hejmadi and Dutta 1981 [k]
dimethoate	RATI	tadpoles	IMMER	DEVOBS	30-38		0.0001- 0.0009 %	Increased exposure conc. lead to increased time to metamorphosis and decreased avg length at metamorphosis.	Dutta and Mohanty-Hejmadi 1978 [k]
dimethoate	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Mortality= 1; Development= 32; Growth= 32 mg/L.	Slooff and Canton 1983 [k]
dimethyl disulfide	AMTI	adult	DERMAL	BEHAV			0.1- 0.5 M	Lavage with dimethyl disulfide decreased response to dimethyl disulfide in behaviour tests.	Mason and Morton 1982
dinitrocresol	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Mortality= 0.32; Development= 0.32; Growth= 0.32 mg/L.	Slooff and Canton 1983 [k]
dinocap	XELA	adult	IMMER	MORT			0-1.0 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>10.	Daston et al. 1991
dinocap	XELA	embryo	IMMER	MORT			0-10 mg/L	Death and defects were noted in embryos exposed for 4 d post-fertilization.	Daston et al. 1991
dinoseb	XELA	adult	IMMER	MORT			0- 0.1 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>5.	Daston et al. 1991
dinoseb	XELA	embryo	IMMER	MORT			0- 0.1 mg/L	All tadpoles died from exposure.	Daston et al. 1991
diphacin	PICA	adult	ORAL	MORT			fed avg. of 14.74 mg	18 snakes showed no observable effects when fed rats.	Brock 1965
diquat	RAPI	egg	IMMER	DEVOBS	18		100	Reduced viability and increased exogastrulation. None survived beyond 14 d post-hatch.	Bimber and Mitchell 1978 [k]
diquat	RAPI	embryo (gastrula)	IMMER	DEVOBS			2-10 mg/L	15 d old embryo exhibited increased survival over gastrula stage embryos (78 % vs 34 % respectively). At 10 mg/L > 70 % survival 16 d post treatment in 2 and 5 mg/L.	Dial and Dial 1987 [k]
diquat	RATE	adult	INJECT	PHYSIO	20-25		4 µL/g body wt	Labeled compounds were taken up by various tissues.	Lindquist et al. 1988
diquat	XELA	embryo (tail bud)	IMMER	DEVOBS			0.5-2.0	Reduced body size and pigmentation; 15 ppm produced some distortion in body shape; 95 % survival at 0.5 ppm; 20 % survival at 20 ppm.	Anderson and Prahlad 1976 [k]
diquat, nabam	XELA	embryo (tail bud)	IMMER	PHYSIO			0.75 diquat/2 nabam	100 % mortality within 6 d. Size of larvae reduced, melanin synthesis retarded, muscle fibres less developed.	Anderson and Prahlad 1976 [k]
distillery effluent	RAHE	egg	IMMER	HATSUC	31		0.3-2.1%	Rate of hatching decreased and rate of mortality increased with increasing effluent conc. Hatching was delayed by 1 - 2 d and hatching success dropped to 42 - 46 %.	Andrews et al. 1990

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
distillery effluent	RAHE	tadpoles	IMMER	MORT	31		0.3-2.1%	No mortality occurred in 0.3, 0.6, 0.9 % exposure groups. 94% survival occurred in 1.2% group and 0% survival after 72h in 1.5, 1.8 and 2.1 % exposure groups.	Andrews et al. 1990
distillery effluent	RAMA	tadpole (pre-hindlimb)	IMMER	DEVOBS			0.03- 0.12 %	Increased conc. reduced period of limb bud emergence and tail resorption; elevated values for length of limbs, tail and body wt of adults.	Haniffa et al. 1985 [k]
DMN	AGAG	adult	ORAL	RESIDUE			50 dose once or 1 daily/50 d	30% had liver damage due to daily repeated oral doses, generally no liver damage was observed in the case of one 50 mg/kg dose.	Maduagwu and Anosa 1981
DMN	BUBU	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.23 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	CYPY	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.13 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	NOVI	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.22 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	RAES	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.10 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	RATE	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.32 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	TRAL	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.19 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	TRCC	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.11 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	TRVU	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.18 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMN	XELA	9 mo old	INJECT	MORT			5 mg/100 g	After 39 wks, 9 of 16 animals had developed macroscopically-visible liver cysts, 3 had kidney cysts, 1 with pancreatic cyst. Histological examination found additional cysts.	Knowles et al. 1982
DMN	XELA	adult	INJECT	PHYSIO			0.1 mg	Due to the fact that DMN is rapidly eliminated from the body and the low rate of metabolism by *Xenopus* liver in vitro, DMN is unlikely to be toxic or carcinogenic in *Xenopus*.	Rao et al. 1979
DMN	XELA	toadlets	IMMER	MORT			5	3 years after beginning of exposure, noted distended abdomens in several individuals. All animals died within the next 6 mos; 10 with macroscopically-visible liver cysts, 5 with kidney cysts and 2 with large pancreatic cysts.	Knowles et al. 1982
DMN	XELA	toadlets (1 yr)	INJECT	MORT			180-260 mg/100 g	Cysts were detected microscopically as early as 16 d after beginning of the treatment and macroscopically at intervals up to 670 d. Cysts developed in liver, kidney and pancreas.	Knowles et al. 1982

Table 4 - Laboratory Studies - 30

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
DMN	XELL	adult	INJECT	PHYSIO			0.1 mg	Mean CO_2 production is reduced to 0.07 (% CO_2 added/160 mg liver/ 90 min.).	Rao et al. 1979
DMSO	ACGR	tadpoles	IMMER	DEVOBS			50 mg/L	DMSO had no effect on rate of metamorphosis.	Pollard and Adams 1988
DMSO	RAPI	not specified	IMMER	PHYSIO				Prolonged exposure to DMSO (15%) blocks action potentials. Effects on chloride transport were also measured. DMF, DMA, HMPA and acetone effects were compared.	Larsen et al. 1996
DNP	RAPI	adult	INJECT	PHYSIO				Specific immune responses in BM may result in a 20-fold increase in the frequency of antigen-related plasma cells among total mononuclear cells.	Zettergren et al. 1988
DNP	RATE	adult	TISPREP	PHYSIO			10^{-4} M	10^{-4} M caused rise in miniature end-plate potential frequency 30 min after application following reduction in first 20 min.	Statham et al. 1978 [k]
DODPA	RAPI	embryo	IMMER	DEVOBS			0-1 g/L	Up to 1 g/L not toxic; no deleterious effects on development.	Greenhouse 1976a [k]
DODPA	RAPI	larvae	IMMER	DEVOBS			0-1 g/L	Up to 1 g/L not toxic; no deleterious effects on development.	Greenhouse 1976a [k]
DODPA	XELA	embryo	IMMER	DEVOBS			0-1 g/L	Up to 1 g/L not toxic; no deleterious effects on development.	Greenhouse 1976a [k]
DODPA	XELA	larvae	IMMER	DEVOBS			0-1 g/L	Up to 1 g/L not toxic; no deleterious effects on development.	Greenhouse 1976a [k]
Domal	RAES	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	100% mortality in all exposure groups.	Gunther and Plotner 1986
Dosanex	BUVU	embryo	IMMER	PHYSIO			1- 2 %	Toxic effects observed only at high conc.	Constantini and Panella 1975
Dosanex	BUVU	embryo	IMMER	MORT			0.05- 0.5 ppt	Toxic for embryos, less so for larvae. 100% mortality at 0.25 - 0.5/1000 and low survivorship for 0.5 - 0.15/1000.	Constantini and Andreoli 1972
DPH	XELA	adult	IMMER	MORT			0-75 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>1.5.	Daston et al. 1991
DPH	XELA	embryo	IMMER	MORT			0-75 mg/L	Death and defects were noted in embryos exposed for four days post-fertilization.	Daston et al. 1991
EB	CHSE	egg	IMMER	DEVOBS				Eggs exposed to estradiol or an estrogen agonist (R2858) caused all embryos incubated at male-producing temps to develop as females.	Crews et al. 1989
edrophonium	RAPI	adult	TISPREP	PHYSIO	22		10^{-3} - 5 x10^{-4} M	Neuromuscular transmission suppressed at 5 x10^{-4} M and 1x10^{-3} M. Contraction evoked by muscle stimulation also suppressed. No effect at 1 x 10^{-4} M.	Takeno et al. 1977 [k]
EDS	POSS	adult (M)	INJECT	PHYSIO			100 body wt	Plasma androgen levels decreased 5-7 d after EDS injection, alongside interstitial tissue destruction and mast cell appearance, with slight but sig. increases on Day 11 and 28. Testicular androgen levels did not change.	Minucci et al. 1995
EDS	RAES	adult	INJECT	PHYSIO			100	Plasmas androgen level were extremely low on day 4 after EDS and remained unchanged after; in testes androgen levels decreased on day 4 but increased thereafter to control levels.	Minucci et al. 1990
EMF	NOVI	adult		PHYSIO			5 times ambient for 5-6 d	An increase in the amount of lymphocytes was present in experimental animals compared to controls, indicating physiological stress due to electromagnetic field exposure.	Moran and Bennett 1991

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
endosulfan	ALMI	adult	TISPREP	DEVOBS			>50	IC50=>50, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
endosulfan	XELA	adult (M)	IMMER	PHYSIO			1	Endosulfan proved toxic at this conc.	Palmer et al. 1998
endrin	BUBJ	tadpoles	IMMER	BEHAV	20			24 h EC50: aberrant behaviour= 0.0013.	Hall and Swineford 1981 [k]
endrin	PICA	adult	ORAL	MORT			fed avg. of 1.64 Mg	5 snakes died, 2 regurgitated and 5 showed no observable effects.	Brock 1965
endrin	RACA	adult	ORAL	MORT			2	Frogs force-fed mosquitofish which had been exposed to 2 ppm endrin solution for 7 d: 100 % mortality.	Rosto and Ferguson 1968 [k]
endrin	RACY	adult	IMMER	PHYSIO			1-10	Liver and intestine demonstrated microscopic cellular changes: nuclear degeneration, cytoplasmic vacuolation and cell necrosis.	Mathur and Rane 1979
endrin	RAPI	adult	IMMER	BEHAV	25	5.78-5.86	0.015- 0.03	5 % mortality in 0.03 ppm; no mortality at 0.2 or 0.015 ppm.	Kaplan and Overpeck 1964 [k]
endrin	RAPI	adult	TISPREP	PHYSIO			2 x10^{-4}M	No sig. effect on the short circuit current or resistance in abdominal skin.	Webb et al. 1979 [k]
epichlorohydrin	PLWA	larvae	IMMER	GENOTOX			1-2	Frequency of micronucleated erythrocytes= 23/1000.	Fernandez et al. 1989
epinephrine	XELA	adult	IMMER	MORT			0-600 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>5.	Daston et al. 1991
epinephrine	XELA	embryo	IMMER	MORT			0-500 mg/L	Defects were noted in embryos exposed for four days post-fertilization.	Daston et al. 1991
esfenvalerate	RASP	tadpoles	IMMER	BEHAV	20	6.6-9.2	0.8- 10 µg/L	Activity level decreased at or < 3.6 µg/L; dose dependent increase in mortality; decreases in body sizes noted.	Materna et al. 1995
estradiol	ALMI	adult	TISPREP	DEVOBS			0.0078	IC50=0.0078, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
estradiol	ALMI	adult (F)	TISPREP	PHYSIO	25			These data suggest the presence of estrogen and progesterone receptors in oviducts of alligators.	Vonier et al. 1997
estradiol	ALMI	egg	IMMER	PHYSIO			0.014-14	Caused sex reversal from male to female.	Crain et al. 1997
estradiol	TRSC	adult (M)	INJECT	PHYSIO	21			Estradiol and DES treatments induced the most vitellogenin; DDT treatments induced smaller amounts of vitellogenin in a dose-dependent fashion.	Palmer and Palmer 1995
estradiol	XELA	adult	TISPREP	DEVOBS				Ovaries contain and secrete testosterone and estradiol, which are stimulated by a gonadotropin preparation promoting ovulation and meiotic maturation.	Fortune et al. 1977
estradiol	XELA	adult (M)	INJECT	PHYSIO	21			A protein identified as vitellogenin was extractable from the plasma of treated frogs but it was not extractable from the plasma of control specimens.	Palmer and Palmer 1995
ethanol	RATE	adult	IMMER	PHYSIO			1000 pm	Enhanced enzymatic activity of asparate aminotransferase and alanine aminotransferase.	Paulov 1987b [k]
ethanol	RATE	tadpole (8 d)	IMMER	DEVOBS			0-1000	100% mortality in 10 min. at 1000 ppm; no effect at <800 ppm for 8 d old tadpoles; 100% mortality for tadpoles kept in 500 ppm from day 7 to day 22.	Paulov 1987b [k]

Table 4 - Laboratory Studies - 32

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
ethanol	RATI	adult	TISPREP	PHYSIO			0.5-4.0 M	Results indicate that ethanol-induced contraction may be due to release of ACh or ACh-like neurotransmitter and that calcium acts as mediator to produce these effects.	Kela et al. 1994
ethanol	XELA	embryo	IMMER	DEVOBS	22-24	7.3	1-2% (pure)	Reduced brain length, reduced body size, hypoplasticity of the anterior region around the mouth.	Nakatsuji 1983
ethidium bromide	PLWA	larvae	IMMER	GENOTOX			12.5-37.5	Frequency of micronucleated erythrocytes: 12.5 ppm= 7/1000; 37.5 ppm= 13/1000.	Fernandez et al. 1989
ethyl acetoacetate	AMTI	adult	DERMAL	BEHAV			0.1- 0.5 M	Lavage with ethyl acetoacetate produce selective response decrements to cyclohexanone; lavage with 0.5 M produced more persistent response decrements than 0.01 M.	Mason and Morton 1982
ethylene dibromide	PLWA	larvae	IMMER	GENOTOX			1-5.0	Frequency of micronucleated erythrocytes: 1 ppm= 14/1000; 5 ppm= 26.5/1000.	Fernandez et al. 1989
ethylenethiourea	MIOR	embryo (gastrula)	IMMER	DEVOBS			5.0-50.0	80 % mortality at 50 ppm; 2 % at 10 ppm; 22 % abnormal at 5 ppm; > 5 ppm= 100 % abnormal.	Ghate 1986 [k]
ethylenethiourea	XELA	adult	IMMER	MORT			0-1000 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested.	Daston et al. 1991
ethylenethiourea	XELA	embryo	IMMER	MORT			0-1000 mg/L	No effects observed.	Daston et al. 1991
ethylmethane sulfonate	RAPI	adult	TISPREP	GENOTOX			0.3 mg/L	7 fold increase in sister chromatid exchanges; mitotic index reduced and cell cycling time lengthened in dose-dependent manner.	Geard and Soutter 1986 [k]
ethylmethane sulfonate	XELA	tadpoles	IMMER	PHYSIO	22, 26		0, 50 and 100 mg/L	Micronucleated RBCs increased with increasing conc. at both temps.	Van Hummelen et al. 1989
ethylmethane sulfonate	XXFR	adult	TISPREP	PHYSIO			25-200	Increase in pre-mitotic, Gs, population and decrease in mitosis; micronucleated cells present; genotoxicity effects (eye epithelial cells).	Kung et al. 1987 [k]
ethylnitrosurea	PLWA	adult	UNAVAIL	PATH				10/50 animals developed fibro- and hemangiosarcomas, nephroblastomas and a cavernous hemangioma. No tumors of the nervous system occurred.	Schmidt 1980
ethylnitrosurea	PLWA	larvae	IMMER	GENOTOX			1-10	Frequency of micronucleated erythrocytes: 1 ppm= 50/1000; 10 ppm= 197/1000.	Fernandez et al. 1989
eulan wa new	RATE	tadpoles	IMMER	DEVOBS	11-15		0.1-1.0 mg/L	High conc.: decreased movement for first 48 h, slower development, abnormalities, decreased feeding rate and weight, 925% mortality. Low conc.: retarded development, no mortality.	Osborn and French 1981 [k]
eulan wa new	RATE	tadpoles	IMMER	RESIDUE			0.01-1 mg/L	Residues: 0.53 - 24.1 (35-36 d exposure).	Osborn and French 1981 [k]
Fe	BUBO	larvae	IMMER	DEVOBS			20-144 mg/L	144 mg/L= 100 % mortality within 24 h; 30 mg/L 100 % mortality within 20 d; 20 mg/L all metamorphosed.	Porter and Hakanson 1976 [k]
Fe	PLXX	larvae	IMMER	GENOTOX			0.6-25 mg/L	At 12.5 mg/L and greater, high level of micronuclei induction in red blood cells; at 0.6 - 4.5 mg/L no genotoxicity observed.	Godet et al. 1996

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration e	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Fe	RACA	tadpoles (stages 20-29)	ORAL	DEVOBS				Changes in metalloprotein, ferritin, is tracked through developmental metamorphosis in tadpoles.	Osaki et al. 1974
fenitrothion	AMMA	larvae	IMMER	BEHAV	15		1, 2, 5 and 9 (1 and 8d exp)	2 ppm led to initial paralysis; almost 100% mortality occurred at 9 ppm.	Berrill et al. 1995
fenitrothion	BUAM	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	Lack of avoidance behaviour at 2 and 5 ppm; rapid recovery; relatively unaffected at 9 ppm.	Berrill et al. 1995
fenitrothion	MIOR	embryo	IMMER	DEVOBS	25		1-13 mg/L	Behavioural and morphological abnormalities.	Pawar and Katdare 1983
fenitrothion	RACA	embryo	IMMER	DEVOBS			0.5, 1.0, 4.0, 8.0	No effect.	Berrill et al. 1994
fenitrothion	RACA	tadpole (8d old)	IMMER	BEHAV	15		1, 2, 5 and 9	Initial paralysis and rapid recovery at 5 ppm; >80% died at 9 ppm within 24 h. of exposure.	Berrill et al. 1995
fenitrothion	RACA	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	30% mortality at 5 ppm; 100% mortality at 9 ppm.	Berrill et al. 1995
fenitrothion	RACA	tadpoles	IMMER	DEVOBS			0.5, 1.0, 4.0, 8.0	Behavioural abnormalities increased with level and duration of exposure; impaired development observed.	Berrill et al. 1994
fenitrothion	RACA	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	Initial paralysis and rapid recovery of survivors; 100% mortality at 9 ppm, treated at 1 d old.	Berrill et al. 1995
fenitrothion	RACL	embryo	IMMER	DEVOBS			0.5, 1.0, 4.0, 8.0	No effect.	Berrill et al. 1994
fenitrothion	RACL	larvae	IMMER	RESIDUE			1	5.3 after 1 h. Peaked at 11.5 at 1 d.	Lyons et al. 1976 [k]
fenitrothion	RACL	larvae	IMMER	BEHAV	21		1-2	Sig. decrease in mean activity time recorded at 2 ppm but not at 1 ppm.	Lyons et al. 1976 [k]
fenitrothion	RACL	not specified	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	50% mortality at 2, 5 and 9 ppm following exposure.	Berrill et al. 1995
fenitrothion	RACL	tadpole (8d old)	IMMER	BEHAV	15		1, 2, 5 and 9	No effect at 1 and 2 ppm; 5-20% mortality at 5 and 9 ppm.	Berrill et al. 1995
fenitrothion	RACL	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	Approx. 50% mortality at 2, 5 and 9 ppm.	Berrill et al. 1995
fenitrothion	RACL	tadpoles	IMMER	DEVOBS			0.5, 1.0, 4.0, 8.0	Tadpoles unresponsive to prodding or paralysed from 2.0-8.0 ppm, yet all but those exposed at 8.0 ppm recovered within 3 d.	Berrill et al. 1994
fenitrothion	RAES	adult (M)	INJECT	PHYSIO			0.2 mg/100 g body wt	Fenitrothion selectively inhibited some esterase fractions.	Zikic et al. 1988
fenitrothion	RAPI	embryo	IMMER	DEVOBS	15		0.5, 1.0, 4.0, 8.0	No effect.	Berrill et al. 1994

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
fenitrothion	RAPI	tadpole (8d old)	IMMER	BEHAV	15		1, 2, 5 and 9	Paralysis at 5 and 9 ppm; mortality occurred after 24 h.	Berrill et al. 1995
fenitrothion	RAPI	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	Paralysis at 5 and 9 ppm; lack of avoidance response; recovery occurred by 24 h; minimal mortality.	Berrill et al. 1995
fenitrothion	RAPI	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	Paralysis at 5 and 9 ppm; minimal mortality; 100% recovery after 11d.	Berrill et al. 1995
fenitrothion	RAPI	tadpoles	IMMER	DEVOBS			0.5, 1.0, 4.0, 8.0	Tadpoles unresponsive to prodding or paralysed from 2.0-8.0 ppm, yet recovered within 3 d.	Berrill et al. 1994
fenitrothion	RASY	tadpole (1 and 8d old)	IMMER	BEHAV	15		1, 2, 5 and 9	Paralysis at 5 and 9 ppm; mortality within 24 h.	Berrill et al. 1995
fenitrothion	RASY	tadpole (8d old)	IMMER	BEHAV	15		1, 2, 5 and 9	Paralysis at 5 and 9 ppm; mortality occurred after at least 24h.	Berrill et al. 1995
fenitrothion	RASY	tadpoles	IMMER	BEHAV	15		1, 2, 5 and 9 (1d and 8d exp)	Paralysis at 5 and 9 ppm; recovery occurred within 24h; minimal mortality.	Berrill et al. 1995
fenitrothion	RATI	egg	IMMER	MORT	30-38			Complete mortality at 0.000001 %.	Mohanty-Hejmadi and Dutta 1981 [k]
fenitrothion	RATI	tadpoles	IMMER	DEVOBS	30-38		0.00001-0.00004 %	> 40 % metamorphosed <0.00003 % at feeding stage and 100 % metamorphosed <0.00003 % at limb bud stage. Delayed metamorphosis in all exposure groups.	Mohanty-Hejmadi and Dutta 1981 [k]
fenitrothion	XELA	tadpoles	IMMER	MORT	25		0.1-10	After 18 h all tadpoles in 10 ppm were dead; at 0.1 ppm swimming behaviour was increasingly impaired up to about 15 h at which point tadpoles swam erratically but were still able to exhibit avoidance behaviour.	Elliot-Feeley and Armstrong 1982
fenoprop	LIEW	adult	IMMER	MORT			80-400	No mortality.	Johnson 1976 [k]
fenoprop	LITA	adult	IMMER	MORT			80-400	No mortality.	Johnson 1976 [k]
fenpropathrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-5}	15-30 end plate potentials and no repetitive activity with respect to action potentials.	Ruigt and Van den Bercken 1986
fenthion	BUBO	juvenile	IMMER	PHYSIO	23-24		60 ppb	Sig. lowered temp tolerance.	Johnson and Prine 1976 [k]
fenthion	HYRE	tadpole (3 wk)	IMMER	PHYSIO			25-100 ppb	Temp. tolerance sig. lowered.	Johnson 1980a [k]
fenthion	RACA	tadpoles	IMMER	RESIDUE			0.01-1	Sig. bioconc.: average= 62 times. Maximum level found in pooled sampled was 320 ppm. No fenoxon detected in tissues (metabolite) at 0.5 ppm detection limit.	Hall and Kolbe 1980 [k]
Fentin	RAES	tadpoles	IMMER	BEHAV	20-22		0, 0.005, 0.01, 0.02 mg/L	Total residues: 0.005 mg/L (N= 6):139 ng/g. 0.01mg/L (N= 6): 280 ng/g 0.02 mg/L (N= 26): 2257 ng/g; reduced swimming behaviour.	Semlitsch et al. 1995

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
fenvalerate	AMMA	larvae	IMMER	MORT	15-20		0.01 mg/L	Little recovery from 0.01 mg/L after 11 d, even at higher temp.	Berrill et al. 1993
fenvalerate	RACL	tadpoles	IMMER	MORT	15-20		0.01- 0.1 mg/L	Occasional mortality; recovery occurred with time.	Berrill et al. 1993
fenvalerate	RAES	adult	TISPREP	PHYSIO			1,10.100,200, 500 µM	Depolarization of axon membrane occurred.	Tippe 1987
fenvalerate	RAPI	tadpoles	IMMER	MORT	15-20		0.01- 0.1 mg/L	Occasional mortality; recovery occurred with time.	Berrill et al. 1993
fenvalerate	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-5}	15-30 end plate potentials and up to 60 action potentials were observed.	Ruigt and Van den Bercken 1986
fenvalerate	XXFR	adult	IMMER	PHYSIO				Fenvalerate and cypermethrin inhibit Na transport in frog skin.	Yu et al. 1986
FIT	RADA	egg	IMMER	HATSUC	18-22		0.001- 0.01%	52% hatched in control groups, 0% hatched in 0.006 and 0.01 % FIT.	Gunther and Plotner 1986
FIT	RAES	egg	IMMER	HATSUC	18-22		0.001- 0.01%	92.5 % hatched in control, 0 % hatched in 0.01% FIT.	Gunther and Plotner 1986
FIT	RAES	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	Increase in tadpole size resulted in increased survivorship at low conc. Tadpoles were fed during FIT exposure.	Gunther and Plotner 1986
FIT	RARE	tadpoles	IMMER	MORT	18-22		0.003%	Exposure for 1-24 h at 0.003% FIT; time required to kill 50% at given conc.= 8.17 h; time required to kill 90%= 13.40 h.	Plotner and Gunther 1987
FIT	RATE	egg	IMMER	HATSUC	18-22		0.001- 0.01%	96 % hatched in control group, 27% hatched in 0.006% FIT.	Gunther and Plotner 1986
FIT	RATE	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	Increased size of tadpoles resulted in increased survival time.	Gunther and Plotner 1986
flumethrin	AGAG	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
flumethrin	AGCA	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
flumethrin	BOCO	adult	IMMER	PATH			<0.074	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
fluoranthene, UV	AMMA	embryo	IMMER	MORT	22-25		0,25,125,250, 625, 1250	UV + PAH caused 10% mortality at 125 µg/L and 100% at 625 µg/L. Only 5% mortality, however, occurred when 1250 µg/L fluoranthene was administered without UV exposure.	Hatch and Burton 1996
fluoranthene, UV	RAPI	embryo	IMMER	MORT	22-25		0, 25, 125, 250, 625, 1250	No effect when UV was administered alone, 15% mortality at 125 µg/L with UV, 80% mortality and 100% malformation at 625 µg/L of fluoranthene yet without UV exposure only 20% mortality occurs at 625 µg/L fluoranthene.	Hatch and Burton 1996
fluoranthene, UV	XELA	larvae	IMMER	MORT	22-28		0, 5, 25, 125	No effects with filtered UV-B and fluoranthene exposures.	Hatch and Burton 1996
fluoroacetamide	COJU	adult	ORAL	MORT			0.8-3.2	Species survived treatment.	Braverman 1979
fluoroacetamide	MAMO	adult	ORAL	MORT			0.4-1.6	Species survived treatment.	Braverman 1979
fluoroacetamide	VIPA	adult	ORAL	MORT			0.1- 0.4	Species survived treatment.	Braverman 1979
formalin	EUOS	adult	INHAL	MORT			3%	24 h lethal time.	Kihara and Yamashita 1978
formalin	RABE	tadpoles	IMMER	MORT			200-300 µL/L	After 1 h exposure 100% died.	Carmichael 1983
formalin	RABE	tadpoles	IMMER	MORT			0-384 µL/L	After 24 h of exposure, 100% mortality occurred at 76 µL/L.	Carmichael 1983
formalin	THRA	adult	DERMAL	BEHAV				The animals which immersed their heads in formalin quickly began to show signs of distress such as foaming at the mouth, gaping and rubbing their head on the floor of the cage.	Secoy 1979

Table 4 - Laboratory Studies - 36

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
fuel oil	RACA	tadpoles	IMMER	BEHAV			0.13-10 % by vol.	Tadpole residues: 7,000 ppb (by weight) for 0.1 % oil exposure and 33,000 ppb (by weight) for 2.5% oil exposure; behavioural abnormalities noted.	McGrath and Alexander 1979
GABA	RACA	adult	TISPREP	PHYSIO	20-24		5 µM - 1 mM	GABA sig. decreased amplitude of action potential in frog ganglion cells.	Kato et al. 1978
garlic	THRA	adult	DERMAL	BEHAV				Investigative behaviour noted.	Secoy 1979
gibberellin	BURE	adult	ORAL	PATH			10 /50g body wt (3x/wk for 5 mo)	Carcinogenic effects.	El-Mofty and Sakr 1988
growmore	RATE	adult	DERMAL	BEHAV				Lung and buccal ventilation rates provide a reliable indication of acute toxicity of growmore.	Oldham et al. 1993
HCH, alpha, lindane	EUOS	adult	INHAL	MORT			1-2%	24-72 h lethal time.	Kihara and Yamashita 1978
HCH, beta, lindane	BUAR	tadpoles	IMMER	MORT			0.4 ppb	>50% mortality.	Ferrari et al. 1997
HCH, beta, lindane	RAPI	adult	INJECT	RESIDUE				Brain= 3.7 - 55.5; liver 6.5 - 53; fat 10.0 - none; (18, 23, 38 d after exposure).	Whitacre and Ware 1967 [k]
HCH, beta, lindane	RAPI	adult	IMMER	RESIDUE			10	Decreasing rate of accumulation by skin over time.	Kaiser and Dunham 1972 [k]
HCH, beta, lindane	RAPI	adult	TISPREP	PHYSIO			100 µM	Frequency of end-plate potentials increased by 327 % and amplitude reduced to 21 % of controls. Neuroblastoma cells: 1-100 µM did not sig. modify action potentials elicited of affect Ca channels.	Joy et al. 1987 [k]
HCH, beta, lindane	RAPI	adult	TISPREP	PHYSIO			2 $x10^{-4}$M	Increased short circuit and resistance in abdominal muscle.	Webb et al. 1979 [k]
HCH, beta, lindane	RAPI	adult	DERMAL	PHYSIO			10	Initial rate of lindane movement through live or dead skin was 0.680 ppb/h; at 8 h rates were 0.691 and 0.666 ppb/h respectively.	Kaiser and Dunham 1972 [k]
HCH, beta, lindane	RATE	adult	TISPREP	PHYSIO	18-23		5 $x10^{-5}$M	40 min exposure caused extensive damage to myofilaments; 20 min exposure had little effect.	Publicover et al. 1979 [k]
HCH, beta, lindane	RATE	adult	TISPREP	PHYSIO			5 $x10^{-5}$M	Marked increased in miniature end plate potential frequency.	Publicover et al. 1979 [k]
HCH, beta, lindane	XELA	egg	IMMER	DEVOBS			0.5-2	Hatching rate 31 % at 2 ppm and 52 % at 0.5 ppm. At 2 ppm, 100 % mortality in 6 wk old tadpoles.	Marchal-Ségault and Ramade 1981 [k]
heptachlor	BUAR	embryo	IMMER	DEVOBS			1-15	5 and 15 ppm produced 100 % mortality on d 15 and 13. 1ppm reduced time to metamorphosis.	Juarez and Guzman 1984a [k]
heptachlor	BUAR	tadpoles	IMMER	MORT	20		0.1 ppb	Approximately 30% mortality.	Ferrari et al. 1997
heptachlor	RAPI	adult	IMMER	RESIDUE			6 ppb	Decreasing rate of accumulation by skin over time.	Kaiser and Dunham 1972 [k]
heptachlor	RAPI	adult	TISPREP	PHYSIO			2 $x10^{-4}$M	No sig. effects on short circuit current or resistance.	Wheeler et al. 1977 [k]
heptachlor epoxide	RAPI	adult	TISPREP	PHYSIO				Liver microsomal metabolism App Vmax= 0.013 nmol/min/mg. App VKm= 29 nmol/kg in liver microsomes.	Ronis and Walker 1985 [k]
hexachlorophene	XXFR	adult	IMMER	PHYSIO	22		1.2 $x10^{-4}$ - 1.6 $x10^{-4}$ M	50 % hemolysis in washed nucleated cells at 12 x 10^{-4} M. $16x10^{-4}$ M produced 50 % hemolysis in nucleated erythrocytes in whole blood.	Flores and Buhler 1974 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
hexamethyl-phosphoramide	PLWA	larvae	IMMER	GENOTOX			30-60	Frequency of micronucleated erythrocytes: 30 ppm= 19/1000; 10 ppm= 28/1000.	Fernandez et al. 1989
hexazinone	RACA	embryo	IMMER	DEVOBS			100	No effect.	Berrill et al. 1994
hexazinone	RACA	tadpoles	IMMER	DEVOBS	15		100	Behavioural abnormalities with eventual recovery over duration of exposure.	Berrill et al. 1994
hexazinone	RACL	embryo	IMMER	DEVOBS			100	No effect.	Berrill et al. 1994
hexazinone	RACL	tadpoles	IMMER	DEVOBS			100	No effect.	Berrill et al. 1994
hexazinone	RAPI	embryo	IMMER	DEVOBS	15		100	No effect.	Berrill et al. 1994
hexazinone	RAPI	tadpoles	IMMER	DEVOBS			100	No effect.	Berrill et al. 1994
Hg	GACA	egg	IMMER	DEVOBS		7.5-8.0	0.146-122.83	41 - 49 % mortality at hatching; 52 - 65 % mortality at 4 d post hatch.	Birge et al. 1977 [k]
Hg	RACA	adult	IMMER	PHYSIO				Irreversible decrease in rod response amplitude; did not affect cones of eyes.	Fox and Sillman 1979 [k]
Hg	RACA	tadpoles	IMMER	RESIDUE				36 (1.7) µg/kg= whole body mean conc. (standard deviation).	Burger and Snodgrass 1998
Hg	RANI	egg	IMMER	DEVOBS			0.8	Damage to primordial germ cells, slower proliferation rate.	Hah 1978 [k]
Hg	RANI	tadpoles	IMMER	DEVOBS			0.4- 0.8	Lethal to tadpoles. Abnormal tadpoles at 0.4 and 0.8 ppm.	Hah 1978 [k]
Hg	RAPI	adult	TISPREP	PHYSIO				No effects on force or relative potentiation were observed unlike in rat tissue.	Oliveira et al. 1994
Hg	RATI	adult	INJECT	RESIDUE			10 µCi/100 g	203 Hg accumulated in kidney and liver.	Dustman et al. 1972 [k]
Hg	RATI	adult	INJECT	RESIDUE			inject 10 µCi/100 g body wt	Residues: 203 Hg accumulated in both high and low MW fractions of kidneys, 2, 4 and 7 d after administration. In liver, 203 Hg appeared in high MW fractions at 2 d, in both high and low at 4 and 7.	Mehra et al. 1980 [k]
Hg	XELA	adult	TISPREP	PHYSIO				Irreversibly shifted Na activation curve in positive direction along the potential nerve axis.	Arhem 1980 [k]
Hg	XELA	egg	IMMER	DEVOBS	18-20	6.6-8.4	20-100 ppb	Exposure resulted in mortality, retarded development of survivors, deformities of eyes, heart, tail and intestine.	Schowing and Boverio 1979
Hg	XELA	embryo	IMMER	DEVOBS	18		0.001-1	1 ppm Hg lethal; increased Hg conc. resulted in moderate to severe deformities; increasing Mg resulted in decreased toxic effects.	Miller and Landesman 1978 [k]
Hg	XELA	embryo-larvae	IMMER	MORT		7.3	0.16- 0.34	4 d post hatch survival 46 % in 0.16 µg/L; 28 % at 0.34 µg/L.	Birge et al. 1979b [k]
HPB	RACA	tadpoles	IMMER	PHYSIO	18	8.8	0.010 mg/L	bioconc. factor: 13±4. Gills: 1.726 (SD=0.305). Liver: 0.017 (SD=0.012). Kidneys: 0.049 (SD=0.042). Fat bodies: 0.056 (SD=0.069). Stomach: 0.031 (SD=0.018). Intestine: 0.236 (SD=0.337). Skin: 0.312 (SD=0.081). mg/L.	Knezovich et al. 1989
HPB	RACA	tadpoles	IMMER	RESIDUE	18		9.8	gill>intestine>skin>stomach> liver (15,000, 6,200, 5,600, 3,600, 500 pg/mg, respectively). GI tract had 29,000 pg/mg.	Knezovich and Inouye 1993
HPB	RACA	tadpoles	IMMER	RESIDUE			3.7	int>skin>stomach>gill>liver: (37, 17, 13, 12, 5 pg/mg, respectively). GI tract= 540 pg/mg.	Knezovich and Inouye 1993

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
HPB	RACA	tadpoles	ORAL	RESIDUE			250 ng	stomach= 4 pg/mg, intestine= 35 pg/mg, GI tract= 96 pg/mg.	Knezovich and Inouye 1993
hydrazine	XELA	embryo	IMMER	DEVOBS			1-100 mg/L	100 % malformation > 10 mg/L. Susceptible during neurulation.	Greenhouse 1976b [k]
hydrazine	XELA	embryo	IMMER	DEVOBS			5-10 mg/L	Normal development in 5 mg/L but did not survive as larvae if not transferred to < 1 mg/L at hatching. Malformation in some batches of eggs at 10 mg/L.	Greenhouse 1976a [k]
hydrazine	XELA	larvae	IMMER	DEVOBS			0.1-1 mg/L	> 1 mg/L produced irreversible toxic effects and death within 24 - 48 h. 0.1 mg/L not toxic.	Greenhouse 1976a [k]
hydrazine sulfate	XELA	embryo	IMMER	DEVOBS			10-40 mg/L	100 % malformation at 40 mg/L. Susceptible during neurulation.	Greenhouse 1976b [k]
hydrocarbons	PLWA	larvae	IMMER	GENOTOX			32 ml/L, 125 ml/L, 250 ml/L of river water	Even at lowest dilution, 32ml/L, double the amount of micronuclei, sig. higher numbers for 250 ml/L.	Gauthier et al. 1993
hydrocarbons	RATE	tadpoles	IMMER	PHYSIO				QSAR investigations using previously published data set.	Lipnick 1989
I	DEHS	adult	DERMAL	MORT			89-179 µg/mL	Residual iodine found in temporary holding containers, reversibly bound to the plastic used during cleaning. Acute toxicity.	Stoskopf et al. 1985
I	NOVI	adult	INJECT	PHYSIO				A sig. fraction of the injected dose continued to circulate as inorganic iodide at 7 and 14 d following injection.	Dunn and Dent 1980
imidazole	XXFR	adult	TISPREP	PHYSIO				Calcium efflux increased from sarcoplasmic reticulum to myo-filament containing space.	Stephenson 1981
Ingran	BUVU	embryo	IMMER	PHYSIO			0.312- 50 %	Very toxic to embryo and tadpole developmental stages.	Constantini and Panella 1975
JKU0422	XELA	adult (M)	TISPREP	PHYSIO	20	7.4	10^{-7}-10^{-4}M	Repetitive activity or frequency dependent suppression of sciatic nerves was not induced by phenylpyrazoles.	Klis et al. 1991b
K (fertilizer)	RATE	adult (M)	DERMAL	BEHAV				At 1/4 SCI two treated frogs exhibited convergence of buccal and lung ventilation rates characteristic of a toxic effect after 3.5 h.	Oldham and Hilton-Brown 1992
KCl	RABR	tadpoles	IMMER	MORT		5.6-7.7	1-10 g/L	Mortality occurs after 48 h with 6 g/L or 5 g/L after 120 h.	Mahajan et al. 1979
KCl	RAPI	not specified	TISPREP	PHYSIO			30 mM K	Na-activated Ca efflux is inhibited.	Chapman et al. 1981
kepone	ALMI	adult	TISPREP	DEVOBS			34	IC50= 34, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
lanthanum	RAPI	adult	IMMER	PHYSIO			0- 0.4 mM	Below 0.4mM, La inhibits a component with high affinity to La representing 40% of Ca efflux.	Stout and Diecke
LAS	RACY	tadpoles	IMMER	MORT	25	7.2-7.5	0- 0.15	Dose dependent reactions to increases in conc.: 0% survival at 0.06 ppm, acute toxicity range was 0.0377- 0.0635, 100% survival between 0.01- 0.04.	Lal et al. 1983
LAS	XELA	embryo	IMMER	DEVOBS				Malformations produced.	Ramusino 1980 [k]
leptophos	BUMA	adult	IMMER	PHYSIO				AChE appeared relatively insensitive to inhibition.	Fulton and Chambers 1983
leptophos	HYCI	tadpole/adult	IMMER	PHYSIO				Neurotoxic esterase activity could not be demonstrated in HYCI. The AChE I50 for leptophos-oxon was 1.7 x 10^{-6} M.	Fulton and Chambers 1983

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
leptophos	PSCR	tadpoles	IMMER	PHYSIO				No symptoms observed.	Fulton and Chambers 1983
leptophos	RAPI	adult	TISPREP	PHYSIO	22		2.5 x10^{-4}M	No effect on muscle contraction evoked by indirect or direct stimulation at up to 25 x 10^{-4} M.	Takeno et al. 1977 [k]
leptophosoxon	HYCH	embryo	DERMAL	DEVOBS			0-7.5	100 % mortality in 7.5 ppm; 0% abnormal embryos after dermal exposure for 24 h.	Fulton and Chambers 1985 [k]
Leunarex	RAES	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	Two sizes of tadpoles exposed to solution. Both 24 and 31 mm tadpole groups recorded 100% mortality in 0.01%.	Gunther and Plotner 1986
Leunarex	RATE	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	Enhanced swimming activity immediately after placement in solution with increasing lethargy and death at high conc. 0% mortality at 0.001%, mortality at 0.003 - 0.006%.	Gunther and Plotner 1986
Li	BUAR	embryo	IMMER	DEVOBS	18-20			Lithium chloride produces anomalies only in certain stages of embryonic development. Most sensitive stages are between 8 and 112 blastomeres.	Bustuoabad et al. 1977
Li	RAPI	egg	IMMER	DEVOBS				Severity of effects increased with increased duration of exposure, conc., or temp.	Hall 1942 [k]
Li	RARI	embryo	IMMER	DEVOBS				Plasma membrane protein composition is altered due to lithium action, lithium may interfere in the process of mRNA translation.	Lazou and Beis 1993
Li	XELA	embryo	INJECT	DEVOBS				Results suggest role for altered polyphosphoinositide cycle activity in lithium-induced teratogenesis.	Busa and Gimlich 1989
Li	XXXA	egg	IMMER	DEVOBS	19	7.73	0.04-1.56 mg/L	No effects on eggs.	Pasteels 1945
Li	XXXA	egg	IMMER	DEVOBS				Severity of effects increased with increased duration of exposure, conc., or temp.	Hall 1942 [k]
lithium carbonate	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc.= 10 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
lithium chloride	RAFU	egg	IMMER	DEVOBS			LiCl	In French.	Pasteels 1942
lithium chloride	TRCR	adult	DERMAL	PHYSIO	18-20			Anomalies of gastrular movements and late morphogenesis by LiCl treatment during the marginal zone formation.	Zaffaroni et al. 1979
lithium chloride	XELA	egg	IMMER	DEVOBS	20		0.117- 0.165 M	Exposed larvae (gastrula stage) exhibited deficiencies in the head (microencephalia) and notocord (phase specific breaks).	Backstrom 1953
lithium chloride	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc.= 10 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
malathion	BUAR	embryo	IMMER	DEVOBS			0.47-47.3 mg/L	47.3 mg/L= 100 % mortality within 5 d. 0.47 mg/L allowed larval development and metamorphosis. Increase exposed time resulted in inhibition of AChE.	de Llamas et al. 1985 [k]
malathion	BUAR	embryo	IMMER	PHYSIO			0-70 mg/L	At 44 mg/L mortality increased sig; morphological abnormalities increased with conc.	Rosenbaum et al. 1988
malathion	BUAR	larvae	IMMER	PHYSIO			0.0047-47.3 mg/L	No detectable effects.	de Llamas et al. 1985 [k]
malathion	EUOS	adult	INHAL	MORT			3%	48 h lethal time.	Kihara and Yamashita 1978

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
malathion	HYRE	tadpole (3 wk)	IMMER	PHYSIO	30.8-37.8		25-50 ppb	Temp. tolerance sig. lowered; onset of spasms occurred at lower temp. at 50 ppb (34.1°C) than 25 ppb (37.5°C).	Johnson 1980a [k]
malathion	LAPA	adult	ORAL	PHYSIO	18-27		1-3	Heavy lipid accumulation for all doses in kidney and liver and intestine as well as congestion and degeneration of the kidney; 2mg/kg resulted in edema and necrosis of fatty tissue.	Ozelmas and Akay 1995
malathion	MIOR	embyro (yolk plug)	IMMER	DEVOBS	25		1-20	5 ppm lethal, 10 ppm resulted in 35% mortality at 96 h; 15 ppm= 100 % mortality after 96 h.	Pawar et al. 1983 [k]
malathion	PLCI	adult	IMMER	PHYSIO			5.6 kg/ha	Brain cholinesterase was sig. inhibited. No changes in feeding, endurance or co-ordination.	Baker 1985 [k]
malathion	PLGL	adult	IMMER	PHYSIO			5.6 kg/ha	Brain cholinesterase was sig. inhibited No changes in feeding, endurance or co-ordination.	Baker 1985 [k]
malathion	RAHE	adult	TISPREP	PHYSIO			10-30	Results indicate that action of malathion is similar to that of pharmacologically active myo- and neuro-toxic agent; decreased twitch amplitude.	Kowsalya et al. 1987 [k]
malathion	RAPI	adult	IMMER	PHYSIO			50-175	20 dead after 15 d at 175 ppm; progressive anemia and leuocopenia occurred with successively higher conc.; white blood cell count showed progressive neutropenia and lymphocytosis with increasing conc.	Kaplan and Glaczenski 1965 [k]
malathion	RAPI	adult	INJECT	PHYSIO			5 ml/kg	ChE activity (µL CO_2/50mg/10 min): 112±6 (corn oil controls), 100±4 (treated). TOTP treatment alone did not sig. affect cholinesterase activity, but it potentiated the anticholinesterase action of malathion by 100-fold in frogs.	Cohen and Murphy 1970
malathion	RATE	tadpoles	IMMER	DEVOBS			0.125 and 1.25 mg/L	Sig. dif. noted in mortality, mobility and growth in exposure groups.	Ranke-Rybicka 1972
malathion	RATI	egg	IMMER	DEVOBS			0.00001-0.004 %	No tadpoles from eggs treated with 0.00001 % to 0.004 % metamorphosed.	Mohanty-Hejmadi and Dutta 1981 [k]
malathion	RATI	tadpole (feeding stage)	IMMER	DEVOBS			0.00001-0.005 %	None metamorphosed at conc. 0.00001 % to 0.005 %.	Mohanty-Hejmadi and Dutta 1981 [k]
malathion	RATI	tadpole (limb bud)	IMMER	DEVOBS	30-38		0.0001-0.0007 %	< 100 metamorphosed > 0.0002 %; increased time for metamorphosis.	Mohanty-Hejmadi and Dutta 1981 [k]
maneb	TRCC	adult	IMMER	PATH	17-20		5	No tumours were found in any animals; some edema; spleen enlargement.	Zavanella et al. 1979 [k]
maneb	TRCC	adult	IMMER	DEVOBS	24		5	Severe limb abnormalities in all regenerated limbs.	Zavanella et al. 1984 [k]
maneb	TRCC	adult (F)	IMMER	DEVOBS	24		5	Growth retardation, skeletal malformation and vascular disturbances of the regenerating limb.	Arias et al. 1982
maneb	TRCR	adult	IMMER	DEVOBS	24		5	Delayed growth, reduced melanogenesis and malformations in regenerated limbs.	Arias and Zavanella 1979 [k]

Table 4 - Laboratory Studies - 41

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
maneb	TRCR	adult	DERMAL	PHYSIO	16-21		0.5, 2.5, 5.0 mg/L	For both experiments no sig. changes in the relative proportions of the white blood cells were found after exposure to maneb at any of the conc. tested.	Zaffaroni et al. 1979
maneb	XELA	embryo (yolk plug)	IMMER	DEVOBS			1-5	Growth retardation, absence or reduction of malanogenesis in eye, shortened tail, distinct notochord waviness. At higher conc. organisms were unable to swim as well and control specimens.	Bancroft and Prahlad 1973 [k]
MCPA	TRCC	adult	IMMER	MORT	18			LT50 (lethal time for 50% of individuals) in h: 300 mg/L= 17 h (M), 21 h (F); 1600 mg/L= 35 h male, 455 h (F).	Zaffaroni et al. 1986b [k]
MCPA	TRCC	adult	IMMER	PATH	23±2		0,100, 200 and 400 mg/L	No carcinogenic activity of MCPA.	Zavanella et al. 1988
meldrin	EUOS	adult	INHAL	MORT			1-2%	3-6 h lethal time.	Kihara and Yamashita 1978
mercury(II)chloride	BUAR	embryo	IMMER	DEVOBS	22	7.2	0- 0.05 mg/L	Evidence of dose and stage related teratogenicity and delayed and irregular development.	Rengel and Pisano 1989
mercury(II)chloride	MIOR	embryo	IMMER	MORT	21-25	7.1	50 µg-300	300 µg/L produced almost total mortality within 24 h. 200-250 µg/L; morphological abnormalities and retarded growth also observed; Most died within 72 h 100-150 µg/L produced low mortality, abnormalities were less severe. No sig. changes at 50 µg/L.	Ghate and Mulherkar 1980a [k]
mercury(II)chloride	MIOR	tadpole (8-10 d)	IMMER	MORT	21-25	7.1	50-300	Survivors at 100-200 µg/L has distended body cavities and were sluggish after 24-48 h.	Ghate and Mulherkar 1980a [k]
mercury(II)chloride	RACY	adult (gravid)	IMMER	MORT			various	Exposed individuals exhibited weight loss, sig. reduction in ovarian mass and reduction in 1st and/or 2nd growth phase oocytes.	Kanamadi and Saidapur 1991
mercury(II)chloride	RACY	adult (M)	IMMER	MORT			0.94 mg/L	No sig. variation in body mass; other body size indices varied.	Kanamadi and Saidapur 1992b
mercury(II)chloride	RAHC	oocytes	IMMER	PHYSIO		7.24	0.88 mg/L	Loss of body weight after 30 d at 6.9 ppm; decrease in ovarian mass for all tests; no mortality.	Punzo 1993b
mercury(II)chloride	RAHE	gametes	IMMER	DEVOBS	21±0.5	7.23	0-5.0 mg/L	Percent fertilized decreased sig. with increasing conc. of mercuric chloride. No effect at 0.5 mg/L, 69% fertilization at 1.0 mg/L, 27% fertilization at 2.5 mg/L, 0% fertilization at 5.0 mg/L.	Punzo 1993a
mercury(II)chloride	RAPI	adult	IMMER	MORT			0.5-50	10 ppm= 100 % mortality at 8 d. < 7.5 ppm no mortality within 10 d.	Birge and Just 1975a [k]
mercury(II)chloride	RAPI	embryo	IMMER	MORT			0.0001-10	Cleavage and blastula stages most sensitive. 78-96 % survival in 0.0001; 0% in 10 ppm.	Birge and Just 1975a [k]
mercury(II)chloride	RAPI	larvae	IMMER	MORT			0.5-50	0.5 ppm 100 % survival for 10 d. > 25 ppm lethal within 1 d.	Birge and Just 1975a [k]
mercury(II)chloride	XXNE	adult	INJECT	PHYSIO			10 body wt	A decrease in serum protein not due to hemodilution was observed after mercury treatment.	Kikuchi et al. 1976
mesotocin	AMTI	adult	INJECT	PHYSIO			5 ng/g	Mesotocin (a possible diuretic in salamanders) caused glomerular filtration rate to increase from 0.204 to 0.319 ml/10g/h.	Hartenstein and Stiffler 1981

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
mesotocin	AMTI	larvae	IMMER	PHYSIO				Mesotocin restored glomerular filtration rate to 148 after vasotocin caused a decrease from 127 to 92 µl/10g/h.	Stiffler et al. 1981
mesotocin	NOVI	adult	INJECT	PHYSIO			5 ng/g	Results not extracted from paper.	Hartenstein and Stiffler 1981
mesotocin	TAGR	adult	INJECT	PHYSIO			5 ng/g	Mesotocin (a possible diuretic in adult salamanders) caused glomerular filtration rate to increase from 0.136 to 0.171 ml/10g/h. (not a sig. increase).	Hartenstein and Stiffler 1981
metal oxides	PLWA	larvae	IMMER	GENOTOX			125 ml/L, 250 ml/L of river water	High numbers of micronucleated erythrocytes (22/1000 erythrocytes).	Gauthier et al. 1993
metals	XXFR	embryo	IMMER	MORT			various	Increased conc. resulted in increased incidence of abnormalities in embryos; higher mortality in earliest embryogenic stages.	Mironova and Andronikov 1992
metals	XXXA	tadpoles	IMMER	MORT				Increased incidence of malformations from laboratory exposures to reservoir surface water samples with increasing metals conc. Effects observed were associated with Cu, Cd and Zn.	Pascoe et al. 1994
metals	XXXA	tadpoles	IMMER	MORT				Results of surface water analysis were spatially variable; no statistically sig. acute toxicity found in tadpoles after 96 h.	Linder et al. 1994
methallibure	TAGR	adult (M)	IMMER	PHYSIO			1 mg	Methallibure sig. reduced the androgen levels.	Moore 1977
methane sulfonate	BUMA	adult	TISPREP	PHYSIO	37			Sulfide and sulfoxide showed no response curve to ACh; sulfone and phystigmine showed cumulative conc. response curve to ACh.	Smith et al. 1996
methane sulfonate	RAPI	adult	INJECT	PHYSIO			150 body wt	Produced a flaccid paralysis and loss of the righting reflex in a number of species, including the frog. Frog regained righting reflex after 113 min on avg.	Wayson et al. 1976
methomyl	EUOS	adult	INHAL	MORT			1-2%	1-3 h lethal time.	Kihara and Yamashita 1978
methoprene	BUBO	juvenile	IMMER	PHYSIO	23-24		100 ppb	Lowered temp. tolerance.	Johnson and Prine 1976 [k]
methoprene	BUBO	tadpoles	IMMER	MORT	22-26		1	No adverse effects were observed, 0% mortality at 1 ppm.	Miura and Takahashi 1973
methoprene	BUBU	tadpoles	IMMER	DEVOBS			10	Inhibitory effect upon development in both amphibian and domestic chicken eggs.	Paulov 1976
methoxychlor	ALMI	adult	TISPREP	DEVOBS				No interaction with estrogen receptors.	Vonier et al. 1996
methoxychlor	AMMA	embryo	IMMER	HATSUC			<= 10 mg/L	Conc. <10 mg/L did not result in appreciable mortality, however, early hatching was a typical response >0.1mg/L.	Ingermann et al. 1997
methoxychlor	AMMA	larvae	IMMER	BEHAV			<= 10 mg/L	Startle response in larvae ten days after hatching was altered with exposure to 0.3 mg/L or greater.	Ingermann et al. 1997
methoxychlor	BUAM	adult	IMMER	RESIDUE			0.024- 0.325	No changes in organ weights, feeding, behaviour or survival. Residues not correlated with exposure.	Hall and Swineford 1979 [k]
methoxychlor	RAPI	adult	IMMER	BEHAV		5.95-6.31	0.4- 0.8	At 0.8 ppm 40 % mortality at 30 d.	Kaplan and Overpeck 1964 [k]
methoxychlor	RAPI	adult	TISPREP	PHYSIO			2 $x10^{-4}$M	No sig. effect on the short circuit current or resistance of abdominal skin.	Webb et al. 1979 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
methoxyfluorane	RAPI	adult	DERMAL	MORT				Effective anesthetic for RAPI; initial excitement (2 min) followed by 38 min deep anaesthesia; recovery 7 h. Pulse and cloacal temp were unaffected, but respiration slowed.	Wass and Kaplan 1974
methyl demeton	RATI	egg	IMMER	DEVOBS	30-38		0.00001-0.00003 %	20 % metamorphosis at 0.00003 %; 50 % metamorphosis at 0.00001 %; 42 - 472 d for metamorphosis in exposed groups compared to 337 in control.	Mohanty-Hejmadi and Dutta 1981 [k]
methyl demeton	RATI	tadpole (feeding stage)	IMMER	DEVOBS			0.00001-0.00004 %	40 % metamorphosed in 0.00004%; 80% metamorphosed at 0.00001 % 51 - 565 d mean time for metamorphosis in exposed groups compared to 333 d in control.	Mohanty-Hejmadi and Dutta 1981 [k]
methyl demeton	RATI	tadpole (limb-bud)	IMMER	DEVOBS			0.00001-0.0008 %	< 0.0005 % 100 % metamorphosed; delayed metamorphosis.	Mohanty-Hejmadi and Dutta 1981 [k]
methyl ethyl ketone	DEXX	adult	DERMAL	BEHAV			2, 16 and 25	Hyperactivity; weight loss; no mortality immediately after exposure.	Whitaker 1993
methyl fluoroacetate	RACL	adult	IMMER	PHYSIO			0.001-50 mM	5 mM blocks nerve in 3 - 4 h; 50 mM blocks within 15 h. 0.005 and 0.001 M produced 80 and 25 % respectively; inhibition of respiration after 2 h.	Boyarsky et al. 1949 [k]
methyl isothiocyanate	XELA	embyro (yolk plug)	IMMER	DEVOBS			0.001-600 ppb	10 d mortality: 5 % in 0.001 ppb and 100 % in 10 ppb. Embryos exposed to 100-500 ppb did not survive after 5 d; those exposed to 60 ppb did not complete neurulation.	Birch and Mitchell 1986 [k]
methyl mercury chloride	NOVI	adult	IMMER	DEVOBS			0.1-1.0	Delayed metamorphosis; regeneration rate increased; 100% mortality in 10 ppm after 8 d.	Chang et al. 1976 [k]
methyl mercury chloride	RAPI	adult	TISPREP	PHYSIO			10^{-3} - 10^{-4} M	Dimethylmercury did not alter the electrical resistance or the short circuit current across the skin at a conc. of 10^{-3} M. Methylmercuric chloride at 10^{-4} M reduced both the electrical resistance and short circuit current.	Yorio and Bentley 1973 [k]
methyl mercury chloride	RAPI	adult	INJECT	MORT			20	No toxic effects with injection into dorsal lymph sac or with immersion.	Yorio and Bentley 1973 [k]
methyl mercury chloride	RAPI	embryo	IMMER	DEVOBS	21		5-30 ppb	Tail defects, exogastrulation, stunting and poor general development, death and severe defects occurred over a narrow range of conc. and increased with exposure time and increased conc.	Dial 1976 [k]
methyl mercury chloride	RAPI	tadpoles	IMMER	BEHAV			0.001-1.0	Increased lethargy, irritative movement, abnormal swimming postures, difficulties breathing and death at 0.05 - 0.01. 40 % mortality at 24 h; 0.5 - 10 ppm. 100 % mortality at 24 h.	Chang et al. 1974 [k]
methyl mercury chloride	XELA	embyro	IMMER	HATSUC			0.0004-1.0	Decreased hatching success and increased mortality with increased conc.	Dumper and Zietz 1984 [k]
methyl mercury chloride	XXNE	adult	INJECT	PHYSIO			10 body wt	A decrease in serum protein not due to hemodilution was observed after mercury treatment.	Kikuchi et al. 1976
methylarsonic acid	LIEW	adult	IMMER	MORT			300-400	No mortality.	Johnson 1976 [k]
methylarsonic acid	LITA	adult	IMMER	MORT			130-520	No mortality after 96 h.	Johnson 1976 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
methylarsonic acid	RAPI	tadpoles	SUBDERM	PHYSIO				Mechanism by which lead stunts neuronal growth is independent of NMDA receptor activity or retinotectal synaptic transmission.	Cline and Witte 1994
methylhydrazine	XELA	embryo	IMMER	DEVOBS			0-> 10 mg/L	< 5 mg/L harmless if embryos transferred to uncontaminated water by completion of neurulation. Teratogenic at > 10 mg/L.	Greenhouse 1976a [k]
methylhydrazine	XELA	embryo	IMMER	DEVOBS			3-15 mg/L	100 % malformation at 15 mg/L; 1 % malformed at 3 mg/L.	Greenhouse 1976b [k]
methylhydrazine	XELA	larvae	IMMER	DEVOBS			0.1-1.0 mg/L	1 mg/L produced irreversible toxic effects and death within 48 h. Normal metamorphosis occurred in larvae in continuous contact with 0.1 mg/L.	Greenhouse 1976a [k]
Mg	RACA	tadpoles	IMMER	PHYSIO	25		2.5-5.0 mM	An increase in Mg exposure resulted in increased serum Mg.	Sasayama et al. 1983
Mg	RANI	tadpoles	IMMER	PHYSIO	25		2.5-5.0 mM	An increase in Mg exposure resulted in increased serum Mg.	Sasayama et al. 1983
Mg	XXFR	adult	IMMER	PHYSIO				Calcium efflux increased from sarcoplasmic reticulum to myo-filament containing space.	Stephenson 1981
Mg, Pb, Cd, Mn, Hg	XELA	embryo	IMMER	MORT	18			Mg ions moderated the toxicity of lead, cadmium, manganese and mercury.	Miller and Landesman 1978 [k]
Mg, Zn	RACA	tadpole (stage 15-18)	TISPREP	PHYSIO		7.4	2.5-50 mM Mg; 50 µM Zn	90 % nuclear survival occurred in the presence of 50uM Zn with 1mM Mg that would cause unstable liver nuclei in frogs at (2-10 mM) Mg conc. alone.	Doyle et al. 1981
microbes	PLWA	larvae	IMMER	PHYSIO				Larvae reared in untreated tap water had higher levels of micronucleated erythrocytes than those reared in filtered water.	Jaylet et al. 1987 [k]
Mimic 240LV	BUAM	tadpoles	IMMER	BEHAV	15-20		2, 4 and 8 mg/L	Initial response to single pulse exposure included complete paralysis and bloating of the cranial area. Behavioural abnormalities were also evident.	Coulson 1995
Mimic 240LV	RACA	embryo	IMMER	DEVOBS	15-20		2,4 and 8 mg/L	No hatching occurred prior to completion of exposure. Less than 10% hatch failure occurred at all conc.	Coulson 1995
Mimic 240LV	RACA	tadpoles	IMMER	DEVOBS	15-20		2, 4 and 8 mg/L	For newly hatched (single pulse) minimal mortality occurred. Less than 30% exhibited abnormal avoidance at 4 mg/L and recovery occurred rapidly.	Coulson 1995
Mimic 240LV	RACL	embryo	IMMER	DEVOBS	15-20		2, 4 and 8 mg/L	For mid- to late neurulating embryos hatching had completed by the end of exposure in all treatments. Successfully hatched tadpoles exhibited no morphological or behavioural abnormalities.	Coulson 1995
Mimic 240LV	RACL	metamorphosis	IMMER	DEVOBS	15-20		2, 4 and 8 mg/L	No morphological or behavioural abnormalities were observed in late stage tadpoles. At termination of exposure there was no dif. Between control and treated animals.	Coulson 1995
Mimic 240LV	RACL	tadpoles	IMMER	DEVOBS	15-20		2, 4 and 8 mg/L	Minimal mortality at all treatment levels with newly hatched tadpoles.	Coulson 1995
Mimic 240LV	RAPI	embryo	IMMER	DEVOBS	15-20		2,4 and 8 mg/L	No hatching occurred prior to completion of exposure. Less than 10% mortality occurred at all conc.	Coulson 1995

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Mimic 240LV	RAPI	tadpoles	IMMER	DEVOBS	15-20		2, 4 and 8 mg/L	For newly hatched (single pulse) minimal mortality occurred. Less than 30% exhibited abnormal avoidance at 4 mg/L and recovery was quick (within exposure period).	Coulson 1995
Mimic 240LV	RASY	tadpoles	IMMER	DEVOBS	15-20		2, 4 and 8 mg/L	Less than 30% newly hatched tadpoles were unresponsive to prodding at 4 mg/L, most recovered within the exposure period.	Coulson 1995
mine drainage	BUBO	zygote	IMMER	DEVOBS		2.79		All zygotes placed in mine drainage died within 12 h and before they reached the cleavage stage.	Porter and Hakanson 1976 [k]
mine drainage	LEMA	larvae	IMMER	MORT	12			Mortality rate was a function of exposure time and conc.	Mathews and Morgan 1982 [k]
mirex	XELA	adult	IMMER	MORT			0-5 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>3.3.	Daston et al. 1991
mirex	XELA	embryo	IMMER	MORT			0-5 mg/L	Defects were noted in embryos exposed for four days post-fertilization.	Daston et al. 1991
Mn	RACA	tadpoles	IMMER	RESIDUE				Results not extracted from paper.	Burger and Snodgrass 1998
Mn	XELA	adult	TISPREP	PHYSIO				Decreased permeability constant in K and Na systems; reversibly shifted Na activation curve in positive direction along potential nerve axis.	Arhem 1980 [k]
Mn	XELA	embryo	IMMER	DEVOBS	18		0.001-10	High Mg conc. during Mn exposure resulted in decreased toxic effects.Increased Mn conc. increased deformities and decreased survival; 0.2 - 200 Mg in addition to Mn exposure.	Miller and Landesman 1978 [k]
MNNG	XEBO	adult	INJECT	PATH				Results not extracted from paper.	Picard et al. 1982
monochloramine	PLWA	larvae (2 mo)	IMMER	PHYSIO	20±0.25			Increased number of micronuclei.	Gauthier et al. 1989
MPP+	EUOS	adult	INHAL	MORT			1-2%	72 h lethal time to survival past 3 d at 1% conc.	Kihara and Yamashita 1978
MPP+	RACL	adult	INJECT	BEHAV			1-5	44/48 animals showed reduced motor ability below 5 mg/kg. All were impaired at 5 mg/kg.	Barbeau et al. 1985
MPP+	RACL	adult	INJECT	BEHAV			5	Far more toxic than parent compound (MPTP).	Barbeau et al. 1985
MPTP	TATO	adult	INJECT	BEHAV			100-400 varying dosages/d	Most died in each treatment within 8 d of injections.	Barbeau et al. 1985
MPTP	TATO	adult	INJECT	BEHAV			100-400 varying dosages/d	Motor impairment occurred, mainly "freezing" where animal is "paralyzed" in an awkward position for extended periods of time.	Barbeau et al. 1985
MTBE	RATE	tadpoles	IMMER	DEVOBS			100-2000	100 ppm in water led to increased weight, stimulated metamorphosis; < 2000 ppm had no lethal effect.	Paulov 1987a [k]
MTMC	EUOS	adult	INHAL	MORT			2%	24-48 h lethal time.	Kihara and Yamashita 1978
Myristate	PLWA	larvae	IMMER	GENOTOX			4-40	Frequency of micronucleated erythrocytes: 4 ppm= 9/1000; 40 ppm= 25/1000.	Fernandez et al. 1989
Na3NTA	RAPI	tadpoles	IMMER	MORT			600 mg/L	No sig. mortality occurred in buffered solutions of 600 mg/L or less.	Flannagan 1971 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Na3NTA	XXXS	larvae	IMMER	MORT			350 mg/L	Survived up to 350 mg/L over 96 h in buffered solutions; complete mortality in unbuffered solutions with pH > 9.4.	Flannagan 1971 [k]
nabam	XELA	embryo (stage 10-11)	IMMER	DEVOBS			4	Alteration in pigment of retina, notochord and skin at ultrastructural level.	Prahlad et al. 1974 [k]
nabam	XELA	embryo (yolk plug stage)	IMMER	DEVOBS	22		1-3	Waviness of notochord and punctuate melanophores.	Bancroft and Prahlad 1973 [k]
nabam	XELA	embyro (yolk plug)	IMMER	DEVOBS			10-1000 ppb	57 % survival in control groups and 56-60 % survival in exposed groups at 10 d > 30 ppb 62 - 96 % abnormal.	Birch and Mitchell 1986 [k]
NaCl	RABR	tadpoles	IMMER	MORT		5.6-7.7	1-10 g/L	Mortality occurs at 6 g/L after 48 h or 3 g/L after 72 h.	Mahajan et al. 1979
NaCl	RACA	adult	IMMER	PHYSIO			1 M NaCl /g	Salt load resulted in increased osmotic water flow and tritiated water diffusion.	Parsons et al. 1990
NaCl	RAPI	adult	IMMER	PHYSIO			1 M NaCl/g	Salt load resulted in increased osmotic water flow and tritiated water diffusion.	Parsons et al. 1990
NaDEDC	MIOR	embryo	IMMER	DEVOBS			0.5 -5 mg/L	5 mg/L: highly embyrotoxic, growth and development retardation, death in 24 h. 3 mg/L: survivors were 'highly retarded' and malformed; after 72 h general edema, abnormal bending of body, kinky notochord.	Ghate and Mulherkar 1980b [k]
naphthalene	RAPI	adult	TISPREP	PHYSIO			1-30 mg/L	EC50(30min)= 4.4 mg/L; dose response relationship on Na active transport.	Blankemeyer and Hefler 1990
napthoflavone (ßNF)	CHPI	adult	INJECT	PHYSIO				Purified turtle P450 fractions may be useful in further studies of the catalytic function of the inducible proteins.	Yawetz et al. ?
n-butyl sulphide	THRA	adult	DERMAL	BEHAV				One snake died shortly after voluntarily ingesting n-butyl sulphide, other behavioural observations are noted.	Secoy 1979
neostigmine	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977
NH3	XELA	embryo	IMMER	MORT				Gastrulation is most resistant stage.	Ramusino 1980 [k]
NH3, temp	XELA	juvenile	IMMER	MORT	16, 20	8-8.4		Toxicity of ammonia differed with temp; possibly related to skin surface area of animal.	Dejours et al. 1989b
NH4, pH	PLWA	tadpoles	pH+CONTAM	BEHAV	24			Toxicity depended little on the ammonium conc., but rather depended mainly on the conc. of dissolved NH3.	Dejours et al. 1989d
NH4Cl, NH3	PLWA	adult	pH+CONTAM	BEHAV	24	7.89-8.49		Ammonia toxicity generally increased with NH3 but at a given PNH3 value, toxicity is higher in hypoxia than in normoxia and higher in normoxia than in hyperoxia. Animal size also influenced ammonia toxicity.	Dejours et al. 1989c
NH4Cl, NH3	XELA	adult		BEHAV	24	7.89-8.49		Ammonia toxicity generally increased with NH3 but at a given PNH3 value, toxicity is higher in hypoxia than in normoxia and higher in normoxia than in hyperoxia. Animal size also influenced ammonia toxicity.	Dejours et al. 1989c

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NH4Cl, NH3, Cl	PLWA	adult	IMMER	PHYSIO	24	7.5		Ammonia loading and urea excretion were tracked in animals.	Dejours et al. 1989a
NH4Cl, NH3, Cl	XELA	adult	IMMER	PHYSIO	24	7.5		Ammonia loading and urea excretion were tracked in animals.	Dejours et al. 1989a
Ni	CYPY	adult	IMMER	PHYSIO			10^{-4} M	Lower conc. did not affect the electrical properties of the cell: 10^{-4} M decreased membrane potential up to 82 % of control value.	Kanno et al. 1978 [k]
Ni	XELA	adult	TISPREP	PHYSIO				Slowed down kinetics of the K system, decreased permeability constant. In K and Na systems, reversibly shifted Na activation curve in positive direction along potential nerve axis.	Arhem 1980 [k]
Ni subsulfide	CYPY	adult	INJECT	PATH	21		40-100µg of Ni3S2	7/8 malignant melanoma tumors developed in eye after injection. 19/28 had pigmented cells.	Okamoto 1987
niclosamide	BURE	adult	ORAL	PATH			0.3 mg	Force feeding 0.3 mg daily during non-breeding season induced formation of kidney tumours in 2 toads (2%).	Sabry and El-Mofty 1986 [k]
nicotine	EUOS	adult	INHAL	MORT			1-2%	12-72 h lethal time.	Kihara and Yamashita 1978
nicotine	RAPI	adult	TISPREP	PHYSIO		7.4	0.1% nicotine solution in frog-Ringer solution	The ciliary beat and oxidative metabolism of the lung tissue decreased an avg of 35-37% respectively.	Kikta et al. 1976
nifurpirinol	RAPI	larvae	IMMER	BEHAV			0.2-20	No mortality after 7 d. In 10 and 20 ppm were immobilized during exposure but recovered.	Marking et al. 1977 [k]
nitrate	AMJE	egg	IMMER	HATSUC			0-40 mg/L	No dif. between hatching success and deformed larvae number (99% hatch success, 13% deformed).	Laposata and Dunson 1998
nitrate	AMMA	egg	IMMER	HATSUC			0-40 mg/L	No dif. between hatching success and deformed larvae number (11% hatching success).	Laposata and Dunson 1998
nitrate	BUAM	egg	IMMER	HATSUC			0-40 mg/L	No dif. between hatching success and deformed larvae number (80% hatching success; 80% deformed).	Laposata and Dunson 1998
nitrate	RACA	adult	IMMER	MORT			10-40 mg/L	Nitrate stress may depress the immune response.	Dappen 1982
nitrate	RACA	tadpoles	IMMER	MORT			10-40 mg/L	Nitrate stress may depress the immune response.	Dappen 1982
nitrate	RAPI	adult	IMMER	MORT			10-40 mg/L	Nitrate stress may depress the immune response.	Dappen 1982
nitrate	RAPI	tadpoles	IMMER	MORT			10-40 mg/L	Nitrate stress may depress the immune response.	Dappen 1982
nitrate	RASY	egg	IMMER	HATSUC			0-40 mg/L	No dif. in hatching success or proportion of deformed larvae (97% hatch success and 78% deformed larvae).	Laposata and Dunson 1998
nitrate	XELA	adult	IMMER	MORT			10-40 mg/L	Nitrate stress may depress the immune response.	Dappen 1982
nitrate	XELA	tadpoles	IMMER	MORT			10-40 mg/L	Nitrate stress may depress the immune response.	Dappen 1982
nitrite	RACA	tadpoles	IMMER	PHYSIO	25	7.3	1-50 mg/L	Total hemoglobin levels not sig. altered; highly sig. positive relationship found between methemoglobinemia and nitrite conc.	Huey and Beitinger 1980a
NMU	NANA	adult	INJECT	MORT			20-200	NMU disturbs synthetic-secretory balance of hypothalamic secretory centres in grass snake.	Biczycki et al. 1992b
NMU	NANA	adult	INJECT	PHYSIO			20-200	NMU is a factor in disturbing normal function of thyroid in grass snake.	Biczycki et al. 1992a

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NMU	PLWA	not specified	UNAVAIL	PATH				10/50 animals developed fibro- and hemangiosarcomas, nephroblastomas and a cavernous hemangioma. No tumors of the nervous system occurred.	Schmidt 1980
NMU	XELA	adult	IMMER	PHYSIO				Lacked response to allograft; response to mammalian red blood cells (RBC) unaffected; cannot respond to trinitrophenyl (TNP) conjugated with RBC; helper T-cell activity is reduced or absent.	James et al. 1982
NMU	XELA	adult	INJECT	PHYSIO				NMU selectively lymphotoxic in XELA.	Balls et al. 1982
NMU	XELA	adult	ORAL	MORT			31 mg/100 g	NMU selectively lymphotoxic in XELA.	Clothier et al. 1983
NMU	XELA	adult	INJECT	MORT				Only 4 of more than 1850 XELA given a single or multiple doses of NMU developed malignant neoplasia. Other lesions, namely sacroidosis, bilateral renal dysplasia and proliferative myositis are described.	Clothier et al. 1983
NMU	XELA	toadlets	INJECT	MORT				Mortality is high after more than 6 high doses of NMU but animals which recover the immediate effects of NMU can live for many years.	Clothier et al. 1983
NMU	XELA	toadlets	ORAL	MORT			31 mg/100 g	NMU selectively lymphotoxic in XELA.	Clothier et al. 1983
NMU	XELA	young adult	INJECT	MORT			9.2 mg/100 g	NMU selectively lymphotoxic in XELA.	Clothier et al. 1983
N-nitrosodiethanolamine	PLWA	larvae	IMMER	GENOTOX	20	8	6.25-50	Dose response effect at 12.5-50 ppm.	L'Haridon et al. 1993
N-nitrosodimethylamine	BURE	adult	ORAL	PATH			10 /50g body wt (3x/wk for 5 mo)	Carcinogenic effects.	El-Mofty and Sakr 1988
N-nitrosodimethylamine	PYRE	adult	ORAL	MORT			0-24	Organ damage; mortality within 31-45 wks at 24 mg/kg.	Schmahl and Scherf 1983
nonachlor	ALMI	adult	TISPREP	DEVOBS			40	IC50= 40, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
nonachlor	ALMI	adult	TISPREP	DEVOBS			10.6	Trans-nonachlor: IC50= 10.6, inhibitor conc. necessary for 50% inhibition of 17ß-estradiol binding to estrogen receptor.	Vonier et al. 1996
nonachlor	RAPI	adult	TISPREP	PHYSIO				Produced a decrease in the short circuit current and increased the resistance in abdominal skin.	Webb et al. 1979 [k]
NPAN	XELA	embryo	IMMER	DEVOBS			0- 6 mg/L	6 mg/L produced malformations while exposure to < 5.2 mg/L resulted in no observable effects.	Greenhouse 1976a [k]
NPE	RAES	adult	TISPREP	PHYSIO			5 x10^{-5}M	Inhibited isosmotic, active transport-coupled volume flow in leg skin.	Celentano et al. 1979 [k]

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NRDC	RATE	adult	TISPREP	PHYSIO			1-100 mg/L	Multiple end-plate potentials appeared after exposure to > 2 mg/L for 18-45 min. 1-100 mg/L had no effects on muscle resting potential or amplitude or time course on the initial evoked end-plate potential.	Evans 1976 [k]
oil refinery	CACA	juvenile	ORAL	PHYSIO				Four fold increase in white blood cell counts and a 50% reduction in amount of red blood cells. Other physiological effects are reported.	Lutcavage et al. 1995
oil refinery	PLWA	larvae	IMMER	GENOTOX			125 ml/L	UV and effluent resulted in an increase in the number of erythrocytes (effluent alone was found to be non-toxic).	Fernandez and L'Haridon 1994
OMPA	RAPI	adult	IMMER	PHYSIO			2500-3100	Anemia, leucopenia, worsening with increasing conc.; progressive neutropenia and lymphocytes evident with increasing conc.; posture drooping, activity decreased, flaccid paralysis.	Kaplan and Glaczenski 1965 [k]
OMPA	XXFR	adult	TISPREP	PHYSIO				Reduced amplitude of response without sig. shifting the dose response curve.	Guy et al. 1977 [k]
OPAN	RAPI	embryo	IMMER	DEVOBS			200 mg/L	No deleterious effects on development.	Greenhouse 1976c [k]
OPAN	RAPI	embryo	IMMER	MORT			1 g/L	Not toxic.	Greenhouse 1976a [k]
OPAN	RAPI	larvae	IMMER	MORT			1 g/L	Not toxic.	Greenhouse 1976a [k]
OPAN	XELA	embryo	IMMER	DEVOBS			1 mg/L	No deleterious effects.	Greenhouse 1976c [k]
OPAN	XELA	embryo	IMMER	MORT			1 g/L	Not toxic.	Greenhouse 1976a [k]
OPAN	XELA	larvae	IMMER	MORT			1 g/L	Not toxic.	Greenhouse 1976a [k]
o-toluidine	PLWA	larvae	IMMER	GENOTOX			0.0025	Frequency of micronucleated erythrocytes= 5/1000.	Fernandez et al. 1989
Otroc	RAES	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	100% mortality in 0.01 exposure group.	Gunther and Plotner 1986
oxamyl	RATE	tadpoles	IMMER	DEVOBS			100	90 % of individuals with vertical curvature deformities.	Cooke 1981 [k]
oxytocin	AMXX	adult	TISPREP	PHYSIO				Oxytocin induces water loss in tail tissue of AMSX; amiloride potentiated oxytocin effects, theophylline and dibutyryl cAMP blocked oxytocin effects.	Platt and LiCause 1981
ozone	SCOC	adult	INHAL	BEHAV	21-35			Mild behavioural hypothermia with inhaled ozone at 35 C.	Mautz 1996
paraoxon	HYCH	embryo	DERMAL	DEVOBS			100	Not toxic or teratogenic after dermal exposure for 24 h.	Fulton and Chambers 1985 [k]
paraoxon	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977
paraquat	RABE	tadpoles	ORAL	BEHAV				Sig. mortality observed on d 7 and thereafter. Only 19.4% of tadpoles lived to d 15 in contrast to 81.1% controls living to d 15; abnormal tails; abnormal swimming behaviour.	Bauer Dial and Dial 1995

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paraquat	RAPI	embryo	IMMER	DEVOBS			0.5, 2.0 mg/L	Gastrula stage: 0 % survival rate at 2 mg/L and 63 % at 0.5 mg/L at 16 d post treatment; 15 d old embryo: 5 % survival at 2 mg/L and 667 % in 0.5 mg/L at 16 d post treatment. Retardation of growth, tail malformations, poor head development.	Dial and Dial 1987 [k]
paraquat	RAPI	embryo	IMMER	DEVOBS	21		0.1-10	No survivors > 0.5 at 12 d Development proceeded normally until approximately 3 d post-hatch. Growth rate slowed in all groups; tail abnormalities noted at 0.5 ppm.	Dial and Bauer 1984 [k]
paraquat dichloride	RATE	adult	INJECT	PHYSIO	20-25		8 µL/g body wt	Labeled compounds were taken up by various tissues.	Lindquist et al. 1988
paraquat dichloride	RATE	adult	IMMER	DEVOBS				Pronounced quantitative changes in the tissue proteins of contaminated adults were observed.	Paulov 1977a
paraquat dichloride	RATE	tadpoles	IMMER	DEVOBS				Relatively strong toxic effect of the herbicide on the developing tadpoles as well as pronounced quantitative changes in the tissue proteins of contaminated tadpoles were observed.	Paulov 1977a
parathion	ACCR	adult	IMMER	RESIDUE			0.1-10	< 0.05 - 4.6 (96 h exp).	Fleming et al. 1982 [k]
parathion	ACCR	adult	IMMER	MORT	23-24	7.6	0.1-10	Mortality at 96 h was dose related.	Fleming et al. 1982 [k]
parathion	BUAR	adult	IMMER	PHYSIO	16-22		0.1 ml/m^2	Toads exposed experienced a plasma cholinesterase activity decrease of 86 % of normal value. Activity quickly recovered when toads replaced into normal conditions.	Guzman and Guardia 1978 [k]
parathion	BUXX	adult	IMMER	PHYSIO				Metabolism of parathion incubated with liver slices for 30 min (mµmol): 376 parathion remaining and 2.81 paraoxon recovered.	Potter and O'Brien 1964 [k]
parathion	GAGA	adult	ORAL	PHYSIO			0.5, 2.5, 5.0, 7.5	Correlation between AChE activity and serum esterase. Generally, serum esterase activities slowly increase after acute treatments, no mortality occurred. Liver microsomal caroxylesterase were induced at lower conc.	Sanchez et al. 1997
parathion	MACR	adult	TISPREP	PHYSIO				Paraoxon caused ACh inhibition in brain homogenate.	Yawetz et al. 1983
parathion	RACA	tadpoles	IMMER	RESIDUE	20	7.2-7.5	1 mg/L	No mortality.	Hall 1990
parathion	RACA	tadpoles	IMMER	RESIDUE			0.1-1	Sig. bioconc.: avg magnification - 64 times, max= 96 ppm, no paraoxon (metabolite) detected in tissues at 0.5 ppm sensitivity.	Hall and Kolbe 1980 [k]
parathion	RACL	tadpoles	IMMER	RESIDUE	20	7.2-7.5	5 mg/L	Mortality at 5 mg/L.	Hall 1990
parathion	RAPE	tadpoles	IMMER	DEVOBS	25±5	7-8	1 and 25 mg/L	At 1 mg/L: mortality= 28%, normal embryos= 12.22%. At 25 mg/L: mortality= 26.09%, normal embryos=0%. the incidence of limb and tail deformities was 74.7% at 1 mg/L.	Alvarez et al. 1995
parathion	RAPI	adult	IMMER	PHYSIO			5-25	Anemia, leucopenia which worsened with increasing conc.; progressive neutropenia and lymphocytosis as conc. increased' marked decrease in activity, decreased muscle tone, generalized edema.	Kaplan and Glaczenski 1965 [k]

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parathion	RAPI	adult	DERMAL	RESIDUE			1	Half time rate of dermal penetration was 198 min.	Shah et al. 1983 [k]
parathion	RAPI	adult	IMMER	PHYSIO				Metabolism of parathion incubated in liver slices for 30 min (mµmol): 52.2 parathion remaining and 2.2 paraoxon recovered.	Potter and O'Brien 1964 [k]
parathion-methyl	BUBO	juvenile	IMMER	PHYSIO	23-24		25 ppb	Sig. lowered temp tolerance.	Johnson and Prine 1976 [k]
parathion-methyl	HYRE	tadpole (3 wk)	IMMER	PHYSIO			25-100 ppb	Sig. reduced temp tolerance.	Johnson 1980a [k]
parathion-methyl	RACY	tadpole (4 wk)	IMMER	PHYSIO			2.5	Exposure affected the qualitative nature of the brain lactate dehydrogenase isozymes.	Yasmeen and Nayeemunnisa 1986 [k]
parathion-methyl	RACY	tadpole (4 wk)	IMMER	PHYSIO			5	Reduced brain glucose and elevated O_2 consumption in exposed groups.	Yasmeen and Nayeemunnisa 1985 [k]
parathion-methyl	RATI	egg	IMMER	DEVOBS			0.00001-0.00005 %	100 % metamorphosis < 0.00002 %; increased time for metamorphosis with increased conc.	Mohanty-Hejmadi and Dutta 1981 [k]
parathion-methyl	RATI	tadpoles	IMMER	DEVOBS	30-38		0.00001-0.0003 %	100 % metamorphosis < 0.00004 % at feeding stage; 100 % metamorphosis at 0.0001 in limb-bud stage.	Mohanty-Hejmadi and Dutta 1981 [k]
Pb	ALMI	adult	INJECT	RESIDUE			0.5-50	Blood Pb= resting 1.511 - 3.966, 504 h= 1.511 - 51.821 mg/kg; free erythrocyte porphyrin conc. (red blood cell basis) resting 2.14 - 3.02 and at 504 h 2.82 - 3.47; ALAD resting 82 - 101, after 504 h 38 - 52.	Lee 1982
Pb	AMJE	embryo	pH+CONTAM	DEVOBS	10	4.5		A toxic response to Pb was not observed at levels as high as 2.0 mg/L. Pb did not alter developmental rate.	Horne and Dunson 1994b
Pb	BUAM	tadpoles	IMMER	BEHAV	22		500-1000	No overt indication of detection of Pb or obvious behavioral stress response by tadpoles when encountering plumes of Pb enriched water.	Steele et al. 1991
Pb	BUAR	embryo	IMMER	DEVOBS	20		2	Susceptibility to lead was markedly stage dependent.	Perez-Coll and Herkovits 1990
Pb	BUAR	tadpoles	IMMER	MORT	20		8-16 mg/L	Sig. decrease in rate of survival after 120 h (60% survival at 8 mg/L and 40% at 16 mg/L Pb). Sig. decrease in survival with combination Zn and Pb doses than with Pb alone.	Herkovits and Pérez-Coll 1991a
Pb	CRRH	adult	ENVIRON	RESIDUE				18 year old female= 247 µg/kg lead (blood).	Cook et al. 1989
Pb	LAAG	adult	INJECT	PHYSIO			single dose 20 µm/g body wt	Doses of lead acetate affected the intensity of neurosecretion and the processes of intracellular respiration.	Biczycki 1992b
Pb	RACA	adult	IMMER	PHYSIO			5.0-12.5 µM	5 and 125 µM Pb produced 9 % and 20 % decrease respectively, in amplitude of rod response. No effect on cone potential in eyes.	Fox and Sillman 1979 [k]
Pb	RACA	adult	TISPREP	PHYSIO			3×10^{-8}	Rapid in vitro uptake of lead during first 30 min.	Smith et al. 1974
Pb	RACA	adult	TISPREP	PHYSIO			5-50 mM	Synaptic transmission sensitive to the toxic effects of lead and cadmium.	Kober 1977b
Pb	RACA	tadpoles	IMMER	RESIDUE				Results not extracted from paper.	Burger and Snodgrass 1998

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Pb	RACA	tadpoles	IMMER	RESIDUE				775 (58.5) µg/kg= whole body mean conc. (standard deviation).	Burger and Snodgrass 1998
Pb	RACA	tadpoles	IMMER	BEHAV	23±1	7.21		Increased latencies; fewer avoidances.	Strickler-Shaw and Taylor 1991
Pb	RACA	tadpoles	IMMER	BEHAV	23±1		0-1.0 mg/L	No sig. behaviour abnormalities were noted due to Pb exposure except for greater variability in activity at 0.5 - 1.0 mg/L.	Steele et al. 1989
Pb	RACL	tadpoles	IMMER	BEHAV	23±1		0-1.0 mg/L	Preference or avoidance behaviour and amount of locomotor activity did not change; variability in locomotor activity occurred at 0.75 and 1.0 mg/L; 0% mortality.	Taylor et al. 1990
Pb	RACL	tadpoles	IMMER	BEHAV	23±1	7.2	0.75 mg/L	Results indicate that sublethal exposure to lead adversely affected both acquisition learning and memory.	Strickler-Shaw and Taylor 1990
Pb	RALU	tadpoles	IMMER	MORT			1,5,20,50,100	Heavy metals reduced survival and growth and fright response of tadpoles.	Lefcort et al. 1998
Pb	RANI	egg	IMMER	DEVOBS			70	Partial reduction of primordial germ cells at the 9-12 mm body length stage.	Hah 1978 [k]
Pb	RANI	tadpoles	IMMER	DEVOBS			70	Lethal to tadpoles.	Hah 1978 [k]
Pb	RAPI	embryo	IMMER	MORT			10^{-4}, 10^{-6} M	Embryos exposed to 10^{-4} exhibited cell deterioration and sloughing, deformation, fragmentation and death. Embryos exposed to 10^{-6} M Pb showed slight distortions in early stages of development.	Scott et al. 1979
Pb	RAPI	larvae (stages 10-20)	IMMER	DEVOBS	21		0.1, 0.5, 1.0, 1.5	Delayed metamorphosis occurred related to Pb conc., however, no morphological changes were observed. The size of the thyroid gland and follicle were reduced for higher Pb conc.	Yeung 1978
Pb	RAPI	tadpoles	SUBDERM	PHYSIO				Mechanism by which lead stunts neuronal growth is independent of NMDA receptor activity or retinotectal synaptic transmission.	Cline and Witte 1994
Pb	RAPI	tadpoles	IMMER	MORT			10^{-4}, 10^{-6} M	Wound healing following tail amputation and regeneration were severely inhibited in 10^{-4} M Pb but less so in 10^{-6} M.	Scott et al. 1979
Pb	TOSC	adult (F)	ENVIRON	RESIDUE				Captive population exhibited high blood lead levels.= 147 - 178 µg/dL.	Cook et al. 1989
Pb	XELA	adult	ORAL	GENOTOX			0.78-12.89 µg/d	Bone= 5.0 - 23.97; skin= 0.81 - 2.98; muscle= 1.01 - 5.9; kidney= 3.40 - 15.07; liver= 1.13 - 7.8 ppm ww.	Ireland 1977 [k]
Pb	XELA	adult	IMMER	RESIDUE			50	Residues (ppm dw) in frogs pretreated for 2 mos on dark or light background: dark= 187; light= 114.	Ireland et al. 1979 [k]
Pb	XELA	embryo	IMMER	DEVOBS	18		0.001-10	10 ppm Pb 100 % mortality; low Mg and exposure to Pb resulted in severe deformities. Increased survival with lower Pb levels.	Miller and Landesman 1978 [k]
Pb acetate	LAAG	adult	ORAL	PHYSIO			4 µm/g body wt	Inhibition of neurosecretory processes and degeneration of cell nuclei.	Biczycki 1992c

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Pb acetate	NEMA	adult	IMMER	PHYSIO			1 %	Destruction of mature erythrocytes which stimulated differentiation and proliferation of erythrocytes in blood.	Dawson 1933 [k]
Pb acetate	RACA	tadpoles	IMMER	PHYSIO			25	Destruction of erythrocytes and necrosis of liver, spleen and intestinal mucosa; high mortality. Action of lead nitrate more rapid than action of Pb acetate.	Barrett 1947 [k]
Pb acetate	RAHE	adult	TISPREP	PHYSIO			10^{-9} - 10^{-5}M	Discusses the effects of Pb and Ca on diogoxin cardiotoxicity.	Muthu et al. 1993
Pb acetate	RAHE	adult	IMMER	PHYSIO			10^{-7}M	Pre-perfusion by 10^{-7}M for 20 min segmented dioxin-induced cardiotoxicity; reduction in total dioxin exposure and time taken for systolic arrest.	Krishnamoorthy et al. 1987 [k]
Pb acetate	XXFR	adult	IMMER	MORT			1-100	Adults killed at 100 ppm.	Dilling and Healey 1926 [k]
Pb acetate	XXFR	egg	IMMER	DEVOBS			1-100	1- 5 ppm partly or fully inhibited germination of eggs.	Dilling and Healey 1926 [k]
Pb acetate	XXFR	tadpoles	IMMER	DEVOBS			1-100	2 ppm toxic to tadpoles.	Dilling and Healey 1926 [k]
Pb nitrate	LAAG	adult	ORAL	PHYSIO			4 µm/g body wt	Inhibition of neurosecretory processes and degeneration of cell nuclei.	Biczycki 1992c
Pb nitrate	LAAG	adult	INJECT	PHYSIO			20 µm/g body wt	Lead nitrate diminishes SDH activity and intensifies LDH. Decrease in neurosecretory activity in NSO and NPV cells during the first phase, followed by a considerable intensification of the process in the second phase.	Biczycki 1992a
Pb nitrate	RACA	tadpoles	IMMER	PHYSIO			25	Destruction of erythrocytes and necrosis of liver, spleen and intestinal mucosa; high mortality.	Barrett 1947 [k]
Pb nitrate	RAES	adult	TISPREP	PHYSIO			$^{10-5}$M	Inhibition of isosmotic, active transport-coupled volume flow in leg skin.	Celentano et al. 1979 [k]
Pb nitrate	RAPI	adult	IMMER	PHYSIO	8		25-300	24 of 300 individuals dead after 30 d. Mortality occurred in all Pb exposed groups.	Kaplan et al. 1967 [k]
Pb nitrate	RATI	adult	INJECT	BEHAV			400-700 /kg	Higher conc. of Pb resulted in accumulation of numerous nuclei in several regions and complete vacuolization of hepatocytes.	Kalyani and Patil 1986
Pb nitrate	XXFR	adult	IMMER	MORT				Adults killed at 100 ppm; inhibitory effects on germination of frog.	Dilling and Healey 1926 [k]
Pb nitrate	XXFR	egg	IMMER	DEVOBS			1-100	1 - 5 ppm partly of fully inhibited germination of eggs.	Dilling and Healey 1926 [k]
Pb nitrate	XXFR	tadpoles	IMMER	DEVOBS			1-100	2 ppm toxic to tadpoles with external gills, more sensitive than those with internal gills.	Dilling and Healey 1926 [k]
PCB	BOCO	adult	ENVIRON	PHYSIO				Histopathological lesions found in liver and kidney. PCB levels in liver and fat relatively high.	Wojcik et al. 1995
PCB	CHSE	adult	ENVIRON	RESIDUE				Aroclor 1242, 1248, 1254 and 1260 as well as combinations of these do not necessarily reflect environmental contaminants found in turtle fat tissue.	Schwartz et al. 1987
PCB	EPST	adult	ENVIRON	PHYSIO				Histopathological lesions found in liver and kidney. PCB conc. in liver and fat of ill snakes was relatively high.	Wojcik et al. 1995

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PCB	EUNO	adult	ENVIRON	PHYSIO				Histopathological lesions in liver and kidney consistent with poisoning. PCB levels in liver and fat were relatively high.	Wojcik et al. 1995
PCB	PYMB	adult	ENVIRON	PHYSIO				Histopathological lesions found in liver and kidney. PCB levels in liver and fat were relatively high.	Wojcik et al. 1995
PCB	PYRG	adult	ENVIRON	PHYSIO				Histopathological lesions found in liver and kidney. PCB in liver and fat relatively high.	Wojcik et al. 1995
PCB	RACA	adult	ORAL	PATH				Dose-dependent decrease in helminth intensity and nematode abundance was observed in RACA. A highly sig. dose-dependent increase in enzyme activity occurred.	Fontenot et al. 1995b
PCB	RACA	adult	ORAL	PATH			10-300	Neither the number of nematode species nor the number of trematode species were affected by the treatment of surviving or dead frogs. There was a dose dependent decrease in parasite burden in those frogs that survived the exposure period.	Fontenot et al. 1995a
PCB	RAES	adult	INJECT	PHYSIO			250	Frogs had limited metabolism of PCB-replacement compounds.	Tulp et al. 1977
PCB	TRSC	egg	DERMAL	DEVOBS	27.8		10-190 µg	11 different PCBs tested. Increased number of females and increased number of hatchlings with oviducts.	Bergeron et al. 1994
PCB 126	RAPI	adult	INJECT	PHYSIO			7.8	Transparent or yellow kidneys, EROD and MROD enzyme activity increased slightly in 7.8mg/kg.	Huang et al. 1998
pentachlorobenzene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
pentachlorophenol	CACU	embryo	IMMER	GENOTOX	18		15 ppb-1.5	Frequency of micronucleated erythrocytes are given for each conc. 1.5 ppm, 100% embryos died; 300 ppb, 46% embryos died; 150 ppb, 5% embryos died after 92 h.	Venegas et al. 1993
pentachlorophenol	EUOS	adult	INHAL	MORT			1-2%	3 h lethal time for both conc.	Kihara and Yamashita 1978
pentachlorophenol	PLTH	adult	TISPREP	PHYSIO	20-22	7.2	0.003- 0.1 mM	Dose-time dependent block of evoked transmitter release in sartorius muscle.	Montoya and Quevedo 1990
pentachlorophenol	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Mortality= 0.032; Development= 0.032; Growth= 0.032 mg/L.	Slooff and Canton 1983 [k]
permethrin	AGAG	adult	IMMER	PATH			0.05- 0.1 mg	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
permethrin	AGCA	adult	IMMER	PATH			0.05- 0.1 mg	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
permethrin	BOCO	adult	IMMER	PATH			0.05- 0.1 mg	Conc. that controls ectoparasites in snakes, not toxic.	Mutschmann et al. 1991
permethrin	BUAM	embryo	IMMER	HATSUC			0.01- 0.1 mg/L	95-99% hatching success; no increase in gross abnormality rate.	Berrill et al. 1993
permethrin	RACL	embryo	IMMER	HATSUC	15		0.01- 0.1 mg/L	No increase in gross abnormality rate; dose and stage dependent variation in twisting response; 95-99% hatching success.	Berrill et al. 1993
permethrin	RACL	embryo	IMMER	DEVOBS	15		0.1-2.0 mg/L	Treated embryos grew sig. slower; malformations observed; behaviour abnormalities.	Berrill et al. 1993

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permethrin	RACL	tadpoles	IMMER	MORT	15, 21		0.01-2.0 ppm	Conc. < 2.0 ppm were not lethal to early stages of RACL, however sublethal effects were noted. 10 - 100 ppb for 22 h did not cause morphological abnormalities but resulted in embryo twisting.	Wilson 1989
permethrin	RACL	tadpoles	IMMER	DEVOBS	15		0.1-2.0 mg/L	Delayed growth; behavioural abnormalities; no mortality.	Berrill et al. 1993
permethrin	RACL	tadpoles	IMMER	DEVOBS	15		0.01- 0.1 mg/L	Metamorphosis success decreased with conc.; mortality occurred 1 to 2 d after exposure.	Berrill et al. 1993
permethrin	RACL	tadpoles	IMMER	MORT	20-15		0.01- 0.1 mg/L	Occasional mortality; recovery occurred with time.	Berrill et al. 1993
permethrin	RACY	tadpoles	IMMER	PHYSIO	28±2		0.25 mg/L	Evidence of molecular disruptions due to the neurotoxic effects of permethrin which may cause neuronal inefficiency and alterations in the functional dynamics of the developing brain.	Yasmeen and Nayeemunnisa 1992
permethrin	RAPI	adult	DERMAL	RESIDUE			1	Half time rate of dermal penetration was 420 min.	Shah et al. 1983 [k]
permethrin	RAPI	embryo	IMMER	HATSUC	15		0.01- 0.1 mg/L	96-98% hatching success; no increase in gross abnormality rate.	Berrill et al. 1993
permethrin	RAPI	tadpoles	IMMER	DEVOBS	15		0.01- 0.1 mg/L	Higher mortality at 0.05 and 0.1 mg/L than 0.01 mg/L.	Berrill et al. 1993
permethrin	RAPI	tadpoles	IMMER	MORT	15, 20		0.01- 0.1 mg/L	Occasional mortality; recovery occurred with time.	Berrill et al. 1993
permethrin	RASY	embryo	IMMER	HATSUC	15		0.01- 0.1 mg/L	95-99% hatching success; no increase in gross abnormality rate.	Berrill et al. 1993
permethrin	XELA	adult	TISPREP	PHYSIO	15		10-40 µM	All three compounds tested modify sodium channel gating of myelinated nerve fibres and reduced selectively the rate of closing of the activation gate.	Vijverberg et al. 1982a
permethrin	XELA	adult	TISPREP	PHYSIO	8-22		5×10^{-6}-10^{-5}M	Lateral line organ: 5×10^{-6} M in vitro for 3 h or 10^{-5} in vitro for 5 h induced short trains of nerve impulses. Peripheral nerves: 5×10^{-6} M caused repetitive activity within first 2 h of exposure.	Vijverberg et al. 1982b [k]
permethrin	XELA	adult	TISPREP	PHYSIO	20-24		10^{-7} - 10^{-5}	Pronounced repetitive activity in sensory fibres; similar results in cutaneous touch receptors and lateral line organ.	van den Bercken and Vijverberg 1979
permethrin	XELA	adult	TISPREP	PHYSIO	18	7.3	3×10^{-5}	R-cis showed 1-4 end plate potentials and no repetitive activity with respect to action potentials, R-trans showed some repetitive activity while S-cis and trans were completely inactive.	Ruigt and Van den Bercken 1986
petroleum	HYCI	embryo-metamorphosis	IMMER	DEVOBS				No sig. dif. was indicated in the number of metamorphs among treatments due to high variability in the groups. No tadpoles metamorphosed from the 100 mg/L treatment group. Weights were generally lower at 100 mg/L.	Mahaney 1994
petroleum	HYCI	embryo-metamorphosis	IMMER	MORT	20-25			The number of hatched larvae at each treatment level varied without pattern; used crankcase oil did not sig. affect hatching success (all replicates were >75% hatching success).	Mahaney 1994
phenanthrene	RAPI	adult	TISPREP	PHYSIO			100 mg/L	No statistically sig. effect on ISC albeit an increase in ISC was suggested.	Blankemeyer and Bowerman 1993

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phenobarbital	CHPI	adult	INJECT	PHYSIO				Purified turtle P450 fractions may be useful in further studies of the catalytic function of the inducible proteins.	Yawetz et al. ?
phenobarbital	PLWA	larvae	IMMER	GENOTOX			50 -100	Frequency of micronucleated erythrocytes: 50 ppm= 12/1000; 100 ppm= 14/1000.	Fernandez et al. 1989
phenol	RAPI	adult	TISPREP	PHYSIO			0.1% v/v	Phenol replaced control Ringer's after an equilibration period of 110 min.	Blankemeyer and Bowerman 1993
phenol	XELA	embryo	IMMER	DEVOBS			50	No teratogenic effects. No effects on embryos at 50 ppm, but animals died within 5 d to 3 wk of completing embryonal development.	Dumpert 1987 [k]
phenol	XXFR	adult	INJECT	MORT			50-100	For these conc. mortality ranged from 10% to 96.6%.	Tripod 1947
phenothrin	DEMA	neonate	IMMER	BEHAV				Insecticide spray applied to cages for snake mite pest control. Magnified symptoms of individuals which ate large meals may have been due to contamination of food animals.	Williams 1989
Phenothrin	LIMA	neonate	IMMER	BEHAV				Insecticide spray applied to cages for snake mite pest control. Magnified symptoms of individuals which ate large meals may have been due to contamination of food animals.	Williams 1989
Phenothrin	PSCO	neonate	IMMER	BEHAV				Insecticide spray applied to cages for snake mite pest control. Magnified symptoms of individuals which ate large meals may have been due to contamination of food animals.	Williams 1989
Phenothrin	PSGU	neonate	IMMER	BEHAV				Insecticide spray applied to cages for snake mite pest control. Magnified symptoms of individuals which ate large meals may have been due to contamination of food animals.	Williams 1989
Phenothrin	PSPO	neonate	IMMER	BEHAV				Insecticide spray applied to cages for snake mite pest control. Magnified symptoms of individuals which ate large meals may have been due to contamination of food animals.	Williams 1989
Phenothrin	PSTE	neonate	IMMER	BEHAV				Insecticide spray applied to cages for snake mite pest control. Magnified symptoms of individuals which ate large meals may have been due to contamination of food animals.	Williams 1989
phenothrin	XELA	adult	TISPREP	PHYSIO	18	7.3	10^{-4} - 10^{-6}	1-4 end plate potentials and no repetitive activity with respect to action potentials.	Ruigt and Van den Bercken 1986
phenothrin	XELA	adult	TISPREP	PHYSIO	18	7.3	3 x10^{-5}	15-30 end plate potentials and no repetitive activity with respect to action potentials.	Ruigt and Van den Bercken 1986
phentolamine	AMTI	larvae	IMMER	PHYSIO				Did not alter glomerular filtration rate.	Stiffler et al. 1981
phosalone	RATI	adult	ORAL	PHYSIO			1-50 mg	Higher alkaline phosphatase activity in test groups indicated the requirement and release of proteins and other energy metabolites causing toxic stress.	Ramalingam and Antony 1990
phosalone	RATI	adult	IMMER	PHYSIO			9	Inhibition of AChe activity.	Balasundaram and Selvarajan 1990
phosalone	RATI	adult	ORAL	BEHAV				Inhibitory effects on frequency of hopping may be attributed to disturbances along nerve paths hindering motor activity.	Antony and Ramalingham 1990

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phosalone	RATI	adult (M)	INJECT	PHYSIO			log conc.= 1.25-10.0 g/kg	Diminished ATPase activity in six distinct CNS compartments.	Balasundaram et al. 1995
phosalone	TRCC	adult	IMMER	DEVOBS	15-20		0-800 mg/L	Growth delay at highest conc.; higher frequency of skeletal anomalies at all conc.	Arias et al. 1989
phosdrin	RAPI	adult	IMMER	PHYSIO			6-20	Anemia, leucopenia, lymphocytosis, neutropenia, decreased activity and flaccid paralysis.	Kaplan and Glaczenski 1965 [k]
phosphamidon	CAVE	adult (M)	ORAL	PHYSIO				Haemotoxic potential observed at greater than 0.77 mg/kg body weight.	Meenakshi et al. 1996a
physostigmine	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977
pig manure	RATE	adult (M)	DERMAL	BEHAV				Frogs exposed to relatively high moisture content pig manure resulted in high lung and buccal ventilation rates within 15 min.	Oldham et al. 1993
pindone	OLMA	adult	ORAL	BEHAV	25		0.02 g over 2 d	Doses used as bait are unlethal to skinks. Sublethal effects are undocumented.	Freeman et al. 1996
piper nigrum	BURE	adult	ORAL	BEHAV			2mg	Tumors appeared after 2 mos. Liver tumors (hepatocellular carcinomas, lymphosarcomas and fibrosarcomas) were found in 12 males and 18 females.	El-Mofty et al. 1991
p-nitrotoluene	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Mortality= 10; Development= 3.2; Growth= 32 mg/L.	Slooff and Canton 1983 [k]
potassium chromate	RAHE	adult	TISPREP	PHYSIO			10- 500	Decreased activity in succinate dehydrogenase and Mg2+ ATPase activity.	Rajendrababu and Nandakumar 1987 [k]
potassium dichromate	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Mortality= 1; Development= 3.2; Growth= 3.2 mg/L.	Slooff and Canton 1983 [k]
potassium dichromate	XELA	egg	IMMER	DEVOBS			2.5, 5, 7.5	Weaker pigmentation at 2.5 ppm; 5 ppm 15.5 % mortality; 7.5 ppm 30 % mortality.	Dumpert 1987 [k]
potassium dichromate	XELA	tadpoles	IMMER	DEVOBS				Only those kept in conc. up to 1.0 ppm developed into toads.	Dumpert 1987 [k]
potassium ferricyanide	RACA	adult	TISPREP	PHYSIO			1.0- 2.5 mM	Effects on evoked potential of tectum elicited by electrical stimulation of the optic nerve was measured.	Watanabe et al. ?
primicarb	RAPE	tadpoles	IMMER	DEVOBS	25±5	7-8	1 and 25 mg/L	At 1 mg/L: mortality= 34.1%, normal embryos= 0%. At 25 mg/L: mortality= 38.8%, normal embryos= 0%. the incidence of limb and tail deformities was 76.66% at 1 mg/L.	Alvarez et al. 1995
primicarb	RAPE	tadpoles	IMMER	MORT			0.02 and 0.14 mg/L	Damage to gills, liver, gall-bladder, heart and notochord did occur; mortality reached 100% after 2 wks.	Honrubia et al. 1993
Procaine	XXSN	adult	INJECT	MORT			0.07 g (0.47 mg/g body wt)	Conc. kills between 5 and 15 min.	Livezey 1958
Procaine	XXXA	larvae	INJECT	MORT				1-4% kills amphibian larvae.	Livezey 1958
prolactin	TAGR	adult (M)	IMMER	PHYSIO			100 µg	Prolactin did not sig. change androgen levels.	Moore 1977

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Prolin	PICA	adult	ORAL	MORT			11 rats, fed avg. of 5.27 Mg	No effects were observed on snakes.	Brock 1965
prometryne	RATE	tadpoles	IMMER	MORT			0.01- 0.05 %	All younger tadpoles treated with 0.05 % for 3 d died within a few days. All older tadpoles exposed to 0.01 or 0.05 % died after 24 - 72 h.	Jordan et al. 1977 [k]
propanolol	AMTI	larvae	IMMER	PHYSIO				Did not alter glomerular filtration rate.	Stiffler et al. 1981
propoxur	RAHE	tadpoles	IMMER	DEVOBS			2, 4 and 10 mg/L	Accelerated metamorphosis and growth. Elevated body weight and reduced limb bud emergence period.	Raj et al. 1988
propylene glycol	RACA	adult	TISPREP	PHYSIO	20-25		0.1-5.0 %	Propylene glycol facilitates transmitter release from nerve terminals and raises ACh sensitivity of muscle endplate.	Hattori and Maehashi 1993
prothiophos	EUOS	adult	INHAL	MORT			1-2%	1-12 h lethal time.	Kihara and Yamashita 1978
PSCP	BUMA	adult	IMMER	PHYSIO				AChE appeared relatively insensitive to inhibition.	Fulton and Chambers 1983
PSCP	GACA	tadpoles	IMMER	PHYSIO				No symptoms were exhibited in GACA exposed in one or two treatments.	Fulton and Chambers 1983
PSCP	HYCH	embryo	DERMAL	DEVOBS			100-1000 ppb	92 % mortality at 1000 ppb and 52 % at 750 ppb; 100 % abnormalities at 1000 ppb and 58 % abnormal embryos at 750 ppb.	Fulton and Chambers 1985 [k]
PSCP	HYCI	tadpole/adult	IMMER	PHYSIO				AChE I50= 2.7 x10 M.	Fulton and Chambers 1983
PSCP	PSCR	tadpoles	IMMER	PHYSIO				No symptoms were exhibited in PSCR or GACA exposed in one or two treatments.	Fulton and Chambers 1983
PSCP	RACA	tadpoles	IMMER	PHYSIO			0.05- 0.1	Neurotoxic esterase inhibition in brains of RACA tadpoles treated with 0.05- 0.1 ppm PSCP for 24 h was 75% or greater.	Fulton and Chambers 1983
PSCP	RASP	embryo	DERMAL	DEVOBS			100-1000 ppb	53 % abnormal embryos at 500 ppb and 100 % abnormal at 1000 ppb; 6 % mortality at 500 ppb and 99 % mortality at 1000 ppb.	Fulton and Chambers 1985 [k]
pulp and paper	CACU	adult	TISPREP	PHYSIO			0.49-1.15 mL	Bioelectric parameters of isolated toad skin and characteristics of frog sciatic nerve compound action potential were examined.	Norris and Quevedo 1996
pulp and paper	PLTH	not specified	TISPREP	PHYSIO				Bioelectric parameters of isolated toad skin and characteristics of frog sciatic nerve compound action potential were examined.	Norris and Quevedo 1996
Pyramin	BUVU	embryo	IMMER	PHYSIO			1- 2 %	Toxic effects only at high conc.	Constantini and Panella 1975
Pyramin	BUVU	embryo	IMMER	MORT			0.025- 0.25 ppt	Toxic for embryos, less so for larvae. 100% mortality in 0.15 - 0.25/1000. Embryo survived 0.025 - 0.1/1000 to hatch and develop as larvae.	Constantini and Andreoli 1972
pyrazophos	RATE	tadpoles	IMMER	DEVOBS			0.1-1 mg/L	0.01 mg/L: stimulation of growth, total inhibition of metamorphosis, marked change in transaminase enzymatic activity; lethal dose= 1 mg/L.	Paulov 1981 [k]

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pyrene	PLWA	larvae	IMMER	GENOTOX			0.035- 0.2	Frequency of micronucleated erythrocytes: 0.035 ppm= 10/1000; 0.2 ppm= 22/1000.	Fernandez et al. 1989
pyrethrin	EUOS	adult	INHAL	MORT			1-2%	1-3 h lethal time.	Kihara and Yamashita 1978
pyrethrin	THRA	adult	DERMAL	BEHAV				Investigative behaviour noted.	Secoy 1979
pyrethroids	XELA	adult	TISPREP	PHYSIO				Pyrethroids affect sodium channel gating (cyano are dif. than non-cyano pyrethroids).	van den Bercken and Vijverberg 1985
q-hexane	BUAR	embryo	IMMER	MORT			1-15	5 and 15 ppm produce 100 % mortality on day 29 and 17 respectively. 1 ppm was not toxic.	Juarez and Guzman 1984a [k]
quinoxaline	EUOS	adult	INHAL	MORT			1-2%	72 h lethal time for both conc.	Kihara and Yamashita 1978
radiation	BUME	adult	RAD	PHYSIO				Activity of ACh and cytochrome "c" oxidase measured.	Sai Siva Kumar et al. 1988
radiation	CACU	larvae	RAD	PHYSIO			50-150 rads	Dose-effect relationship demonstrated between level of radiation and presence of micronucleated blood cells.	Hermosilla and Carrasco 1985 [k]
radiation	HELE	adult	RAD	PHYSIO			100 R/min with x-ray machine at 250 kVp	Studies on esterase isoenzymes using PAGE technique show characteristic patterns in brain, kidneys, liver and lung.	George and Eapen 1973
retinoic acid	TRSC	adult	IMMER	PHYSIO				Elimination rates were not affected by the dietary treatment.	Hinton and Whicker 1992
retinoic acid	XELA	adult	IMMER	MORT			0- 0.1 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio=>10.	Daston et al. 1991
retinoic acid	XELA	embryo	IMMER	MORT			0- 0.1 mg/L	Death and defects were noted in embryos exposed for four days post-fertilization.	Daston et al. 1991
rotenone	EUOS	adult	INHAL	MORT			3%	Survived 3 d through end of experiment.	Kihara and Yamashita 1978
rotenone	RAPI	tadpoles	IMMER	PHYSIO			10-500 gamma/L	Results not extracted from paper.	Hamilton 1941
rotenone	XXFR	adult	TISPREP	PHYSIO			5-10 µM	Rates of active sodium transport and suprabasal oxygen consumption were found to be inhibited in frog skin by rotenone.	Lau et al. ?
Rupon	RAES	tadpoles	IMMER	MORT	18-22		0.001- 0.01%	Two sizes of tadpoles exposed to solution. 21mm exhibited 0% mortality in 0 - 0.003%; 100% mortality in 0.01% for 32 tadpoles 100% mortality in all conc.	Gunther and Plotner 1986
S	RAES	adult (F)	INJECT	PHYSIO			5 µg progesterone	Sulphatides were measured in oviducts of RAES.	Vitaioli et al. 1990
S	THRA	adult	DERMAL	BEHAV				Investigative behaviour noted.	Secoy 1979
saffan	AGPI	adult	INJECT	BEHAV			1.0 ml/kg	70 min anaesthesia, excellent muscle relaxation and effect.	Calderwood and Jacobson 1979
saffan	AGPI	adult	INJECT	BEHAV			1.0 ml/kg	No effect, unsatisfactory sedation.	Calderwood and Jacobson 1979
saffan	BOSC	adult	INJECT	BEHAV			3.0 ml/kg	89 min anaesthesia, not anesthetized enough for safe handling.	Calderwood and Jacobson 1979
saffan	CRAD	adult	INJECT	BEHAV			0.50 ml/kg	5 min anaesthesia, very good muscle relaxation and effect, rapid recovery necessitating methoxyflurane anaesthesia.	Calderwood and Jacobson 1979

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saffan	CRLE	adult	INJECT	BEHAV			0.25-1.5 ml/kg	28-38 min anaesthesia time poor to unsatisfactory muscle relaxation, lost righting reflex but constant movement, not anaesthetised enough for safe handling.	Calderwood and Jacobson 1979
saffan	DRCC	adult	INJECT	BEHAV			1.0 ml/kg	40 min anaesthesia time, excellent muscle relaxation and effect.	Calderwood and Jacobson 1979
saffan	ELOQ	adult	INJECT	BEHAV			1.0 ml/kg	19 min anaesthesia, excellent muscle relaxation and effect.	Calderwood and Jacobson 1979
saffan	ELOQ	adult	INJECT	BEHAV			0.50 ml/kg	35 - 60 min anaesthesia time, excellent muscle relaxation and effect.	Calderwood and Jacobson 1979
saffan	ELOQ	adult	INJECT	BEHAV			0.5-3.0 ml/kg	No effects at 0.5 and 3.0 ml/kg; excellent muscle relaxation and effect at 1.0 ml/kg (anaesthesia time for 66 min).	Calderwood and Jacobson 1979
saffan	EPST	adult	INJECT	BEHAV			1.5 ml/kg	Excellent muscle relaxation but specimen died.	Calderwood and Jacobson 1979
saffan	LAGF	adult	INJECT	BEHAV			0.25 ml/kg	8 min anaesthesia time very good muscle relaxation (tail movement), excellent sedation.	Calderwood and Jacobson 1979
saffan	LAGG	adult	INJECT	BEHAV			0.25 ml/kg	42 min anaesthesia time, excellent for muscle relaxation and sedation.	Calderwood and Jacobson 1979
saffan	NEFF	adult	INJECT	BEHAV			1.0-1.5 ml/kg	41 - 80 min anaesthesia, excellent muscle relaxation and effect; one died.	Calderwood and Jacobson 1979
saffan	NEFF	adult	INJECT	BEHAV			0.25 ml/kg	43 min anaesthesia, excellent muscle relaxation and effect.	Calderwood and Jacobson 1979
saffan	NEFF	adult	INJECT	BEHAV			0.25-3.0 ml/kg	No anaesthesia time unsatisfactory muscle relaxation and effect. No effect.	Calderwood and Jacobson 1979
saffan	PIME	adult	INJECT	BEHAV			0.5-3.0 ml/kg	0.5 no effect; 3.0 ml/kg excellent muscle relaxation and effect, > 120 min anaesthesia time recovered overnight.	Calderwood and Jacobson 1979
saffan	PIME	adult	INJECT	BEHAV			0.25 ml/kg	22 min anaesthesia time, excellent for muscle relaxation and sedation.	Calderwood and Jacobson 1979
saffan	PIME	adult	INJECT	BEHAV			0.50 ml/kg	49 min anaesthesia, excellent muscle relaxation and effect.	Calderwood and Jacobson 1979
saffan	PYRG	adult	INJECT	BEHAV			3.0 ml/kg	90 min anaesthesia, good muscle relaxation and excellent effect.	Calderwood and Jacobson 1979
salinity	BUMA	adult	IMMER	PHYSIO			0, 0.1, 1.0% sea water	Aldosterone increased with time in 1.0% sea water, cAMP and cGMP were elevated at this conc. in kidney.	Busacker et al. 1977
salinity	RAPI	adult	ORAL	MORT			2.6 g/100g body wt	Died within one h.	Bentley and Schmidt-Nielsen 1971
sarin	RACA	adult	INJECT	MORT	22		0.06-8.0 mg/frog	No effect on frogs at or below 0.5 mg/frog, yet 6% mortality occurred at 1.0 mg and 67% mortality occurred at 8.0 mg/frog.	Wilber 1954
sarin	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Scent-Off Repellant Buds	THRA	adult	DERMAL	BEHAV				Investigative behaviour noted.	Secoy 1979
SDBSA	XELA	egg	IMMER	DEVOBS			0.1-50	No effect at 0.1 - 10 ppm. Eggs did not develop past 2 cell stage at 50 ppm.	Dumpert 1987 [k]
Se	RACA	tadpoles	IMMER	RESIDUE				Results not extracted from paper.	Burger and Snodgrass 1998
Se	XELA	embryo (gastrula)	IMMER	RESIDUE			5	Uptake rapid and linear until 36 h of exposure. Linear decrease in Se over first 24 h of depuration; rate of depuration similar to rate of uptake.	Browne and Dumont 1979 [k]
Se	XELA	tadpoles	IMMER	RESIDUE			5	80 % decrease in Se content within 30 min; Se level remained stable for next 3 d.	Browne and Dumont 1979 [k]
Se	XELA	tadpoles	IMMER	DEVOBS			2-20	Above 2 ppm, severe abnormalities and increased mortality. Toxicity increased with increasing conc. up to 20 ppm.	Browne and Dumont 1979 [k]
Se	XELA	tadpoles	IMMER	PHYSIO			2, 5, 10	Cellular damage, disorganization and degeneration of in epithelial muscle cells. Damage more extensive at higher doses.	Browne and Dumont 1980 [k]
SLA4685	XELA	adult	TISPREP	PHYSIO	18		$4x10^{-6}$-$2x10^{-4}$ M	Increase in transmitter release and endplate potentials at conc. >10^{-5} M in pectoral nerve-muscle.	Klis et al. 1991a
SLA4685	XELA	adult (M)	TISPREP	PHYSIO	20	7.4	10^{-7} to 10^{-4}	Conc. dependent reduction of survival time of lateral-line sense organ. No repetitive activity occurred on lateral line sense organ when temp was lowered from 20 to 10 C.	Klis et al. 1991b
SLA4722	XELA	adult	TISPREP	PHYSIO	18		$4x10^{-6}$-$2x10^{-4}$ M	Increase in transmitter release and endplate potentials at conc. >10^{-5}M in pectoral nerve-muscle.	Klis et al. 1991a
SLA4722	XELA	adult (M)	TISPREP	PHYSIO	20	7.4	10^{-7}-10^{-4}	Effects on survival time of sciatic nerve was evident and response time gradually declined.	Klis et al. 1991b
sodium bromide	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Morality= 32; Development= 320; Growth= 320 mg/L.	Slooff and Canton 1983 [k]
sodium fluoracetate	PICA	adult	ORAL	MORT			fed avg. of 0.19 Mg (7 rats)	2 snakes regurgitated the rats, 5 had no observable effects.	Brock 1965
sodium fluoracetate	RACL	adult	IMMER	PHYSIO			0.01- 0.1 M	No action potential changes produced by up to 100 µM 0.01 and 0.10 M produced 3 and 40 % inhibition respectively of respiration after 3 h.	Boyarsky et al. 1949 [k]
sodium fluoracetate	TIRU	adult	INJECT	PHYSIO			0-800	Populations of TIRU which coexist with fluoracetate-bearing vegetation were much less sensitive to fluoracetate intoxification than were conspecifics not exposed to the toxic plants.	Twigg and Mead 1990
sodium fluoracetate	TIRU	adult	INJECT	PHYSIO	30-37		300 mg	Reduced oxygen consumption by 2-11% in skinks.	Twigg et al. 1986
sodium fluoracetate	TIRU	adult (M)	INJECT	PHYSIO			25-250	Single or multiple doses resulted in decrease in plasma testosterone in males; decreased plasma testosterone with a single dose of 100 - 250 mg/kg; 25 mg/kg had little effect.	Twigg et al. 1988

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
sodium fluoride	HEFL	adult	IMMER	DEVOBS			50-5000 µg/mL	50 µg/mL showed hastening of healing compared to controls, 250-2500 µg/mL showed delayed wound healing and 3000-5000 µg/mL showed high mortality rates.	Suresh and Hiradhar 1990
sodium hypochlorite, Cl	PLWA	larvae	IMMER	PHYSIO	20±0.25		0- 0.25 mg/L active Cl	Chlorine levels of 0.125 and 0.25 mg/L led to sig. elevations of micronuclei in treated larvae. Conc. above 0.25 mg/L killed larvae.	Gauthier et al. 1989
sodium nitrate	BUBU	tadpoles	IMMER	DEVOBS	19-24	5.57-7.47	40 and 100	Exposure groups exhibited increased mortality and reduce foraging. 100 % mortality occurring at 100 ppm after 13 d. At 40 ppm 1 of 13 individuals survived 13 d.	Baker and Waights 1993
sodium nitrate	LICA	tadpoles	IMMER	DEVOBS	22.5-26	5.6-7.6	40 and 100	Nitrate exposure groups exhibited sig. greater mortality and decreased growth. Growth changes were attributed to NO_3 ions and not Na. Mortality reached 50 - 58% in nitrate exposure groups.	Baker and Waights 1994
sodium nitrate	PLWA	larvae	IMMER	GENOTOX			8000	No effect found on erythrocytes.	L'Haridon et al. 1993
sodium nitrite	PLWA	larvae	IMMER	GENOTOX			140	No effect found on erythrocytes.	L'Haridon et al. 1993
sodium selenite	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc.= 10 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
sodium sulfide	PLWA	larvae	IMMER	GENOTOX		2-7	125 ml/L, 250 ml/L of river water	High numbers of micronucleated erythrocytes (22/1000 erythrocytes).	Gauthier et al. 1993
soman	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977
sour water	BUTE	adult (M)	IMMER	PHYSIO			3.35-19.9 ng/mL	Increases in B corticosterone levels were observed.	Hopkins et al. 1996
Sr	RAPI	adult	RAD	RESIDUE				Half-lives longer than those found for newts at 10 and 20°C.	Willis et al. 1976 [k]
Sr	RAPI	adult	RAD	RESIDUE	10			The biological half-life of radiostrontium in whole frog was 222 d after i.p. injection.	Willis and Valett 1971
Sr	RATE	tadpole (5-7 wk)	RAD	RESIDUE			0.125 µc	Tadpoles absorbed approx. 18 % (0.02 uc) of Sr and about 72% of yttrium in 175 ppm.	Lucas and Pickering 1958 [k]
Sr	TAGR	adult	RAD	RESIDUE	10-20			Slower loss component had biological half-lives of 130 - 80 d at 10°C and 20°C respectively.	Willis et al. 1976 [k]
Sr	TAGR	adult	RAD	RESIDUE	10			The rate of uptake was initially rapid, but declined sharply after day 3.	Willis and Valett 1971
Sr	TRSC	adult	RAD	PHYSIO				Elimination rates were not affected by the dietary treatment.	Hinton and Whicker 1992
strychnine	PICA	adult	ORAL	MORT			fed avg. of 10.04 Mg (5 rats)	6 snakes regurgitated, 5 showed no observable effects.	Brock 1965
styrene	RAPI	adult	IMMER	PHYSIO			665	Extensive ultrastructural alterations in olfactory epithelium following exposure for 60 min, increased secretion from sustentacular cells, membrane fusion of cilia, reduction of summed receptor potential.	Ekblom et al. 1984 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
styrene	RATE	adult	IMMER	PHYSIO			665	Extensive ultrastructural alterations in olfactory epithelium following exposure for 60 min, increased secretion from sustentacular cells, membrane fusion of cilia and reduction of summed receptor potential.	Ekblom et al. 1984 [k]
tabun	XXFR	adult	TISPREP	PHYSIO				Inhibition of ACh was recorded and compared to that found in chicken and rat brain.	Andersen et al. 1977
tamoxifen	ALMI	egg	DERMAL	PHYSIO			0.14-14	Sex reversal from male to female occurred.	Crain et al. 1997
taurine	RAAR	larvae (stage 26)	IMMER	MORT	20-25		50-500 µg/mL	Taurine enhanced the early stages of metamorphosis yet retarded later ones (shortening of the tail).	Feuer et al. 1979
taurine	RACA	adult	TISPREP	PHYSIO			20 mM taurine; 0.5-2.8 mM Ca	Taurine showed a positive inotropic effect in low calcium solutions and negative inotropism in high Ca solutions. Taurine modifies calcium levels at sarcolemmal membrane.	Steffen et al. 1977
TBS	XELA	< 2 d	IMMER	MORT	20			100 d NOEL: Mortality= 3.2, Development= 10; Growth= 10 mg/L.	Slooff and Canton 1983 [k]
TBT	AMME	larvae	IMMER	DEVOBS			0- 0.05 mg/L	100% mortality within 24h at 0.05 mg/L. 80% mortality within 7d at 0.015 mg/L. Toxicant was slightly teratogenic to developing hindlimbs (deletions or defects). No effect on skeletal pattern in regenerating forelimbs.	Scadding 1990
TBT	RATE	embryo	IMMER	MORT			0.3-30 ppb	Survival not affected at 0.3 or 3 ppb; mortality 40 % and 50 % at 30 ppb TBTO and TBTF, respectively. Weights declined only at 30 ppb.	Laughlin and Linden 1982 [k]
TCA	BUVU	embyro	IMMER	PHYSIO			25- 50 %	Toxic effects observed at high conc. only.	Constantini and Panella 1975
TCB	CHPI	adult	INJECT	PHYSIO				Purified turtle P450 fractions may be useful in further studies of the catalytic function of the inducible proteins.	Yawetz et al. ?
TCDD	BUAM	egg	IMMER	MORT			0.003-30	Higher mortality than tadpoles yet not sig. dif. from controls, elimination of TCDD occurred quickly.	Jung and Walker 1997
TCDD	BUAM	tadpoles	IMMER	MORT			0.003-30	No mortality; elimination of TCDD occurred quickly.	Jung and Walker 1997
TCDD	RACA	adult	INJECT	BEHAV			500 µg/kg	No mortality during 35 d observation . Some lessened food intake in groups injected with 500 µg/kg in early phase. No histopathologic lesions were found at any dose level.	Beaty et al. 1976 [k]
TCDD	RACA	tadpoles	INJECT	MORT			25-1000 µg/kg	All surviving tadpoles successfully completed metamorphosis with no morphological abnormalities. 73 - 90 % survival on d 50 post-injection.	Beaty et al. 1976 [k]
TCDD	RACL	egg	IMMER	MORT			0.3-100	Higher mortality when exposed as eggs yet not sig. dif. from controls, elimination of TCDD occurred quickly.	Jung and Walker 1997
TCDD	RACL	tadpoles	IMMER	MORT			0.3-100	No mortality, elimination of TCDD occurred quickly.	Jung and Walker 1997
TCDD	RAPI	egg	IMMER	MORT			3	Sig. increase in mortality compared to controls at 3 µg/L.	Jung and Walker 1997
TCDD	RAPI	tadpoles	IMMER	MORT			3	No mortality, elimination of TCDD occurred quickly.	Jung and Walker 1997
TCDD	XELA	embryo	IMMER	DEVOBS			0.025-1.0 mg/L	Mortality of larvae was high when edema appeared at an earlier developmental stage, the period from edema formation to death tended to be short.	Mima et al. 1992

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temephos	BUBO	juvenile	IMMER	PHYSIO	23-24			Exposure of hydrated toads to 60 ppb sig. lowered temp tolerance.	Johnson and Prine 1976 [k]
temephos	HYRE	tadpole (3 wk)	IMMER	PHYSIO			25-50 ppb	Temp tolerance sig. lowered.	Johnson 1980a [k]
temephos	RACH	not specified	IMMER				1-100	Japanese paper.	Hattori 1974
temephos	RACL	tadpoles	IMMER	BEHAV			0-10 µl/L	By 24 h of exposure, half of the tadpoles at the highest conc. died. At the end of 96 h, % mortality ranged from 0% at 1.86 µl/L and 100% at 10 µl/L.	Sparling et al. 1997
TEPP	RAPI	adult	IMMER	PHYSIO			10-80	Increasing conc. resulted in anemia, leucopenia; differential white cell count showed neutropenia and lymphocytosis, red blood cells distorted in shape, visceral organs desiccated, spasticity in hindlimbs.	Kaplan and Glaczenski 1965 [k]
TETD	MIOR	embryo	IMMER	DEVOBS			0-2.5 mg/L	50% mortality at 1 mg/L, 100% mortality at 2 mg/L. Other effects were bent notochord, pigmentation, edema, other tissue disarrays. Abnormality incidence 100% at 0.5 mg/L.	Ghate 1983
TETM	MIOR	embryo	IMMER	DEVOBS			0-5 mg/L	Mortality: 100% at 5 mg/L, 20% at 3 mg/L. Bent notochord, pigmentation, edema, other tissue disarrays, abnormality incidence was 100% at 2 mg/L.	Ghate 1983
tetrachlorobenzene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
tetrahydrofuran	DEXX	adult	DERMAL	BEHAV			2, 16 and 25	Hyperactivity; weight loss; no mortality immediately after exposure.	Whitaker 1993
TFM	RACA	egg	IMMER	DEVOBS			0.1-3.0 mg/L	Arrested growth at conc. greater than 1.0 mg/L, following development in the next 96 h.	Kane et al. 1993
TFM	RACA	larvae	IMMER	MORT			7.5 mg/L	No tadpoles recovered after treatment.	Kane and Johnson 1989
TFM	RACA	tadpoles	IMMER	DEVOBS			2.0 mg/L	No adverse effects observed.	Kane et al. 1993
TFM	RACL	larvae	IMMER	MORT			7.5 mg/L	Treatment effective in controlling larvae in treated ponds.	Kane and Johnson 1989
thalium	XXFR	embryo	IMMER	MORT			N/500000 (see paper for details)	Tadpoles killed on emergence.	Dilling and Healey 1926 [k]
thallium sulfate	PICA	adult	ORAL	MORT			11 rats, fed avg. of 5.27 Mg	No effects were observed on snakes.	Brock 1965
thiabendazole	ELOO	adult	ORAL	PATH			110	Thiabenzadole is a treatment for parasites; species completely recovered after treatments.	Holt et al. 1979
thiabendazole	ELOQ	adult	ORAL	PATH			110	Thiabenzadole is a treatment for parasites; this species died after 4th treatment, 24 h with different symptoms than PYRE. Death caused by nematode parasitism.	Holt et al. 1979

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thiabendazole	PYRE	adult	ORAL	PATH			110 body wt	Thiabenzadole is a treatment for internal parasites; this species died from nematode before treatment could be administered.	Holt et al. 1979
thiosemicarbazide	RASY	tadpoles	IMMER	DEVOBS	18-28		10-75 mg/L	Curved digits, abnormal limb articulation, difficulty swimming, no effects at 10. Otherwise dose response effects, increased tibia/femur ossification at higher conc., higher conc. resulted in increased developmental speed.	Riley and Weil 1986
thiosemicarbazide	XELA	metamorphosis	IMMER	MORT	23-25	7.2	0-75 mg/L	Physical abnormalities and inhibition of metamorphosis.	Newman and Dumont 1983
thorium	XXFR	embryo	IMMER	DEVOBS			N/100000 (see paper for details)	Development to tadpole stage in N/100000 was 50 %.	Dilling and Healey 1926 [k]
thyroxine	ASTR	tadpoles	IMMER	DEVOBS	5-20		7-1000 ppb	100% mortality at 1000 ppb (18-20C), 60% mortality at 500ppm (18-20°C). Morphological changes included limbs, operculum, oral disc, anal fold and tooth rows.	Brown 1990
TME	RACY	adult	IMMER	MORT				25 % mortality after 96 h; 50 % after 144 h.	Shrinivas et al. 1984 [k]
TMT	TRCR	adult (M)	IMMER	BEHAV			3 and 12	Behavioural changes and neuropathological damage and CNS damage occurred at highest doses (12 mg/kg).	Gozzo et al. 1992
toluene	RAPI	adult	IMMER	PHYSIO			585-2000	Structural alterations in olfactory mucous following exposure; increased secretion from sustentacular cells; reduction in summed receptor potential in frogs exposed to 2000 ppm for 1 h; no reduction in those exposure to 585 ppm.	Ekblom et al. 1984 [k]
toluene	RATE	adult	IMMER	PHYSIO			585-2000	Structural alternations in olfactory mucosa following exposure.	Ekblom et al. 1984 [k]
toluene	TRCR	adult	INHAL	PHYSIO			5, 10	Results not extracted from paper.	Garavini and Seren 1979 [k]
toluene diisocyanate	RAPI	adult	TISPREP	PHYSIO				Inhibits isoproterenol and fluoride ion stimulated adenylate cyclase activity in a dose dependent manner.	McKay and Brooks 1983 [k]
toluene diisocyanate	XXFR	adult	TISPREP	PHYSIO				Findings suggest that the mechanism of TDI asthma is not due to an abnormality of the beta-adrenergic system.	McKay and Brooks 1981
TOTP	RAPI	adult	INJECT	PHYSIO			125 with 5 ml/kg (malathion)	ChE activity (µL CO^2/50mg/10 min): 112±6 (corn oil controls), 100±4 (treated). TOTP treatment alone did not sig. affect cholinesterase activity, but it potentiated the anticholinesterase action of malathion by 100-fold in frogs.	Cohen and Murphy 1970
toxaphene/ camphechlor	ALMI	adult	TISPREP	DEVOBS				No interaction with estrogen receptors.	Vonier et al. 1996
toxaphene/ camphechlor	ALMI	adult (F)	TISPREP	PHYSIO				Estrogen receptors from alligator oviductal tissue tested with various environmental chemicals and with 17ß-estradiol.	Arnold et al. 1997
toxaphene/ camphechlor	ALMI	adult (F)	TISPREP	PHYSIO				Toxaphene had high binding affinity to estrogen sites.	Crain et al. 1998a
toxaphene/ camphechlor	RACA	tadpoles	IMMER	PHYSIO	4		0.1 µg/g	Antibodies usually produced in response to heat shock were produced from stress of contaminants.	Dunlap and Matsumura 1997

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toxaphene/ camphechlor	RAPI	adult	IMMER	BEHAV		5.75-5.83	0.3- 0.6	After 30 d, 40 % of frogs in 0.6 ppm died.	Kaplan and Overpeck 1964 [k]
toxaphene/ camphechlor	TRSC	adult (F)	TISPREP	PHYSIO				Toxaphene had high binding affinity to estrogen sites.	Crain et al. 1998a
toxaphene/ camphechlor	XELA	adult	IMMER	PHYSIO				Toxaphene treated frogs showed sig. levels of vitellogenin induction.	Palmer et al. 1998
TP	CHSE	egg	IMMER	DEVOBS				Administration of testosterone propionate caused 42% of the embryos to develop as females under male-producing temperatures.	Crews et al. 1989
TPT	RAES	tadpoles	IMMER	MORT		6.4-8.1	0.11, 0.81, 1.87	Decrease in survival and growth rate and an increase in time to metamorphosis with TPT exposure alone.	Fioramonti et al. 1997
TPT	RALE	tadpoles	IMMER	MORT		6.4-8.1	0.11, 0.81, 1.87	Decrease in survival and growth rate and an increase in time to metamorphosis with TPT exposure alone.	Fioramonti et al. 1997
Tribunil	BUVU	embryo	IMMER	MORT			0.025- 0.5 ppt	No embryos survived to larval stages.	Constantini and Andreoli 1972
Tribunil	BUVU	embryo	IMMER	PHYSIO			1- 2 %	Very toxic to embryo and tadpole developmental stages.	Constantini and Panella 1975
Tricaine	NOVV	adult	IMMER	PHYSIO			0.3%	No sig. changes in heart rate were reported when exposed to MS-222.	Pitki and Erdman 1992
trichlorobenzene	RAPI	adult	INJECT	PHYSIO				Metabolites of substances were isolated and identified by chromatographic and spectroscopic methods.	Safe et al. 1976
trichlorphon	GAGA	adult	IMMER	PHYSIO				High sensitivity to OP and extremely slow recovery of serum BChE with respect to other vertebrate species; high correlation with brain BChE, 24 h after treatment.	Fossi et al. 1995
trichlorphon	RAES	adult	IMMER	PHYSIO	15		0, 1, 2 and 4 mg/L	No changes in RBC or Hb levels; increase in haematocrit values; increase in erythrocyte volume; RBCs and nuclei were larger.	Szubartowska et al. 1990
trichlorphon	RATE	adult	INJECT	PHYSIO			50-300	Decreased blood parameters (haemoglobin, hematocrit) and leucocytosis.	Szubartowska 1979 [k]
trichlorphon	RATE	adult	INJECT	PHYSIO			50-300	Reduction in erythrocytes and erythroblasts, hemoglobin, hematocrit, increased thrombocyte numbers.	Gromysz-Kalkowska et al. 1986 [k]
trichlorphon	RATE	tadpoles	IMMER	DEVOBS			1.8 and 18 mg/L	Sig. dif. in mortality and growth in exposure groups.	Ranke-Rybicka 1972
trichlorphon	RATE	tadpoles	IMMER	DEVOBS			0.9 mg/L Foschlorine; 0.0625 mg/L Malathion or mixture: 9 mg/L Foschlorine; 0.625 mg/L Malathion	Sig. dif. noted in mortality, mobility and growth in exposure groups.	Ranke-Rybicka 1972

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
tricyclohexyltin hydroxide	EUOS	adult	INHAL	MORT			1-2%	72 h lethal time to survival past 3 d at 1% conc.	Kihara and Yamashita 1978
tri-o-tolyl phosphate/ TTP	GACA	tadpoles	IMMER	PHYSIO				No symptoms were exhibited in GACA exposed in one or two treatments.	Fulton and Chambers 1983
tri-o-tolyl phosphate/ TTP	HYCH	embryo	DERMAL	DEVOBS			100	Not toxic or teratogenic after dermal exposure.	Fulton and Chambers 1985 [k]
tri-o-tolyl phosphate/ TTP	PSCR	tadpoles	IMMER	PHYSIO				No symptoms were exhibited in PSCR exposed in one or two treatments.	Fulton and Chambers 1983
Tritox-30	RATE	tadpoles	IMMER	MORT			0.015-1.92 mg/L	At low conc. (0.015 mg/L), 12.5% mortality after 96 h. No mortality occurred after 24 h in conc. < 0.24 mg/L. At high conc. (1.92 mg/L), 72.5% mortality after 96 h.	Wojcik and Ranke-Rybicka 1971
Tritox-30	XELA	tadpoles	IMMER	MORT			0.015-1.92 mg/L	At low conc. (0.015 mg /L) 10 % mortality after 96 h. At high conc. (1.92 mg/L), 83.4 % mortality after 96 h. Growth inhibited in exposure groups.	Wojcik and Ranke-Rybicka 1971
tryclopyr	RACA	embryo	IMMER	DEVOBS			0.6, 1.2, 2.4	No effect.	Berrill et al. 1994
tryclopyr	RACA	tadpoles	IMMER	DEVOBS			0.6, 1.2, 2.4	2.4 and 4.8 ppm exposure groups died; dose dependent avoidance behaviour response.	Berrill et al. 1994
tryclopyr	RACL	embryo	IMMER	DEVOBS			0.6, 1.2, 2.4	No effect.	Berrill et al. 1994
tryclopyr	RACL	tadpoles	IMMER	DEVOBS			0.6, 1.2, 2.4	Dose dependent mortality and avoidance behaviour response observed.	Berrill et al. 1994
tryclopyr	RAPI	embryo	IMMER	DEVOBS	15		0.6, 1.2, 2.4	No effect.	Berrill et al. 1994
tryclopyr	RAPI	tadpoles	IMMER	DEVOBS			0.6, 1.2, 2.4	Dose dependent mortality and avoidance behaviour response.	Berrill et al. 1994
trypan blue	RAPI	egg	IMMER	DEVOBS			various	Aberrant development.	Greenhouse and Hamburgh 1968
trypan blue	XELA	adult	IMMER	MORT			0-4000 mg/L	Adult vs. development toxicity ratios varied for chemical and between other animal species tested. A/D ratio= 13.3.	Daston et al. 1991
trypan blue	XELA	adult	IMMER	MORT			0-1000 mg/L	Death and defects were noted in embryos exposed for four d postfertilization.	Daston et al. 1991
trypan blue	XELA	embryo-larvae	IMMER	DEVOBS				Lowest effect conc.= 500 mg/L. Developmental toxicity occurred in a dose-dependent manner.	Sakamoto et al. ?
TSP	RATE	adult (M)	DERMAL	BEHAV	13			Slightly elevated lung ventilation during first h and subsequently appeared normal, after 4 d one frog died; decreased mass in treated groups; EC50= 9.7 g/m^2.	Oldham and Hilton-Brown 1992
U	CYPY	adult	TISPREP	PHYSIO			10^{-6} - 10^{-4} M	Almost no effect on the electrical properties of stomach mucous epithelial cells.	Kanno et al. 1978 [k]
urea	RATE	adult (M)	DERMAL	BEHAV				One individual showed increased ventilation rates after two h; decreased mass; EC50= 17.5 g/m^2.	Oldham and Hilton-Brown 1992
UV	AMGR	egg	RAD	HATSUC				Photolyase activity= approx. 1, similar to BUBO, sig. less than HYRE.	Blaustein et al. 1994b
UV	AMMA	egg	RAD	HATSUC				Photolyase activity= approx 1, similar to BUBO and TAGR, sig. less than HYRE.	Blaustein et al. 1994b

Table 4 - Laboratory Studies - 68

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
UV	BUAM	egg	RAD	MORT				No effect of UV-A was found on eggs or larvae even at exposures twice the intensity of normal outdoor levels. All embryos exposed for 30 min or more to UV-B died. Exposure to UV-B for 15 min or less did not affect hatching success.	Grant and Licht 1995
UV	BUBO	egg	RAD	HATSUC				HYRE had highest photolyase active compared to BUBO and RACS.	Blaustein et al. 1994b
UV	CNEX	adult	RAD	BEHAV	25-60			CNEX acquired as adults exhibited normal behaviour and morphology. Those acquired as juveniles and maintained under Vita-Lite exhibited abnormalities in pelvic and caudal regions.	Behler 1987
UV	CNSO	hatchlings	RAD	BEHAV	25-60			Lizards exhibited skeletal deformities and suffered spontaneous vertebral fractures and posterior paresis as they grew.	Behler 1987
UV	DIWA	juvenile	RAD	BEHAV	25-60			Lizards exhibited skeletal deformities and suffered spontaneous vertebral fractures and posterior paresis as they grew.	Behler 1987
UV	HYRE	egg	RAD	HATSUC				Highest activity of photolyase was found in HYRE compared to BUBO and RACS.	Blaustein et al. 1994b
UV	HYVE	egg	RAD	MORT				No effect of UV-A was found on eggs or larvae even at exposures of twice the intensity of normal outdoor levels. All embryos exposed 30 min. or more to UV-B died.	Grant and Licht 1995
UV	PLDU	egg	RAD	HATSUC				Photolyase activity= < 0.1, sig. less than AMMA and AMGR.	Blaustein et al. 1994b
UV	PLVE	egg	RAD	HATSUC				Photolyase activity= < 1.0, similar to AMGR and AMMA.	Blaustein et al. 1994b
UV	RABR	embryo	RAD	DEVOBS	room			Results similar to RAJA. In both species, sex ratios were determined at two stages, the first immediately after metamorphosis and the other when the animals matured, as based on gonad morphology and histology and on external sexually dimorphic characters.	Shirane 1982
UV	RACA	tadpole (late stage)	RAD	GENOTOX	20	9.5	0.55-3.3 Gy (gamma rays)	Increase in number of micronucleated erythrocytes; younger tadpoles more sensitive.	Krauter et al. 1987
UV	RACA	tadpoles	RAD	GENOTOX	20	9.5	2.1 Gy (gamma rays)	Increase in number of micronucleated erythrocytes in early stage larvae.	Krauter et al. 1987
UV	RACL	egg	RAD	MORT				No effect of UV-A was found on eggs or larvae even at exposures of twice the intensity of normal outdoor levels. All embryos exposed 30 min. or more to UV-B died.	Grant and Licht 1995
UV	RACS	egg	RAD	HATSUC				RACS had sig. lower photolyase activity than BUBO and HYRE	Blaustein et al. 1994b
UV	RAJA	egg	RAD	DEVOBS				40 - 90 % of tadpoles had no germ cells, the gonads with no or few germ cells were remarkably slender at metamorphosis and showed that they were depressed in their development.	Shirane 1970

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
UV	RAJA	egg	RAD	DEVOBS				Formation of primordial germ cells was more suppressed in the pressed egg groups than the non-pressed ones.	Shirane 1981
UV	RAJA	embryo	RAD	DEVOBS	room			70% of larvae at stage I from the pressed and UV-irradiated eggs were germ cell free, but at a stage immediately after metamorphosis all animals had at least some germ cells, although their gonads often were extremely small and poorly differentiated.	Shirane 1982
UV	RASY	egg	RAD	MORT				No effect of UV-A was found on eggs or larvae even at exposures of twice the intensity of normal outdoor levels. All embryos exposed 30 min. or more to UV-B died.	Grant and Licht 1995
UV	RAXX	egg	RAD	HATSUC				UV radiation of a frog's eggs rarely results in sterilization, however, sterilization is greatly improved with compression of the lower pole of the egg or irradiating just before the first division of the egg.	Bounoure et al. 1954
UV	RHVA	egg	RAD	HATSUC				Photolyase activity= 0.05, less than AMMA, AMGR and PLVE.	Blaustein et al. 1994b
UV	TAGR	egg	RAD	HATSUC				Photolyase activity= 0.2, sig. less than HYRE, RACS and BUBO.	Blaustein et al. 1994b
UV	XELA	egg	RAD	DEVOBS				Effects of cold and pressure resemble effects noted for UV radiation.	Scharf and Gerhart 1983
UV	XELA	egg	RAD	DEVOBS				Irradiation of vegetal pole reduces primordial germ cells, produces cytological damage to the vegetal hemisphere and disruption of the normal mechanism by which the vegetal yolk mass induces the formation of the dorsal axis of the embryo.	Thomas et al. 1983
UV	XELA	egg	RAD	HATSUC				Photolyase conc.= 0.06 - 0.11, sig. lower than RACS, HYRE and BUBO.	Blaustein et al. 1994b
UV, anthracene	PLWA	larvae	IMMER	GENOTOX	20		0-12.5 ppb	0 - 6.25 ppb= 15-17 /1000 erythrocyte mean micronucleus frequency, 12.5 ppb resulted in death.	Fernandez and L'Haridon 1992
UV, AQ	PLWA	larvae	IMMER	GENOTOX	20		0-100 ppb	0 - 100 ppb= 17-19.5 /1000 erythrocyte mean micronucleus frequency.	Fernandez and L'Haridon 1992
UV, BA	PLWA	larvae	IMMER	GENOTOX	20		0-6.25 ppb	0 - 3.125 ppb= 17- 23 /1000 erythrocyte mean micronucleus frequency, 6.25 ppb resulted in death.	Fernandez and L'Haridon 1992
UV, BAA	PLWA	larvae	IMMER	GENOTOX	20		0-12.5 ppb	0 - 6.25 ppb= 9-27 /1000 erythrocyte mean micronucleus frequency, 12.5 ppb resulted in death.	Fernandez and L'Haridon 1992
UV, BaP	PLWA	embryo	IMMER	GENOTOX				At 25 ppb BaP, 24% of embryos died (toxicity was enhanced with addition of UV exposure).	Fernandez and L'Haridon 1994
UV, BaP	PLWA	larvae	IMMER	GENOTOX	20		12.5-500 ppb	No effects were observed with UV, BaP treatments alone, however, >25 ppb BaP with UV showed toxic effects. When larvae were not irradiated in advance, 90% died when exposed to 50ppb BaP and UV. BaP was 4-fold less genotoxic than non-irradiated BaP.	Fernandez and L'Haridon 1994

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
UV, DBA	PLWA	larvae	IMMER	GENOTOX	20		0-200 ppb	0 - 200 ppb= 17-25 % mean micronucleus frequency.	Fernandez and L'Haridon 1992
UV, DMA	PLWA	larvae	IMMER	GENOTOX	20		0-50 ppb	0 - 50 ppb= 7-13 % mean micronucleus frequency.	Fernandez and L'Haridon 1992
UV, DMBA	PLWA	larvae	IMMER	GENOTOX	20		0-50 ppb	0 - 50 ppb= 9-109 % mean micronucleus frequency.	Fernandez and L'Haridon 1992
UV, methoprene	RAPI	embryo	RAD	DEVOBS			280-400 nm µV; ND-64.4 (methoprene)	After 12-16 d exposure, mortality and deformation occurred in varying degrees for highest methoprene conc. alone, UV did not increase this effect.	Ankley et al. 1998
UV-B	BUBO	embryo	RAD	DEVOBS				Curvature of spine and thick pigmented corneas were observed; survival rate was also reduced.	Worrest and Kimeldorf 1975
UV-B	BUBO	tadpoles	RAD	DEVOBS	18-25			After exposure; abnormal development occurred in eyes, integument, spine and mortality increased.	Worrest and Kimeldorf 1976
UV-B	XXFR	adult	RAD	PHYSIO			4.3-21.5 Joules	% haemolysis in frog species was found to range from 1.5 to 6.0 which was smaller than that found for fish, human, lizard, pigeon, rat or sheep.	Kumar and Joshi 1992
various	EUOS	adult	INHAL	MORT			1-2%	Results not extracted from paper.	Kihara and Yamashita 1978
various	HEPA	adult	DERMAL	MORT	25		3249-3728 total pesticides in soil	Pesticides in soils were: BHC, dieldrin, heptachlor, DDT, fenitrothion, malathion, diazinon, chlorpyrifos, mevinphos, tetrachlorinphos; survived for 26.5 h when exposed to soils contaminated with pesticides.	Lambert 1997b
various	MAST	adult	DERMAL	MORT	25		3249-3728 total pesticides in soil	Pesticides in soils were: BHC, dieldrin, heptachlor, DDT, fenitrothion, malathion, diazinon, chlorpyrifos, mevinphos, tetrachlorinphos; survived for 33.5 h when exposed to soils contaminated with pesticides.	Lambert 1997b
various	RACA	tadpole (stage 20-24)	TISPREP	PHYSIO				At the time of foreleg emergence, intracellular colloid droplets increased in number, large dense lysosomal vacuoles appeared; serum T4 levels increased about 10-fold over earlier larval stages and then dropped, suggesting production of thyroglobulin.	Kaltenbach and Lee 1977
various	TOCR	adult	DERMAL	MORT	25		3249-3728 total pesticides in soil	100% mortality within 40 min (pesticides in soil were BHC, dieldrin, heptachlor, DDT, fenitrothion, malathion, diazinon, chlorpyrifos, mevinphos, tetrachlorinphos).	Lambert 1997b
vasotocin	AMTI	larvae	IMMER	PHYSIO				Vasotocin reduced glomerular filtration rate from 127 to 92 µl/10g-hr.	Stiffler et al. 1981
verbenalol	RATE	tadpoles	IMMER	MORT			15	15 ppm and greater lethal.	Paulov et al. 1985 [k]
vinclozolin	ALMI	egg	DERMAL	PHYSIO			0.14-14	No effect on endocrine system of hatchlings.	Crain et al. 1997
warfarin	PICA	adult	ORAL	MORT			11 rats, fed avg. of 5.27 Mg	No effects were observed on snakes.	Brock 1965
waste water	BUAN	tadpoles	IMMER	PHYSIO				Control frequencies of micronucleated erythrocytes was 4.4 - 4.68/1000. Exposed tadpoles exhibited a sig. elevated frequency at 17.01/1000.	Weishun and Ruifang 1992

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
waste water	XELA	larvae	IMMER	GENOTOX				Larvae accumulated damaged normochromatic erythrocytes in their blood.	Lehmann and Miltenburger 1987
waste water	XELA	larvae	IMMER	DEVOBS	17	5.8		No dif. were found in behaviour, morphology and growth of larvae between product water and regular tap water. Tap water animals had a sig. delay in development.	Hrubec et al. 1983
zineb	MIOR	embryo	IMMER	DEVOBS			2.0	Oxidative damage to embryonic cells, as well as discussion of biproduct and chelating agent effects.	Ghate 1985a
Zn	AMJE	embryo	pH+CON TAM	DEVOBS	10	4.5		Zn at levels up to 2.0 mg/L did not induce a toxic response in the embryos nor did it affect developmental rate.	Horne and Dunson 1994b
Zn	BUAM	adult	TISPREP	PHYSIO			1.0 m/mol	In the presence of Zn ions, motor end plate channel decay remained exponential, while the time constant of decay was prolonged as single channel conductance and ACh null potential remained virtually unchanged.	Takeda et al. 1978
Zn	BUAM	adult	TISPREP	PHYSIO			0.1-5 mM	Motor end-plate channels were increased by Zn.	Takeda et al. 1982
Zn	BUAR	embryo	IMMER	DEVOBS			1 mg/L	Zn has a protective affect in embryos against spontaneous malformations and lethality.	Herkovits et al. 1989
Zn	BUAR	tadpoles	IMMER	MORT	20		4-32 mg/L	Sig. decrease in survival occurred after 72 h at 32 mg/L (65% survived), no decrease occurred at lower doses; Sig. decrease in survival with combination Zn and Pb doses than with Pb alone. Pb was twice as toxic as Zn when tested alone.	Herkovits and Pérez-Coll 1991a
Zn	BUBO	larvae	IMMER	DEVOBS			0.1-39 mg/L	100 % mortality in 39 mg/L within 24 h; 0.1 mg/L all metamorphosed.	Porter and Hakanson 1976 [k]
Zn	CRRH	adult	ENVIRON	PHYSIO				Serum Zn level 45.3 ppm which is considered toxic to mammals. Following post operative treatment with ceftazidime and Ca EDTA feeding resumed and serum levels dropped to 4.88 ppm after 39 d.	Cook et al. 1989
Zn	CYPY	adult	TISPREP	PHYSIO			10^{-7} - 10^{-4} M	10^{-4} M reduced membrane potential to 50 % of control. Effect increased with increasing conc.	Kanno et al. 1978 [k]
Zn	GACA	egg	IMMER	DEVOBS		7.5-8.0	0.1-100	3 - 7 % mortality and teratogenesis at hatching; 5 - 14 % mortality at 4 d post hatch.	Birge et al. 1977 [k]
Zn	PICA	adult	ORAL	MORT			fed avg. of 10.33 Mg (6 rats)	3 snakes regurgitated, 3 showed no observable effects.	Brock 1965
Zn	PLXX	larvae	IMMER	GENOTOX			0-10 mg/L	No genotoxicity observed.	Godet et al. 1996
Zn	TAGR	adult	IMMER	RESIDUE				Equilibrium body burden at 30 d. Half life following injection was 1.5 years, highest conc. in skin, muscle, blood and liver.	Willis and Valett 1978 [k]
Zn	TRCR	adult	IMMER	RESIDUE				Newts left in tank with Zn plated bottom. Unusual cells present in primordium hippocampi of poisoned newts.	Taban et al. 1982 [k]
Zn	XELA	adult	INJECT	RESIDUE			5	Results not extracted from paper.	Suzuki et al. 1983 [k]

Contaminant [a]	Species Code [b]	Lifestage	Exposure Route [f]	Study Endpoint [g]	Temp [h]	pH	Contaminant Concentration [e]	Results, Residues, Effects and/or Remarks [d,e]	Reference [k]
Zn	XELA	adult	TISPREP	PHYSIO			3.4 mM	Slowed kinetics of system; decreased the permeability constant, increased the time constant, shifted the K activation curve along the potential nerve axis.	Arhem 1980 [k]
Zn	XXFR	tadpoles	IMMER	DEVOBS			N/20000-N/50000 (see paper for details)	Few survived N/20000; those which survived in N/50000 for > 3 mos were stunted and had no limb buds.	Dilling and Healey 1926 [k]
Zn	XXXX	not specified	INJECT	PHYSIO				The degree of cellular disturbance after injections was related to intensity and persistence of intravital reaction.	Eschenko 1978
$ZnSO_4$	XELA	tadpole (stage 54-58)	IMMER	MORT			10-20 mg/L	0 % mortality at 10 and 15 mg/L in pre-treated groups (either Zn or Cd); 4 - 15 % mortality at 20 mg/L in groups; 10 - 80 % mortality in non-pretreated groups with increasing mortality at higher $ZnSO_4$ conc.	Woodall et al. 1988 [k]

Table 5: FETAX data. [FETAX (Frog Embryo Teratogenesis Assay-*Xenopus*) is a standardized methodology for developmental toxicity assays that uses embryos of South African Clawed Frog (*Xenopus laevis*)]. (More information is available on FETAX methodology in American Society for Testing and Materials 1991; Bantle 1994a, 1994b, Bantle et al. 1992)

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
1,1-dimethylhydrazine			blastula to hatching exposure= 7-9 mg/L						Greenhouse 1977 [k]
1,2-dihydroxynaphthalene		0.50 mg/L (mean)	0.29 mg/L (mean)						Schultz and Dawson 1995
2,4-D (2,4-dichloro-phenoxyacetic acid)		254 mg/L in buffer	245 mg/L in buffer	1.04 in buffer				LC50 in natural water>270 mg/L, EC50 >270 mg/L.	Morgan et al. 1996
2-AAF (2-acetylaminofluorene)		88.5 mg/L	7.2 mg/L	12.4 (ai avg = 16.7)				Metabolic activation reduced (1.9 fold) the LC50/96 h to 42.5 mg/L and the EC50 to 2.6 mg/L. Malformations induced by inactivated 2-AAF included improper gut coiling and pericardial edema at conc >6 mg/L.	Fort et al. 1989
2-ethylhexanoic acid	0-88 mg/L		47.5 (44.0-50.6)					EC50 in mixture: 5.7 (5.3-6.1) TU in mixture for malformation: 0.120 (0.112-0.128).	Dawson 1991
2-ethylhexanoic acid	EC50 range							In binary combination with valproic acid conc. addition occurred suggesting similar modes of action.	Dawson et al. 1992
2-methylpentanoic acid	0-280 mg/L		172.6 (161.0-185.5)					EC50 in mixture: 18.0 (16.8-19.3) TU in mixture for malformation: 0.104 (0.097-0.112).	Dawson 1991
6-aminonicotinamide			1.0 mg/L					1:1 ratio of compound to retinoic acid and 1:1 ratio of compound to isoniazid = response addition (TU>1.0).	Dawson and Wilke 1991a
6-aminonicotinamide			900 mg/L					As the conc. of 6-aminonicotinamide increased, the fluorescence from the dye decreased. EC50 value determined was comparable with those reported in FETAX for LC50.	Stringer and Blankemeyer 1993
6-aminonicotinamide		2.23	0.005	446	1.15				Bantle et al. 1994a
6-aminonicotinamide		2950-3190	5.3 - 5.7	518-602	100 mg/L				Dawson et al. 1989
7-penicillamine								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991

Table 5 - FETAX Studies - 2

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
acetaminophen		decreased 3.9	decreased 7.1					Results indicate that a highly reactive intermediate formed as the result of MFO-mediated metabolism (possibly P-448) significantly increased the developmental toxicity of acetaminophen.	Fort et al. 1992
acetone		1.92 - 2.49	1.06 - 1.4	1.6 - 1.83	1.0 - 1.8			Results from 3 trials.	Rayburn et al. 1991b
acetone	0.9-1.0% v/v					0.9% v/v		Acetone increased the mortality for both teratogens, but only increased the methylmercury chloride malformation greater than the additive effects. There were additive effects for growth for all solvents with the teratogens. EC25(96) = 1.0%v/v.	Rayburn et al. 1991a
acridine		3.6 (LC48=10.9; LC72=8.7 mg/L	midblastula embryo: 48h = 65; 72h = 26; 96h = 24					Abnormalities included exogastrulation, edema, formation of blisters.	Davis et al. 1981 [k]
acridine	5.0 mg/L							Max conc. in larvae = 85 ppm; ND after 2 h.	Davis et al. 1981 [k]
actinomycin D		18.9 (13.8-26.1)mg/L	21.7 (18.8-25.1)mg/L		15.9 mg/L			EC50 (96 h) for swimming ability = 17.6 (0.08-38.0) mg/L. EC50 (96 h) for pigmentation = 21.8 (16.8-28.1) mg/L. Min conc. to inhibit development = 15.9 mg/L.	Courchesne and Bantle 1985
AH (acetylhydrazide)		decreased 7.9 fold	increased 2.0 fold	decreased 15.87 fold				Fluctuations with contaminant-induced metabolic activation.	Fort and Bantle 1990a
AH (acetylhydrazide)	1.0-50.0 mg/L							Embryo stage 46-54; abnormal hind limb development >25.0mg/L.	Fort and Stover 1997
alcohol								All aceylenic alcohols tested produced linear conc.-response relationships for embryolethality, embryo malformation and 5 d old tadpole lethality. Primary propargylic alcohols were teratogenic, producing head, eye, gut, and skeletal malformations in larvae/tadpole.	Dawson et al. 1990
alpha-chaconine			2.03 ± 0.005 mg/L.					Alpha-chaconine increased dye fluoresence up to 1600% of control.	Blankemeyer et al. 1992

Table 5 - FETAX Studies - 3

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
alpha-chaconine		0.0022	0.0020	1.1	<0.0047			Compound was found to be lethal to embryo.	Rayburn et al. 1994
alpha-chaconine		3.2-4.6/3.2mg/L	2.6-3.1 / >6mg/L	1.03-1.77 / >1.05	3.0-3.7/>6			Results given for alpha-chaconine alone and with MAS respectively.	Friedman et al. 1991
alpha-solanine			8.3 ±0.03 mg/L.					Alpha-solanine increased dye fluorescence up to 400% of control.	Blankemeyer et al. 1992
alpha-solanine		0.0297	0.0131	2.26	<0.0092			Compound caused severe malformations and all malformed embryos died after 96 h.	Rayburn et al. 1994
alpha-solanine		10.9 -14.6 / > 20	8.8-10.5 / 19.9	1.24-1.4 /> 1.0	7-12 / > 20			Results given for solanine without MAS and with MAS respectively.	Friedman et al. 1991
amaranth		2670-3810	3060-3910	0.8 - 1.2	3750-4000				Bantle et al. 1990
aniline		550; LC24 = 1400; LC48 = 660; LC72 = 490	mid blastula stage 24 h = 360 m/L; 48 h = 560 mg/L; 72 h = 460 mg/L; 96 h = 370 mg/L					Abnormalities included exogastrulation, edema, formation of blisters.	Davis et al. 1981 [k]
Aroclor 1254	1.1nmol/mL-1.2mmol/mL		64.4 µmol/mL					Depigmentation occurred in animals yet no effect on rate of malformation or growth and development was otherwise noted at any of the treatment conc.	Gutleb et al. 1998
aromatic petroleum crude		33 - 38 %	31.1 %						Dumont et al. 1983 [k]
ascorbic acid								Little to no teratogenic potential.	DeYoung et al. 1991
aspartame		> 10000 - 13920	13140	1.1	3000-7000				Bantle et al. 1990
atrazine		100 mg/L in buffer	33 mg/L in buffer	3.03 in buffer			1.1 mg/L	In natural water LC50=126 mg/L, EC50<8 mgL.	Morgan et al. 1996
azacytidine		430-620	20-70	8.6-21.5	70-400				Bantle et al. 1990
azinphos-methyl		1.6 mg/L ai (100mL)	>1.3 mg/L ai (100mL)	<1.23		1.30 mg/L ai*	3.80 mg/L ai*	This assay was conducted with Guthion 2S (formulation). NOEL and LOEL are based on mortality. Values were also calculated based on length: NOEL=0.48; LOEL=1.3 mg/L a.i.	Schuytema et al. 1994

Table 5 - FETAX Studies - 4

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
azinphos-methyl	<0.01-15.68 mg/L	6.1-6.3 mg/L (10mL); >7.62-11.9 mg/L (100mL)		3.4 (10mL),1.9(100mL)		0.51,3.11 mg/L based on deformity at 10 ml, 100 ml	1.31,7.31 mg/L based on deformity at 10 ml, 100 ml	Embryos exposed to 10 mL volumes exhibited increased mortality, deformation and decreased size compared to those at 100 mL volumes (percent hatch was never less than 91%). Percent deformities: 73-89% (3 mg/L in 10 mL vol.), >2% (3 mg/L in 100 mL vol.).	Schuytema et al. 1994
BaP (benzo(a)pyrene)		>10 mg/L (inactive)	11 mg/L (inactive)					Activated LC50 also ≥10 mg/L (median lethal conc. exceeded the limit of solubility in 1% DMSO). The activated EC50 was 0.1.7 mg/L. The TI increased upon activation. At conc. > 2.5 mg/L, inactivated compound elicited moderate gut malformations.	Fort et al. 1989
brodifacoum								Moderately positive teratogenic potential.	DeYoung et al. 1991
BTH14 (*Bacillus thuringiensis*)		163.2 mg/L	0.02 mg/L					Tadpole.	Channing 1998
butyric acid	0-640 mg/L		400.8 (368.0-432.0)					EC50 in mixture:41.2 (38.4-44.0). TU in mixture for malformation: 0.103 (0.096-0.110).	Dawson 1991
BZH (benzoic hydrazide)			EC50= 18.7 mg/L					In combination with ß-aminopropionitrile at conc. that induce malformation: conc. additive at all ratios (TU=1.0), this TU occurred at all three ratios tested (3:1, 1:1 and 1:3).	Dawson 1993
BZH (benzoic hydrazide)		96 h =113.68 mg/L	96 h = 58.58 mg/L	25°C=1.9; 20°C=7.9				Gross effects produced by changes in connective tissue fibres of the notochordal sheath; effects were conc. and to lesser extent developmental stage dependent; teratogenic indices suggest that benzoic hydrazine is a developmental hazard.	Riggin and Schultz 1986
caffeine		0.19	0.13	1.46				Edema occurred at conc. >2.0 mg/mL, spinal kinking occurred at 3.5 mg/mL, severe kinking, optic and facial malformations and edema occurred >4.5 mg/mL.	DeYoung et al. 1996
caffeine		0.24 - 0.35	0.074 - 0.158	1.8 - 3.4	0.05 - 0.09				Bantle et al. 1994b
caffeine		0.252 - 0.297	0.107 - 1.52	1.83 - 2.36	0.04 - 0.1				Dawson and Bantle 1987b

Table 5 - FETAX Studies - 5

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
caffeine	0.08							When coadministered with: hydroxyurea (+), cytosine arabinoside (+), cyclohexamide (+), emetine (+), Fluorouracil (+)(+): increase in rate of malformation compared to chemical tested alone; (-): no significant difference in rate of malformation.	Dawson and Bantle 1987a
carboxylic acids								Overall treatment lethality for the study was 0.43 %. The range of lethality for the six combinations was 0.16 - 0.81 %. For 1:0 and 0:1 solutions, mean treatment lethality was 0.61 % while for 3:1, 1:1, and 1:3 treatments, the mean lethality was 0.31 %.	Dawson 1994b
catechol		13.3 mg/L mean	2.7 mg/L mean						Schultz and Dawson 1995
Cd	0.1-10 mg/L							LC100 for 24 h was 1.13mg/L; LC100 for 72 h was 0.3 mg/L; malformations and growth inhibitions did not appear to be related to Cd toxicity.	Herkovits et al. 1997b
Cd	3.6 µmol/L							At study termination (after 13 wks) survival of Cd exposed was 51.1%. Median number of days to metamorphosis = 49 g (range: 41-85). Mean body weight after 13 wks = 1.04 g (SD=0.43).	Plowman et al. 1994
CdCl2, Cd	0.75-56 µmol/L Cd	32 µmol/L	3.7 µmol/L	8.6	18 µmol/L			>95% of the embryos survived at 101 h post-fertilization, and the incidence of malformations was = to or <7%. In Cd exposed groups there was conc.-dependent mortality, and the embryos showed a conc.-related pattern of malformations.	Sunderman et al. 1991
CdCl2, Cd	0.75-56 µmol/L Cd	32 µmol/L	3.7 µmol/L	8.6	18 µmol/L			>95% of the embryos survived at 101 h post-fertilization, and the incidence of malformations was = to or <7%. In Cd exposed groups there was conc.-dependent mortality, and the embryos showed a conc.-related pattern of malformations.	Sunderman et al. 1992

Table 5 - FETAX Studies - 6

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
CDD (cytochalasin D)		450 ng/mL (inactive)	100 ng/mL (inactive)	3.9				For activated treatment the LC50 = 800 ng/mL and the EC50 was 600 ng/mL. The TI for activated treatment was 1.5. Inactivated conc. > 50 ng/mL induced severe impairment of eye formation, gut miscoiling and craniofacial malformations.	Fort et al. 1989
chlorocresol	25 mg/L	178 mg/L						LC10=32 mg/L.	Bernardini et al. 1996
chlorocresol	40 & 80 mg/L							Chlorocresol exposure during the cleavage phase caused a conc. dependent increase of mortality; 78% (40 mg/L) and 97% (80 mg/L). The difference between control and treated groups was highly significant.	Vismara et al. 1995
chlorocresol	40 & 80 mg/L							Chlorocresol at these conc. did not affect the rate of fertilization.	Vismara et al. 1995
chlorothalonil		0.09 mg/L	0.02 mg/L					Tadpole.	Channing 1998
Co	25 µmol/L							At study termination (after 13 wks) survival of Co exposed was 71.3%. Median number of days to metamorphosis = 43 (range: 41-67). Mean body weight after 13 wks = 0.95 (SD=0.36).	Plowman et al. 1994
CoCl2	0.0018 - 18 mmol/L	10.4 mmol/L	0.025 mmol/L	416	0.042 mmol			Exposed embryos showed a conc.-related pattern of malformations, comprising gut malrotation, ocular anomalies, kinked tail, craniofacial dysplasia, cardiac deformities and dermal blisters.	Plowman et al. 1991
cotinine		4340 mg/L	720 mg/L					Scored as potential teratogens.	Dawson et al. 1988a
crude oil		6.97 %	0.96 %						Dumont et al. 1983 [k]
Cu		0.89 - 0.98	0.74 - 0.88	1.1 - 1.2	0.75			Results also given for metal contaminated soils.	Fort et al. 1995b
Cu		1.25 - 1.38	0.95 - 0.99	1.32 - 1.39	1.10 - 1.15			Long term exposure (60-75 d) indicated that Cu induced reduction deficiency malformations of the hind-limb at conc. as low as 0.05 mg/L.	Fort and Stover 1996
Cu	0.1-0.75 mg/L							Embryo stages 46-54; abnormal hind limb development at > 0.5mg/L.	Fort and Stover 1997

Table 5 - FETAX Studies - 7

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
Cu	0.3-100 µmol/L	22 µmol/L	2.5 µmol/L	8.8	10 µmol/L			Shown to be a potent teratogen for XELA causing conc.-related increases of eye, gut, facial, notochord, fin, and cardiac anomalies. Head to tail lengths were inversely correlated with Cu conc.	Luo et al. 1993a
cycloheximide		0.159 (0.1-0.23)mg/L	0.119(0.10-0.14)mg/L		0.056 mg/L			EC50 (96 h) for swimming ability = 0.1 (0.052-0.19) mg/L. Minimum conc. to inhibit development = 0.028 mg/L. Close correlation between the two dose-response curves.	Courchesne and Bantle 1985
cycloheximide	0.00004 mg/L							Administration alone produced 18.4% malformation in survivors. Coadministration of caffeine, theophylline and theobromine greatly increased the incidence of malformed embryos (8.7%, 69.6% and 70.6%, respectively). Significant decreases in length occurred.	Dawson and Bantle 1987a
cyclophosphamide		8.0 - 1.4 mg/mL	6.2 - 0.4 mg/mL					CP activation reduced the 96 LC50 from 8.0 - 1.4 mg/mL. Malformation EC50 was reduced to 0.4 mg/mL. Activation also increased the types and severity of malformation and reduced embryonic growth.	Fort et al. 1988
cytosine arabinoside		5410 (4510-6480) mg/L	760 (630-930) mg/L		800 mg/L			Initial experiments indicated that high conc. lowered the pH of the water to about 3.5. The possible interaction of low pH and DNA synthesis inhibition yielded an LC50 of 2450 mg/L and an EC50 (malformation) of 200 mg/L.	Courchesne and Bantle 1985
cytosine arabinoside	0.0006 mg/L							For all treatments with cytosine arabinoside there was no significant difference in mortality. Cytosine arabinoside alone produced 23.6% malformations in survivors.	Dawson and Bantle 1987a
deltamethrin		0.19 mg/L	0.006 mg/L					Tadpole.	Channing 1998
dichlorvos		39.4 mg/L	0.5 mg/L					Tadpole.	Channing 1998

Table 5 - FETAX Studies - 8

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
dicrotophos	0-100 mg/L	>100	ean P=3.00; G=6.12	TI (P): 33.3; TI (G): 16.3				Mean length of embryos significantly greater than controls at most doses. Normal orientation. Dose dependent reduction of NAD+. Only one of 17 kept until metamorphosis was abnormal (bent forelimb) (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989
dieldrin	<0.002-0.1512 mg/L					Mortality and spinal deformities : NOAEL: 0.0116 mg/L	Mortality and spinal deformities : LOAEL: 0.0252	Mortality increased with conc. and time: 81.2% at 0.07 mg/L, 100% at 0.1512 mg/L. Deformities increased with conc. and time: 40% at 0.07 mg/L and 51.2% at 0.1512 mg/L. Generally not smaller than controls.	Schuytema et al. 1991
dieldrin	<0.002-0.1792 mg/L	>0.1792 mg/L				For length NOAEL: 0.006; For spinal deformities LOAEL: 0.0951	For length LOAEL: 0.0241; For spinal deformities LOAEL: 0.181	Minimal mortality (7.5% at 0.1792 mg/L). Teratogenic effects occurred: 7.5% deformed at 0.1792 mg/L. Embryos exposed at >0.024 mg/L were significantly shorter than controls.	Schuytema et al. 1991
dieldrin	<0.002-0.185 mg/L					Mortality: NOAEL= 0.0103 mg/L. Spinal deformities : NOAEL= 0.0013 mg/L	Mortality: LOAEL= 0.0258, Spinal deformities : LOAEL= 0.005	Mortality increased with conc. and time: 98.8% at 0.0696 mg/L, 100% at 0.185 mg/L. Deformities increased with increasing conc. and time: 56.2% at 0.0696 mg/L, 40% at 0.185 mg/L. Generally not smaller than controls.	Schuytema et al. 1991
dieldrin	<0.002-1.073 mg/L					Spinal deformities : NOAEL: 0.115	Spinal deformities : LOAEL: 0.238	Mortality (100% at 0.238 and 1.073 mg/L, 92.5% at 0.651 mg/L) increased with conc. and time. Teratogenic effects increased with conc. and time: 65% at 0.238 mg/L, 72.5% at 1.073 mg/L and 85% at 0.651 mg/L. Generally not smaller than controls.	Schuytema et al. 1991
DMSO (dimethylsulfoxide)								Delays in gastrulation were accompanied by changes in the regulation of transcription of several genes known to be active during gastrulation in normal development.	Brennan 1991

Table 5 - FETAX Studies - 9

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
DMSO (dimethylsulfoxide)		1.77 - 1.86	1.24 - 1.4	1.3 - 1.5	1.3 - 1.7			Results from 3 trials.	Rayburn et al. 1991b
DMSO (dimethylsulfoxide)	0, 1-1.2% v/v					1.0% v/v		DMSO potentiated the lethal effect of both teratogens but did not alter significantly the rate of malformation. EC25(96) = 1.2% v/v. There were additive effects for growth for all solvents with the teratogens.	Rayburn et al. 1991a
DMSO (dimethylsulfoxide)	0.25-2.0% v/v	1.92% (trials pooled)	1.57% (trials pooled)	1.2, 1.24 (trials separate)		1.0% v/v (trials separate) (malform)		Least toxic or teratogenic solvent examined. NOELs for mortality and length were: 1.75, 1.5% v/v (mortality), 1.25, 1.0% v/v (length).	Dresser et al. 1992
DPH (diphenylhydantoin)		up 74.5 to126.4 mg/L	up 32.4 to 62.9 mg/L	reduced 1.2 fold				Both p-HPPH and m-HPPH (hydroxylated metabolites) were much less developmentally toxic than DPH.	Fort and Bantle 1990b
emetine	0.7 µg/mL							No significant difference occurred in mortality resulting from any treatment. Administration alone resulted in 28.9% malformation of survivors. Coadministration of caffeine, theophylline and theobromine significantly increased the incidence of malformations.	Dawson and Bantle 1987a
ethanol		1.44 - 1.95	1.01 - 1.20	1.33 - 1.88	0.6 - 1.0				Dawson and Bantle 1987b
ethanol	0.25-1.7% v/v	1.58,1.44 % v/v (trials separate)	1.04% v/v (pooled trials)	1.42, 1.50		1.00, 0.75 %v/v		Most teratogenic solvent tested. NOEL for mortality and length were also calculated (1.25 % v/v and < 0.25% v/v, respectively).	Dresser et al. 1992
ethidium bromide		50 (47-54) mg/L	35 (29-43) mg/L		1 mg/L			Only a slight teratogenic risk. Growth was the most sensitive endpoint measured. EC50 (96 h) for swimming ability = 50 mg/L. Min conc. to inhibit development = 50 mg/L.	Courchesne and Bantle 1985
ethylnitrosurea		0.29 mg.mL	0.05 mg/mL	5.8				Inactivated ENU (evaluated by different operator) resulted in LC50 of 0.25 mg/mL and EC50 of 0.052 mg/mL.	Bantle et al. 1989b
fenthion		2.61 mg/L	0.002 mg/L					Tadpole.	Channing 1998

Table 5 - FETAX Studies - 10

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
fluoranthene, UV	0, 25, 125, 250, 625 µg/L							UV exposure alone cause brown pigmentation on skin. UV + PAH exposure resulted in inhibited growth and 40% mortality at 125 µg/L of fluoranthene and 100% mortality at 1250 µg/L of fluoranthene.	Hatch & Burton 1996
fluoranthene, UV	0, 25, 125, 250, 625 µg/L							UV exposure alone caused brown pigmentation on skin. UV + PAH exposure resulted in inhibited growth and 40% mortality at 125 µg/L of fluoranthene and 100% mortality at 1250 µg/L of fluoranthene.	Hatch & Burton 1998
fluorouracil		0.53 mg/L	0.08	6.63				Malformations included abnormal gut, face, eye, brain, heart, spine formation (0.01 mg/L).	DeYoung et al. 1996
fluorouracil		0.71 - 1.9	0.038 - 0.122	6.7 - 18.7	0.05 - 0.125				Bantle et al. 1994b
fluorouracil		1.22 - 1.62	0.120 - 0.137	10.16 - 11.82	0.0875 - 0.120				Dawson and Bantle 1987b
fluorouracil	0.08 mg/mL							Tested alone at this conc. Fuorouracil exhibited 24% malformation in survivors (1.9% mortality). Coadministration of caffeine, theophylline, and theobromine greatly increased the incidence of malformed embryos (85.7%, 87.8% and 42.5% respectively).	Dawson and Bantle 1987a
formamide	0.25-1.75% v/v	1.04% v/v (pooled trials)	1.26, 1.06% v/v (trials separate)	0.83,0.97 (trials separate)		0.75, 0.5% v/v (trials separate)		Most toxic solvent. NOEL values for mortality and length were: 1.0, 0.5% v/v (mortality), 0.75, 1.0% v/v (length).	Dresser et al. 1992
fuel oil blend		1.48 %	0.96 %						Dumont et al. 1983 [k]
Garlon 3A	100 mg/L							No significant effects up to 100 mg/L for formulated triclopyr.	Perkins 1995
gentisic acid		10839.5 mg/L mean	1531.8 mg/L mean						Schultz and Dawson 1995
glycerol formal	0.25-1.75% v/v	1.65, 1.57% v/v	1.09, 1.15% v/v	1.51,1.37		0.50% v/v (malform.)		NOEL values for mortality and length were: 1.25, 1.0% v/v (mortality) and 0.75,<0.25% v/v (length).	Dresser et al. 1992
glyphosate salt (RoundUp)	5000 mg/L							Extremely toxic to XELA.	Perkins 1995

Table 5 - FETAX Studies - 11

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
glyphosate salt without surfactant (Rodeo)	5000 mg/L							No significant effects on XELA.	Perkins 1995
groundwater		36.3 - > 100 %	21.2 > 100 %	1.7 - 2.2					Bantle et al. 1989a
heptanoic acid	0-88 mg/L		57.6 (55.0-60.5)					EC50 in mixture: 5.7 (5.3-6.1) TU in mixture for malformation: 0.099 (0.092-0.106).	Dawson 1991
hexanoic acid	0-176.4 mg/L		108.1 (102.3-114.7)					EC50 in mixture: 9.1 (8.5-9.7) TU in mixture for malformation: 0.084 (0.079-0.090).	Dawson 1991
hydrazine			blastula to hatching = 114 - 125 mg/L						Greenhouse 1977 [k]
hydroxyurea			187.2 mg/L (tested alone)					At malformation inducing conc. levels: hydroxyurea:isoniazid and hydroxyurea:retinoic acid = response-addition (TU= 1.0).	Dawson and Wilke 1991a
hydroxyurea								In binary combination with valproic acid response addition occurred suggesting different modes of action for inducing malformation.	Dawson et al. 1992
hydroxyurea								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991
hydroxyurea		0.75	0.18	4.2	0.25				Bantle et al. 1994a
hydroxyurea		1820 (1.5-2.7) mg/L	430 (0.35-0.5) mg/L		300 mg/L			The slope of the dose-response curve for malformation did not change but the entire curve was shifted to lower conc. throughout the course of the experiment. The greater shift occurred between 24 and 48 h into the experiment.	Courchesne and Bantle 1985
hydroxyurea	0.3 mg/mL							Hydroxyurea alone caused 20.6 % malformation. Coadministration with caffeine or theophylline greatly increased the incidence of malformed embryos (89% and 50.6%, respectively) and mortality (6.9% and 8.1%, respectively).	Dawson and Bantle 1987a
imidacloprid		17.4 mg/L	10 mg/L					Tadpole.	Channing 1998
INA				2.5				None of MAS affected developmental toxicity of INA.	Fort and Bantle 1990a
isazophos		724 mg/L	0.25 mg/L					Tadpole.	Channing 1998

Table 5 - FETAX Studies - 12

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
isoniazid			251.0-285 mg/L (tested alone)					At malformation inducing conc. levels: isoniazid:semicarbazide= conc. addition occurred (TU=1.0). isoniazid:6-aminonicotinamide and isoniazid:retinoic acid = additive response (TU>1.0).	Dawson and Wilke 1991a
isoniazid								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991
isoniazid		7.86	0.24	32.8	1.18				Bantle et al. 1994a
isoniazid		9750-9850	240-280	35-41	80-150				Dawson et al. 1989
isoniazid		decreased 1.6 fold	unaffected					Isoniazid-MAS decreased teratogenic index 96h LC50/96hEC50 (malformation) nearly 1.8 fold.	Fort and Bantle 1990a
isoniazid	57.2-550 mg/L		4.23 (3.1-5.2) mL *					Mixed (3:1, 1:1, 1:3) with ß-aminopropionitrile the LC50s were 4.06 (3.4-4.7)*, 4.23 (3.9-4.6)*, 4.16 (3.9-4.5)*. Mixture TUs for the same ratios were 0.97, 1.01 and 1.00, respectively. (of a total exposure volume of 10 ml at 550 mg/L).	Dawson and Wilke 1991b
isovalerianic acid	0-880 mg/L		575.3 (484.0-682.0)					EC50 in mixture: 56.7 (52.8-60.5) TU in mixture for malformation: 0.099 (0.092-0.105).	Dawson 1991
malaoxon		0.9 (0.7-1.0)	mean P=0.18; G=0.26; (N): 0.37	TI (P): 4.8; TI (G): 3.4; TI (N): 2.4				10-fold more potent than malathion. Minimal curvature to severe notochordal bending. Barrel-shaped embryos. Inactive until disturbed, then responded with erratic movements. (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989
malathion								Severe defects at low conc. Dose dependent decrease in length. Abnormal pigmentation, abnormal gut and notochordal bending (dose dependent) as well as dose dependent reduction of intestinal loops with a concurrent increase in anterior intestine diameter.	Snawder and Chambers 1990

Table 5 - FETAX Studies - 13

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
malathion		10.9 (10.6-11.3)	mean P=0.33; G=0.79; (N): 2.16	TI (P): 33.2; TI (N): 5.1; TI (G): 13.8				10-fold less potent than its metabolite (malaoxon). Severe edema at 10 mg/L. Minimal curvature to severe notochordal bending. Barrel-shaped embryos. Inactive until disturbed, then responded with erratic movements. Significantly shorter than controls. (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989
malathion	3, 15, 30 µM			0.7 x 10^{-9} M (lysyl oxidase inhibition)				Enzyme activity was inhibited by malathion, notochords were bent and disorganized. Malathion alters post-translational modification of collagen with resultant morphological defects in connective tissue.	Snawder and Chambers 1993
mancozeb		3.08 mg/L	0.03 mg/L					Tadpole.	Channing 1998
MCPA		3607 mg/L	299 mg/L (5 min.)	2691 mg/L				EC50 was 248 mg/L after 15 minutes.	Vismara et al. 1996
MCPA	2000 mg/L	3.6 mg/L						LC10=1.56 mg/L.	Bernardini et al. 1996
MCPA	22.65-2900 mg/L							16 h after exposure MPC=725 mg/L and LU=163.2 mg/L; 24 h after exposure MPC=1450 mg/L and LU=12.78 mg/L.	Vismara and Garavaglia 1997
methimazole	10-100 µg/L					10 µg/L	25 µg/L	Stage 60-66; decreased tail resorption.	Fort and Stover 1997
methoprene								No effect for conc. between 0.25 and 1.5 µg/L. Effects that were noted were the same as those found from retinoic acid.	La Clair et al. 1998
methotrexate		230-508	20-30	11.5 - 23.1	10 - 30				Bantle et al. 1990
methyl mercury chloride		0.083 mg/L	0.024 mg/L	3.4	0.036 mg/L			Two trials were conducted to determine the LC and EC50, TI and MCIG. The second trial resulted in 0.094 mg/L, 0.025 mg/L, 3.7 and 0.04 mg/L, respectively. Methylmercury chloride was less teratogenic than TCE. EC25(96) = 0.015 mg/L. LC50(96) = 0.088 mg/L.	Rayburn et al. 1991a
Mg								In assays performed with the standard Mg^{2+} conc. (620 µmol/L), the incidence of malformations in embryos averaged 5.4%; and increased at low Mg^{2+} conc. (32±7% at 62 µmol/L.	Luo et al. 1993b

Table 5 - FETAX Studies - 14

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
Mg, Cd	18 µmol/L							Caused death in < 10 % of exposed embryos and malformations in > 95 % when tested under standard conditions.	Luo et al. 1993b
Mg, Co	1,800 µmol/L							Caused death in < 10 % of exposed embryos and malformations in > 95 % when tested under standard conditions.	Luo et al. 1993b
Mg, Ni	56 µmol/L							Caused death in < 10 % of exposed embryos and malformations in > 95 % when tested under standard conditions.	Luo et al. 1993b
Mg, Zn	300 µmol/L							Caused death in < 10 % of exposed embryos and malformations in > 95 % when tested under standard conditions.	Luo et al. 1993b
mine drainage			131 - 136 % (Fe 293 - 433, Zn 178 - 235) and 303 - 535 % (Fe 414 - 533; Zn 47.2 - 73)						Dawson et al. 1985 [k]
mine drainage								Subacute or teratogenic endpoints expressed by frog embryos in laboratory exposures were frequently subtle, i.e. mild abdominal edema, hyperpigmentation and only occasionally severe.	Linder et al. 1991
monocrotophos	0-100 mg/L	>100 mg/L	mean P=2.87; G=8.66	TI (P): 34.8; TI (G): 11.5				Mean length of embryos significantly greater than controls at most doses. Normal orientation. Dose dependent reduction of NAD+. All tadpoles kept until metamorphosis developed normally but slower than controls. (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989
Na acetate		4.24	3.29	1.29				Edema occurred at conc. >2.0 mg/mL, spinal kinking occurred at 3.5 mg/mL, severe kinking, optic and facial malformations and edema occurred >4.5 mg/mL.	DeYoung et al. 1996
naphthalene		no effects observed	no effects observed						Schultz and Dawson 1995

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
nicotine			0.34mg/L (tested alone)					Retinoic acid:N = No interaction (No effect greater than that observed for either compound alone; TU=1.35-1.76).	Dawson and Wilke 1991a
nicotine		reduced to 20 mg/L	increased to 5.8mg/L					Scored as potential teratogens. Metabolism of nicotine to more polar metabolites increased the nicotine conc. required to induce terata.	Dawson et al. 1988a
N-nitrosodimethylamine		increased 2.0 fold	increased 2.1 fold					Based on TI values, embryo growth, types, and severity of induced malformations, NDMA was toxic.	Fort et al. 1991
Ni	0.1-3000 µmol/L	365 µmol/L	2.5 µmol/L	147	5.6 µmol/L			Malformations were found in >95% of exposed embryos (equal to or >5.6 µmol/L). The most frequent malformations in Ni-exposed embryos were ocular, skeletal, and intestinal deformities; less common were facial, cardiac, and integumentary deformities.	Hopfer et al. 1991
Ni	180 µmol/L							The ocular abnormalities of Ni^{2+} exposed tadpoles included microphthalmia, hypopigmentation, hernias and cysts of the choroid and retina, and iris coloboma (cataracts were uncommon).	Hauptman et al. 1993
Ni	2.3 µmol/L							At study termination (after 13 wks) survival of Ni exposed was 60%. Median number of days to metamorphosis = 51 (range: 43-85). Mean body weight after 13 wks = 1.17 (SD=0.49).	Plowman et al. 1994
nonylphenol	10.0-100.0 µg/L					5.0	10.0	Increased tail resorption (stage 60-66).	Fort and Stover 1997
NTA		540-600	520-530	1.0-1.1	350-400				Dawson et al. 1989
octanoic acid	0-41.8 mg/L		27.9 (25.6-30.8)					EC50 in mixture of ten acids: 2.7 (2.5-2.9) TU in mixture for malformation: 0.097 (0.090-0.104).	Dawson 1991
paraoxon		1.2 (1.1-1.3)	mean P=0.11; G=0.16; (N): 0.22	TI (P): 10.6; TI (G): 7.3; TI (N): 4.3				10-fold more potent than parathion. Significantly decreased growth. Minimal curvature to severe notochordal bending. Barrel-shaped embryos. Inactive until disturbed, then responded with erratic movements. Significantly shorter than controls. (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989

Table 5 - FETAX Studies - 16

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
paraquat	0-10.0 mg/L	8.1, 4.2, 3.2 mg/L						For the formulation product LC50 values were (mg/L): >8.1 (96h), 6.2 (10d), 6.2 (30d).	Linder et al. 1990
parathion		14.7 (13.5-16.0)	mean P=0.33; G=0.46	TI (P): 44.6; TI (G): 32.0; TI (N): 2.7				Significantly decreased growth. 10-fold less potent than metabolite paraoxon. Minimal curvature to severe notochordal bending. Barrel-shaped embryos. (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989
Pb	0.02-3.0 mg/L							Short-term effects: no Pb uptake in tissues between 72 and 96 h. 0.02-0.1 µg/L conc. treatments after 3 weeks displayed delayed lordoscolosis (dorsal/ventral and lateral flexure of the tail).	Sobotka and Rahwan 1995
Pb acetate	0 - > 1 mg/L							Lethality and/or abnormalities occurred above 1 mg/L.	Kanunura and Tanimura 1985 [k]
PCB 126	17.1 pmol/mL - 15.5 µmol/mL							Larvae; 29% of the animals died within first 10 days, 48% died over whole experimental period. 93% of animals were malformed when exposed to 6.4 µmol/mL of PCB 126. Oedema, misformed eyes, tails and lack of gut coiling were most common malformations.	Gutleb et al. 1998
PCB 126	17.1 pmol/mL - 15.5 µmol/mL							No effect on rate of malformations,growth and development in FETAX assay.	Gutleb et al. 1998
pentachlorophenol		0.39 - 0.46	0.03 - 0.05	7.8 - 9.2	0.01			Metal contaminated soils also tested.	Fort et al. 1995b
pentachlorophenol		0.52 - 0.56	0.07 - 0.10	5.6 - 7.43	0.15 - 0.18			Conc. as low as 0.5 µg/L inhibited tail resorption.	Fort and Stover 1996
pentachlorophenol	0.5-25.0 µg/L					5.0	10.0	Stage 60-66 embryo.	Fort and Stover 1997
pentanoic acid			183.6-274-5 mg/L					Valproic acid:petanoic acid and butyric acid:petanoic acid = conc. additive (TU=1.0).	Dawson and Wilke 1991a
pentanoic acid	0-360.0 mg/L		227.7 (216.0-238.5)					EC50 in mixture: 23.2 (21.6-24.8) TU in mixture for malformation: 0.102 (0.095-0.109).	Dawson 1991

Table 5 - FETAX Studies - 17

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
pentanoic acid	183.6-274-5 mg/L							In binary combination with valproic acid conc. addition occurred suggesting similar modes of action.	Dawson et al. 1992
pH, Cu	0.042-1.18 mg/L							Mortality related to copper. Over all pH treatments, interactions between fulvic acid and pH were associated with fulvic acid and copper activity.	Buchwalter et al. 1996
phenol	2.5 mg/L	13 mg/L						LC10=1.56 mg/L.	Bernardini et al. 1996
propionic acid	0-2000.0 mg/L		1514.0 (1360-1700)					EC50 in mixture: 103.0 (96.0-110.0) TU in mixture for malformation: 0.068 (0.063-0.073).	Dawson 1991
pseudoephedrine		390-440	210-260	1.7 - 1.9	150 - 200				Bantle et al. 1990
purification system water								Input water 100 % mortality; output water 6.7 % mortality. Common malformations observed were abnormal spine, gut and eyes.	Vismara et al. 1993
quinaldine		26.4						Development retarded, reduction in motility; early cleavage to mid blastula stage.	Dumont et al. 1979 [k]
quinaldine		6.5						Reduced mortality, development retarded, pigmentation lighter.	Dumont et al. 1979 [k]
quinoline		26.3						Caused reduced motility and retarded development.	Dumont et al. 1979 [k]
quinoline		79; LC24 = 219; LC48 = 115; LC72 = 87	24 h = 71; 72 h = 36; 96 h = 29						Davis et al. 1981 [k]
retinoic acid			0.0056-0.0059 mg/L (tested alone)					Isoniazid: retinoic acid, hydroxyurea:retinoic acid, and 6-aminonicotinamide:retinoic acid = response-additive (TU> 1.0).	Dawson and Wilke 1991a
retinoic acid								In binary combination with valproic acid response addition occurred suggesting different modes of action for inducing malformation.	Dawson et al. 1992
retinoic acid								Strong tertatogenic potential.	DeYoung et al. 1991
retinoic acid		0.25 - 0.5	0.024 - 0.44	10.4 - 11.4	0.06 - 0.08			Results of 3 trials.	Rayburn et al. 1991b

Table 5 - FETAX Studies - 18

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
rifampicin		>0.2 mg/L	>0.2 mg/L					Unactivated rifampicin was not developmentally toxic at the limit of solubility in 1% DMSO. Bioactivation decreased the LC50 to 1400 mg/L. The EC50 for bioactivated rifampicin was 500 mg/L and the TI was 2.8.	Fort et al. 1989
saccharin		14.68 - 16.43	14.13 - 16.95	0.9 - 1.1	13.33 - 16.67				Bantle et al. 1994b
saccharin		17.94 - 21.09	18.2 - 20.71	0.95 - 1.02	12- 17				Dawson and Bantle 1987b
salicylaldehyde		10.8 mg/L mean	5.5 mg/L mean						Schultz and Dawson 1995
salicylic acid		1067 mg/L mean	476.4 mg/L mean						Schultz and Dawson 1995
semicarbazide hydrochloride			10.8 mg/L (tested alone)					At malformation inducing conc. levels: semicarbazide:isoniazid = Conc. additive, TU=1.0. For embryo lethal conc. levels: semicarbazide:isoniazid = response-addition (TU>1.0).	Dawson and Wilke 1991a
semicarbazide hydrochloride								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991
semicarbazide hydrochloride		1504 (1052-2313)	76.28 (23.20-125.8)	TI (P): 19.7				Dose dependent severity of bent and wavy notochords. Some edema seen in a few tadpoles. NAD+ reductions were dose dependent. (p= effect of abnormal pigmentation observed; g= effect of abnormal gut observed; n= abnormal notochord).	Snawder and Chambers 1989
serotonin								Moderately strong teratogenic potential.	DeYoung et al. 1991
sewage	10-50 µg/L	31.74 µg/L	10 µg/L	1.98				Sewage included Triton-16, an anionic detergent. Embryos showed axial abnormalities (6%) and 5% died. 10µg/L significantly reduced length.	Presutti et al. 1994
sodium butyrate			379.2 mg/L (tested alone)					Butyric acid:petanoic acid = conc. additive (TU=1.0).	Dawson and Wilke 1991a

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
sodium butyrate			4.29 mL * valproic acid					For mixtures of valproic acid:butyric acid (3:1, 1:1, 1:3) the LC50s were 4.38 mL*, 4.21 mL* and 4.29 mL*. Mixture TUs for the same ratios were 1.01, 0.96 and 0.98, respectively. *(Of a total volume of 10 ml at 113.1 mg/L).	Dawson and Wilke 1991b
sodium butyrate								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991
sodium cyclamate		12.16 - 17.33	12.17 - 14.91	1.0 - 1.3	10.00 - 17.00				Bantle et al. 1994b
sodium cyclamate		15,930-16,340	14480-15210	1.0-1.1	12,000				Dawson et al. 1989
sodium selenate								Moderately positive tertogenic potential.	DeYoung et al. 1991
soil								FETAX used to test a series of hazardous waste-site soil samples containing metals, PAHs and OPs. Samples collected from PAH and petroleum product-contained sites induced greater levels of embryolethal effects.	Fort et al. 1995a
solanidine								Solanidine had no effect.	Blankemeyer et al. 1992
ß-aminopropionitrile (ßAPN)			0.075 mg/L					In combination with BZH at conc. that induce malformation: conc. additive at all ratios (TU=1.0), this T.U occurred for all ratios (3:1, 1:1 and 1:3).	Dawson 1993
ß-aminopropionitrile (ßAPN)								In binary combination of the 1:1 ratio mixture with valproic acid response addition occurred suggesting different modes of action for inducing malformation. Slight antagonism was observed for the 3:1 and 1:3 ratios.	Dawson et al. 1992
ß-aminopropionitrile fumarate			4.17 mL*					The EC50s for ß-aminopropionitrile in ratios of 3:1, 1:1 and 1:3) with isoniazid were 4.16mL*, 4.23mL* and 4.06mL*. The TUs for the mixture at each ratio were 1.00, 1.01 and 0.97, respectively. Strictly additive. *Of a total exposure volume of 10 ml at 0.137 mg/L. Concentrations were corrected for fumarate.	Dawson and Wilke 1991b
ß-aminopropionitrile fumarate								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991

Table 5 - FETAX Studies - 20

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
tamoxifen	10-100 µg/L							Stage 60-66 embryo; no effect on tail resorption, > 100 µg/L resulted in mortality.	Fort and Stover 1997
tar		0.83 %	0.48 %						Dumont et al. 1983 [k]
theobromine	0.000075 mg/L							When coadministered with: hydroxyurea (-), cytosine (-), cyclohexamide (+), emetine (+), fluorouacil (+). (+) = increase in rate of malformation compared to chemical tested alone; (-) = no significant difference in rate of malformation.	Dawson and Bantle 1987a
theophylline	0.000075 mg/L							When coadministered with: hydroxyurea (+), cytosine arabinoside (+), cyclohexamide (+), emetine (+), Fluorouracil (+). (+) = increase in rate of malformation compared to chemical tested alone; (-) = no significant difference in rate of malformation.	Dawson and Bantle 1987a
toluene	500 mg/L	179-193 (test range)	173-217 (test range)	0.86-1.04 (test range)			mortality (180-200); malformation (146-182); growth (131-164)		Kononen and Gorski 1997
trichloroethylene		0.24, 0.29	0.0048, 0.0023	5, 12.6	NA, 0.02			More teratogenic than methylmercury chloride. Additive effects occurred with all solvents. EC25(96) and LC50(96) were 0.002% v/v and 0.035% v/v, respectively.	Rayburn et al. 1991a
trichloroethylene		decreased 1.8	decreased 3.8					Results indicated that a highly embyrotoxic epoxide intermediate, trichloroethylene oxide, formed as a result of the MFO mediated metabolism may play a significant role in the developmental toxicity of trichloroethylene in vitro.	Fort et al. 1993
trichloroethylene		increased 2.1 fold	increased 1.7 fold					Based on TI values, embryo growth and types and severity of induced malformations, TCE was developmentally toxic.	Fort et al. 1991

Table 5 - FETAX Studies - 21

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
triethylene glycol		2.19 - 2.75	2.0 - 2.4	1.07 - 1.2	1.7 - 1.8			Results from 3 trials.	Rayburn et al. 1991b
triethylene glycol	0, 1.7, 2.0% v/v					1.7% v/v		TG only increased the mortality and malformation with TCE. There were additive effects for growth for all solvents with the teratogens. EC25(96) = 2.0% v/v.	Rayburn et al. 1991a
tryptophan	40 mg/L with 5 mg/L malathion							Treatments of malathion with tryptophan added had NAD+ levels similar to or higher than levels of controls. Incidence and severity of defects was not reduced and length and mortality were unchanged. Protein content was not altered.	Snawder and Chambers 1990
urethane		5580-5710	1660-1800	3.1-3.4	1000-1500				Dawson et al. 1989
UV, methoprene	UV=190-310 nm							Methoprene is subject to hydrolytic degradation.	La Clair et al. 1998
UV-B	302 nm							Larvae (stage 32-34); pyrimidine dimer frequency increased, directly correlated to UV-B. (<10%-29% mortality).	Bruggeman et al. 1998
UV-B	365 nm							Egg (stage 8-11).	Bruggeman et al. 1998
valproic acid		924.8 mg/L	33.1 mg/L	27.9				Potent developmental toxicant. At embryolethal conc. all embryos were severely malformed, with craniofacial and axial skeleton defects.	Dawson et al. 1992
valproic acid salts			49.7 mg/L (tested alone)					Valproic acid:petanoic acid = conc. additive (TU = 1.0).	Dawson and Wilke 1991a
valproic acid salts			48.5 mg/L					For mixtures of valproic acid with butyric acid 96 h EC50 ranged from 12.1 - 37.1 mg/L.	Dawson and Wilke 1991b
valproic acid salts								Ratios of measured and calculated model parameters and median conc. ranged from 0.72 - 1.44 with an average of 0.99.	Shirazi and Dawson 1991
valproic acid salts	0.0-76.6 mg/L		43.0 (40.2-45.9)					EC50 in mixture:4.9 (4.6-5.3) TU in mixture for malformation: 0.114 (0.107-0.123).	Dawson 1991

Table 5 - FETAX Studies - 22

Contaminant [a]	Contaminant Concentration [b]	LC50 [b]	EC50 [b]	TI [d]	MCIG [d]	NOEL [d]	LOEL [d]	Effects/Notes [de]	Reference [k]
xylenes	100-200 mg/L	54-135 (test range)	ND-299 (test range)	ND-1.34 (test range)			mortality (61-141); malform (41-118); growth (47->118)		Kononen and Gorski 1997
Zn		25.35 - 28.65	2.65 - 2.83	9.57 - 10.12	1.75 - 2.0			Results also given for metal contaminated soils.	Fort et al. 1995b
Zn	1-3000 µmol/L	850 µmol/L	40 µmol/L	21	300 µmol/L			Shown to be a potent teratogen for XELA causing conc. related increases of eye, gut, facial, notochord, fin, and cardiac anomalies. Head to tail lengths were inversely correlated with Zn conc.	Luo et al. 1993a
ZnSO4		34.4 mg/L (inactive)	2.7 mg/L (inactive)	13.3 (inactive)				Activated tests resulted in an LC50 of 36.7 mg/L and an EC50 of 2.9 mg/L. The TI for activated tests was 12.7. Embryos exposed to ZnSO4 alone at conc. of >1.5 mg/L caused mild gut malformations & pericardial edema.	Fort et al. 1989
ZnSO4		7 day LC50 = 34.5	36						Dawson et al. 1988b [k]

Table 6: pH study data. (Studies that alter pH under laboratory or field conditions including the combined effects of pH and various contaminants)

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
ACCC	larvae	RESIDUE			Al					Al conc. were greater than that of other metals except for Fe, Mg and Mn. Al was higher in clay than in loam soils.	Sparling and Lowe 1996
ACCR	larvae	BEHAV	5.3-6.6							ACCR tadpole abundance was less in acidified macrocosms than in circumneutral ones and less in those with loam soils than in macrocosms with clay soils.	Sparling et al. 1995
ACGR	embryo	DEVOBS							4.1	Results not extracted from paper.	Gosner and Black 1957 [k]
AMJE	adult	PHYSIO	3.5, 4.0, 4.5							After 4 d of exposure adults demonstrated an apparent substrate selection. At the termination of the experiment (7d), none of the salamanders remained on the pH 3.5 substrate, 3 were on the pH 4.0 substrate and 7 were on the pH 4.5 substrate.	Horne and Dunson 1994
AMJE	adult	POPSUR	4.62							Not observed in ponds with mean pH < 4.62.	Freda and Dunson 1986 [k]
AMJE	egg	HATSUC	4.3, 5.3, 6.3, 7.0	10						At pH 4.3 100% of eggs died (n=200). At pH 5.3, 26% died (n=72), At pH 6.3, 15% died (n=68). At pH 7.0, 22% of eggs died (n=67).	Brodman 1993
AMJE	egg	HATSUC	4-8							Greatest hatching success at pH 5-6.	Pough and Wilson 1977 [k]
AMJE	embryo	HATSUC	4.0-5.8							10 % hatching at pH 4.75 - 5.8; 25% hatching at pH 4.5 and 0% < pH 4.5.	Freda and Dunson 1986 [k]
AMJE	embryo	MORT	ambient field pH	ambient field temp						At 14 d, mortality was not significantly different between sites. After 28 d of development, mortality was significantly lower in the control ponds than in the ponds lacking AMJE.	Horne and Dunson 1994
AMJE	embryo	POPSUR	4.0-5.75	10 &15				At 14 d: 4.4 (15°C), 4.55 (10°C)		At both 10°C and 15°C, pH had a significant effect on hatching success. Temperature and pH interacted to determine the hatching success of the embryos; low pH was more toxic at the lower temperature.	Horne and Dunson 1994
AMJE	embryo	DEVOBS	4.5-5.5		Al	130-800				Decreasing pH led to decreased hatching success and developmental processes and increased egg mass and larval mortality.	Horne and Dunson 1995
AMJE	embryo	HATSUC	4.5							Did not hatch below 4.5.	Freda and Dunson 1985 [k]

Table 6 - pH Studies - 2

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMJE	embryo	MORT	4.5					4.51 for hatching		Embryonic mortality high in ponds below pH 4.5 ; more larval AMJE survived pH 4.1 over 7 days when larval RASY and AMMA were available as prey than when no prey were available; larval AMJE did not metamorphose in pH 4.2 and survived in low numbers.	Sadinski and Dunson 1992
AMJE	embryo	DEVOBS	4.5-5.5		Cu	7-12				Increased egg mass mortality at both pH levels. Number of arrested embryos was significantly affected by pH.	Horne and Dunson 1995
AMJE	embryo	DEVOBS	4.5-5.5		Pb	8-86				Larval mortality not affected by Pb or pH.	Horne and Dunson 1995
AMJE	embryo	DEVOBS	4.5-5.5		Zn	30-101				Low pH and high Zn resulted in high hatching success; pH and Zn did not increase egg mass mortality.	Horne and Dunson 1995
AMJE	embryo	POPSUR	4.25							Mortality of embryos increased as pH decreased.	Freda and Dunson 1986 [k]
AMJE	embryo	MORT	4.07-5.62							No significant correlation between pond pH and % embryonic mortality.	Cook 1983 [k]
AMJE	embryo	DEVOBS	4.5-5.5		Pb	8-86				Pb: No effect on egg mass mortality or hatching success, hatching success greater at higher pH.	Horne and Dunson 1995
AMJE	embryo	HATSUC	4.0-5.0							pH 5.0: 95 - 100 % hatched; 0 - 40 % hatched at pH 4.0; 5% killed early at pH 4.5 and 5.0 whereas 100 % killed early at pH 4.0.	Freda and Dunson 1985 [k]
AMJE	embryo	DEVOBS	4.5-5.5		Fe	10-40				Significant effect of pH on % hatching success; Fe increased egg mass mortality at low pH.	Horne and Dunson 1995
AMJE	embryo-larval	MORT								The field survey revealed that Al, SO_4, H^+ and Zn were significantly higher in 40 ponds lacking successful breeding of AMJE whereas alkalinity, Cu, DOC, K, Mg, Na, and NO_3 were significantly higher in 10 ponds that supported successful breeding.	Horne and Dunson 1994
AMJE	larvae	PHYSIO	2.5-4.0							Acute exposure depressed Na influx and markedly accelerated Na efflux - resulting in net loss of 50 % body Na (fatal). Chronic exposure caused 21 - 62 % reduction in body Na level, K content did not change.	Freda and Dunson 1985 [k]
AMJE	larvae	MORT	5.4, 4.5, 4.1							As a result of increased mortality among AMJE over 7 d, 38% more RASY survived at pH 4.1 than at pH 5.4.	Sadinski and Dunson 1989

Table 6 - pH Studies - 3

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMJE	larvae	DEVOBS	4.5 and 5.5	ambient outdoor	Cu	0.015	mg/L			Copper was extremely toxic to both species during both acute and chronic exposures. Acute survival of AMJE was significantly higher at the low pH level (46 vs 0%).	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5-5.5		Cu	7-12				Cu resulted in severe toxic effects on early stage larvae, and increased Cu conc. lead to increased larval mortality.	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5-5.5		Al	130-800				Decreased pH lead to increased larval mortality.	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5 and 5.5	ambient outdoor			mg/L			In the treatment combinations with no metals present, acute survival of AMJE was significantly higher in the high pH treatments (100 vs 88%). AMJE chronic survival was significantly higher in the high pH treatments (96 vs 50%).	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5-5.5		Zn	30-101				Increased Zn had a toxic effect on early stage larvae at low pH.	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5-5.5		Fe	10-40				Increasing Fe conc. had severe toxic effect on early stage larvae at pH 4.5 but not at higher pH.	Horne and Dunson 1995
AMJE	larvae	POPSUR	4.5-5.5	15-20	Al	100-300	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMJE	larvae	POPSUR	4.5-5.5	15-20	Cu	6-9	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMJE	larvae	POPSUR	4.5-5.5	15-20	Fe	250-350	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMJE	larvae	POPSUR	4.5-5.5	15-20	Pb	2-5	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMJE	larvae	POPSUR	4.5-5.5	15-20	Zn	25-41	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMJE	larvae	BEHAV	4.3, 5.3, 6.3, 7.0	10						Larvae behave more sluggishly at pH 5.3, reducing competition with AMMA and potentially increasing survival of AMJE, (predation of AMJE on AMMA increased) Survivorship and larval period did not differ between treatments.	Brodman 1993

Table 6 - pH Studies - 4

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMJE	larvae	DEVOBS	4.5 and 5.5	ambient outdoor	Al, Cu, Pb, Fe, Zn		mg/L			The all-metals mixture treatment induced significantly higher mortality for both species during acute and chronic exposure. Acute exposure AMJE survival was significantly higher in the high water hardness treatments (63 vs 25%).	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5 and 5.5	outdoor ambient	Al	0.525	mg/L			The presence of Al significantly reduced survival during both acute and chronic exposure. There were no ameliorative effects of pH or hardness on acute exposure AMJE survival.	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5 and 5.5	ambient outdoor	Fe	0.02	mg/L			There were no significant negative effects of iron, lead and zinc on RASY or AMJE during acute or chronic exposure. Likewise, there were no significant effects of iron, lead or zinc on RASY or AMJE wet mass.	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5 and 5.5	ambient outdoor	Pb	0.01	mg/L			There were no significant negative effects of iron, lead and zinc on RASY or AMJE during acute or chronic exposure. Likewise, there were no significant effects of iron, lead or zinc on RASY or AMJE wet mass.	Horne and Dunson 1995
AMJE	larvae	DEVOBS	4.5 and 5.5	ambient outdoor	Zn	0.115	mg/L			There were no significant negative effects of iron, lead and zinc on RASY or AMJE during acute or chronic exposure. Likewise, there were no significant effects of iron, lead or zinc on RASY or AMJE wet mass.	Horne and Dunson 1995
AMJE	larvae	MORT	4.2 and >4.7		Al	10-30 (pH= 4.2), 5-15 (pH>4.7)	µM			Total dissolved Al was higher in acidified enclosure compared to controls (pH >4.7). Greater mortality occurred at pH 4.2 than at pH >4.7. Significant effect of pond on survival also occurred. Mean wet masses of survivors was not influenced by pH.	Rowe et al. 1992
AMJE	larvae - metamorph	DEVOBS	4.2 and >6.0		Al	16 (pH= 4.2), 0.1 (pH>6.0)	µM			100% mortality at pH 4.2. 8% survival at pH >6.0.	Rowe et al. 1992
AMJE	terrestrial metamorph	PHYSIO	3.5, 4.0, 4.5, 5.0							After 7 d there was no significant changes in body water or NA, Ca, Mg, K levels. Exposure to the most acidic conditions for 14 d induced significant water loss and whole body Na loss. Body water loss was 20% at pH 3.5, compared to only 3% at pH 5.0.	Horne and Dunson 1994

Table 6 - pH Studies - 5

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMJE	terrestrial metamorph	PHYSIO	3.5, 4.0, 4.5, 5.0	ambient field						Low pH exacerbated body water loss in AMJE metamorphs. Dry mass after the experiment did not differ between treatments. Salamanders in pH 3.5 lost approx. 32% initial wet body mass. Those at pH 5.0 lost only 2%.	Horne and Dunson 1994
AMJE	terrestrial metamorph	PHYSIO	3.5, 4.0, 4.5							Metamorphs demonstrated a choice of substrate based on pH. For a period of 24 h after they were placed in test containers there was a wide variation in response (no consistent "choice").	Horne and Dunson 1994
AMLA	embryo	HATSUC	4.1-4.3	15						0% successful hatch, 59.1% curl for embryos treated with acidic bog water. 97.3% successful hatch, 0% curl occurred for embryos treated with control artificial soft water (pH 7.5).	Karns 1992
AMLA	embryo	HATSUC	4.2 bog, 7.5 fen							No eggs hatched at pH 4.2; 59.1 % embryo developed but did not hatch; 97.3 % hatched at pH 7.5.	Karns 1984 [k]
AMLA	larvae	MORT	4.2							0% survival at pH 4.2 (bog water), 100% survival at pH 7.5 (artificial soft water).	Karns 1992
AMLA	larvae	BEHAV	4.0-6.5							Swimming activity increased linearly with pH between pH 4.0 and 6.5; activity was significantly lower at pH 5.0 and near inactivity occurred at pH 4.0. Stronger linear relationship than AMMA.	Kutka 1994
AMMA	adult	POPSUR	3.9-6.3							AMMA presence affected by soil pH.	Wyman 1988
AMMA	adult	POPSUR	4.1-6.3							Sensitive to acidic conditions.	Dale et al. 1985
AMMA	adult	BEHAV	5.5, 7.7							Substrate selection: 60 % selected pH 7.7.	Mushinsky and Brodie 1975 [k]
AMMA	adult	POPSUR	4.1							Successfully breeding at pH 4.1.	Dale et al. 1985
AMMA	all	POPSUR	4.3-7.3		Al, Zn					Amphibians were present in all 118 potential breeding sites. There were only two observations of AMMA.	Glooschenko et al. 1992
AMMA	egg	MORT	4.0-6.0							> 50 % of eggs removed from acidic ponds (< pH 6.0) survived pH 4.3 - 4.7 but no larvae tolerated exposure to pH < 4.0.	Blem and Blem 1989
AMMA	egg	HATSUC	4.6 - 6.9							0 % hatching success at 4.6 ; 77.1 % at pH 6.9.	Nielsen et al. 1977 [k]

Table 6 - pH Studies - 6

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMMA	egg	DEVOBS	4.5-7.0							43.7 % mortality of embryos at pH 5.5; 65 % at each pH 5.0 and 4.5. Eggs from ponds with pH 4.5 and 5.0 failed to retract yolk plug; eggs in pH 5.5 developed chest swellings and stunted gills after gastrulation.	Tome and Pough 1982 [k]
AMMA	egg	POPSUR								71 of 218 ponds sampled contained egg masses, incidence of egg laying in those ponds declined by 23.9% from 1988-1990. pH in successful breeding ponds was significantly higher than failed ponds (5.3 - 5.64 vs. 5.12 - 5.32).	Blem and Blem 1991
AMMA	egg	HATSUC	4.15-6.15							88% hatching success at pH 6.15; 80 % at pH 4.51.	Clark 1986 [k]
AMMA	egg	HATSUC	4.3, 5.3, 6.3, 7.0	10						At pH 4.3, 100% of eggs died (n=200). At pH 5.3, 40% of eggs died (n=140), At pH 6.3, 18% of eggs died (n=131), At pH 7.0 18% of eggs died (n=149).	Brodman 1993
AMMA	egg	MORT	3.66-5.18							Egg mass abundance and survival of embryos not correlated with pond pH. Survival of eggs transferred among ponds of pH 3.66 - 5.18 reduced only at pH 3.66.	Albers and Prouty 1987 [k]
AMMA	egg	HATSUC	6 - 10							Greatest hatching success at pH 7 - 9.	Pough and Wilson 1977 [k]
AMMA	egg	HATSUC			Al					Hatching success was negatively correlated with Al and DOC and positively correlated with pH.	Clark and Hall 1985
AMMA	egg	PHYSIO	4.0-6.0							Initial pervitelline fluid pH decreased significantly 7 to 96 h after initial immersion in eggs in water. Rate of H^+ flux into the fluid is greater in eggs in pH 4 than those in pH 5 or 6.	Robb and Toews 1987 [k]
AMMA	egg	MORT	4.5-7.0	8-23						Mortality low during early embryonic development. Abnormalities observed at low pH.	Pough 1976 [k]
AMMA	embryo	HATSUC	3.5-7.0	12, 21						0-1% hatched at pH 3.5 - 4.0 at 12 and 21°C. Greatest hatching success (40-81 % hatched) at 21°C and pH 6.0. At low temperature egg masses at < pH 3.5 turned milky-opaque within 2 h of exposure; at pH 4.5 embryos tightly coiled, those that hatched were deformed.	Dale et al. 1985 [k]

Table 6 - pH Studies - 7

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMMA	embryo	HATSUC								At pH 4.3-4.5, gross abnormalities and then 100% mortality occurred. pH 4.6-5.5, >80% survival occurred in 8 out of 12 ponds.	Portnoy 1990
AMMA	embryo	HATSUC	4.1-6.0	17±3	Al	0.2	mg/L			Hatching success of AMMA also varied among clutches, but in general, hatching success was lower at pH 4.3 than at pH 6.0. The concentration of 0.2 mg Al/L at pH 4.3 increased hatching success compared with when no Al was present.	Clark and LaZerte 1987
AMMA	embryo	MORT						4.31 for hatching		Less pH associated embryonic mortality observed among more tolerant AMMA; AMMA survival not different between pH 4.1 and > 6.0 as they were eaten by AMJE at pH > 6.0 and suffered pH induced mortality at pH 4.1 ; AMMA metamorphosed less often.	Sadinski and Dunson 1992
AMMA	embryo	MORT	4.17-6.19		Al	0.016-0.985	mg/L (total Al)			Mortality correlated only with pH. In two low-pH ponds, high conc. of dissolved organic compounds might have been a toxic component. Generally, decreases in mortality occurred with pH below 5.0 (exceptions did occur).	Freda and McDonald 1993
AMMA	embryo	MORT	4.07-5.62							No significant correlation between pond pH and % mortality.	Cook 1983 [k]
AMMA	embryo	MORT	4.0-6.0		Al	75	µg/L (nominal conc.)	TS: 4.3 (SE=0.08) PTS: 4.32 (SE=0.12).		No significant effect. Critical pH: 4.5 (post-treatment survival), 4.5 (total length).	Bradford et al. 1994
AMMA	embryo	HATSUC	4.3-4.8		Al	34-46				pH 4.8 and 37 µg/L was toxic to eggs of AMMA.	Clark and Hall 1985
AMMA	embryo (late blastula)	HATSUC	4.5-6.0	21	Al	0.7 - 1.1 ppm				Results not extracted from paper.	Dale et al. 1985 [k]
AMMA	larvae	MORT	4.97 - 5.30							46 % survival in pH 4.97; 64 % survival at pH 5.3.	Clark 1986 [k]
AMMA	larvae	BEHAV	4.0-7.0							Acidity had a significant effect on number of lunges at prey and capture success. Larvae raised at pH 4 made fewer lunges towards prey and caught fewer prey per lunge than did larvae raised at pH 4.5, 6.0, 7.0.	Preest 1992
AMMA	larvae	MORT	5.4, 4.5, 4.1							As a result of increased mortality among AMJE over 7 d, 38% more RASY survived at pH 4.1 than at pH 5.4.	Sadinski and Dunson 1989

Table 6 - pH Studies - 8

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMMA	larvae	DEVOBS								Decreases in growth rates of larvae occurred in the presence of sulfate test solutions. Acetic acid and pH 4.5 resulted in differences in growth rates.	Ireland 1991
AMMA	larvae	POPSUR	4.5-5.5	15-20	Al	100-300	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMMA	larvae	POPSUR	4.5-5.5	15-20	Cu	6-9	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMMA	larvae	POPSUR	4.5-5.5	15-20	Fe	250-350	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMMA	larvae	POPSUR	4.5-5.5	15-20	Pb	2-5	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMMA	larvae	POPSUR	4.5-5.5	15-20	Zn	25-41	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
AMMA	larvae	BEHAV	4, 4.5, 6 and 7	20						Larvae raised in higher pH water grew and developed more rapidly than did larvae in lower pH. Larvae raised in higher-pH responded to prey more often and were more successful in capturing prey than were larvae raised in lower pH water.	Preest 1993
AMMA	larvae	MORT	3, 4, 5							pH 3 = 100 % mortality within 12 h ; pH 4 and 5 significantly slower rate of development and growth than those reared at pH > 5.	Ling et al. 1986 [k]
AMMA	larvae	DEVOBS	4.5-6.5							pH alone does not affect growth of larvae, however, in combination with anions, effects occurred.	Ireland 1991
AMMA	larvae	MORT	4.9-5.8		Al	75	µg/L (nominal conc.)	TS: 4.33 (SD=0.04) post-treatment survival: 4.33 (SD=0.04).		Significant reduction in total length at pH 5.3. More sensitive than the embryo stage to low pH.	Bradford et al. 1994

Table 6 - pH Studies - 9

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMMA	larvae	MORT	4.2 and >4.7		Al	10- 30 (pH= 4.2), 5-15 (pH>4.7)	µM			Total dissolved Al was higher in acidified enclosure compared to controls (pH >4.7). Survival was unaffected by pH. Mean wet mass of survivors was not influenced by pH.	Rowe et al. 1992
AMMA	larvae	BEHAV	4.0-6.5	15						Weaker relationship between activity and pH and showed less overall activity than AMLA. Significant difference between treatments over 180 min was observed: lower activity at pH < 5.0. No differences between noon and evening observations.	Kutka 1994
AMMA	larvae - metamorph	DEVOBS	4.2 and >6.0		Al	16 (pH= 4.2), 0.1 (pH>6.0)	µM			Survival was not associated with pH but was low at both pH levels. Survival did not differ between egg mass color morphs. Between the two pH levels there was no difference in time to metamorphosis and no difference in wet mass at metamorphosis.	Rowe et al. 1992
AMMA	larvae (newly hatched)	PHYSIO	3.0-6.0							100 % mortality at pH 3.0 occurred at 1.25 h exposure; 75 % mortality at pH 3.5 at 2.5 h.	Robb and Toews 1987 [k]
AMOP	adult	BEHAV	5.5, 7.7							Substrate selection: 62.5 % selected pH 7.7.	Mushinsky and Brodie 1975 [k]
AMOP	embryo	HATSUC	6-7							Hatching most rapid between pH 6 and 7.	Petranka et al. 1982 [k]
AMTE	egg	HATSUC								Results not extracted from paper.	Pierce and Wooten 1992
AMTE	embryo	HATSUC	4.0-11.0	5-30						Highest survival rate at 15°C and pH 6-8 (>90 %). No survival at 5 or 30 °C at all pH levels.	Punzo 1983 [k]
AMTI	adult	POPSUR						5.6		Adult AMTI population declined 65 % over seven years, while larval recruitment declined over all but the last year of this period.	Harte and Hoffman 1989
AMTI	adult	BEHAV	3.0-4.1 and 6.75-7.5							Males were more likely to leave acidic pools, which may have been population specific.	Whitemann et al. 1995
AMTI	adult	BEHAV	4.5-7.0							Survival at pH 4.5 was significantly lower; in all pH exposures, AMTI growth and ability to capture were significantly reduced.	Kiesecker and Clarke 1991
AMTI	egg	POPSUR	4.0-6.0							Populations not declining, close to 100 % of areas occupied.	Corn et al. 1989
AMTI	embryo	BEHAV								Breeding habitats in the Rocky Mountains do not appear to be sufficiently acidic to kill embryos.	Corn and Vertucci 1992

Table 6 - pH Studies - 10

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
AMTI	embryo	BEHAV	3.0-4.1 and 6.75-7.5							Survival decreased as pH decreased. 70% survived at pH of 4.5 and above. 50% mortality occurred at 4.2 pH.	Whitemann et al. 1995
AMTI	embryo-adult	POPSUR	5.8	2.0-3.5						Larval recruitment fluctuated yearly, but no evidence of embryo or larvae survival was affected by pH. In 1990-91, high embryonic survival that did not differ between high and low acid neutralizing capacity ponds.	Wissinger and Whiteman 1992
AMTI	larvae	POPSUR	4.5-7.0	15						Results not extracted from paper.	Kiesecker 1996
AMTI	larvae	PHYSIO	3.5-7.0							Blood analyses at 3.5 - 5.0 pH indicated ability to maintain relatively stable arterial pH, however at pH 3.5 the blood pH diminished over 12 h period before death; greater stability of arterial pH at higher external pH.	DeRuyter and Stiffler 1988
BAAT	adult	BEHAV	5.5, 7.7							Substrate selection: 53.3 % selected pH 5.5.	Mushinsky and Brodie 1975 [k]
BUAM	adult	POPSUR	4.3-7.3		Al, Zn					Amphibians were present in all 118 potential breeding sites. The species also showed negative correlation with Ni.	Glooschenko et al. 1992
BUAM	adult	POPSUR	4.44-6.63							Did not occur in ponds with pH > 5.0.	Clark 1986 [k]
BUAM	adult	POPSUR	4.1-6.3							Sensitive to low pH.	Dale et al. 1985
BUAM	egg	HATSUC			Al					Hatching success was negatively correlated with Al and DOC and positively correlated with pH.	Clark and Hall 1985
BUAM	eggs	HATSUC	4.14-4.75		Al	0-200				Results not extracted from paper.	Clark and LaZerte 1985 [k]
BUAM	embryo	HATSUC	4.1-4.3	15						0% successful hatch, 21.02% curl for embryos treated with acidic bog water. 93% successful hatch, 0.2% curl occurred for embryos treated with control artificial soft water (pH 7.5).	Karns 1992
BUAM	embryo	BEHAV	< 3.8-5.0		Al	114-834				High levels of inorganic monomeric Al combined with low pH may inhibit hatching success in almost 20 % of the ponds surveyed; hatching success may also be reduced by high levels of iron, manganese and dissolved organic carbon in breeding ponds.	Glooschenko et al. 1986
BUAM	embryo	HATSUC	4.3-4.8		Al	34-46				Higher conc. of Al resulted in greater toxicity to BUAM, and BUAM was more sensitive to low pH than RASY.	Clark and Hall 1985

Table 6 - pH Studies - 11

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
BUAM	embryo	MORT	4.15-6.23		Al	0.031-1.155	mg/L (total Al)			Mortality correlated only with pH. In two low-pH ponds, high conc. of dissolved organic compounds might have been a toxic component. Generally, decreases in mortality occurred with pH below 5.0 (exceptions did occur).	Freda and McDonald 1993
BUAM	embryo	HATSUC	3.0-5.5	22.5						Mortality reached 100 % at pH 3.0 and 3.5 within 24 h; embryos died at stages 8-11; overall hatching success was lower for embryos exposed to pH 4.0 treatments than for all other treatments > pH 4.0 regardless of exposure time.	Leftwich and Lilly 1992
BUAM	embryo	HATSUC	4.2 bog, 7.5 fen							No eggs hatched at pH 4.2; 14.6 % developed but did not hatch; 93 % hatched at pH 7.5.	Karns 1984 [k]
BUAM	embryo	HATSUC	4.1-6.0	17±3	Al	0.2	mg/L			There was significant variation among clutches, but in general, BUAM hatching success was reduced at pH 4.1 compared with pH 6.0. At pH 4.1, 0.2 mg Al/L caused even greater embryonic mortality. Al toxicity did not vary among clutches.	Clark and LaZerte 1987
BUAM	embryo	HATSUC	4.2, 4.4, 4.6, 4.8, 6.0		Al	0, 0.25, 0.5, 0.75, 1.0	mg/L			With no Al added, pH had little effect on mortality of RASY embryos over the range of 4.2-4.8. However, at pH 6 (0 mg Al/L) control mortality (37±6%) was significantly higher than at the lower pH's. This occurred due to fungal growth.	Freda and McDonald 1993
BUAM	embryo (early gastrula)	HATSUC	4.0-6.0	21	Al					Results not extracted from paper.	Dale et al. 1985 [k]
BUAM	embryo (early gastrula)	HATSUC	3.8-6.0	21						100 % hatched at pH 4.3 - 6.0. 0 % hatched at pH 3.8.	Dale et al. 1985 [k]
BUAM	tadpoles	MORT	4.14-5.75		Al	0-200				Results not extracted from paper.	Clark and LaZerte 1985 [k]
BUAM	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996
BUAM	tadpoles	MORT	4.2							0% survival at pH 4.2 (bog water), 100% survival at pH 7.5 (artificial soft water).	Karns 1992

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
BUAM	tadpoles	MORT	4.5	20	Al	0-1.0	mg/L	0.627 mg/L total Al (96 h)		Increasing Luther pond water from 5 to 20% significantly reduced Al toxicity such that the LC50 for total Al increased to above 2.0 mg/L. Labile Al conc. were not good predictors of mortality. Luther pond water was not toxic to tadpoles at pH 4.	Freda et al. 1990
BUAM	tadpoles	MORT	4.15-6.20		Al	0.106-1.155	mg/L (total Al)			Percent mortality was significantly different among ponds. Mortality was correlated with pH but not with total or labile Al. Other ions were not correlated with mortality either.	Freda and McDonald 1993
BUAM	tadpoles	BEHAV	4.0, 4.5	20-22				3.99 (96 h); N=30/treat-ment		Significant difference in activity during experimental period at pH 4.0 (compared to control period); when tadpoles entered the acidified octants they would exhibit burst swimming similar to escape behaviour.	Freda and Taylor 1992
BUBO	adult	pH								A survey in Greater Yellowstone ecosystem found that water samples from sites where Western Toads successfully reproduced had higher pH values.	Peterson et al. 1993
BUBO	adult	POPSUR								No evidence that amphibian embryos are present during snow melt and episodic acidification; population decline not likely due to acidification.	Vertucci and Corn 1996
BUBO	egg	POPSUR	4.0-6.0							Low percentage of occupied sites, populations declining severely.	Corn et al. 1989
BUBO	embryo	BEHAV								Breeding habitats in the Rocky Mountains do not appear to be sufficiently acidic to kill embryos.	Corn and Vertucci 1992
BUBO	larvae	DEVOBS	3.1-4.0							100 % mortality at pH 3.1; all metamorphosed at pH 4.0.	Porter and Hakanson 1976 [k]
BUBU	adult	POPSUR	4.0-5.0							84.4 % of systems at pH 5.0 contained BUBU with only 11.8 % systems containing BUBU at pH 4.0.	Leuven et al. 1986 [k]
BUBU	adult	POPSUR								Population increased in acidified lakes.	Hagstrom 1981 [k]
BUBU	egg	POPSUR	4.0-5.0							In acidic waters, egg masses became heavily infested with fungi.	Leuven et al. 1986 [k]
BUBU	egg	DEVOBS	4.0-5.0							Most hatchlings at pH 4.0 were formed at pH 4.5 and 5.0 few deformities were noted.	Leuven et al. 1986 [k]
BUBU	larvae (stage 29-33)	DEVOBS	4.0-5.0		Al	185 µmol/L				In pH medium: 23.8 % mortality at pH 4.0, no mortality at 4.5 or 5.0. In Al medium: 14.3 % mortality at pH 4.0 increasing to 47.6 % mortality at pH 5.0.	Leuven et al. 1986 [k]

Table 6 - pH Studies - 13

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
BUBU	not specified	POPSUR	4.0-8.0							Survey of amphibian breeding sites.	Beebee 1983 [k]
BUBU	tadpoles	POPSUR	4.0-5.0							No tadpoles found in pH > 5.0.	Leuven et al. 1986 [k]
BUBU	tadpoles (30-35 mm)	MORT	2.0-4.2	18						Survival time 55 min at pH 2.0; no apparent effects in 3 d at pH 4.2.	Jones 1939 [k]
BUCA	adult	POPSUR	3.8-6.5							Bred only in eutrophic ponds (pH 5.0 - 6.5), as did 4 other unidentified amphibian species.	Beebee 1987 [k]
BUCA	adult	POPSUR	4.0-5.0							No animals present in pH 4.0 waters and only 13.3 % of systems at pH 5.0 contained BCAL.	Leuven et al. 1986 [k]
BUCA	egg	POPSUR	4.0-5.0							In acidic waters, egg masses became heavily infested with fungi.	Leuven et al. 1986 [k]
BUCA	egg	MORT	3.5-7.0						4.0	Spawn more vulnerable than tadpoles to low pH; 100 % mortality below pH 4.0 critical range between 4.0 - 4.5; more than 24 h for mortality to occur at pH 3.5; healthy spawn is less vulnerable to acid damage than spawn containing large numbers of dead eggs.	Beebee 1986
BUCA	embryo	HATSUC	4-6		Al	75				Results not extracted from paper.	Bradford et al. 1991
BUCA	embryo	DEVOBS	<4.0-6.0							Hatch rates, larval growth rates and survival to metamorphosis were all substantially and progressively reduced at pHs below 6.0. 0% survival at pH<4.0.	Beebee et al. 1990
BUCA	embryo	HATSUC	4-6		Al	75				Reduced survivorship at pH 5-6 with aluminum.	Bradford et al. 1991
BUCA	not specified	POPSUR	4.0-8.0							Survey of amphibian breeding sites.	Beebee 1983 [k]
BUCA	tadpoles	BEHAV	> 5.0							Avoided acid heathland ponds (< 5.0). No tadpoles survived to metamorphosis below pH 4.75 and success was minimal below pH 6.0.	Beebe and Griffin 1977 [k]
BUCA	tadpoles	HATSUC	4-6		Al	75				Increases of aluminum resulted in developmental abnormalities.	Bradford et al. 1991
BUCA	tadpoles	MORT	3.5-7.0							Small tadpoles and eggs more vulnerable than later tadpoles to low pH; growth of tadpoles was inhibited by pH between 4.0 - 6.0.	Beebee 1986
BUCN	adult	PHYSIO								Pyruvate and lactate conc. were higher than apparent Km values of heart enzyme. At physiological conc. of substrate, pyruvate reductase activity was more affected by temperature increase when pH decreases.	Mendiola and de Costa 1991

Table 6 - pH Studies - 14

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
BUCN	adult	POPSUR								Species has disappeared; cause of population decline is not due to acidification and is unknown.	Bradford et al. 1994
BUCN	embryo	MORT	4.0-6.0	15	Al	0 or 0.039-0.080	mg/L	4.7		The estimated extreme pH for Sierra Nevada surface waters (5.0) did not cause a significant reduction in survival for either life stage or species. Sublethal effects were evident as earlier hatching at pH 5.0.	Bradford et al. 1992
BUCN	tadpoles	MORT	4.0-6.0	15	Al	0 or 0.039-0.080	mg/L	4.3		The estimated extreme pH for Sierra Nevada surface waters (5.0) did not cause a significant reduction in survival for either life stage or species. Experimental exposure to Al did not affect survival; some sublethal effects reported.	Bradford et al. 1992
BUVA	tadpoles	DEVOBS	4.0, 7.2-7.6	25-30						Significant difference in wet wt; controls exhibited twice the growth rate (86% suppression in growth rate of pH 4.0 exposed tadpoles). Significant differences in dry wts between controls and pH 4.0 exposed tadpoles. No significant differences were observed.	Pierce and Montgomery 1989
BUWO	adult	POPSUR	4.25							Not observed in ponds with pH > 4.25.	Freda and Dunson 1986 [k]
BUWO	embryo	HATSUC	3.75-5.8							45 % hatching at pH 4.10; 0 % hatching at pH 3.75 - 4.0; 100 % hatching at pH 4.25 and 5.8 in softened water.	Freda and Dunson 1986 [k]
BUWO	tadpoles	DEVOBS	4.0-6.0	25-30						Significant difference in wet wt; controls exhibited twice the growth rate No significant differences were observed 7 d after exposure period.	Pierce and Montgomery 1989
BUXX	embryo	MORT	3.6-4.0	14.4-19						83.3 % mortality.	Saber and Dunson 1978 [k]
CACA	embryo	MORT	3.5-6.5							At higher acidity developmental abnormalities, delayed development and mortality was observed. Frequent abnormalities included microcephaly, edema, spinal deformities, curling effect and integument injury. Levels of pH lower than 4.0 were lethal.	Hermosilla and Pincheira 1992
DEFA	adult	BEHAV	5.5, 7.7							Substrate selection: 56.8 % selected pH 7.7.	Mushinsky and Brodie 1975 [k]
DEFU	adult	PHYSIO	3.0-6.0							Animals exposed to low pH exhibited elevated Na efflux rate constants.	Frisbie and Wyman 1991

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
DEFU	adult	POPSUR								Bimodal distribution with one mode representing animals found in the forest interior (low pH) and the second mode representing animals near streams and wet areas. Distribution suggested avoidance of acidic conditions.	Wyman and Jancola 1992
DEFU	adult	POPSUR	3.9-6.3							DEFU presence affected by soil pH.	Wyman 1988
DEFU	adult	BEHAV	5.5, 7.7							Substrate selection: 72.5 % selected pH 7.7.	Mushinsky and Brodie 1975 k
DEFU	larvae-premetamorph	POPSUR								Hatchling Desmognathine larvae and pre-metamorphic larvae were found in 16 of 78 low order streams from coal surface mine impacted areas of the Cumberland Plateau, Kentucky, Tennessee and Alabama. Although larvae were found to be surviving in a wide range of conditions.	Gore 1983
DEMO	adult	BEHAV	3.5-7.2							100 % survival after 3 weeks; significant inhibition of feeding at 3.5 - 5.0 pH when compared to 7.0 pH.	Roudebush 1988
DEQU	adult	BEHAV	3.5-7.2							100 % survival after 3 weeks at 3.5 - 7.2 pH; at pH 3.5 - 5.0 significant inhibition of feeding when compared to 7.2 pH.	Roudebush 1988
ELOB	adult	PHYSIO	7.0		pyruvate	0.03-0.50 mM				Greater LDH activity in snake than turtle (PSSC); higher V max and lower Km suggesting faster conversion of pyruvate to lactate when the enzyme is saturated with substance.	Baeyens and Hurley 1986
EUBI	adult	PHYSIO	3.0-6.0							Animals exposed to low pH in the laboratory exhibited elevated Na efflux rate constants.	Frisbie and Wyman 1991
EUBI	adult	POPSUR	3.9-6.3							EUBI presence affected by soil pH.	Wyman 1988
EUBI	adult	POPSUR								Found only on soils of higher pH. Field distribution suggests avoidance of acidic conditions.	Wyman and Jancola 1992
EULO	adult	BEHAV	5.5, 7.7							Substrate selection: no preference, 50 % on each of pH 5.5 and 7.7 substrates.	Mushinsky and Brodie 1975 k
EULU	adult	BEHAV	5.5, 7.7							Substrate selection: 67.1 % selected pH 7.7.	Mushinsky and Brodie 1975 k
EUQU	adult	BEHAV	5.5, 7.7							Substrate selection: 53 % selected pH 7.7.	Mushinsky and Brodie 1975 k
HYAN	adult	POPSUR								Presence unrelated to pond pH < 4.62.	Freda and Dunson 1986 [k]

Table 6 - pH Studies - 16

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
HYAN	embryo	HATSUC	3.75-5.8							In acidic bog water: 20 % hatching at pH 3.75; 85 % hatching at pH 4.0 and 93 % hatching at pH 4.10.	Freda and Dunson 1986 [k]
HYAN	embryo	DEVOBS								pH 3.8 = 50 % or more developed normally.	Gosner and Black 1957 [k]
HYAN	tadpoles	DEVOBS	3.9-6.25							Reduced pH had no direct effect on either HYAN or less acid tolerant competitor species RASP or HYVE.	Pehek 1995
HYCI	tadpoles	BEHAV	4.5, 5.5, 7.0	25.1-26.3	Al	150, 250, 400				96 h LC50 for Al at pH 4.5: 277 µg/L. Mortality increased with increased Al concentration at pH 4.5 but not at 5.5. Tadpoles exposed to pH 4.5 and Al exhibited bent stubby tails, gut edema, and curved bodies.	Jung and Jagoe 1995
HYCI	tadpoles	BEHAV	4.5, 5.5, 7.0	25-26	Al	150				Tadpoles exposed to Al were smaller and exhibited deformities and reduced swimming speeds. Dragonfly larvae consumed a similar amount of tadpoles biomass among treatments and thus more of the smaller Al exposed tadpoles.	Jung and Jagoe 1995
HYFE	embryo	HATSUC	3.46-8.69							50% hatching success observed at pH=3.35.	Warner 1994
HYFE	tadpoles	DEVOBS								Density of HYGR was found to have the greatest effect on both species tested, pH and density of HYFE also had significant effects. Low pH caused decreased survival of HYGR, but increased that of HYFE.	Warner et al. 1991
HYFE	tadpoles	DEVOBS	4.3-6.0							Higher density decreased survival, increased larval period and decreased size at metamorphosis; pH: lower survivorship at low pH than HYGR and decreased size at metamorphosis; in general less affected by pH variation than HYGR.	Warner et al. 1991
HYGR	tadpoles	DEVOBS								Density of HYGR was found to have the greatest effect on both species tested, pH and density of HYFE also had significant effects. Low pH caused decreased survival of HYGR, but increased that of HYFE.	Warner et al. 1991
HYGR	tadpoles	DEVOBS	4.3-6.0							Higher density increased larval period and decreased size; lower pH decreased survival rate and also decreased size at metamorphosis; lower pH increased susceptibility of tadpoles to adverse effects of higher densities.	Warner et al. 1991

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
HYRE	adult	POPSUR								Some population decline and no correlation was found between pH and presence or absence of species.	Bradford et al. 1994
HYRE	embryo	MORT	4.9-5.8		Al	75	µg/L (nominal conc.)	4.23 (TS), 4.31(hatch survival), 4.32(post-treatment survival)		Aluminum did not significantly affect post treatment survival but significantly reduced hatching time at all pH levels. Total length (TL) was unaffected. Critical pH: 4.25 (post-treatment survival), 4.75 (TL), 4.75 (hatch time).	Bradford et al. 1994
HYRE	tadpoles	MORT	4.9-5.8		Al	75	µg/L (nominal conc.)	total survival: 4.14 (SD=0.02) hatch survival: 4.26 (SD=0.09) post-treatment survival: 4.27 (SD=0.09)		No significant effect. Critical pH: 4.25 (post-treatment survival).	Bradford et al. 1994
HYVE	embryo	DEVOBS								At pH 4.3, 50 % or more developed normally.	Gosner and Black 1957 [k]
HYVE	embryo	HATSUC	3.5-6.3	20					3.5	Critical pH was 3.8. Hatching success varied from 22.2% at pH 3.5 to 100% at pHs 4.0 and 5.0.	Grant and Licht 1993
HYVE	tadpoles	HATSUC	3.5-6.3	20					3.8-4.0	Critical pH was 3.5-3.8. pH had significant effect on the mean total length of the tadpoles. Mean total length of tadpoles at pH 3.8 was not significantly different from length at pH 4.0 (which was statistically the same as length at higher pH).	Grant and Licht 1993
HYVE	tadpoles	BEHAV	5.3-6.6							HYVE abundance was affected by an interaction between soil and acidification in that treatment effects were only observed in macrocosms with clay soils.	Sparling et al. 1995
LELA	egg	PHYSIO	10							Structure and molecular composition of jellycoats were analyzed.	Carroll et al. 1991
LEMA	adult	MORT	4.6 - 7.0	8-10						None of the caged animals placed upstream (pH 7.0) died; most of those placed downstream (pH 4.6) died.	Huckabee et al. 1975 [k]

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
MIOR	embryos	MORT	3.0-11.0							Late gastrula stage embryos tolerated pH 4.0 - 10.5 showing normal development and hatching; pH 3.0 development immediately arrested and embryos were killed within a few hours; pH 3.2 - 3.6 gradual decrease in toxicity; pH 3.8 20 % mortality.	Padhye and Ghate 1988
MIOR	tadpoles	MORT	3.0-11.0							No significant difference in tolerance of tadpoles to altered pH as compared to that of the embryos, however hind-limb stage tadpoles appeared to be slightly resistant to acidic pH and more sensitive to alkaline pH.	Padhye and Ghate 1988
NEMA	adult	PHYSIO								The mechanosensitivity was suppressed by Mg, Co and La as well as low pH. Possibly due to competition with calcium.	Sand 1975
NERH	adult	PHYSIO	7.0		pyruvate	0.03-0.50 mM				Greater LDH activity than turtle PSSC, Km values lower and Vmax higher than in turtle suggesting after conversion of pyruvate to lactate when the enzyme is saturated with substrate.	Baeyens and Hurley 1986
NOVI	adult	MORT	3.5-5.0	5, 21						100 % survival at pH 3.8 - 5.0 at 5 and 21°C. 10 - 30 % survival at pH 3.5 after 38 d at 5°C; 50 - 87 % survival after 14 d at 21°C.	Dale et al. 1985 [k]
NOVI	adult	POPSUR								Appeared to be distributed uniformly across pH spectrum, but with low numbers on soils of lowest pH.	Wyman and Jancola 1992
NOVI	adult	POPSUR								pH range= 4.53-6.97.	Doka et al. 1997
NOVI	adult	PHYSIO	4.22-4.32							Rate of Na loss after acute exposure to low pH (4.24- 4.32) increased significantly; chronic exposure to low pH followed by a transfer to pH 4.22 - 4.37 reduced the rate of Na loss to less than that observed in control animals.	Robinson 1993
NOVI	adult	BEHAV	4.2-6.0							Reproduction of NOVI significantly lower in lower pH; adults often trapped more in pH 4.2 than in > 6.0; release of NOVI resulted in significantly lower survival of RASY at metamorphosis, survival not affected by pH 4.2.	Sadinski and Dunson 1992
NOVI	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996
NOVV	adult	PHYSIO	3.0-6.0							Animals exposed to low pH in the laboratory did not exhibit elevated Na efflux rate constants as in PLCI, EUBI and DEOC.	Frisbie and Wyman 1991

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
NOVV	adult	PHYSIO	3-5							Na efflux rate constant was not affected by pH. Efflux was generally greater under aquatic than terrestrial conditions and for efts than for adults. In aquatic setting, both adults and efts were able to maintain Na balance at pH 5.	Frisbie and Wyman 1992
PLCI	adult	POPSUR	3.7							50.8 % quadrats with pH < 3.8 contained a salamander; juveniles never found on soil with pH < 3.7.	Wyman and Hawsley-Lescault 1987 [k]
PLCI	adult	BEHAV	2.0-6.5	8-10						Animals given substrate choice were found 50 % of the time on pH 6.0 - 6.5. Animals held on substrates pH 2.0 - 2.5 died within 1 wk; those on pH 3-6 survived. During 8 month exposure expt, 40 % of animals on pH 3 died within 4 months, all others survived.	Wyman and Hawsley-Lescault 1987 [k]
PLCI	adult	PHYSIO	3-5							At pH 3, body Na conc. and body water content were reduced when compared to pH 5 and control salamanders.	Frisbie and Wyman 1995
PLCI	adult	PHYSIO	3-5							Effects of acid rain conditions were determined in a controlled environment for ion balance in PLCI.	Frisbie and Wyman 1994
PLCI	adult	PHYSIO	3.0-6.0							In the laboratory, animals exposed to low pH exhibited elevated Na efflux rate constants. Animals maintained on acidic substrate for 14 d had reduced body Na and body water levels and lost mass more than salamanders maintained on substrate of higher pH.	Frisbie and Wyman 1991
PLCI	adult	PHYSIO	3-5							Na efflux rate constant was not affected by pH. Efflux was generally greater under aquatic than terrestrial conditions and for efts than for adults. In aquatic setting, both adults and efts were able to maintain Na balance at pH 5.	Frisbie and Wyman 1992
PLCI	adult	POPSUR	3.9-6.3							PLCI presence affected by soil pH.	Wyman 1988
PLCI	adult	POPSUR								The mode of distribution drops off sharply at low soil pH. Occurred infrequently on soils of higher pH. Field distribution suggested an avoidance of acidic conditions.	Wyman and Jancola 1992
PSCR	adult	POPSUR	4.44-6.63							Did not occur in ponds with pH > 5.0.	Clark 1986 [k]

Table 6 - pH Studies - 20

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
PSCR	all	POPSUR	4.3-7.3		Al, Zn					Amphibians were present in all 118 potential breeding sites. The presence of HYCR was positively related to buffering status (alkalinity, pH and other correlated variables).	Glooschenko et al. 1992
PSCR	embryo	DEVOBS							3.8	Results not extracted from paper.	Gosner and Black 1957 [k]
PSCR	embryo	HATSUC	4.1-4.3	15						100% mortality at early development for embryos treated with acidic bog water. 71.5% successful hatch, 0.3% curl occurred for embryos treated with control artificial soft water (pH 7.5).	Karns 1992
PSCR	embryo	BEHAV	< 3.8-5.0							Abundance marginally correlated with pH, low pH may decrease hatching success.	Glooschenko et al. 1986
PSCR	embryo	HATSUC	4.2 bog, 7.5 fen							No eggs developed or hatched at pH 4.2; 71.5 % hatched at pH 7.5.	Karns 1984 [k]
PSCR	embryo (mid blastula)	HATSUC	4.5-6.0	21	Al					Results not extracted from paper.	Dale et al. 1985 [k]
PSCR	embryo (mid-blastula)	REPRO	3.0-8.0	20						0 % hatch at pH 3.0; 80-83 % hatched at pH 6.0 - 8.0; 54 % hatched at pH 4.0, all hatched larvae were deformed and all died.	Dale et al. 1985 [k]
PSCR	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996
PSCR	tadpoles	MORT	4.2							6.7% survival at pH 4.2 (bog water), 100% survival at pH 7.5 (artificial soft water).	Karns 1992
PSCR	tadpoles	BEHAV	4.0, 4.5	20-22				3.74 (96 h); N=30/treat-ment		Activity declined significantly at both pH levels during the experimental period in the fluvarium. Tadpoles avoided pH level 4.0. A significant correlation was found between the 96 h LC50 for pH and the % reduction in use of the two octants acidified.	Freda and Taylor 1992
PSCR	tadpoles (4 wk)	MORT	4, 5, 7							96 h survival was over 90 % at pH 7.0 and approx. 70% at pH 5.0. No tadpoles survived 24 h at pH 4.0.	Correll et al. 1987 [k]
PSNI	embryo	DEVOBS							3.8	Results not extracted from paper.	Gosner and Black 1957 [k]
PSSC	adult	PHYSIO	7.0		pyruvate	0.03-0.50 mM				Less LDH activity in brain and heart than in either NRHE or ELOB snakes; snakes had lower Km values.	Baeyens and Hurley 1986
PSTR	adult	POPSUR								No evidence that amphibian embryos are present during snow melt and episodic acidification; population decline not likely due to acidification.	Vertucci and Corn 1996

Table 6 - pH Studies - 21

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
PSTR	egg	POPSUR	4.0-6.0							Populations not declining, close to 100 % occupied sites.	Corn et al. 1989
PSTR	embryo	HATSUC	4.1-4.3	15						100% mortality at early development for embryos treated with acidic bog water. 64.5% successful hatch, 0% curl occurred for embryos treated with control artificial soft water (pH 7.2-7.6).	Karns 1992
PSTR	embryo	BEHAV								Breeding habitats in the Rocky Mountains do not appear to be sufficiently acidic to kill embryos.	Corn and Vertucci 1992
PSTR	embryo	HATSUC	4.2 bog, 7.5 fen							No eggs hatched or developed at pH 4.2; 64.5 % hatched at pH 7.5.	Karns 1984 [k]
PSTR	tadpoles	DEVOBS	4.2							0% survival at pH 4.2 (bog water), 100% survival at pH 7.5 (artificial soft water).	Karns 1992
RAAR	adult	POPSUR	4.0-5.0							62.5 % of water bodies at pH 4 -5 contained RAAR; 21.9 % of water bodies at pH 5.0; and 35.3 % of water bodies at pH 4.0.	Leuven et al. 1986 [k]
RAAR	egg	HATSUC	4.0, 5.0, 6.0	12-15	Al	100-800				62% mortality in eggs at pH 4.0, 0% mortality at 5.0, and 6.0. Egg mortality not affected by Al alone but synergistic effect of pH and Al at 5.0 and 6.0. Hatch time increased at low pH but was not affected by Al.	Andren et al. 1988
RAAR	egg	HATSUC	4.0, 5.0, 6.0	12-15						95 % or more of eggs were successfully fertilized and frequency was not associated with pH.	Andren et al. 1988
RAAR	egg	POPSUR	4.0-5.0							In acidic water egg masses became heavily infested with fungi.	Leuven et al. 1986 [k]
RAAR	egg	DEVOBS	3.8-4.2							Increased survival of embryos obtained from acid field site compare to those obtained from neutral pH sites.	Andrén et al. 1989
RAAR	egg	DEVOBS	4.0-6.0		Al	100-800				Low pH exerted strong harmful effect and high levels of Al almost completely precluded successful reproduction.	Andren and Nilson 1988
RAAR	egg	DEVOBS	4.0-5.0							Most hatchlings at pH 4.0 were deformed; at pH 4.5 and 5.0 few deformities noted.	Leuven et al. 1986 [k]
RAAR	embryo	PATH	4.0-6.0							Rate of fungal infection was 75-100% in the pre-treatment year. Infection rate decreased to 0-25% in the treated (limed) pools. Removal of sphagnum did not affect the infection rate of the eggs at all. No differences were found.	Bellemakers and van Dam 1995

Table 6 - pH Studies - 22

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RAAR	larvae	DEVOBS	4.2							Larvae survival significantly higher in progeny from acidic locality and larvae metamorphosed earlier and at a larger size than those originating form neutral pH locality.	Andrén et al. 1989
RAAR	larvae	DEVOBS	4.0-6.0		Al	100-800				Low pH exerted a strong harmful effect and high levels of Al almost completely precluded successful reproduction.	Andren and Nilson 1988
RAAR	larvae (stage 29-33)	DEVOBS	4.0-5.0		Al	185 µmol/L				No mortality in pH medium alone; 75 % mortality at pH 4.5 in Al medium and 83.3 % mortality at pH 5.0; no mortality at pH 4.0 in Al medium.	Leuven et al. 1986 [k]
RAAR	tadpoles	POPSUR	4.0-5.0							No tadpoles found in pH < 5.0.	Leuven et al. 1986 [k]
RACA	adult	PHYSIO	7.2-10		Cd					Cd at pH 7.2 decreased contractility of the cardiac muscle, however, if pH was raised, this effect was reduced.	Horiuchi and Hayashi 1979
RACA	adult	POPSUR	4.44-6.63							Did not occur in ponds with pH > 5.0.	Clark 1986 [k]
RACA	adult	POPSUR								pH range= 4.53-6.97.	Doka et al. 1997
RACA	adult (100-300 g)	PHYSIO	4.6							Brain AChE activity altered in pH dependent fashion. Animals raised at pH 4.6 died within 7 - 10 d.	Marquis 1982 [k]
RACA	adult (brain)	PHYSIO	4.6-6.6		Al					Brain AChE levels.	Marquis 1982 [k]
RACA	embryo	MORT	3.8-4.01	14.4-19						100 % mortality at pH 3.8 - 4.01.	Saber and Dunson 1978 [k]
RACA	embryo	HATSUC	3.5-6.8	20					3.5-3.8	Critical pH was 4.0-4.5. One egg mass showed unusually high embryonic survival in comparison to the other 5 egg masses. Hatching success was generally high and statistically the same for pH 4.5 and above.	Grant and Licht 1993
RACA	embryo	DEVOBS								pH 4.3 = 50 % or more developed normally.	Gosner and Black 1957 [k]
RACA	larvae	PHYSIO	2.5-4.0							Acute exposure depressed Na influx and accelerated Na efflux. Increased external Ca slowed loss of Na. Initial body Na content was inversely correlated with acid tolerance.	Freda and Dunson 1985 [k]
RACA	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996
RACA	tadpoles	HATSUC	3.5-6.3	20					3.5-3.8	Critical pH was 4.0. No significant difference in mean total length of tadpoles occurred at pH 4.5 or higher. Body length of tadpoles at pH 4.0 was less than at higher pH.	Grant and Licht 1993

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RACA	tadpoles (stage 25-30)	MORT	3.9-4.3							Near 0 % mortality at pH 4.3; 78% mortality at pH 4.2 and 100 % mortality at pH 3.9.	Gascon and Bider 1985 [k]
RACL	adult	BEHAV	4-7							Results not extracted from paper.	Vatnick et al. 1996
RACL	adult	POPSUR	3.5-3.9							Both adults and larvae found in fields at pH 3.5 - 3.9.	Dale et al. 1985
RACL	adult	POPSUR	4.44 - 6.63							Occurred in all ponds; densities increased in more acidic ponds; egg mass density was reduced as pH decreased.	Clark 1986 [k]
RACL	adult	POPSUR								pH range= 4.53-6.97.	Doka et al. 1997
RACL	all	POPSUR	4.3-7.3		Al, Zn					Amphibians were present in all 118 potential breeding sites. The presence of RACL was positively related to buffering status (alkalinity, pH and other correlated variables).	Glooschenko et al. 1992
RACL	embryo	MORT	3.7-3.99	14.4-19						0 % mortality.	Saber and Dunson 1978 [k]
RACL	embryo	HATSUC	3.75-5.8							100 % hatching in soft water at pH 4.25 and only 35 % in acidic bog water; 100 % hatching at pH 4.00 in soft water and only 10 % in acidic bog water.	Freda and Dunson 1986 [k]
RACL	embryo	HATSUC	4.4-7.85							21% decrease in hatching success at low pH. Lower temperatures and low pH also resulted in decreased length of frogs.	Schalk et al. 1998
RACL	embryo	DEVOBS								At pH 4.1 50 % or more developed normally.	Gosner and Black 1957 [k]
RACL	juvenile	PHYSIO	4.0							Substantially increased transepithelial net ion loss and net acid uptake, and a slight inhibition of active ion transport. Disturbances disappeared by 7 h exposure in tadpoles by persisted in juveniles.	McDonald et al. 1984 [k]
RACL	larvae	PHYSIO	2.5-4.0							Acute exposure depressed Na influx and accelerated Na efflux. Increased external Ca slowed loss of Na. Initial body Na content was inversely correlated with acid tolerance.	Freda and Dunson 1985 [k]
RACL	larvae (stage 25-29)	MORT	3.3-6.0	5, 21						100 % survival after 14 d at 21°C for pH 3.5 - 6.0; 80 % survival at pH 5.0 after 38 d at 5°C.	Dale et al. 1985 [k]
RACL	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RACL	tadpoles	BEHAV	4.0, 3.5 (behaviour)	20-22				3.36 (96 h); N=30/treat -ment		Behaviour - Along with RASY, RACL were the least sensitive species and did not avoid pH 4.0. A significant correlation was found between the 96 h LC50 pH and the % reduction in use of the two acidified octants (pH 4.0).	Freda and Taylor 1992
RACL	tadpoles	BEHAV	5.3-6.6							No differences were observed among treatments for RACL or RAUT tadpoles.	Sparling et al. 1995
RACL	tadpoles	PHYSIO	4.0							Substantially increased transepithelial net ion loss and net acid uptake, and a slight inhibition of active ion transport. Disturbances disappeared by 7 h exposure in tadpoles but persisted in juveniles.	McDonald et al. 1984 [k]
RACL	tadpoles (stage 25-30)	MORT	4.1-4.5							Mortality estimated from graph, 10 % at pH 4.5 and 90 % at pH 4.1.	Gascon and Bider 1985 [k]
RACY	adult (female)	MORT	4.0-10	15 - 35	Cr	115 mg/L = 96 h LC50				Increased toxicity evident with increased temperature, or decreased pH and water hardness.	Joshi and Patil 1992
RADA	egg	HATSUC	4.0, 5.0, 6.0	12-15	Al	100-800				100 % mortality of embryos at pH 4.0 within 2 d, and 6% mortality at pH 5.0, 6.0. Embryo mortality not affected by Al alone but synergistic effect of Al and pH at 5.0, and 6.0 resulted in increased mortality.	Andren et al. 1988
RADA	eggs	DEVOBS	4.0-6.0		Al	100-800				Low pH exerted a string harmful effect and high levels of Al almost completely precluded successful reproduction.	Andren and Nilson 1988
RADA	larvae	DEVOBS	4.0-6.0		Al	100-800				Low pH exerted a strongly harmful effect and high levels of Al almost completely precluded successful reproduction.	Andren and Nilson 1988
RAES	adult	POPSUR	4.0-5.0							76 % of water bodies at pH 5 and 4-5 contained RAES; 63.3 % of water bodies at pH 4.0.	Leuven et al. 1986 [k]
RAES	egg	POPSUR	4.0-5.0							In acidic waters, egg masses became heavily infested with fungi.	Leuven et al. 1986 [k]
RAES	egg	DEVOBS	4.0-5.0							Most hatchlings at pH 4.0 were deformed; at pH 4.5 and 5.0 few deformities noted.	Leuven et al. 1986 [k]
RAES	larvae (stage 29-33)	DEVOBS	4.0-5.0		Al	185 µmol/L				pH medium: 6 % mortality at pH 4.0 and 4.5 ; no mortality at pH 5.0. In Al medium: 100 % mortality in all groups.	Leuven et al. 1986 [k]
RAES	tadpoles	MORT	6.4-8.1		TPT					Lower growth rate, longer larval period at pH 6.4.	Fioramonti et al. 1997

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RAES	tadpoles	POPSUR	4.0-5.0							No tadpoles found in pH < 5.0.	Leuven et al. 1986 [k]
RALE	tadpoles	MORT	6.4-8.1		TPT					Higher growth rate, shorter larval period.	Fioramonti et al. 1997
RAMU	adult	POPSUR								Acidification is not responsible for population decline, however, species has now disappeared from study area.	Bradford et al. 1994
RAMU	embryo	HATSUC	4-6		Al	75				Results not extracted from paper.	Bradford et al. 1991
RAMU	embryo	MORT	4.5-6.0	ambient outdoor	UV-B	0-6403.3	J/m2day			For most treatments (non sediment) *R. mucosa* had either 100% survivorship or only one death per dish with only the pH 4.5 in combination with UV-B at 6403.3 J/m^2 day (16% ozone reduction) differing where there was 50% survivorship (3 deaths).	Long 1993
RAMU	embryo	MORT	4.0-6.0	15	Al	0 or 0.039-0.080	mg/L	4.4		The estimated extreme pH for Sierra Nevada surface waters (5.0) did not cause a significant reduction in survival for either life stage or species. Sublethal effects were evident as reduced body size in embryos at pH 5.0 and 5.25.	Bradford et al. 1992
RAMU	tadpoles	HATSUC	4-6		Al	75				Increases of Al resulted in reduced growth rates.	Bradford et al. 1991
RAMU	tadpoles	MORT	4.0-6.0	15	Al	0 or 0.039-0.080	mg/L	<4.0		The estimated extreme pH for Sierra Nevada surface waters (5.0) did not cause a significant reduction in survival for either life stage or species. The addition of Al to treatment waters did not significantly affect post-treatment survival.	Bradford et al. 1992
RAPA	embryo	DEVOBS							4.0	At pH 4.3, 50 % or more developed normally.	Gosner and Black 1957 [k]
RAPA	embryos (<32 stage)	MORT	4.3-7.0	12						100 % hatched at pH 6.0 - 7.0; 36-41 % hatched at pH 5.0 however 50 % later died.	Dale et al. 1985 [k]
RAPE	adult	PHYSIO								Pyruvate and lactate conc. were higher than apparent Km values of heart enzyme.	Mendiola and de Costa 1991
RAPI	3 wk tadpoles	DEVOBS	4.2-6.5	20±2	Al	0, 0.25, 0.5, 0.75, 1.0	mg/L			Three wk old tadpoles did not die at any test pH (without Al) and mortality (>20%) caused by Al occurred at only pH 4.8 and 0.75-1.0 mg/L Al. The body Na conc. of 3 wk old tadpoles was also elevated in water containing high conc. of Al.	Freda and McDonald 1990
RAPI	adult	BEHAV	4-7							Results not extracted from paper.	Vatnick et al. 1996
RAPI	adult (skin)	PHYSIO								Lowering of pH caused a decrease in short circuit current .	Fromm 1981 [k]

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RAPI	all	POPSUR	4.3-7.3		Al, Zn					Amphibians were present in all 118 potential breeding sites. The presence of RAPI was positively related to buffering status (alkalinity, pH and other correlated variables).	Glooschenko et al. 1992
RAPI	egg	DEVOBS	4.5-6.0		UV-B					Embryo survival was reduced by low pH and increased UV-B.	Long et al. 1995
RAPI	egg	POPSUR	4.0-6.0							Low percentage of occupied sites, populations declined.	Corn et al. 1989
RAPI	egg	REPRO	<4.8-6.5							Sperm motility decreased with decreasing pH below pH 6.5 in solutions acidified with H_2SO_4 or HNO_3; below 5.55 in solutions acidified with HCl. No eggs developed at < pH 4.8. Lower limit for optimal fertilization and early development was pH 6.0.	Schlichter 1981 [k]
RAPI	embryo	HATSUC	4.1-4.3	15						0% successful hatch, 0.9% curl for embryos exposed to acidic bog water. 98.5% successful hatch, 0% curl for embryos exposed to control artificial soft water.	Karns 1992
RAPI	embryo	MORT	4.5-5	ambient outdoor	UV-B	4341.2-9507.2	J/m2day			At 30 % ozone reduction: 51% survival, SE=0.025 (significant) 91% survival, SE=.025 (nearly significant).73% survival, SE=0.055 (significant).	Long 1993
RAPI	embryo	DEVOBS							3.7	At pH 4.1, 50 % or more developed normally.	Gosner and Black 1957 [k]
RAPI	embryo	BEHAV								Breeding habitats in the Rocky Mountains do not appear to be sufficiently acidic to kill embryos.	Corn and Vertucci 1992
RAPI	embryo	MORT	5.0	23						Higher levels of nitric acid precipitation showed slower growth rate and severe abnormalities not characteristic of embryos exposed to lesser conc. of nitric acid.	McCue 1989
RAPI	embryo	MORT	4.4-6.5	20		0-60	mg/L	humic: 15.6 (13.3-19.2) mg/L fulvic: 14.1 (4.8-18.1)		Humic and fulvic acid increased mortality. Both humic and fulvic acid stained the egg jelly and membranes a dark brown color and caused these structures to become “tough and rubbery”. The embryos became tightly curled within the egg membranes and were unable to hatch.	Freda et al. 1990

Table 6 - pH Studies - 27

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RAPI	embryo	DEVOBS	4.2-6.5	20±2	Al	0, 0.25, 0.5, 0.75, 1.0	mg/L			In embryos and pre-stage 25 tadpoles, Al ameliorated the toxic effects of very low pHs (4.2-4.4), while becoming toxic at higher pH (4.6-4.8). Although both embryos and pre-stage 25 tadpoles were killed by low pH (4.2-4.4 and 4.2, respectively).	Freda and McDonald 1990
RAPI	embryo	HATSUC	4.2 bog, 7.5 fen							No eggs hatched at pH 4.2; 98.5 % hatched at pH 7.5.	Karns 1984 [k]
RAPI	embryo	MORT	4.2-4.8	20	Al	0-1.0 mg/L		At 100% artificial soft water = 0.471 mg/L (for Al).		Nontoxic (5% mortality) without Al. Al was toxic only at pH 4.8. Organic compounds (DOC 5.7 to 16.2 mg/L) complexed the Al and thus increased the LC50 for total Al by more than two-fold. 100% artificial soft water and the four dilutions of pond water were toxic to embryos.	Freda et al. 1990
RAPI	embryo	BEHAV	< 3.8-5.0							One of the most common species noted.	Glooschenko et al. 1986
RAPI	larvae	PHYSIO	2.5-4.0							Acute exposure depressed Na influx and accelerated Na efflux. Increased external Ca slowed loss of Ca. Initial body Na content was inversely correlated with acid tolerance.	Freda and Dunson 1985 [k]
RAPI	prestage 25 tadpoles	DEVOBS	4.2-6.5	20±2	Al	0, 0.25, 0.5, 0.75, 1.0	mg/L			In embryos and pre-stage 25 tadpoles, Al ameliorated the toxic effects of very low pHs (4.2-4.4), while becoming toxic at higher pH (4.6-4.8). Although both embryos and pre-stage 25 tadpoles were killed by low pH (4.2-4.4 and 4.2, respectively).	Freda and McDonald 1990
RAPI	tadpoles	DEVOBS								96 h exposure to bog water (pH 4.2): there was 0% survival (controls had 97.5% survival).	Karns 1992
RAPI	tadpoles	DEVOBS	4.4-5.8							Linear increase in survival time and thus pH tolerance during first 8 wks of development. Tadpoles grew at rates of 5.9 - 36 mg/d.	Freda and Dunson 1985 [k]
RAPI	tadpoles	BEHAV	4.0, 4.5	20-22				4.06 (96 h); N=30/treat -ment		No significant difference in activity level after acidification was initiated. Tadpoles avoided pH 4.0 and 4.5 (along with BUAM they were the most sensitive species tested).	Freda and Taylor 1992
RAPR	embryo	BEHAV								Breeding habitats in the Rocky Mountains do not appear to be sufficiently acidic to kill embryos.	Corn and Vertucci 1992
RARI	adult (abdominal skin)	PHYSIO	2.5							Increase in influx and backflux of Ca and mannitol and in backflux of Na at pH 2.5 in short circuited skin. Total conductance and short-circuit current increased at pH 2.5.	Ferreira and Hill 1982 [k]

Table 6 - pH Studies - 28

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RASE	adult	POPSUR								pH range= 4.53-6.97.	Doka et al. 1997
RASE	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996
RASY	adult	POPSUR	4.1-6.3							Least sensitive to low pH compared to AMMA and BUAM.	Dale et al. 1985
RASY	adult	POPSUR								No evidence that amphibian embryos are present during snow melt and episodic acidification; population decline not likely due to acidification.	Vertucci and Corn 1996
RASY	adult	POPSUR	4.44-6.63							Occurred in all ponds; densities increased in more acidic ponds; egg mass density was reduced as pH decreased.	Clark 1986 [k]
RASY	adult	POPSUR								Presence unrelated to pond pH.	Freda and Dunson 1986 [k]
RASY	adult	POPSUR	4.1							Successfully breeding at pH 4.1.	Dale et al. 1985
RASY	all	POPSUR	4.3-7.3		Al, Zn					Amphibians were present in all 118 potential breeding sites. The species showed a relationship with conductivity.	Glooschenko et al. 1992
RASY	egg	HATSUC	4.14-5.75		Al	0-200				Results not extracted from paper.	Clark and LaZerte 1985 [k]
RASY	egg	HATSUC	3.75-7.6							95.3 % hatched at pH 7.2 - 7.6; 41.9 % hatched at pH 3.75. Time required for hatching increased significantly as pH decreased.	Pierce and Sikand 1985 [k]
RASY	egg	HATSUC								Egg mass density was negatively correlated with acidity. Hatching success was inversely correlated with pH. Occurrence of mould on eggs increased in low pH.	Gascon and Planas 1986 [k]
RASY	egg	POPSUR								Hatching of RASY not related to pH.	Freda and Dunson 1986 [k]
RASY	egg	HATSUC			Al					Hatching success was negatively correlated with Al and DOC and positively correlated with pH.	Clark and Hall 1985
RASY	egg	HATSUC	3.75-7.6	15						Ovum volume was negatively correlated with hatching success at pH 4.0 and capsule thickness was negatively correlated with hatching success at pH 3.75.	Pierce et al. 1987
RASY	egg	POPSUR	4.0-6.0							Populations not declining, close to 100% of sites occupied.	Corn et al. 1989
RASY	embryo	MORT						3.5		Results not extracted from paper.	Tome and Pough 1982 [k]

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RASY	embryo	HATSUC	4.2-7.5	15 or 3.5 and 15.5						For embryos collected from bog site exposed to bog water (pH 4.2) only 11% normal hatch and 77% curl occurred; low temperature affected the hatching success of RASY in bog water (100% mortality at early development).	Karns 1992
RASY	embryo	HATSUC	3.5-7.0	12, 21						0 % hatched at pH 3.0 at both 12 and 21°C.> 90 % hatched at pH 7.0. More hatched at higher temperature.	Dale et al. 1985 [k]
RASY	embryo	HATSUC	4.2 bog, 7.5 fen							11 % hatch at pH 4.2 and 96.3 % hatch at pH 7.5; 77.2 % embryo developed by not hatched at pH 4.2.	Karns 1984 [k]
RASY	embryo	DEVOBS	4.0-5.8							80-100 % hatched at pH 5.0 and 5.8 with some deformities; at pH 4.5, 15 (at Ca 80 ppm) - 100 % (Ca 20 ppm) hatched . 0-13 % hatched at pH 4.0.	Freda and Dunson 1985 [k]
RASY	embryo	HATSUC	4.0-5.8							95-100 % hatching at pH 4.5 - 5.8; 80 % hatching at 4.25 (significantly greater than AMJE); 0 % hatching at pH 4.0.	Freda and Dunson 1986 [k]
RASY	embryo	DEVOBS								At pH 3.9, 50 % or more developed normally.	Gosner and Black 1957 [k]
RASY	embryo	BEHAV								Breeding habitats in the Rocky Mountains do not appear to be sufficiently acidic to kill embryos.	Corn and Vertucci 1992
RASY	embryo	HATSUC	4.2, 4.4, 4.6, 4.8, 6.0		Al	0, 0.25, 0.5, 0.75, 1.0	mg/L			BUAM embryos were more sensitive to low pH than RASY embryos as indicated by a significant increase in mortality at pH 4.2 and 0 mg/L Al/L. BUAM embryos were most stressed by Al at pH 4.2.	Freda and McDonald 1993
RASY	embryo	BEHAV	< 3.8-5.0		Al	114-834				Elevated Al and low pH may reduce breeding success.	Glooschenko et al. 1986
RASY	embryo	HATSUC	4.25							Hatched at 4.25.	Freda and Dunson 1985 [k]
RASY	embryo	HATSUC	2.0-7.6							Hatching success > 71 % at pH 4.0 - 7.6.	Pierce et al. 1984 [k]
RASY	embryo	HATSUC	3.5-6.3	20					3.5-4.0	Hatching success at pH 4.0 was significantly higher than at pH 3.5 but significantly lower than pH 4.5-6.3. No significant difference occurred between hatching success at pH 4.5 or higher. The critical pH was determined to be pH 4.0-4.5.	Grant and Licht 1993

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RASY	embryo	MORT						4.10 for hatching		Less pH-associated embryonic mortality observed among more tolerant RASY; more larval RASY survived pH 4.1 in lab when initially contained with AMJE than at pH > 6.0 due to reduced survival and subsequent predation by AMJE at pH 4.1.	Sadinski and Dunson 1992
RASY	embryo	HATSUC	4.5-8.1	5.6-6.2						Low pH led to 45% decrease in hatching success; but did not affect hatch timing. Lower temperatures and low pH resulted in a decrease in frog length.	Schalk et al. 1998
RASY	embryo	MORT	4.15-6.23		Al	0.031-1.155	mg/L (total Al)			Mortality correlated only with pH. In two low-pH ponds, high conc. of dissolved organic compounds might have been a toxic component. Generally, decreases in mortality occurred with pH below 5.0 (exceptions did occur).	Freda and McDonald 1993
RASY	embryo	HATSUC	4.3-4.8		Al	34-46 ig/L				pH 4.8 and 37 µg/L Al did not affect eggs of RASY ; pH 4.3 and 46 µg/L were more toxic to RASY than 34 - 35 µg/L Al.	Clark and Hall 1985
RASY	embryo (4h)	MORT		15						Differences in acid tolerance among populations of embryos was not related to levels of acidity in ponds.	Pierce and Harvey 1987 [k]
RASY	larvae	MORT	3, 4, 5							100 % mortality within 2 h. No differences in development noted at any other treatment.	Ling et al. 1986 [k]
RASY	larvae	DEVOBS	3.25-7.6	15						Acid tolerance of larvae was not related to ovum size nor to capsule thickness.	Pierce et al. 1987
RASY	larvae	PHYSIO	2.5-4.0							Acute exposure depressed Na influx and markedly accelerated Na efflux - resulting net loss of 50 % of body Na was fatal. Chronic exposure caused 21-62 % reduction in body Na level K content did not change.	Freda and Dunson 1985 [k]
RASY	larvae	MORT	3.75-7.6							All survived for 24 h at pH 7.2 - 7.6; 37% survival at pH 3.5.	Pierce and Sikand 1985 [k]
RASY	larvae	HATSUC	2.0-7.6							Early feeding stage: 100 % survival at > 4.0; metamorphosed larvae 90 - 100 % at pH 3.5 and above.	Pierce et al. 1984 [k]
RASY	larvae	POPSUR	4.5-5.5	15-20	Al	100-300	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
RASY	larvae	POPSUR	4.5-5.5	15-20	Cu	6-9	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RASY	larvae	POPSUR	4.5-5.5	15-20	Fe	250-350	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
RASY	larvae	POPSUR	4.5-5.5	15-20	Pb	2-5	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
RASY	larvae	POPSUR	4.5-5.5	15-20	Zn	25-41	µg/L			Interactive effects of pH and metals on a freshwater, palustrine wetland assemblage were measured in 500L outdoor mesocosms.	Horne and Dunson 1995
RASY	larvae (25-27)	MORT		15						Tadpoles produced by adult from acidic ponds were more acid tolerant.	Pierce and Harvey 1987 [k]
RASY	tadpoles	MORT	4.14-5.75		Al	0-200				Results not extracted from paper.	Clark and LaZerte 1985 [k]
RASY	tadpoles	POPSUR								Results not extracted from paper.	Mallory et al. 1996
RASY	tadpoles	DEVOBS	4.2							96 h exposure to bog water (pH 4.2): (i) for Porter Ridge, artificial soft water hatched tadpoles there was 31.7% survival; (ii) for Porter Ridge, bog hatched tadpoles there was 83.3% survival; for Avery Carlos marsh, artificial soft water hatched tadpoles there was 5.0% survival.	Karns 1992
RASY	tadpoles	BEHAV	3.75, 4.0, 4.5	20-22				3.71 (96 h); N=30/treat-ment		Along with RACL, they were the least sensitive species and did not avoid pH 4.0. They did avoid pH 3.75. A significant correlation was found between the 96 h LC50 for pH and the % reduction in use of the two octants acidified to pH 4.0.	Freda and Taylor 1992
RASY	tadpoles	MORT	5.4, 4.5, 4.1							As a result of increased mortality among AMJE over 7 d, 38% more RASY survived at pH 4.1 than at pH 5.4.	Sadinski and Dunson 1989
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor	Cu	0.015	mg/L			Copper was extremely toxic to both species during both acute and chronic exposures. Acute exposure RASY survival was significantly greater in the low pH (88 vs 52%) and the high hardness treatments (90 vs 50%).	Horne and Dunson 1995
RASY	tadpoles	HATSUC	3.5-6.3	20					3.5	Critical pH was 3.5-3.8 for tadpoles; survival at pH 3.8 did not differ from that at pH 3.5 or 4.0 but it was significantly lower than at pH 4.0.	Grant and Licht 1993

Table 6 - pH Studies - 32

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor			mg/L			In the treatment combinations with no metals present, acute survival of RASY was significantly higher in the high water hardness (100%) than in the low water hardness treatment (87%). After 28 d of exposure there were no significant pH or hardness effects.	Horne and Dunson 1995
RASY	tadpoles	MORT	4.16-6.36		Al	0.115-1.180	mg/L (total Al)			Percent mortality was significantly different among ponds. Mortality was correlated with both total Al and pH. Total Al had a higher r^2 than did labile Al. Other ions measured were not correlated with mortality. Some malformation was noted.	Freda and McDonald 1993
RASY	tadpoles	PHYSIO	4.5-6.37							Tadpoles from pond with pH 4.5 - 4.90 had lower body Na, Cl, and water conc. than those from nearby pond with pH 5.74 - 6.37. Tadpoles from either pond placed in low pH had higher Na efflux than when placed in high pH.	Freda and Dunson 1985 [k]
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor	Al, Cu, Pb, Fe, Zn		mg/L			The all-metals mixture treatment induced significantly higher mortality for both species during acute and chronic exposure. There were no effects of pH or water hardness on the acute survival of RASY.	Horne and Dunson 1995
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor	Al	0.525	mg/L			The presence of Al significantly reduced survival during both acute and chronic exposure. Toxicity of Al to RASY was significantly lower in low water hardness treatments (73 vs 52%).	Horne and Dunson 1995
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor	Fe	0.02	mg/L			There were no significant negative effects of iron, lead and zinc on RASY or AMJE during acute or chronic exposure. Likewise, there were no significant effects of iron, lead or zinc on RASY or AMJE wet mass.	Horne and Dunson 1995
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor	Pb	0.01	mg/L			There were no significant negative effects of iron, lead and zinc on RASY or AMJE during acute or chronic exposure. Likewise, there were no significant effects of iron, lead or zinc on RASY or AMJE wet mass.	Horne and Dunson 1995

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RASY	tadpoles	DEVOBS	4.5 and 5.5	ambient outdoor	Zn	0.115	mg/L			There were no significant negative effects of iron, lead and zinc on RASY or AMJE during acute or chronic exposure. Likewise, there were no significant effects of iron, lead or zinc on RASY or AMJE wet mass.	Horne and Dunson 1995
RASY	tadpoles	MORT	4.2 and >4.7		Al	10-30 (pH4.2),5 -15 (pH>4.7)	µM			Total dissolved Al was higher in acidified enclosure compared to controls (pH >4.7). Survival was unaffected by pH. Mean wet masses were significantly lower at pH 4.2 than at pH > 4.7.	Rowe et al. 1992
RASY	tadpoles - metamorph	DEVOBS	4.2 and >6.0		Al	16 (pH= 4.2), 0.1 (pH>6.0)	µM			Survival not associated with pH. Time to metamorphosis was longer for RASY at pH 4.2. No differences in wet masses at metamorphosis between the two pH levels.	Rowe et al. 1992
RATE	adult	POPSUR	4.0-5.0							68.8 % of water bodies at pH 5.0 contained RATE; 55 % of water at pH 4-5; and 17.7 % of water at pH 4.0.	Leuven et al. 1986 [k]
RATE	adult	POPSUR								Population decreased in acidified lakes.	Hagstrom 1981 [k]
RATE	adult	BEHAV	0.01 - 0.1 mol/L							Threshold = 0.01 and almost 100 % avoidance at 0.1 mol/L; efficiency of acidic stimulants is determined by quality of anions rather than pH value; difference in pH of two efficient solutions of different acids can be as big as 1.0.	Manteifel 1991
RATE	adult	PHYSIO	2.7-8.0			0.005-0.1 mol/L				Threshold of skin sensitivity for the three acids was 0.01 mol/L; in behavioural and electrophysiological experiments. Stimulus efficiency appeared dependent on concentration in the range of 0.01 - 0.1 mol/L.	Margolis and Manteifel 1991
RATE	egg	HATSUC	4.0, 5.0, 6.0	12-15	Al	100-800				79% embryos died at pH 4.0, < 5% at pH 5.0, and 6.0. Embryo mortality not associated with Al alone but synergistic effects of Al and pH at 5.0, and 6.0 resulted in increased mortality.	Andren et al. 1988
RATE	egg	POPSUR	4.0-5.0							In acidic waters, egg masses became heavily infested with fungi.	Leuven et al. 1986 [k]
RATE	egg	DEVOBS	4.0-5.0							Most hatchlings at pH 4.0 were deformed; at pH 4.5 or 5.0 few deformities noted.	Leuven et al. 1986 [k]
RATE	eggs	DEVOBS	4.0-6.0			100-800				Low pH exerted a strong harmful effect and high levels of Al almost completely precluded successful reproduction.	Andren and Nilson 1988

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RATE	embryo	DEVOBS	4.0-5.0	-2.0-25	Al					A few of the eggs in the 31 ponds died before first cleavage, particularly in circumneutral ponds, but most eggs died at mid-late cleavage/early gastrula (stages 7-12). Various types of abnormal embryos were observed.	Beattie and Tyler-Jones 1992
RATE	embryo	MORT	3.5-4.5 and 6.0 (control)	10±1	Ca	0.5, 1.0, 2.0 and 4.0	mg/L			All but one of the embryos exposed to pH 3.5 and 3.75 died within 24 h. There was some mortality between 6 h and 12 h at pH 3.5 but no discernible effect of calcium concentration within that period.	Cummins 1988
RATE	embryo	MORT	3.5-4.75 and 6.0 (control)	12±1	Ca	0.5, 1.0, 2.0 and 4.0	mg/L			At the lowest pH, all embryos but one died within 45 h. At pH 3.75 mortality increased with duration of exposure and with decreasing calcium concentration.	Cummins 1988
RATE	embryo	DEVOBS	4.0-5.0	-2.0-25.0	Al					Embryonic survival decreased with increasing inorganic monomeric Al at pH 4.5. High conc. of Al also increased embryo mortality. Body length of surviving larvae was decreased by both increasing Al conc. and low pH.	Beattie and Tyler-Jones 1992
RATE	embryo	DEVOBS	4.5 and 6.0	10	Al	0-0.4	mg/L			Embryonic survival decreased with increasing inorganic monomeric Al concentration at pH 4.5. High conc. of inorganic monomeric Al also increased the number of embryos which died in the early stages of development.	Beattie and Tyler-Jones 1992
RATE	embryo	DEVOBS	4.5-6.0	0-5 and 10	Al	0-14.83	µmol/L			Embryonic survival was lower at lower aluminum conc. Gastrulation and hatching appeared to be the most sensitive stages to both pH and Al concentration.	Beattie et al. 1992
RATE	embryo	MORT	3.92-7.39							Fertilization success was 87 % in acidic water and increased to 100 % following liming. It was estimated that at least 2.1 % of eggs deposited in a limed pond gave rise to metamorphs.	Beattie et al. 1993
RATE	embryo	DEVOBS								Inorganic monomeric Al conc. was the principal factor reducing fertilization success. Exposure to a high zinc concentration, early in development, subsequently increased the number of abnormal species.	Beattie et al. 1991
RATE	embryo	MORT	4.0-4.5							No embryos survived to become adults.	Hagstrom 1977 [k]

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RATE	embryo	DEVOBS	4.5, 6.0		Al	0-1600	µg/L			pH in the absence of Al had no effect on survival to tadpoles stage. Increasing Al conc. reduced the survival of lowland embryos in circumneutral water, but did not effect upland embryos.	Tyler-Jones et al. 1989
RATE	embryo	MORT	3.8, 4.0, 4.25, 4.5	7±1	Ca	0.5, 1.0, 2.0 and 4.0	mg/L			pH rose then remained close to initial levels. There was no significant relation between calcium conc. and the amount pH increased.	Cummins 1988
RATE	embryo	DEVOBS	3.92-4.84		Al					When limestone was added to ponds 1 and 2, fertilization success increased from approx 87% to 100%. The mean percentage survival of embryos increased significantly from 22% to 93% and from 0% to 69.3%, respectively.	Beattie and Tyler-Jones 1992
RATE	embryo-tadpoles	MORT	5.0	14.5	Al	0-1.6	mg/L			Elevated Al conc. increased the rate of morphological defects in larvae. Spinal curvatures and vesicles on head and thorax were observed. Vesicles ruptured and caused ulceration at later stages.	Olsson et al. 1987
RATE	embryo-tadpoles	MORT	4.0	14.5						No altered hatching frequency could be found for any stage of development due to a 24 h reduction of pH to 4.0. All samples from a certain egg mass showed similar hatching success independent of the stage at which they were acid shocked.	Olsson et al. 1987
RATE	embryo-tadpoles	HATSUC	4.5	18.0						Significantly lower hatching frequency for embryos incubated on sphagnum (35.2% survival) in comparison to controls (67.6% survival). A rise in pH occurred in control aquaria (from 4.5 to 4.97); this did not happen in the sphagnum treated aquaria.	Olsson et al. 1987
RATE	larvae	MORT	3.92-7.39							Embryonic survival in the two acidic ponds increased from 0 % and 22 % to 69% and 93 % respectively following liming. A year after liming, embryonic survival in one pond had decreased significantly from 93 % to 79 %.	Beattie et al. 1993
RATE	larvae	DEVOBS	4.0-6.0		Al	100-800				Low pH exerted a strong harmful effect and high levels of Al almost completely precluded successful reproduction.	Andren and Nilson 1988
RATE	not specified	POPSUR	4.0-8.0							Survey of amphibian breeding sites.	Beebee 1983 [k]

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
RATE	tadpoles	DEVOBS	4-7	17						Low pH resulted in deformities and malformations. This study shows that individuals responded differently to variations in pH than groups (ie. density dependent effects).	Cummins 1989
RATE	tadpoles	DEVOBS	3.6-6.5							Maximum size attained was positively correlated with pH; time to foreleg emergence was negatively correlated with pH.	Cummins 1986 [k]
RATE	tadpoles	POPSUR	4.0-5.0							No tadpoles found in pH > 5.0.	Leuven et al. 1986 [k]
RATI	metamorph -osis	BEHAV	3.5-4.5> pH >8.5-10.5					acidic: LC24: 3.6, LC72: 3.7, LC96: 3.9. alkaline: LC24: 9.9, LC72: 9.5, LC96: 9.5		Stress on tadpoles was noticeable at 4.5> pH >8.5. Erratic, jerky, twisted swimming, balance loss, sinking and sluggish movement. Tendencies increased with acidity or alkalinity. Significantly decreased food consumption.	Abbasi et al. 1989
RAUT	tadpoles	BEHAV	5.3-6.6							No differences were observed among treatments for RACL or RAUT tadpoles.	Sparling et al. 1995
RAVI	embryo	DEVOBS								At pH 3.8, 50 % or more developed normally.	Gosner and Black 1957 [k]
SASA	larvae	POPSUR	6.3-7.1	3.9-26.6						Larvae were growing in 11 out of 36 ponds showing various degrees of trophicity (eutrophic, oligotrophic and dystrophic), reflecting adaptation of the species to conditions prevailing at the site. Oxygen contents ranged from 0.9-10.1 mg/L.	Swierad and Zakrzewski 1989
TRAL	adult	POPSUR	4.0-5.0							9 % of water at pH 4-5, or 5.0 contained TRAL; no TRAL at pH 4.0.	Leuven et al. 1986 [k]
TRCR	adult	POPSUR	4.0-5.0							8 % of water bodies at pH 5.0 contained TRCR; 6 % of water at pH 4.0 - 5.0; no TRCR in water pH 4.0.	Leuven et al. 1986 [k]
TRCR	not specified	POPSUR	4.0-8.0							Survey of amphibian breeding sites.	Beebee 1983 [k]
TRHE	adult	POPSUR	4.0-5.0							21.6 % water bodies at pH 5.0 contained TRHE; no TRHE in pH 4.0.	Leuven et al. 1986 [k]
TRHE	adult	POPSUR	3.8-6.5							Bred in all pools; rarest in pH 3.8 - 4.3 rain fed ponds.	Beebee 1987 [k]
TRHE	adult	POPSUR	4.0-6.0							Rarely encountered in water with pH > 4.0 Breeding site characteristics studied.	Cooke and Frazer 1976 [k]

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
TRHE	embryo	DEVOBS	4.45 and 7.4	21±1						Embryos raised in acidified artificial soft water hatched at a smaller size, an earlier stage (38 vs. 39) of development and on average 1-2 d before those raised under neutral conditions. Survival to hatching was reduced under low pH in both species.	Griffiths et al. 1993
TRHE	larvae	DEVOBS	4.45 and 7.4	17-24						At 4 wks of growth all larvae had reached stages 52-54. Larvae grew to a larger size under neutral artificial soft water than under acid conditions. TRHE were smaller than TRVU (no significant difference). 95% TRHE survived under neutral and acid conditions.	Griffiths et al. 1993
TRHE	larvae	BEHAV	4.5 and 7.4-7.5	20±3						TRHE and TRVU both showed a decline in the response to prey after transfer to pH 4.5. For TRHE this was only significant at 22 h after transfer back to the same conditions. Larvae were more sluggish at the lower pH and tended to orient towards food.	Griffiths et al. 1993
TRHE	not specified	POPSUR	4.0-8.0							Survey of amphibian breeding sites.	Beebee 1983 [k]
TRVU	adult	POPSUR	4.0-5.0							18.9 % of water at pH 5.0 contained TRVU; no TRVU in water at pH 4.0.	Leuven et al. 1986 [k]
TRVU	adult	POPSUR								Population increased in acidified lakes.	Hagstrom 1981 [k]
TRVU	adult	BEHAV								Predation pressure on eggs of RAAR was low due to thick jelly. The eggs of BUBU were not attractive to predators with chewing mouths parts due to unpalatability but predators with sucking mouth parts were not repulsed.	Henrikson 1990
TRVU	adult	POPSUR	4.0-6.0							Rarely encountered in water with pH > 6.0. Breeding site characteristics studied.	Cooke and Frazer 1976 [k]
TRVU	embryo	DEVOBS	4.45 and 7.4	21±1						Embryos raised in acidified artificial soft water hatched at a smaller size, an earlier stage (38 vs. 39) of development and on average 1-2 d before those raised under neutral conditions. Survival to hatching was reduced under low pH in both species.	Griffiths et al. 1993

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
TRVU	larvae	DEVOBS	4.45 and 7.4	17-24						At 4 wks of growth all larvae had reached stages 52-54. Larvae grew to a larger size under neutral artificial soft water than under acid conditions. TRVU were larger than TRHE (not significant difference).	Griffiths et al. 1993
TRVU	larvae	BEHAV	4.5 and 7.4-7.5	20±3						TRHE and TRVU both showed a decline in the response to prey after transfer to pH 4.5. Larvae were more sluggish at the lower pH and tended to orient towards food but snap less frequently than under circumneutral conditions.	Griffiths et al. 1993
TRVU	not specified	POPSUR	4-8							Survey of amphibian breeding sites.	Beebee 1983 [k]
XEGI	embryo	MORT	3.6-9.0 (third bioassay)	21-22		0.3-10 x normal		LC50 at pH 4.5 was 2x blackwater		Dejellied embryos of XEGI and XELA showed comparable tolerances to increasing blackwater conc. No development occurred at pH 3.6. At pH 4.5 and above, survival increased and was only depressed in solutions of 2x, 5x and 10x blackwater.	Picker et al. 1993
XEGI	embryo	MORT	3-10	21-22		1 x normal		Blackwater : 3.84 (0.026 SE) (jellied) 6.73 (0.414 SE) (dejellied)	Blackwater: 3.6 (jellied) 4.3 (dejellied)	For the second bioassay the pH at which survival was first noted differed with type of water, jellied embryos were more resistant to low pH stress in both tap and blackwater. Dejellied eggs of both species have similar tolerance levels.	Picker et al. 1993
XEGI	embryo	MORT	3-10	21-22				Clearwater (1st bioassay): 3.81 (0.063 SE) (jellied) 4.06 (0.148 SE) (dejellied)	Clear water: 3.6 (jellied) 3.6 (dejellied)	The pH at which survival was first noted differed with type of water, jellied embryos were more resistant to low pH stress in both tap (clearwater) and blackwater. Dejellied eggs of both species have similar tolerance levels.	Picker et al. 1993
XELA	adult (skin)	PHYSIO								Decreased in short circuit current.	Fromm 1981 [k]
XELA	embryo	MORT						3.5	3.0	Results not extracted from paper.	Tome and Pough 1982 [k]
XELA	embryo	HATSUC	3.5 and 3.6	20-24						>90% of eggs remained in the egg stage; cleavage divisions visible after 3d. No hatching occurred.	Dumpert 1986

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
XELA	embryo	MORT	3.6-9.0 (third bioassay)	21-22		0.3-10 x normal		LC50 at pH 4.5 was 2x blackwater		Dejellied embryos of XEGI and XELA showed comparable tolerances to increasing blackwater conc. No development occurred at pH 3.6. At pH 4.5 and above, survival increased and was only depressed in solutions of 2x, 5x and 10x blackwater.	Picker et al. 1993
XELA	embryo	MORT	3-10	21-22				Clearwater: 3.92 (0.13 SE) (jellied) 3.93 (0.081 SE) (dejellied)	Clearwater: 3.8 (jellied), 3.6 (dejellied)	The pH at which survival was first noted differed with type of water, jellied embryos were more resistant to low pH stress in both tap (clearwater) and blackwater. Dejellied eggs of both species have similar tolerance levels.	Picker et al. 1993
XELA	embryo	MORT	3-10	21-22		1x normal		Blackwater : 5.03 (0.148 SE) (jellied) 4.51 (0.054 SE) (dejellied)	Blackwater: 4.2 (jellied) 4.2 (dejellied)	The pH at which survival was first noted differed with type of water, jellied embryos were more resistant to low pH stress in both tap (clearwater) and blackwater. Dejellied eggs of both species have similar tolerance levels.	Picker et al. 1993
XELA	embryo (< stage 4)	HATSUC	3.5-6.0	21	Al	0.15-0.90				Results not extracted from paper.	Dale et al. 1985 [k]
XELA	embryo (stages 10-13)	DEVOBS	3.9-4.3	25						Tight coiling associated with shrinkage of the perivitelline space; when jelly layer removed at pH 4.3 the embryos developed normally.	Dunson and Connell 1982 [k]
XELA	embryo-metamorph	HATSUC	3.5-3.6 (Brook I, II)	20-24						36±14% developed into tadpoles. 57.2±22% of tadpoles were injured ie. bent backs, weaker pigmentation than controls. 40% tadpoles mortality occurred. Those that survived developed significantly slower than controls.	Dumpert 1986
XELA	tadpoles	DEVOBS	4.0, 7.2-7.6	25-30						One mortality occurred at neutral pH, 10 died at pH 4.0. Three d after exposure period 4 more tadpoles from the pH 4.0 group died.	Pierce and Montgomery 1989
XXNE	larvae	BEHAV	4.5 and 7.4-7.5	20±3						TRCR showed no decline in the response to prey after transfer to pH 4.5. With only three exceptions, TRCR snapped and consumed food immediately after it was offered. All TRCR larvae achieved the maximum score of 5 in all tests.	Griffiths et al. 1993

Table 6 - pH Studies - 40

Species Code [b]	Lifestage	Study Endpoint [g]	pH Level(s)	Temp [h]	Additional Contam [a]	Cont. Conc.	Conc. Units [e]	LC50 [e]	LC100 [e]	Effects [eg]	Reference [k]
XXXA	adult	POPSUR								1233 individuals of 10 species of urodeles, 139 individuals of 6 species of anurans. Overall density across all forest types was 0.41/m ^{2} (urodeles, 0.37/m ^{2}; anurans, 0.04/m ^{2}).	Wyman and Jancola 1992
XXXA	all stages	POPSUR								The pH levels encountered were generally not toxic to the resident amphibians. A direct relationship of amphibian species richness with pond size was found. Only larger ponds were long-lived enough for metamorphosis of amphibian larvae.	Kutka and Bachmann 1990
XXXA	embryo	MORT								There was very limited evidence that anthropogenic episodic acidification occurred in high-elevation habitats in the Rocky Mountains.	Vertucci and Corn 1993
XXXX	not specified	pH+ CONTAM								Results not extracted from paper.	Nishiuchi 1980

Table 7: Reviews of primary literature on effects of contaminants on amphibians and reptiles.

Review Title	Reference[k]
Evaluation of water quality criteria for four common pesticides on the basis of computer-aided studies	Abbasi and Soni 1991
Linking genotoxic responses and reproductive success in ecotoxicology	Anderson and Wild 1994
Modelling of DDT dynamics in Lake Kariba, a tropical man-made lake, and its implications for the control of tsetse flies	Berg 1995
Reptiles and amphibians: shy and sensitive vertebrates of the Great Lakes Basin and St. Lawrence River	Bishop and Gendron 1998
Effects of ionizing radiation on the development of amphibians	Brunst 1965 [k]
Introduction to round table discussion: Chemical carcinogens in amphibians	Clothier 1982
Endocrine-disrupting contaminants and reproduction in vertebrate wildlife	Crain and Guillette 1997
The role of estrogen in turtle sex determination and the effect of PCBs	Crews et al. 1995
Genotoxicity of mercury compounds. A review	de Flora et al. 1994
Review of the toxicity and impacts of brodifacoum on non-target wildlife in New Zealand	Eason and Spurr 1995
Cadmium hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1985a
Carbofuran hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1985b
Mirex hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1985c
Selenium hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1985d
Toxaphene hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1985e
Chromium hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1986a
Diazinon hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1986b
Dioxins hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1986c
Polychlorinated biphenyls hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1986d
Mercury hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1987a
Polycyclic aromatic hydrocarbons hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1987b
Arsenic hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1988a
Chlorpyrifos hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1988b
Lead hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1988c
Atrazine hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1989a
Molybdenum hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1989b
Pentachlorophenol hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1989c
Tin hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1989d
Boron hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1990b
Chlordane hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1990c
Paraquat hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1990d
Cyanide hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1991
Diflubenzuron hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1992a
Fenvalerate hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1992b

Table 7 - Reviews - 2

Review Title	Reference[k]
Zinc hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1993
Acrolein hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1994a
Famphur hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1994b
Radiation hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1994c
Sodium monofluoroacetate (1080) hazards to fish, wildlife, and invertebrates: A synoptic review	Eisler 1995
Impacts of mercury contamination in the southeastern United States	Facemire et al. 1995
Mississippi Delta wildlife developing resistence to pesticides	Ferguson 1963a
Amphibian micronucleus test(s): a simple and reliable method for evaluating in vivo genotoxic effects of freshwater pollutants and radiations. Initial assessment	Fernandez et al. 1993
Rotenone hazards to amphibians and reptiles	Fontenot et al. 1994
The influence of acidic pond water on amphibians: a review	Freda 1986a
The effects of aluminum and other metals on amphibians	Freda 1991
Long term monitoring of amphibian populations with respect to the effects of acidic deposition	Freda et al. 1991
Assessing hazards of organophosphate pesticides to wildlife	Grue et al. 1983
Organization versus activation: The role of endocrine-disrupting contaminants (EDCs) during embryonic development in wildlife	Guillette et al. 1995
Endocrine-disrupting contaminants and reproductive abnormalities in reptiles	Guillette and Crain 1995
Effects of increased solar ultraviolet radiation on aquatic ecosystems	Hader et al. 1995
Waterfowl and their habitat: Threatened by acid rain?	Haines and Hunter 1982
Effects of environmental contaminants on reptiles: a review	Hall 1980
Review: Assessing effects of pesticides on amphibians and reptiles: status and needs	Hall and Henry 1992
Developmental responses of amphibians to solar and artificial UVB sources: a comparative study	Hays et al. 1996
Green turtle fibropapillomatosis: Challenges to assessing the role of environmental cofactors	Herbst and Klein 1995
Leopard frog populations and mortality in Wisconsin	Hine et al. 1981
A review of the effects of pollution on marine turtles	Hutchinson and Simmonds 1991
Enzyme-mediated selective toxicity of an organophosphate and a pyrethroid: some examples from a range of animals	Hutson and Millburn 1991
Causes of mortality and diseases in tortoises: A review	Jacobson 1994
Cellular neurophysiological effects of phenol derivatives	Kaila 1982 [k]
Effects of pesticides on amphibians and reptiles in Sub-Saharan Africa	Lambert 1997a
Chronic toxicity of environmental contaminants: sentinels and biomarkers	Leblanc and Bain 1997
Drugs, anesthetics and toxic conditions in alligators	Lee 1981
Residues and some effects of chlorinated hydrocarbon insecticides in biological material	Marth 1965
Assessment of the effects of chemicals on the reproductive functions of reptiles and amphibians	Martin 1983
Manual of acute toxicity: interpretation and data base for 410 chemicals and 66 species of freshwater animals	Mayer and Ellersieck 1986
Experiences with single-species tests for acute toxic effects on freshwater animals	Mayer and Ellersieck 1988

Table 7 - Reviews - 3

Review Title	Reference[k]
Turtles as monitors of chemical contaminants in the environment	Meyers-Schone and Walton 1994
Aspects on the toxicity of cadmium and its compounds	Nilsson 1970
Bioaccumulation and effects of selenium in wildlife	Ohlendorf 1989
Methyl mercury and PCB in the alligator; public health implications, environmental monitoring and pathological effects	Peters 1982
Effects of pollution on freshwater fish and amphibians	Pickering et al. 1983
Acid tolerance in amphibians	Pierce 1985 [k]
The effects of acid rain on amphibians	Pierce 1987
Genetic variation in tolerance of amphibians to low pH	Pierce and Wooten 1992b
Frogs, poisons and parasites	Poynton 1993
Inheritance and environment as causes for teratogenesis in amphibians and reptiles	Sachsse 1983
Candidate repellents, oral and dermal toxicants and fumigants for brown tree snake control	Savarie and Bruggers 1992
Environmental genotoxicity: probing the underlying mechanisms	Schugart and Theodorakis 1994
Reproductive toxins and alligator abnormalities at Lake Apopka, Florida	Semenza et al. 1997
Environmental hazards of aluminum to plants, invertebrates, fish and wildlife	Sparling and Lowe 1996a
Some effects of pollutants in terrestrial ecosystems	Stickel 1975
Amphibian toxicity data for water quality criteria chemicals	US EPA 1996
Action of pyrethroid insecticides on the vertebrate nervous system	Vijverberg and van den Bercken 1982 [k]
Ecological considerations regarding massive environmental contamination with 2,3,7,8-tetrachlorodibenzo-para-dioxin	Westing 1978
Review: Status and conservation of tortoises in Greece	Willemsen and Hailey 1989
Neoplastic skin lesions in salamanders from a sewage lagoon containing perylene	Windsor et al. 1977
A review of some petroleum impacts on sea turtles	Witham 1983
A long-term study of ecosystem contamination with 2,3,7,8-tetrachlorodibenzo-p-dioxin	Young and Cockerham 1987

Table 8: Primary literature or reviews that examine possible causes for amphibian and/or reptile populations declines with no direct contaminant exposure investigation.

Population Status Paper Title	Reference
Natural mortality of eggs and larvae of *Ambystoma t. tigrinum*	Anderson et al. 1971
Species translocation menaces Iberian waterfrogs	Arano et al. 1995
Where have all the froggies gone?	Barinaga 1990
Observations concerning the decline of the British amphibians	Beebee 1973
Environmental change as a cause of Natterjack toad (*Bufo calamita*) declines in Britain	Beebee 1977
Predation by gray jays on aggregating tadpoles of the boreal toad (*Bufo boreas*)	Beiswenger 1981
Amphibian losses in the Oregon Cascade range	Blaustein and Olson 1992
The puzzle of declining amphibian populations	Blaustein and Wake 1995
Potentiel d'utilisation du necture tachete (*Necturus maculosus*) comme bioindicateur de la contamination de Fleuve Saint-Laurent	Bonin et al. 1994
Risk assessment, life history strategies, and turtles: Could declines be prevented or predicted?	Burger and Garber 1995
Status report on the Lake Erie water snake *Nerodia sipedon insularum* in Canada	Campbell and King 1991
Possible interrelations among environmental toxicants, amphibian development, and decline of amphibian populations	Carey and Bryant 1995
Tadpoles as bio-indicators of stream quality: a baseline study	Channing 1998
Indications of recent changes in status in the British Isles of the frog (*Rana temporaria*) and the toad (*Bufo bufo*)	Cooke 1972a
Logging in Western Oregon: Responses of headwater habitats and stream amphibians	Corn and Bury 1989
Effects of silvicultural edges on the distribution and abundance of amphibians in Maine	DeMaynadier and Hunter 1998
A recovery program for the natterjack toad (*Bufo calamita*) in Britain	Denton et al. 1997
Amphibians and reptiles: the declining species	Dodd 1977
The need for status information on common herpetofaunal species	Dodd and Franz 1993
Collapse of a regional frog fauna in the Yosemite area of the California Sierra Nevada, USA	Drost and Fellers 1996
A symposium on amphibian declines and habitat acidification	Dunson et al. 1992
Effect of road traffic on amphibian density	Fahrig et al. 1995
The decline of amphibians in California's Great Central Valley	Fisher and Shaffer 1996
Fowler's toad, *Bufo woodhousii fowleri*, in Canada: Biology and population status	Green 1989
Perspectives on amphibian population declines: defining the problem and searching for answers	Green 1998
Decline and fall of the amphibians	Griffiths and Beebee 1992
Predicting the persistence of amphibian populations with the help of a spatial model	Halley et al. 1996
Declining amphibians in Europe, with particular emphasis on the situation in Britain	Halliday 1993
Regional dynamics and the status of amphibians	Hecnar and M'Closkey 1996b
Changes in the composition of a ranid frog community following bullfrog extinction	Hecnar and M'Closkey 1997a
Spatial scale and determination of species status of the green frog	Hecnar and M'Closkey 1997b
The effects of predatory fish on amphibian species richness and distribution	Hecnar and M'Closkey 1997c

Table 8 - Population Status - 2

Population Status Paper Title	Reference
Global amphibian declines: a perspective from the Caribbean	Hedges 1993
Leopard frog populations and mortality in Wisconsin	Hine et al. 1981
Monitoring amphibian populations in the Copenhagen region	Holmen and Wederkinch 1988
Conservation and management of the American crocodile	Kushlan 1988
The problem of declining amphibian populations in the Commonwealth of Independent States and adjacent territories	Kuzmin 1994
Herpetology in Mauritius, a history of extinction, future hope for conservation	Lambert 1988
Epidemic disease and the catastrophic decline of Australian rain forest frogs	Laurance et al. 1996
The status of *Drymarchon corais couperi* (Holbrook), the eastern indigo snake, in the southeastern United States	Lawler 1977
Untersuchungen zu den Auswirkungen der Gewasserversauerung auf die Ei- und Larvalstadien von *Rana temporaria* Linnaeus, 1758	Linnenbach and Gebhardt 1987
Decline of a tropical montane amphibian fauna	Lips 1998
Amphibian alarm: Just where have all the frogs gone?	Livermore 1992
Effects of habitat fragmentation on the abundance of two species of leptodactylid frogs in an Andean Montane forest	Marsh and Pearman 1997
Reptile and frog utilization of rehabilitated bauxite minesites and dieback-affected sites in western Australia's Jarrah *Eucalyptus marginata* forest	Nichols and Bamford 1985
Changes in vegetation and reptile populations on Round Island, Mauritius, following eradication of rabbits	North et al. 1994
Putting declining amphibian populations in perspective: Natural fluctuations and human impacts	Pechmann and Wilbur 1994
Amphibian declines and climate disturbance: The case of the Golden Toad and the Harlequin Frog	Pounds and Crump 1994
Declining amphibian populations	Rabb 1990
The elucidation of amphibian declines - Are amphibian populations disappearing?	Reaser 1996
Assessment of "nondeclining" amphibian populations using power analysis	Reed and Blaustein 1995
Declines in populations of Australia's endemic tropical rainforest frogs	Richards et al. 1993
Threats to imperiled freshwater fauna	Richter et al. 1996
Polychlorinated biphenyls and chlorinated pesticdes in Southern Ontario, Canada, green frogs	Russell et al. 1997
The role of pollution in large-scale population disturbances. Part 2: Terrestrial populations	Sarokin and Schulkin 1982
Amphibian deformities continue to puzzle researchers	Schmidt 1997
Apparent long-term decline in diamondback terrapin populations at the Kennedy Space Center Florida	Seigel 1993
Indications of the decline of breeding amphibians at an isolated pond in marginal land, 1954-1967	Simms 1969
The nocturnal amphibian fauna of the southern Lake Michigan Beach	Stille 1952
Relative abundance of herpetofauna among eight types of Maine peatland vegetation	Stockwell and Hunter 1989
Herpetological notes from the Nevada test site	Tanner 1982
Population dynamics of the Manitoba toad, *Bufo hemiophrys*, in northwestern Minnesota	Tester and Breckenridge 1964
Frog abundance along streams in Bornean forests	Voris and Inger 1995
Declining amphibian populations	Wake 1991
Seasonal changes in anuran populations in a northern Michigan pond	Werner and McCune 1979

Table 8 - Population Status - 3

Population Status Paper Title	Reference
What's happening to the amphibians?	Wyman 1990

Table Notes

Note [a]: see Appendix 2a for description of contaminant codes

Note [b]: see Appendix 1a for species common names, scientific names and classifications associated with specific species codes.

Note [c]: see Appendix 3 for province, state or country names associated with codes

Note [d]: see Appendix 6a for glossary of abbreviations and units or Appendix 6b for unknown or study classification terms

Note [e]: where units are not listed, ppm or µg/L wet weight may be assumed

Note [f]: see Appendix 4 for standard exposure route and study method descriptions

Note [g]: see Appendix 5 for standard study endpoint descriptions

Note [h]: temperature in degrees Celsius

Note [i]: Species names are given as reported in papers. If discrepancy occurred between common names and scientific names, Frank and Ramus 1995 was used as the primary source. Where only a scientific name or only a common name was reported in a paper, Frank and Ramus 1995, various internet sites and personal communication sources were used to suggest corresponding scientific or common names.

Note [j]: Contaminant names are as reported in papers. The Merck Index, 1989 and The Dictionary of Chemical Synonyms was used to assign Chemical Abstract Service numbers where not given in papers. Contaminants with the same CAS numbers were grouped under the same Contaminant Code.

Note [k]: refers to those references previously listed in Harfenist *et al.* 1989.

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Appendix 1a: Species codes in alphabetical order grouped by Class (Amphibian or Reptile) with corresponding scientific name, common name and Order[i]

Class	Code	Scientific Name[i]	Common Name[i]	Order
U	XXXV	Various amphibians and reptiles	various species of amphibians/reptiles	Various
U	XXXX	unknown species	unknown amphibian or reptile species	unknown
A	ACCB	*Acris crepitans blanchardi*	Blanchard's Cricket Frog	Anura
A	ACCR	*Acris crepitans*	Northern Cricket Frog	Anura
A	ACGR	*Acris gryllus*	Southern Cricket Frog	Anura
A	ADBR	*Adelotus brevis*	Tusked Frog	Anura
A	AFFO	*Afrixalus fornasini*	Silver-banded Banana Frog	Anura
A	AFSP	*Afrixalus spinifrons*	Natal Banana Frog	Anura
A	ALOB	*Alytes obstetricans*	Olive Midwife Toad	Anura
A	AMCA	*Ambystoma californiense*	California Tiger Salamander	Caudata
A	AMCI	*Ambystoma cingulatum*	Flatwood Salamander	Caudata
A	AMGR	*Ambystoma gracile*	Northwestern Salamander	Caudata
A	AMJE	*Ambystoma jeffersonianum*	Jefferson Salamander	Caudata
A	AMLA	*Ambystoma laterale*	Blue-Spotted Salamander	Caudata
A	AMLJ	*Ambystoma laterale-jeffersonianum*	hybrid complexes of Salamanders	Caudata
A	AMMA	*Ambystoma maculatum*	Spotted Salamander	Caudata
A	AMMC	*Ambystoma macrodactylum croceum*	Santa Cruz Long-toed Salamander	Caudata
A	AMME	*Ambystoma mexicanum*	Axolotl	Caudata
A	AMMM	*Ambystoma m. macrodactylum*	Western Long-toed Salamander	Caudata
A	AMOP	*Ambystoma opacum*	Marbled Salamander	Caudata
A	AMOR	*Amolops orphnocnemis*	Orphnocnemis Sucker Frog	Anura
A	AMPH	*Amolops phaeomerus*	Phaeomerus Sucker Frog	Anura
A	AMPL	*Ambystoma platineum*	Silvery Salamander	Caudata
A	AMPO	*Amolops poecilus*	Peocilus Sucker Frog	Anura
A	AMTA	*Ambystoma talpoideum*	Mole Salamander	Caudata
A	AMTE	*Ambystoma texanum*	Smallmouth Salamander	Caudata
A	AMTI	*Ambystoma tigrinum*	Tiger Salamander	Caudata
A	AMTM	*Ambystoma tremblayi*	Tremblay's Salamander	Caudata
A	AMTR	*Amphiuma tridactylum*	Three-toed Amphiuma	Caudata
A	AMXX	*Ambystoma* species	Mole Salamander species	Caudata
A	ANAE	*Aneides aeneus*	Green Salamander	Caudata
A	ANFE	*Aneides ferreus*	Clouded Salamander	Caudata
A	ANFN	*Aneides flavipunctatus niger*	Santa Cruz Black Salamander	Caudata
A	ANLE	*Ansonia leptopus*	Matang Stream Toad	Anura
A	ANLU	*Aneides lugubris*	Arboreal Salamander	Caudata
A	ANSP	*Ansonia spinulifer*	Kina Balu Stream Toad	Anura
A	ARPO	*Arthroleptis poecilonotus*	West African Screeching Frog	Anura
A	ASTR	*Ascaphus truei*	Tailed Frog	Anura
A	ATCH	*Atelopus chiriquiensis*	Lewis' Stubfoot Toad	Anura
A	ATIG	*Atelopus ignescens*	Quito Stubfoot Toad	Anura
A	ATVA	*Atelopus varius*	Veragoa Stubfoot Toad	Anura
A	BAAT	*Batrachoseps attenatus*	California Slender Salamander	Caudata
A	BOBO	*Bombina bombina*	Firebelly Toad	Anura
A	BOMA	*Bolitoglossa marmorea*	Crater Salamander	Caudata
A	BOMI	*Bolitoglossa minutula*	Tropical Lungless Salamander species	Caudata
A	BONI	*Bolitoglossa nigrescens*	Cordillera Central Salamander	Caudata
A	BOOR	*Bombina orientalis*	Oriental Firebelly Toad	Anura
A	BOVA	*Bombina variegata*	Yellowbelly Toad	Anura

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	BUAM	*Bufo americanus*	American Toad	Anura
A	BUAN	*Bufo andrewsi*	Andrews' Toad	Anura
A	BUAR	*Bufo arenarum*	Common Toad	Anura
A	BUAS	*Bufo asper*	Java Toad	Anura
A	BUBJ	*Bufo japonicus*	Japanese Toad	Anura
A	BUBO	*Bufo boreas*	Western Toad	Anura
A	BUBU	*Bufo bufo*	Common European Toad	Anura
A	BUCA	*Bufo calamita*	Natterjack Toad	Anura
A	BUCN	*Bufo canorus*	Yosemite Toad	Anura
A	BUCO	*Bufo cognatus*	Great Plains Toad	Anura
A	BUDD	*Bufo debilis debilis*	Eastern Green Toad	Anura
A	BUDI	*Bufo divergens*	unknown toad species	Anura
A	BUFA	*Bufo fastidiosus*	Pico Blanco Toad	Anura
A	BUFO	*Bufo fowleri*	Fowler's Toad	Anura
A	BUGA	*Bufo gariepensis*	Karroo Toad	Anura
A	BUGR	*Bufo gargarizans*	Chusan Island Toad	Anura
A	BUHA	*Bufo halophilus*	California Toad	Anura
A	BUHB	*Bufo hemiophrys baxteri*	Wyoming Toad	Anura
A	BUHE	*Bufo hemiophrys*	Canadian Toad	Anura
A	BUJU	*Bufo juxtasper*	Sungei Tawan Toad	Anura
A	BUMA	*Bufo marinus*	Giant Toad	Anura
A	BUMC	*Bufo maculatus*	Hallowell's Toad	Anura
A	BUME	*Bufo melanostictus*	Black Spined Toad	Anura
A	BUPE	*Bufo periglenes*	Alajuela Toad	Anura
A	BUPU	*Bufo punctatus*	Baird's Spotted Toad	Anura
A	BUQU	*Bufo quercicus*	Oak Toad	Anura
A	BURA	*Bufo rangeri*	Kei Road Toad	Anura
A	BURE	*Bufo regularis*	Square-marked Toad	Anura
A	BUTE	*Bufo terrestris*	Southern Toad	Anura
A	BUVA	*Bufo valliceps*	Gulf Coast Toad	Anura
A	BUVI	*Bufo viridis*	European Green Toad	Anura
A	BUVU	*Bufo vulgaris*	unknown toad species	Anura
A	BUWO	*Bufo woodhousii*	Woodhouse's Toad	Anura
A	BUXX	*Bufo* species	Toad species	Anura
A	CACU	*Caudiverbera caudiverbera*	Helmeted Water Toad	Anura
A	CANA	*Cacosternum namaquense*	Namaqua Metal Frog	Anura
A	CANN	*Cacosternum nanum*	Mozambique Metal Frog	Anura
A	CATR	*Capensibufo tradouwi*	Swellendam Cape Toad	Anura
A	CEOR	*Ceratophrys ornata*	Ornate Horned Frog	Anura
A	CEXX	*Centrolene* species	Giant Glass Frog species	Anura
A	CHXE	*Chiromantis xerampelina*	African Gray Treefrog	Anura
A	COXX	*Cophixalus* species	Rainforest Frog species	Anura
A	CRAA	*Cryptobranchus alleganiensis*	Eastern hellbender	Caudata
A	CRAL	*Cryptobranchus alleganiensis*	Hellbender	Caudata
A	CRGE	*Crinia georgiana*	Red-Legged Froglet	Anura
A	CRGL	*Crinia glauerti*	Rattle Froglet	Anura
A	CRIN	*Crinia insignifera*	White-throated Froglet	Anura
A	CRPS	*Crinia pseudinsignifera*	Darling Plateau Froglet	Anura
A	CYPY	*Cynops pyrrhogaster*	Japanese Firebelly Newt	Caudata
A	DEBU	*Dendrobates pumilio*	Strawberry Poison Frog	Anura

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	DEFA	*Desmognathus auriculatus*	Southern Dusky Salamander	Caudata
A	DEFU	*Desmognathus fuscus*	Dusky Salamander	Caudata
A	DEHS	*Dendrobates histrionicus sylvaticus*	Harlequin Poison Frog	Anura
A	DEMO	*Desmognathus monticola*	Seal Salamander	Caudata
A	DEOC	*Desmognathus ochrophaeus*	Mountain Dusky Salamander	Caudata
A	DEQU	*Demognathus quadramaculatus*	Blackbelly Salamander	Caudata
A	DEWE	*Desmognathus welteri*	Black Mountain Salamander	Caudata
A	DEWR	*Desmognathus wrighti*	Pigmy Salamander	Caudata
A	DEXX	*Dendrobates* species	Poison Frog species	Anura
A	DICO	*Dicamptodon copei*	Cope's Giant Salamander	Caudata
A	DIEN	*Dicamptodon ensatus*	California Giant Salamander	Caudata
A	DITE	*Dicamptodon tenebrosus*	Pacific Giant Salamander	Caudata
A	DIVI	*Diemictylus viridescens*	unknown newt	Caudata
A	ELAN	*Eleutherodactylus angelicus*	Angel Robber Frog	Anura
A	ELBU	*Eleutherodactylus buckleyi*	Buckley's Robber Frog	Anura
A	ELCH	*Eleutherodactylus chloronotus*	Green Robber Frog	Anura
A	ELCO	*Eleutherodactylus coqui*	Puerto Rican Coqui	Anura
A	ELCR	*Eleutherodactylus cruentus*	Chiriqui Robber Frog	Anura
A	ELHY	*Eleutherodactylus hylaeformis*	Pico Blanco Robber Frog	Anura
A	ELJA	*Eleutherodactylus jasperi*	Cayey Robber Frog	Anura
A	ELKA	*Eleutherodactylus karlschmidti*	Karl's Robber Frog	Anura
A	ELME	*Eleutherodactylus melanostictus*	Black-lined Robber Frog	Anura
A	ELPO	*Eleutherodactylus podiciferus*	Cerro Utyum Robber Frog	Anura
A	ELPU	*Eleutherodactylus punctariolus*	Bob's Robber Frog	Anura
A	ELTR	*Eleutherodactylus trepidotus*	Shy Robber Frog	Anura
A	ENEO	*Ensatina eschscholtzi oregonensis*	Oregon Ensatina	Caudata
A	ENES	*Ensatina eschscholtzii*	Ensatina	Caudata
A	EUBB	*Eurycea bislineata bislineata*	Two-lined Salamander	Caudata
A	EUBI	*Eurycea bislineata*	Northern Two-lined Salamander	Caudata
A	EULL	*Eurycea longicauda longicauda*	Longtailed Salamander	Caudata
A	EULO	*Eurycea longicauda*	Longtail Salamander	Caudata
A	EULU	*Eurycea lucifuga*	Cave Salamander	Caudata
A	EUPU	*Eupemphix pustulosus*	unknown tropical frog species	Anura
A	EUQU	*Eurycea quadridigitata*	Dwarf Salamander	Caudata
A	GACA	*Gastrophryne carolinensis*	Eastern Narrowmouth Toad	Anura
A	GYPO	*Gyrinophilus porphyriticus*	Spring Salamander	Caudata
A	HEEY	*Heleioporus eyrei*	Moaning Frog	Anura
A	HEHE	*Heleophryne hewitti*	Hewitt's African Ghost Frog	Anura
A	HEIO	*Heleioporus inornatus*	Swamp Burrowing Frog	Anura
A	HENA	*Heleophryne natalensis*	Natal Ghost Frog	Anura
A	HEOR	*Heleophryne purcelli*	Purcell's African Ghost Frog	Anura
A	HERE	*Heleophryne regis*	Royal Ghost Frog	Anura
A	HERO	*Heleophryne rosei*	Skeleton Gorge Ghost Frog	Anura
A	HESC	*Hemidactylium scutatum*	Four-toed Salamander	Caudata
A	HEWA	*Heideotriton wallacei*	unknown salamander species	Caudata
A	HYAJ	*Hyla arborea*	European Treefrog	Anura
A	HYAN	*Hyla andersonii*	Pine Barrens Treefrog	Anura
A	HYCA	*Hyla cadaverina*	California Chorus Frog	Anura
A	HYCE	*Hyla crepitans*	Emerald-eyed Treefrog	Anura
A	HYCH	*Hyla chrysoscelis*	Cope's Gray Treefrog	Anura

Appendix 1a - Species Codes - 4

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	HYCI	*Hyla cinerea*	Green Treefrog	Anura
A	HYCL	*Hyla calypsa*	unknown treefrog	Anura
A	HYFE	*Hyla femoralis*	Pine Woods Treefrog	Anura
A	HYGA	*Hyla grylatta*	Pacific Lowland Treefrog	Anura
A	HYGR	*Hyla gratiosa*	Barking Treefrog	Anura
A	HYJA	*Hyla japonica*	Japanese Treefrog	Anura
A	HYMA	*Hyperolius marmoratus*	Marbled Reed Frog	Anura
A	HYPI	*Hyla picadoi*	Volcan Barba Treefrog	Anura
A	HYPL	*Hydromantoides platycephalus*	Mount Lyell Salamander	Caudata
A	HYPS	*Hyla pseudopuma*	Gunther's Costa Rican Treefrog	Anura
A	HYRE	*Pseudacris regilla*	Pacific Chorus Frog	Anura
A	HYRI	*Hyla rivularis*	American Cinchona Plantation Treefrog	Anura
A	HYRT	*Hynobius retardatus*	Noboribetsu Salamander	Caudata
A	HYSE	*Hyperolius semidiscus*	Hewitt's Reed Frog	Anura
A	HYSQ	*Hyla squirella*	Squirrel Treefrog	Anura
A	HYVA	*Hyla vasta*	Hispaniola Treefrog	Anura
A	HYVE	*Hyla versicolor*	Gray Treefrog	Anura
A	HYXX	*Hyla* species	Treefrog species	Anura
A	KASE	*Kassina senegalensis*	Senegal Running Frog	Anura
A	LEGR	*Leptolalax gracilis*	Matang Asian Toad	Anura
A	LELA	*Lepidobatrachus laevis*	Budgett's Frog	Anura
A	LEMA	*Leurognathus marmoratus*	Shovelnose Salamander	Caudata
A	LEMO	*Leptobrachium montanum*	Mountain Spadefoot Toad	Anura
A	LETY	*Leptodactylus typhonius*	White-lipped Frog	Anura
A	LIAD	*Litoria adelaidensis*	Slender Treefrog	Anura
A	LICA	*Litoria caerulea*	Australasian Treefrog species	Anura
A	LIEW	*Litoria ewingii*	Australian Brown Treefrog	Anura
A	LIGE	*Litoria genimaculata*	Brown-Spotted Treefrog	Anura
A	LIGR	*Litoria gracilenta*	Dainty Green Treefrog	Anura
A	LILO	*Litoria lorica*	Alexandra Greek Treefrog	Anura
A	LIMO	*Litoria moorei*	Western Green Frog	Anura
A	LINA	*Litoria nannotis*	Torrent Treefrog	Anura
A	LINY	*Litoria nyakalensis*	Henrietta Creek Treefrog	Anura
A	LIOR	*Limnodynastes ornatus*	Ornate Burrowing Frog	Anura
A	LIPE	*Limnodynastes peronii*	Brown-Striped Frog	Anura
A	LIRH	*Litoria rheocola*	Atherton Tableland Treefrog	Anura
A	LITA	*Limnodynastes tasmaniensis*	Spotted Grass Frog	Anura
A	LIXA	*Litoria xanthomera*	Lime Treefrog	Anura
A	LIXX	*Limnodynastes* species	Australian Swamp Frog species	Anura
A	LYDO	*Limnodynastes dorsalis*	Western Banjo Frog	Anura
A	MIFL	*Mixophyes fleayi*	Queensland Barred Frog	Anura
A	MIIT	*Mixophyes iteratus*	Giant Barred Frog	Anura
A	MIOR	*Microhyla ornata*	Ornate Rice Frog	Anura
A	NABO	*Natalobatrachus bonebergi*	Natal Diving Frog	Anura
A	NECE	*Neobatrachus centralis*	Trilling Frog	Anura
A	NELE	*Necturus lewisi*	Neuse River Waterdog	Caudata
A	NEMA	*Necturus maculosus*	Mudpuppy	Caudata
A	NOPE	*Notophthalmus perstriatus*	Striped Newt	Caudata
A	NOVI	*Notophthalmus viridescens*	Eastern Newt	Caudata
A	NOVL	*Notophthalmus viridescens louisianensis*	Central Newt	Caudata

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	NOVV	*Notophthalmus viridescens virdescens*	Eastern Red-spotted Newt	Caudata
A	NOXX	*Notophthalmus* species	Red-spotted Newt species	Anura
A	NYDA	*Nyctimystes dayi*	Day's Big-eyed Treefrog	Anura
A	OEGR	*Oedipina grandis*	Cerro Pando Worm Salamander	Caudata
A	OSAN	*Osornophryne antisana*	Napo Plump Toad	Anura
A	PAHO	*Paramesotriton hongkongensis*	Hong Kong Warty Newt	Caudata
A	PEFU	*Pelobates fuscus*	Common Eurasian Spadefoot Toad	Anura
A	PEHO	*Pedostibes hosii*	Boulenger's Asian Tree Toad	Anura
A	PELE	*Peltophryne lemur*	Lowland Carribean Toad	Anura
A	PHMA	*Phyllodactylus marmoratus*	MarmoRatus Leaf-toad Froglet	Anura
A	PHNA	*Phrynobatrachus natalensis*	Natal River Frog	Anura
A	PHVI	*Phyllobates vittatus*	Golden Poison Frog	Anura
A	PLCI	*Plethodon cinereus*	Red-Backed Salamander	Caudata
A	PLDU	*Plethodon dunni*	Dunn's Salamander	Caudata
A	PLEL	*Plethodon elongatus*	Del Norte Salamander	Caudata
A	PLGL	*Plethodon glutinosus*	Northern Slimy Salamander	Caudata
A	PLHU	*Plethodon huldae*	Huldae Woodland Salamander	Caudata
A	PLID	*Plethodon idahoensis*	Cour D'alene Salamander	Caudata
A	PLJO	*Plethodon jordani*	Jordan's Salamander	Caudata
A	PLKE	*Plethodon kentucki*	Cumberland Plateau Salamander	Caudata
A	PLME	*Plethodon metcalfi*	Woodland Salamander	Caudata
A	PLNE	*Plethodon nettingi*	Cheat Mountain Salamander	Caudata
A	PLPO	*Pleorodeles poireti*	Algerian Ribbed Newt	Caudata
A	PLRS	*Plethodon richmondi*	Ravine Salamander	Caudata
A	PLTH	*Pleurodema thaul*	Chile Four-eyed Frog	Anura
A	PLVE	*Plethodon vehiculum*	Western Redback Salamander	Caudata
A	PLWA	*Pleorodeles waltl*	Spanish Ribbed Newt	Caudata
A	PLXX	*Pleorodeles* species	Ribbed Newt species	Caudata
A	PLYO	*Plethodon yonahlossee*	Yonahlossee Salamander	Caudata
A	POMI	*Pogona minor*	Dwarf Bearded Dragon	Squamata
A	POPA	*Poyntonia paludicola*	Kogelberg Reserve Frog	Anura
A	PRTR	*Prostherapis trinitatis*	unknown tropical frog	Anura
A	PSCR	*Pseudacris crucifer*	Spring Peeper	Anura
A	PSGE	*Pseudophryne guentheri*	Gunther's Toadlet	Anura
A	PSMA	*Pseudacris maculata*	Boreal Chorus Frog	Anura
A	PSNI	*Pseudacris nigrata*	Southern Chorus Frog	Anura
A	PSOR	*Pseudacris ornata*	Ornate Chorus Frog	Anura
A	PSRR	*Pseudotriton ruber ruber*	Northern Red Salamander	Caudata
A	PSTR	*Pseudacris triseriata*	Western Chorus Frog	Anura
A	PTMO	*Ptychadena mossambica*	Mozambique Grassland Frog	Anura
A	RAAE	*Rana areolata*	Crawfish Frog	Anura
A	RAAM	*Rana amurensis*	Khabarovsk Frog	Anura
A	RAAN	*Rana angolensis*	Angola Frog	Anura
A	RAAR	*Rana arvalis*	Swedish Swamp Frog	Anura
A	RAAU	*Rana aurora*	Red Legged Frog	Anura
A	RABE	*Rana berlandieri*	Rio Grande Frog	Anura
A	RABL	*Rana blairi*	Plains Leopard Frog	Anura
A	RABO	*Rana boylii*	Foothill Yellow-Legged Frog	Anura
A	RABR	*Rana brevipoda*	Rana brevipoda	Anura
A	RABU	*Rana bufo*	Rana bufo???	Anura

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	RABY	*Rana blythi*	Blythi True Frog	Anura
A	RACA	*Rana catesbeiana*	Bullfrog	Anura
A	RACH	*Rana chensinensis*	Inkiapo Frog	Anura
A	RACL	*Rana clamitans*	Green Frog	Anura
A	RACO	*Rana chalconota*	Schlegel's Java Frog	Anura
A	RACS	*Rana cascadae*	Cascades Frog	Anura
A	RACY	*Rana cyanophlyctis*	Skipper Frog	Anura
A	RADA	*Rana dalmatina*	Spring Frog	Anura
A	RADR	*Rana dracomontana*	Sani Pass Frog	Anura
A	RAES	*Rana esculenta*	Edible Frog	Anura
A	RAFI	*Rana finchi*	Finch True Frog	Anura
A	RAFS	*Rana fuscigula*	Brown-throated Frog	Anura
A	RAFU	*Rana fusca*	Rana fusca	Anura
A	RAGR	*Rana grylio*	Pig Frog	Anura
A	RAHC	*Rana heckscheri*	River Frog	Anura
A	RAHE	*Rana hexadactyla*	Indian Green Frog	Anura
A	RAHO	*Rana hosii*	Mount Dulit Frog	Anura
A	RAIB	*Rana ibanorum*	Ibanorum True Frog	Anura
A	RAIN	*Rana ingeri*	Ingeri True Frog	Anura
A	RAJA	*Rana japonica*	Agile Frog	Anura
A	RAKU	*Rana kuhli*	Kuhli True Frog	Anura
A	RALE	*Rana lessonae*	Pool Frog	Anura
A	RALI	*Rana limnocharis*	Indian Rice Frog	Anura
A	RALU	*Rana luteiventris*	Columbia Spotted Frog	Anura
A	RAMA	*Rana malabarica*	Malabar Hills Frog	Anura
A	RAMU	*Rana muscosa*	Mountain Yellow-Legged Frog	Anura
A	RANI	*Rana nigromaculata*	Black-Spotted Frog	Anura
A	RAON	*Rana onca*	Relict Leopard Frog	Anura
A	RAPA	*Rana palustris*	Pickerel Frog	Anura
A	RAPE	*Rana perezi*	Coruna Frog	Anura
A	RAPI	*Rana pipiens*	Northern Leopard Frog	Anura
A	RAPP	*Rana pretiosa pretiosa*	Western Spotted Frog	Anura
A	RAPR	*Rana pretiosa*	Spotted Frog	Anura
A	RARE	*Rana ridibunda-esculenta hybrid*	Common Frog hybrid	Anura
A	RARI	*Rana ridibunda*	Marsh Frog	Anura
A	RARU	*Rana rugosa*	Wrinkled Frog	Anura
A	RASE	*Rana septentrionalis*	Mink Frog	Anura
A	RASI	*Rana signata*	Matang Frog	Anura
A	RASP	*Rana sphenocephala*	Florida Leopard Frog	Anura
A	RASY	*Rana sylvatica*	Wood Frog	Anura
A	RATA	*Rana tagoe*	Tago Frog	Anura
A	RATE	*Rana temporaria*	European Common Frog	Anura
A	RATI	*Rana tigrina*	Asian Bullfrog	Anura
A	RATL	*Rana tlaloci*	Tlaloc's Leopard Frog	Anura
A	RATS	*Rana tsushimensis*	Tsushima Frog	Anura
A	RAUT	*Rana utricularia*	Southern Leopard Frog	Anura
A	RAVE	*Rana vertebralis*	Ice Frog	Anura
A	RAVI	*Rana virgatipes*	Carpenter Frog	Anura
A	RAWR	*Batrachoseps wrighti*	Oregon Slender Salamander	Caudata
A	RAXX	*Rana* species	Ranid species	Anura

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	RAYA	*Rana yavapiensis*	Yavapai Leopard Frog	Anura
A	RHGA	*Rhacophorus gauni*	Inger's Flying Frog	Anura
A	RHOL	*Rhyacotriton olympicus*	Olympic Salamander	Caudata
A	RHPA	*Rhacophorus pardalis*	Panther Flying Frog	Anura
A	RHSC	*Rhacophoros schlegelii*	Schlegel's Flying Frog	Anura
A	RHSI	*Rheobatrachus silus*	Southern Gastric Brooding Frog	Anura
A	RHVA	*Rhyacotriton variegatus*	Southern Torrent Salamander	Caudata
A	RHVI	*Rheobatrachus vitellinus*	Northern Gastric-brooding Frog	Anura
A	SASA	*Salamandra salamandra*	European Fire Salamander	Caudata
A	SCCO	*Scaphiopus couchii*	Couch's Spadefoot Toad	Anura
A	SCHA	*Spea hammondii*	Western Spadefoot Toad	Anura
A	SCHH	*Scaphiopus holbrookii holbrookii*	Eastern Spadefoot Toad var	Anura
A	SCHO	*Scaphiopus holbrookii*	Eastern Spadefoot Toad	Anura
A	SCIN	*Spea intermontana*	Great Basin Spadefoot Toad	Anura
A	SCMU	*Scaphiopus multiplicata*	Southern Spadefoot Toad	Anura
A	SCNA	*Scinax nasica*	Lesser Snouted Treefrog	Anura
A	SIIN	*Siren intermedia*	Lesser Siren	Caudata
A	SPXX	*Sphenophryne* species	Land Frog species	Anura
A	STFA	*Rana fasciata*	Striped Frog	Anura
A	STGR	*Rana grayii*	Gray's Spotted Frog	Anura
A	STHY	*Rana hymenopus*	Natal Drakensberg Frog	Anura
A	STLA	*Staurois latopalmatus*	Sabah Splash Frog	Anura
A	STNA	*Staurois natator*	Mindanao Splash Frog	Anura
A	STSP	*Rana springbokensis*	Springbok Frog	Anura
A	STWA	*Rana wageri*	Natal Uplands Frog	Anura
A	TAAC	*Taudactylus acutirostris*	Sharpsnout Torrent Frog	Anura
A	TADI	*Taudactylus diurnus*	Mount Glorious Torrent Frog	Anura
A	TAEU	*Taudactylus eungellensis*	Eungella Dayfrog	Anura
A	TAGR	*Taricha granulosa*	Roughskin Newt	Caudata
A	TALI	*Taudactylus liemi*	Palm Torrent Frog	Anura
A	TARH	*Taudactylus rheophilus*	Mountain Torrent Frog	Anura
A	TARI	*Taricha rivularis*	Redbelly Newt	Caudata
A	TATO	*Taricha torosa*	California Newt	Caudata
A	TATS	*Taricha torosa sierrae*	Sierra Newt	Caudata
A	TOCR	*Tompterna cryptotis*	Catequero Bullfrog	Anura
A	TODE	*Tompterna delalandii*	African Bullfrog	Anura
A	TOMA	*Tompterna marmorata*	Marbled Bullfrog	Anura
A	TRAL	*Triturus alpestris*	Laurenti's AlPine Newt	Caudata
A	TRCC	*Triturus carnifex*	Great Crested Newt	Caudata
A	TRCR	*Triturus cristatus*	Northern Crested Newt	Caudata
A	TRHE	*Triturus helveticus*	Palmate Newt	Caudata
A	TRVU	*Triturus vulgaris*	Smooth Newt	Caudata
A	XEBO	*Xenopus borealis*	Marsabit Clawed Frog	Anura
A	XEGI	*Xenopus gilli*	Cape Clawed Frog	Anura
A	XELA	*Xenopus laevis*	African Clawed Frog	Anura
A	XELL	*Xenopus laevis laevis*	South African Clawed Frog	Anura
A	XEMU	*Xenopus muelleri*	Muller's Clawed Frog	Anura
A	XXAA	unknown anuran species	unknown anuran amphibian	Anura
A	XXFR	unknown frog species	unknown frog species	Anura
A	XXNE	unknown newt species	unknown newt species	Caudata

Class	Code	Scientific Name[i]	Common Name[i]	Order
A	XXTD	unknown toad species	unknown toad species	Anura
A	XXXA	unknown amphibian species	unknown amphibian species	unknown
A	XXXS	unknown salamander species	unknown salamander species	Caudata
R	ABER	*Abastor erythrogrammus*	Rainbow Snake	Squamata
R	ACAN	*Acanthophis antarcticus*	Common Death Adder	Squamata
R	ACJA	*Acrochordus javanicas*	Java File Snake	Squamata
R	AGAC	*Agama aculeata*	Ground Agama	Squamata
R	AGAG	*Agama agama*	Common Agama	Squamata
R	AGBB	*Agkistrodon blomhoffi*	Japanese Mamushi	Squamata
R	AGCA	*Agama caucasica*	Caucasica Agama	Squamata
R	AGCO	*Agkistrodon contortrix*	Copperhead	Squamata
R	AGKI	*Agama kirkii*	Kirk's Rock Agama	Squamata
R	AGPI	*Agkistrodon piscivorus*	Water Moccasin	Squamata
R	AGRO	*Agama robecchii*	Robecchi's Agama	Squamata
R	AGSP	*Agama spinosa*	Lanza's Spiny Agama	Squamata
R	AGSS	*Agama stellio stellio*	unknown Typical Agama species	Squamata
R	ALMI	*Alligator mississippiensis*	American Alligator	Crocodylia
R	AMBA	*Amphibolurus barbatus*	Australian Dragon Lizard species	Squamata
R	AMEX	*Ameiva exsul*	Puerto Rican Ameiva	Squamata
R	AMMU	*Amphibolurus muricatus*	Jacky Lizard	Squamata
R	AMUN	*Ameiva undalata*	Rainbow Ameiva	Squamata
R	ANCA	*Anolis carolinensis*	Green Anole	Squamata
R	ANCO	*Anolis coelestinus*	Jeremie Anole	Squamata
R	APPU	*Aprasia pulchella*	Coastal Legless Lizard	Squamata
R	APSE	*Apalone spinifera emoryi*	Texas Spiny Softshell	Testudines
R	APSP	*Apalone spinifera*	Spiny Softshell	Testudines
R	APXX	*Apalone* species	North American Softshell Turtle species	Testudines
R	BIAS	*Bitis arietans somalica*	Somalian Puff Adder	Squamata
R	BOCO	*Boa constrictor*	Boa Constrictor	Squamata
R	BOFU	*Boaedon fuliginosus*	House Snake	Squamata
R	BOIR	*Boiga irregularis*	Brown Tree Snake	Squamata
R	BOMU	*Bolyeria multocarinata*	Round Island Burrowing boa	Squamata
R	BOSC	*Bothriechis schlegelii*	Eyelash Palm Pit Viper	Squamata
R	CACA	*Caretta caretta*	Loggerhead Turtle	Testudines
R	CACC	*Caiman crocodilus*	Narrow-snouted Spectacled Caiman	Crocodylia
R	CADU	*Casarea dussumieri*	Round Island Boa	Squamata
R	CALA	*Caiman latirostris*	Broad-snouted Spectacled Caiman	Crocodylia
R	CATE	*Carlia tetradactyla*	Forest Carlia	Crocodylia
R	CAVE	*Calotes versicolor*	Variable Agama	Squamata
R	CAXX	*Caiman* species	Caiman species	Squamata
R	CAYA	*Caiman yacare*	Yacare Caiman	Crocodylia
R	CECE	*Cerastes cerastes*	Horned Viper	Squamata
R	CHBO	*Charina bottae*	Rubber Boa	Squamata
R	CHMY	*Chelonia mydas*	Common Green Turtle	Testudines
R	CHOT	*Chionactis occcipatalis talpina*	Nevada Shovelnose Snake	Squamata
R	CHPI	*Chrysemys picta*	Painted Turtle	Testudines
R	CHPM	*Chrysemys picta marginata*	Midland Painted Turtle	Testudines
R	CHRA	*Chalcides ragazzi*	Ragazzi's Cylindrical Skink	Squamata
R	CHSE	*Chelydra serpentina serpentina*	Common Snapping Turtle	Testudines
R	CHXX	*Chelonia* species	Sea Turtle species	Testudines

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R	CLCA	*Clemmys caspica*	Pond Turtle species	Testudines
R	CLGU	*Clemmys guttata*	Spotted Turtle	Testudines
R	CLIN	*Clemmys insculpta*	Wood Turtle	Testudines
R	CLMA	*Clemmys marmorata*	Pacific Pond Turtle	Testudines
R	CNEX	*Cnemidophorus exsanguis*	Chihuahuan Spotted Whiptail	Squamata
R	CNGU	*Cnemidophorus gularis*	Texas Spotted Whiptail	Squamata
R	CNNE	*Cnemidophorus neomexicanus*	New Mexico Whiptail	Squamata
R	CNSE	*Cnemidophorus sexlineatus*	Six-lined Racerunner	Squamata
R	CNSO	*Cnemidophorus sonorae*	Sonoran Spotted Whiptail	Squamata
R	CNSP	*Cnemidophorus septemvittatus*	Plateau Spotted Whiptail	Squamata
R	CNTI	*Cnemidophorus tigris*	Western Whiptail	Squamata
R	CNTT	*Cnemidophorus tigris tigris*	Great Basin Whiptail	Squamata
R	CNUN	*Cnemidophorus uniparens*	Desert Grassland Whiptail	Squamata
R	CNXX	*Cnemidophorus* species	Whiptail Lizard species	Squamata
R	COCO	*Coluber constrictor*	Racer	Squamata
R	COCP	*Coluber constrictor priapus*	Southern Black Racer	Squamata
R	COFL	*Coluber florulentus*	Flowered Racer	Squamata
R	COJU	*Coluber jugularis*	Fire Racer	Squamata
R	COTE	*Cophosaurus texanus*	Greater Earless Lizard	Squamata
R	COVU	*Coleonyx variegatus utahensis*	Utah Banded Gecko	Squamata
R	CRAC	*Crocodylus acutus*	American Crocodile	Crocodylia
R	CRAD	*Crotalus adamanteus*	Eastern Diamondback Rattlesnake	Squamata
R	CRBO	*Cryptoblepharus boutonii*	Snake-eyed Skink	Squamata
R	CRCA	*Crocodlus cataphractus*	African Slender-snouted Crocodile	Crocodylia
R	CRCB	*Crotaphytus bicinctores*	Mojave Black Collared Lizard	Squamata
R	CRHO	*Crotalus horridus*	Timber Rattlesnake	Squamata
R	CRHT	*Crotaphopeltis hotamboeia*	Herald Snake	Squamata
R	CRJO	*Crocodylus johnstoni*	Australian Freshwater Crocodile	Crocodylia
R	CRLE	*Crotalus lepidus*	Rock Rattlesnake	Squamata
R	CRNI	*Crocodylus niloticus*	Nile Crocodile	Crocodylia
R	CRNO	*Crocodylus novaeguineae*	FreshWater Crocodile	Crocodylia
R	CRPA	*Crocodylus palustris*	Mugger Crocodile	Crocodylia
R	CRPL	*Cryptoblepharus plagiocephalus*	Australian Snake-eyed Skink	Squamata
R	CRPO	*Crocodylus porosus*	Saltwater Crocodile	Crocodylia
R	CRRH	*Crocodylus rhombifer*	Cuban Crocodile	Crocodylia
R	CRVI	*Crotalus viridis*	Western Rattlesnake	Squamata
R	CTDE	*Ctenotus delli*	White-dotted ctenotus	Squamata
R	CTLA	*Ctenotus labillardieri*	Labillardier's ctenotus	Squamata
R	CTRO	*Ctenotus robustus*	Robust ctenotus	Squamata
R	CTTA	*Ctenotus taeniolatus*	Coppertail ctenotus	Squamata
R	CYAE	*Cyclodina aenea*	Girard's Skink	Squamata
R	CYMA	*Cyclodina macgregori*	McGregor's New Zealand Skink	Squamata
R	CYWH	*Cyclodina whitakeri*	Whitaker's New Zealand Skink	Squamata
R	DASC	*Dasypeltis scabra*	Common Egg-eating Snake	Squamata
R	DECO	*Dermochelys coriacea*	Leatherback Turtle	Testudines
R	DEMA	*Denisonia maculata*	Ornamental Snake	Squamata
R	DIPE	*Diadophis punctatus edwardsii*	Northern Ringneck Snake	Squamata
R	DIPO	*Diplodactylus polyophthalmus*	Many-eyed Gecko	Squamata
R	DITY	*Dispholidus typus*	Boomslang	Squamata
R	DIWA	*Diploglossus warreni*	Warren's Galliwasp Lizard	Squamata

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R	DRCC	*Drymarchon corais couperi*	Eastern Indigo Snake	Squamata
R	EGNA	*Egernia napoleonis*	Napoleon Skink	Squamata
R	ELCE	*Elgaria coerulea*	Northern alligator Lizard	Squamata
R	ELGU	*Elaphe guttata*	Cornsnake	Squamata
R	ELOB	*Elaphe obsoleta*	Rat Snake	Squamata
R	ELOO	*Elaphe obsoleta obsoleta*	Black Rat Snake	Squamata
R	ELOQ	*Elaphe obsoleta quadrivittata*	Yellow Rat Snake	Squamata
R	ELQU	*Elaphe quadrivittata*	Chicken Snake	Squamata
R	ELVU	*Elaphe vulpina*	Fox Snake	Squamata
R	EMBL	*Emydoidea blandingii*	Blanding's Turtle	Testudines
R	EMOR	*Emys orbicularis*	European pond Turtle	Testudines
R	ENPL	*Enhydris plumbea*	Yellowbelly Water Snake	Squamata
R	EPST	*Epicrates striatus*	Haitian Boa	Squamata
R	ERCO	*Eryx colubrinus*	Kenya Sand Boa	Squamata
R	ERIM	*Eretmochelys imbricata*	Hawksbill Turtle	Testudines
R	ERPY	*Eryx pyramidum*	Egyptian Saw-scaled Viper	Squamata
R	EUFA	*Eumeces fasciatus*	Five-lined Skink	Squamata
R	EUNO	*Eunectes notaeus*	Yellow Anaconda	Squamata
R	EUOS	*Eumeces oshimensis*	unknown Eyelid Skink	Squamata
R	EUSK	*Eumeces skiltonianus*	Western Skink	Squamata
R	EUXX	*Eumeces* species	Eyelid Skink species	Squamata
R	FAAB	*Farancia abacura*	Mud Snake	Squamata
R	GAGA	*Gallotia galloti*	Gallot's Lizard	Squamata
R	GAGN	*Gavialis gangeticus*	Gharial	Crocodylia
R	GEMU	*Elgaria multicarinata*	Southern Alligator Lizard	Squamata
R	GEPA	*Geochelone pardalis*	Leopard Tortoise	Testudines
R	GOAG	*Gopherus agassizii*	Desert Tortoise	Testudines
R	GOPO	*Gopherus polyphemus*	Gopher Tortoise	Testudines
R	GRFL	*Graptemys flavimaculata*	Yellow-blotched Map Turtle	Testudines
R	GRGE	*Graptemys geographica*	Common map Turtle	Testudines
R	HAST	*Haldea striatula*	Rough-earth Snake	Squamata
R	HECO	*Heterodon contortix*	unknown Hognose Snake	Squamata
R	HEFL	*Hemidactylus flaviviridis*	Indian Leaf-toed Gecko	Squamata
R	HEIN	*Hemiergis initialis*	Fine-lined Skink	Squamata
R	HELE	*Hemidactylus leschenaultii*	Leschenault's Leaf-toed Gecko	Squamata
R	HEMA	*Hemidactylus macropholis*	Largescale Leaf-toed Gecko	Squamata
R	HENO	*Hemirhagerrhis nototaenia*	Bark Snake	Squamata
R	HENS	*Heterodon nasicus*	Western Hognose Snake	Squamata
R	HEPA	*Hemidactylus parkeri*	Parker's Leaf-toed Gecko	Squamata
R	HEPL	*Heterodon platirhinos*	Eastern Hognose Snake	Squamata
R	HESI	*Heterodon simus*	Southern Hognose Snake	Squamata
R	HESM	*Hemidactylus smithi*	Smith's Leaf-toed Gecko	Squamata
R	HEXX	*Hemidactylus* species	Leaf-toed Gecko species	Squamata
R	HOMA	*Hoplodactylus maculatus*	Spotted Sticky-toed Gecko	Squamata
R	KIFL	*Kinosternon flavescens*	Yellow Mud Turtle	Testudines
R	KISO	*Kinosternon sonoriense*	Sonoran Mud Turtle	Testudines
R	KISU	*Kinosternon subrubrum*	Common Mud Turtle	Testudines
R	LAAG	*Lacerta agilis*	Sand Lizard	Squamata
R	LADE	*Lampropholis delicata*	Delicate Skink	Squamata
R	LADT	*Lampropeltis doliata triangulum*	Milk Snake	Squamata

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R	LAFU	*Lamprophis fuliginosus*	Brown House Snake	Squamata
R	LAGE	*Lampropeltis getula*	Common King Snake	Squamata
R	LAGF	*Lampropeltis getula floridana*	Florida King Snake	Squamata
R	LAGG	*Lampropeltis getula getula*	Eastern King Snake	Squamata
R	LAGU	*Lampropholis guichenoti*	Guichenot's Skink	Squamata
R	LALO	*Latastia longicaudata*	Southern Longtail Lizard	Squamata
R	LAMU	*Lacerta muralis*	Common Eurasian Lizard species	Squamata
R	LAPA	*Lacerta parva*	Dwarf Lizard	Squamata
R	LAVI	*Lacerta viridis*	Emerald Lizard	Squamata
R	LAVV	*Lacerta vivipara*	Viviparous Lizard	Squamata
R	LAXX	*Lampropeltis* species	King Snake species	Squamata
R	LEDI	*Lerista distinguenda*	Distinguished Lerista	Squamata
R	LEKE	*Lepidochelys kempii*	Kemp's Ridley Turtle	Testudines
R	LENI	*Leiolopisma nigriplantare*	Dark Ground Skink	Squamata
R	LEOL	*Lepidochelys olivacea*	Olive Ridley Turtle	Testudines
R	LETE	*Leiolopisma telfairii*	Telford's Ground Skink	Squamata
R	LETR	*Leiolopisma trilineata*	Trilinear Ground Skink	Squamata
R	LIBU	*Lialis burtonis*	Burton's Snake Lizard	Squamata
R	LIMA	*Liasis mackloti*	Macklot's Python	Squamata
R	LIOL	*Liasis olivaceus*	Olive Python	Squamata
R	LIPG	*Lissemys punctata granosa*	Southern Flap-shelled Turtle	Testudines
R	LYCA	*Lygodactylus capensis*	Cape Dwark Gecko	Squamata
R	LYCH	*Lygodactylus chobiensis*	Okavango Dwark Gecko	Squamata
R	LYCP	*Lycophidion capense*	Cape Wolf Snake	Squamata
R	LYSO	*Lygosoma somalicum*	Somali Writhing Skink	Squamata
R	MABR	*Mabuya brevicollis*	Sudan Mabuya	Squamata
R	MACR	*Mauremys caspica rivulata*	Capian Turtle	Testudines
R	MAFL	*Masticophis flagellum*	Coachwhip	Squamata
R	MAFT	*Masticophis flagellum testaceus*	Western Coachwhip Snake	Squamata
R	MAMO	*Malpolon monspessulanus*	Montpellier Snake	Squamata
R	MAQU	*Mabuya quinquetaeniata*	Rainbow Skink	Squamata
R	MAST	*Mabuya striata*	African Striped Mabuya	Squamata
R	MATE	*Malaclemys terrapin*	DiamondBack Terrapin	Testudines
R	MATT	*Malaclemys terrapin tequesta*	Florida East Coast Terrapin	Testudines
R	MAVV	*Mabuya varia varia*	Sanannah Variable Mabuya	Squamata
R	MEGR	*Menetia greyi*	Gray-Brown Menetia	Squamata
R	MENI	*Melanosuchus niger*	Black Caiman	Crocodylia
R	MENY	*Mehelya nyassae*	Nyassa File Snake	Squamata
R	MOBO	*Morethia boulengeri*	Boulenger's Morethia	Squamata
R	MOOB	*Morethia obscura*	Obscure Morethia	Squamata
R	MOSV	*Morelia spilotes variegata*	Carpet Python	Squamata
R	NAEY	*Nerodia erythrogaste*	Red-bellied Water Snake	Squamata
R	NAHA	*Naja haje*	Egyptian Cobra	Squamata
R	NANA	*Natrix natrix*	Grass Snake	Squamata
R	NASE	*Nactus serpensinsula*	Serpent Island Gecko	Squamata
R	NASI	*Nerodia sipedon sipedon*	Common Water Snake	Squamata
R	NATA	*Nerodia taxispilota*	Brown Water Snake	Squamata
R	NAXX	*Naja* species	Cobra species	Squamata
R	NECY	*Nerodia cyclopion*	Mississippi Green Water Snake	Squamata
R	NEER	*Nerodia erythrogaster*	Plainbelly Water Snake	Squamata

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R	NEFA	*Nerodia fasciata*	Banded Water Snake	Squamata
R	NEFC	*Nerodia fasciata compressicauda*	Southern Water Snake species	Squamata
R	NEFF	*Nerodia fasciata floridana*	Southern Water Snake	Squamata
R	NERH	*Nerodia rhombifer*	Diamondback Water Snake	Squamata
R	NESI	*Nerodia sipedon*	Northern Water Snake	Squamata
R	NESN	*Nerodia sipedon insularum*	Lake Erie Water Snake	Squamata
R	NEXX	*Nerodia* species	Water Snake species	Squamata
R	NOAT	*Notechis ater*	Black Tiger Snake	Squamata
R	NTXX	*Natrix* species	Grass Snake species	Squamata
R	OLMA	*Oligosoma maccanni*	unknown skink species	Squamata
R	OPAE	*Opheodrys aestivus*	rough Green Snake	Squamata
R	OPVE	*Opheodrys vernalis*	Smooth Green Snake	Squamata
R	PADA	*Panaspis dahomeyense*	Lidless Skink species	Squamata
R	PAPA	*Palaeosuchus palperbosos*	Dwarf Caiman	Crocodylia
R	PATI	*Paleosuchus trigonatus*	Smooth-fronted Caiman	Crocodylia
R	PAWA	*Panaspis wahlbergi*	Savannah Lidless Skink	Squamata
R	PELI	*Pediplanic lineoocellata*	Sand Lizard species	Squamata
R	PENA	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Squamata
R	PHCO	*Phrynosoma coronatum*	Coast Horned Lizard	Squamata
R	PHGU	*Phelsuma guentheri*	Round Island Day Gecko	Squamata
R	PHHA	*Philochortus hardeggeri*	Hardegger's Orangetail Lizard	Squamata
R	PHOR	*Phelsuma ornata*	Ornate Day Gecko	Squamata
R	PHPL	*Phrynosoma platyrhinos*	Desert Horned Lizard	Squamata
R	PICA	*Pituophis catenifer*	Gopher Snake	Squamata
R	PIME	*Pituophis melanoleucus*	Pine Snake	Squamata
R	PIML	*Pituophis melanoleucus lodingi*	Black Pine Snake	Squamata
R	PIMM	*Pituophis melanoleucus mugitis*	Florida Pine Snake	Squamata
R	PISA	*Pituophis catenifer sayi*	Bull Snake	Squamata
R	POSS	*Podarcis sicula sicula*	Italian Wall Lizard	Squamata
R	POXX	*Podarcis* species	Wall Lizard species	Squamata
R	PSAF	*Pseudonaja affinis*	Dugite	Squamata
R	PSAU	*Pseudechis australis*	King Brown Snake	Squamata
R	PSCO	*Pseudechis colletti*	Collett's Black Snake	Squamata
R	PSDO	*Psammophilus dorsalis*	Indian Sand Agama	Squamata
R	PSGU	*Pseudechis guttatus*	Spotted Black Snake	Squamata
R	PSNE	*Pseudemys nelsoni*	Florida Redbelly Turtle	Testudines
R	PSPO	*Pseudechis porphyriacus*	Redbelly Black Snake	Squamata
R	PSSC	*Pseudemys scripta*	Cooter Turtle / Red-bellied Turtle	Testudines
R	PSSI	*Psammophis sibilans*	African Beauty Racer	Squamata
R	PSSM	*Pseuderemias smithi*	Smith's Racerunner	Squamata
R	PSTE	*Pseudonaja textilis*	Eastern Brown Snake	Squamata
R	PSTI	*Psammophis trivirgatus*	Sand Racer species	Squamata
R	PYMB	*Python molurus bivittatus*	Indian Python	Squamata
R	PYRE	*Python reticulatus*	Reticulate Python	Squamata
R	PYRG	*Python regius*	Ball Python	Squamata
R	REGR	*Regina grahami*	Graham's Crayfish Snake	Squamata
R	SAOB	*Sauromalus obesus obesus*	Western Chuckwalla	Squamata
R	SCBO	*Scelotes bojerii*	Bojer's Burrowing Skink	Squamata
R	SCCL	*Sceloporus clarkii*	Clark's Spiny Lizard	Squamata
R	SCGR	*Sceloporus graciosus*	Sagebrush Lizard	Squamata

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R	SCJA	*Sceloporus jarrovi*	Yarrow's Spiny Lizard	Squamata
R	SCOC	*Sceloporus occidentalis*	Western Fence Lizard	Squamata
R	SCOL	*Sceloporus olivaceus*	Texas Spiny Lizard	Squamata
R	SCUN	*Sceloporus undalatus*	Fence Lizard	Squamata
R	SCUU	*Sceloporus undulatus undulatus*	Southern Fence Lizard	Squamata
R	SCXX	*Sceloporus* species	Spiny Lizard species	Squamata
R	SCXY	*Scincella* species	Ground Skink species	Squamata
R	SPPU	*Sphenodon punctatus*	Tuatara	Squamata
R	STDE	*Storeria dekayi*	Northern Brown Snake	Squamata
R	STMO	*Stegonotus modestus*	New Guinea Frog-eating Snake	Squamata
R	STOC	*Storeria occipitomaculata*	Redbelly Snake	Squamata
R	SUSU	*Suta suta*	Curl Snake	Squamata
R	TECA	*Terrapene carolina*	Box Turtle	Testudines
R	TECM	*Terrapene carolina major*	Gulf Coast Box Turtle	Testudines
R	TEHE	*Testudo hermanni*	Hermann's Tortoise	Testudines
R	TESE	*Telescopus semiannulatus*	Eastern Tiger Snake	Squamata
R	THCO	*Thamnophis couchii*	Western Aquatic Garter Snake	Squamata
R	THEL	*Thamnophis elegans*	Western Terrestrial Garter Snake	Squamata
R	THKI	*Thelotornis kirtlandii*	Northern Vine Snake	Squamata
R	THOR	*Thamnophis ordinoides*	Northwestern Garter Snake	Squamata
R	THPR	*Thamnophis proximus*	Western Ribbon Snake	Squamata
R	THRA	*Thamnophis radix*	Plains Garter Snake	Squamata
R	THSA	*Thamnophis sauritus*	Eastern Ribbon Snake	Squamata
R	THSI	*Thamnophis sirtalis*	Common Garter Snake	Squamata
R	THXX	*Thamnophis* species	Garter Snake species	Squamata
R	TIRU	*Tiliqua rugosa*	Shingleback Skink	Squamata
R	TOSC	*Tomistoma schlegelii*	False Gharial	Squamata
R	TRFL	*Trimeresurus flavoviridis*	Habu Poisonous Snake	Squamata
R	TRSC	*Trachemys scripta*	Red-eared Slider	Testudines
R	TRSP	*Trionyx spinifer*	African Softshell Turtle	Testudines
R	TYAU	*Typhlina australis*	Greiberg's Blind Snake	Squamata
R	UNGO	*Unechis gouldii*	Gould's Black-headed Snake	Squamata
R	UNNI	*Unechis nigriceps*	Gunther's Black-headed Snake	Squamata
R	UROR	*Urosaurus ornatus*	Tree Lizard	Squamata
R	UTPA	*Uta palmeri*	San-Pedro Side-blotched Lizard	Squamata
R	UTST	*Uta stansburiana*	Side-blotched Lizard	Squamata
R	VAAM	*Varanus albigularis microstictus*	White-throated Monitor	Squamata
R	VAGI	*Varanus giganteus*	Perentie	Squamata
R	VAGO	*Varanus gouldii*	Sand Monitor	Squamata
R	VAXX	*Varanus* species	Monitor species	Squamata
R	VIAS	*Vipera aspis*	Asp Viper	Squamata
R	VIPA	*Vipera palestinae*	Palestine Viper	Squamata
R	XAHE	*Xantusia henshawi*	Granite Night Lizard	Squamata
R	XETA	*Xenagama taylori*	Taylor's Strange Agama	Squamata
R	XXSN	unknown snake or serpentene species	unknown snake species	Squamata
R	XXSS	unknown sea snake species	unknown sea snake	Squamata
R	XXXR	unknown reptile species	unknown reptile species	unknown
R	XXXT	unknown or various turtle species	unknown turtle species	Testudines

Appendix 1b: Species names in alphabetical order grouped by Class with corresponding scientific name, species code and Order[i]

Class	Common Name*	Scientific Name*	Code	Order
U	unknown amphibian or reptile species	unknown species	XXXX	unknown
U	various species of amphibians/reptiles	various amphibians and reptiles	XXXV	Various
A	African Bullfrog	*Tompterna delalandii*	TODE	Anura
A	African Clawed Frog	*Xenopus laevis*	XELA	Anura
A	African Gray Treefrog	*Chiromantis xerampelina*	CHXE	Anura
A	Agile Frog	*Rana japonica*	RAJA	Anura
A	Alajuela Toad	*Bufo periglenes*	BUPE	Anura
A	Alexandra Greek Treefrog	*Litoria lorica*	LILO	Anura
A	Algerian Ribbed Newt	*Pleorodeles poireti*	PLPO	Caudata
A	American Cinchona Plantation Treefrog	*Hyla rivularis*	HYRI	Anura
A	American Toad	*Bufo americanus*	BUAM	Anura
A	Andrews' Toad	*Bufo andrewsi*	BUAN	Anura
A	Angel Robber Frog	*Eleutherodactylus angelicus*	ELAN	Anura
A	Angola Frog	*Rana angolensis*	RAAN	Anura
A	Arboreal Salamander	*Aneides lugubris*	ANLU	Caudata
A	Asian Bullfrog	*Rana tigrina*	RATI	Anura
A	Atherton Tableland Treefrog	*Litoria rheocola*	LIRH	Anura
A	Australasian Treefrog species	*Litoria caerulea*	LICA	Anura
A	Australian Brown Treefrog	*Litoria ewingii*	LIEW	Anura
A	Australian Swamp Frog species	*Limnodynastes* species	LIXX	Anura
A	Axolotl	*Ambystoma mexicanum*	AMME	Caudata
A	Baird's Spotted Toad	*Bufo punctatus*	BUPU	Anura
A	Barking Treefrog	*Hyla gratiosa*	HYGR	Anura
A	Black-lined Robber Frog	*Eleutherodactylus melanostictus*	ELME	Anura
A	Black-Spotted Frog	*Rana nigromaculata*	RANI	Anura
A	Black Mountain Salamander	*Desmognathus welteri*	DEWE	Caudata
A	Black Spined Toad	*Bufo melanostictus*	BUME	Anura
A	Blackbelly Salamander	*Demognathus quadramaculatus*	DEQU	Caudata
A	Blanchard's Cricket Frog	*Acris crepitans blanchardi*	ACCB	Anura
A	Blue-Spotted Salamander	*Ambystoma laterale*	AMLA	Caudata
A	Blythi True Frog	*Rana blythi*	RABY	Anura
A	Bob's Robber Frog	*Eleutherodactylus punctariolus*	ELPU	Anura
A	Boreal Chorus Frog	*Pseudacris maculata*	PSMA	Anura
A	Boulenger's Asian Tree Toad	*Pedostibes hosii*	PEHO	Anura
A	Brown-Spotted Treefrog	*Litoria genimaculata*	LIGE	Anura
A	Brown-Striped Frog	*Limnodynastes peronii*	LIPE	Anura
A	Brown-throated Frog	*Rana fuscigula*	RAFS	Anura
A	Buckley's Robber Frog	*Eleutherodactylus buckleyi*	ELBU	Anura
A	Budgett's Frog	*Lepidobatrachus laevis*	LELA	Anura
A	Bullfrog	*Rana catesbeiana*	RACA	Anura
A	California Chorus Frog	*Hyla cadaverina*	HYCA	Anura
A	California Giant Salamander	*Dicamptodon ensatus*	DIEN	Caudata
A	California Newt	*Taricha torosa*	TATO	Caudata
A	California Slender Salamander	*Batrachoseps attenatus*	BAAT	Caudata
A	California Tiger Salamander	*Ambystoma californiense*	AMCA	Caudata
A	California Toad	*Bufo halophilus*	BUHA	Anura

Appendix 1b - Species Common Names - 2

Class	Common Name*	Scientific Name*	Code	Order
A	Canadian Toad	*Bufo hemiophrys*	BUHE	Anura
A	Cape Clawed Frog	*Xenopus gilli*	XEGI	Anura
A	Carpenter Frog	*Rana virgatipes*	RAVI	Anura
A	Cascades Frog	*Rana cascadae*	RACS	Anura
A	Catequero Bullfrog	*Tompterna cryptotis*	TOCR	Anura
A	Cave Salamander	*Eurycea lucifuga*	EULU	Caudata
A	Cayey Robber Frog	*Eleutherodactylus jasperi*	ELJA	Anura
A	Central Newt	*Notophthalmus viridescens louisianensis*	NOVL	Caudata
A	Cerro Pando Worm Salamander	*Oedipina grandis*	OEGR	Caudata
A	Cerro Utyum Robber Frog	*Eleutherodactylus podiciferus*	ELPO	Anura
A	Cheat Mountain Salamander	*Plethodon nettingi*	PLNE	Caudata
A	Chile Four-eyed Frog	*Pleurodema thaul*	PLTH	Anura
A	Chiriqui Robber Frog	*Eleutherodactylus cruentus*	ELCR	Anura
A	Chusan Island Toad	*Bufo gargarizans*	BUGR	Anura
A	Clouded Salamander	*Aneides ferreus*	ANFE	Caudata
A	Columbia Spotted Frog	*Rana luteiventris*	RALU	Anura
A	Common Eurasian Spadefoot Toad	*Pelobates fuscus*	PEFU	Anura
A	Common European Toad	*Bufo bufo*	BUBU	Anura
A	Common Frog hybrid	*Rana ridibunda-esculenta hybrid*	RARE	Anura
A	Common Toad	*Bufo arenarum*	BUAR	Anura
A	Cope's Giant Salamander	*Dicamptodon copei*	DICO	Caudata
A	Cope's Gray Treefrog	*Hyla chrysoscelis*	HYCH	Anura
A	Cordillera Central Salamander	*Bolitoglossa nigrescens*	BONI	Caudata
A	Coruna Frog	*Rana perezi*	RAPE	Anura
A	Couch's Spadefoot Toad	*Scaphiopus couchii*	SCCO	Anura
A	Cour D'alene Salamander	*Plethodon idahoensis*	PLID	Caudata
A	Crater Salamander	*Bolitoglossa marmorea*	BOMA	Caudata
A	Crawfish Frog	*Rana areolata*	RAAE	Anura
A	Cumberland Plateau Salamander	*Plethodon kentucki*	PLKE	Caudata
A	Dainty Green Treefrog	*Litoria gracilenta*	LIGR	Anura
A	Darling Plateau Froglet	*Crinia pseudinsignifera*	CRPS	Anura
A	Day's Big-eyed Treefrog	*Nyctimystes dayi*	NYDA	Anura
A	Del Norte Salamander	*Plethodon elongatus*	PLEL	Caudata
A	Dunn's Salamander	*Plethodon dunni*	PLDU	Caudata
A	Dusky Salamander	*Desmognathus fuscus*	DEFU	Caudata
A	Dwarf Bearded Dragon	*Pogona minor*	POMI	Squamata
A	Dwarf Salamander	*Eurycea quadridigitata*	EUQU	Caudata
A	Eastern Green Toad	*Bufo debilis debilis*	BUDD	Anura
A	Eastern hellbender	*Cryptobranchus alleganiensis*	CRAA	Caudata
A	Eastern Narrowmouth Toad	*Gastrophryne carolinensis*	GACA	Anura
A	Eastern Newt	*Notophthalmus viridescens*	NOVI	Caudata
A	Eastern Red-spotted Newt	*Notophthalmus viridescens virdescens*	NOVV	Caudata
A	Eastern Spadefoot Toad	*Scaphiopus holbrookii*	SCHO	Anura
A	Eastern Spadefoot Toad var	*Scaphiopus holbrookii holbrookii*	SCHH	Anura
A	Edible Frog	*Rana esculenta*	RAES	Anura
A	Emerald-eyed Treefrog	*Hyla crepitans*	HYCE	Anura
A	Ensatina	*Ensatina eschscholtzii*	ENES	Caudata
A	Eungella Dayfrog	*Taudactylus eungellensis*	TAEU	Anura
A	European Common Frog	*Rana temporaria*	RATE	Anura

Appendix 1b - Species Common Names - 3

Class	Common Name*	Scientific Name*	Code	Order
A	European Fire Salamander	*Salamandra salamandra*	SASA	Caudata
A	European Green Toad	*Bufo viridis*	BUVI	Anura
A	European Treefrog	*Hyla arborea*	HYAJ	Anura
A	Finch True Frog	*Rana finchi*	RAFI	Anura
A	Firebelly Toad	*Bombina bombina*	BOBO	Anura
A	Flatwood Salamander	*Ambystoma cingulatum*	AMCI	Caudata
A	Florida Leopard Frog	*Rana sphenocephala*	RASP	Anura
A	Foothill Yellow-Legged Frog	*Rana boylii*	RABO	Anura
A	Four-toed Salamander	*Hemidactylium scutatum*	HESC	Caudata
A	Fowler's Toad	*Bufo fowleri*	BUFO	Anura
A	Giant Barred Frog	*Mixophyes iteratus*	MIIT	Anura
A	Giant Glass Frog species	*Centrolene* species	CEXX	Anura
A	Giant Toad	*Bufo marinus*	BUMA	Anura
A	Golden Poison Frog	*Phyllobates vittatus*	PHVI	Anura
A	Gray Treefrog	*Hyla versicolor*	HYVE	Anura
A	Gray's Spotted Frog	*Rana grayii*	STGR	Anura
A	Great Basin Spadefoot Toad	*Spea intermontana*	SCIN	Anura
A	Great Crested Newt	*Triturus carnifex*	TRCC	Caudata
A	Great Plains Toad	*Bufo cognatus*	BUCO	Anura
A	Green Frog	*Rana clamitans*	RACL	Anura
A	Green Robber Frog	*Eleutherodactylus chloronotus*	ELCH	Anura
A	Green Salamander	*Aneides aeneus*	ANAE	Caudata
A	Green Treefrog	*Hyla cinerea*	HYCI	Anura
A	Gulf Coast Toad	*Bufo valliceps*	BUVA	Anura
A	Gunther's Costa Rican Treefrog	*Hyla pseudopuma*	HYPS	Anura
A	Gunther's Toadlet	*Pseudophryne guentheri*	PSGE	Anura
A	Hallowell's Toad	*Bufo maculatus*	BUMC	Anura
A	Harlequin Poison Frog	*Dendrobates histrionicus sylvaticus*	DEHS	Anura
A	Hellbender	*Cryptobranchus alleganiensis*	CRAL	Caudata
A	Helmeted Water Toad	*Caudiverbera caudiverbera*	CACU	Anura
A	Henrietta Creek Treefrog	*Litoria nyakalensis*	LINY	Anura
A	Hewitt's African Ghost Frog	*Heleophryne hewitti*	HEHE	Anura
A	Hewitt's Reed Frog	*Hyperolius semidiscus*	HYSE	Anura
A	Hispaniola Treefrog	*Hyla vasta*	HYVA	Anura
A	Hong Kong Warty Newt	*Paramesotriton hongkongensis*	PAHO	Caudata
A	Huldae Woodland Salamander	*Plethodon huldae*	PLHU	Caudata
A	hybrid complexes of Salamanders	*Ambystoma laterale-jeffersonianum*	AMLJ	Caudata
A	Ibanorum True Frog	*Rana ibanorum*	RAIB	Anura
A	Ice Frog	*Rana vertebralis*	RAVE	Anura
A	Indian Green Frog	*Rana hexadactyla*	RAHE	Anura
A	Indian Rice Frog	*Rana limnocharis*	RALI	Anura
A	Ingeri True Frog	*Rana ingeri*	RAIN	Anura
A	Inger's Flying Frog	*Rhacophorus gauni*	RHGA	Anura
A	Inkiapo Frog	*Rana chensinensis*	RACH	Anura
A	Japanese Firebelly Newt	*Cynops pyrrhogaster*	CYPY	Caudata
A	Japanese Toad	*Bufo japonicus*	BUBJ	Anura
A	Japanese Treefrog	*Hyla japonica*	HYJA	Anura
A	Java Toad	*Bufo asper*	BUAS	Anura
A	Jefferson Salamander	*Ambystoma jeffersonianum*	AMJE	Caudata

Appendix 1b - Species Common Names - 4

Class	Common Name*	Scientific Name*	Code	Order
A	Jordan's Salamander	*Plethodon jordani*	PLJO	Caudata
A	Karl's Robber Frog	*Eleutherodactylus karlschmidti*	ELKA	Anura
A	Karroo Toad	*Bufo gariepensis*	BUGA	Anura
A	Kei Road Toad	*Bufo rangeri*	BURA	Anura
A	Khabarovsk Frog	*Rana amurensis*	RAAM	Anura
A	Kina Balu Stream Toad	*Ansonia spinulifer*	ANSP	Anura
A	Kogelberg Reserve Frog	*Poyntonia paludicola*	POPA	Anura
A	Kuhli True Frog	*Rana kuhli*	RAKU	Anura
A	Land Frog species	*Sphenophryne* species	SPXX	Anura
A	Laurenti's AlPine Newt	*Triturus alpestris*	TRAL	Caudata
A	Lesser Siren	*Siren intermedia*	SIIN	Caudata
A	Lesser Snouted Treefrog	*Scinax nasica*	SCNA	Anura
A	Lewis' Stubfoot Toad	*Atelopus chiriquiensis*	ATCH	Anura
A	Lime Treefrog	*Litoria xanthomera*	LIXA	Anura
A	Longtail Salamander	*Eurycea longicauda*	EULO	Caudata
A	Longtailed Salamander	*Eurycea longicauda longicauda*	EULL	Caudata
A	Lowland Carribean Toad	*Peltophryne lemur*	PELE	Anura
A	Malabar Hills Frog	*Rana malabarica*	RAMA	Anura
A	Marbled Bullfrog	*Tompterna marmorata*	TOMA	Anura
A	Marbled Reed Frog	*Hyperolius marmoratus*	HYMA	Anura
A	Marbled Salamander	*Ambystoma opacum*	AMOP	Caudata
A	MarmoRatus Leaf-toad Froglet	*Phyllodactylus marmoratus*	PHMA	Anura
A	Marsabit Clawed Frog	*Xenopus borealis*	XEBO	Anura
A	Marsh Frog	*Rana ridibunda*	RARI	Anura
A	Matang Asian Toad	*Leptolalax gracilis*	LEGR	Anura
A	Matang Frog	*Rana signata*	RASI	Anura
A	Matang Stream Toad	*Ansonia leptopus*	ANLE	Anura
A	Mindanao Splash Frog	*Staurois natator*	STNA	Anura
A	Mink Frog	*Rana septentrionalis*	RASE	Anura
A	Moaning Frog	*Heleioporus eyrei*	HEEY	Anura
A	Mole Salamander	*Ambystoma talpoideum*	AMTA	Caudata
A	Mole Salamander species	*Ambystoma* species	AMXX	Caudata
A	Mount Dulit Frog	*Rana hosii*	RAHO	Anura
A	Mount Glorious Torrent Frog	*Taudactylus diurnus*	TADI	Anura
A	Mount Lyell Salamander	*Hydromantoides platycephalus*	HYPL	Caudata
A	Mountain Dusky Salamander	*Desmognathus ochrophaeus*	DEOC	Caudata
A	Mountain Spadefoot Toad	*Leptobrachium montanum*	LEMO	Anura
A	Mountain Torrent Frog	*Taudactylus rheophilus*	TARH	Anura
A	Mountain Yellow-Legged Frog	*Rana muscosa*	RAMU	Anura
A	Mozambique Grassland Frog	*Ptychadena mossambica*	PTMO	Anura
A	Mozambique Metal Frog	*Cacosternum nanum*	CANN	Anura
A	Mudpuppy	*Necturus maculosus*	NEMA	Caudata
A	Muller's Clawed Frog	*Xenopus muelleri*	XEMU	Anura
A	Namaqua Metal Frog	*Cacosternum namaquense*	CANA	Anura
A	Napo Plump Toad	*Osornophryne antisana*	OSAN	Anura
A	Natal Banana Frog	*Afrixalus spinifrons*	AFSP	Anura
A	Natal Diving Frog	*Natalobatrachus bonebergi*	NABO	Anura
A	Natal Drakensberg Frog	*Rana hymenopus*	STHY	Anura
A	Natal Ghost Frog	*Heleophryne natalensis*	HENA	Anura

Class	Common Name*	Scientific Name*	Code	Order
A	Natal River Frog	*Phrynobatrachus natalensis*	PHNA	Anura
A	Natal Uplands Frog	*Rana wageri*	STWA	Anura
A	Natterjack Toad	*Bufo calamita*	BUCA	Anura
A	Neuse River Waterdog	*Necturus lewisi*	NELE	Caudata
A	Noboribetsu Salamander	*Hynobius retardatus*	HYRT	Caudata
A	Northern Crested Newt	*Triturus cristatus*	TRCR	Caudata
A	Northern Cricket Frog	*Acris crepitans*	ACCR	Anura
A	Northern Gastric-brooding Frog	*Rheobatrachus vitellinus*	RHVI	Anura
A	Northern Leopard Frog	*Rana pipiens*	RAPI	Anura
A	Northern Red Salamander	*Pseudotriton ruber ruber*	PSRR	Caudata
A	Northern Slimy Salamander	*Plethodon glutinosus*	PLGL	Caudata
A	Northern Two-lined Salamander	*Eurycea bislineata*	EUBI	Caudata
A	Northwestern Salamander	*Ambystoma gracile*	AMGR	Caudata
A	Oak Toad	*Bufo quercicus*	BUQU	Anura
A	Olive Midwife Toad	*Alytes obstetricans*	ALOB	Anura
A	Olympic Salamander	*Rhyacotriton olympicus*	RHOL	Caudata
A	Oregon Ensatina	*Ensatina eschscholtzi oregonensis*	ENEO	Caudata
A	Oregon Slender Salamander	*Batrachoseps wrighti*	RAWR	Caudata
A	Oriental Firebelly Toad	*Bombina orientalis*	BOOR	Anura
A	Ornate Burrowing Frog	*Limnodynastes ornatus*	LIOR	Anura
A	Ornate Chorus Frog	*Pseudacris ornata*	PSOR	Anura
A	Ornate Horned Frog	*Ceratophrys ornata*	CEOR	Anura
A	Ornate Rice Frog	*Microhyla ornata*	MIOR	Anura
A	Orphnocnemis Sucker Frog	*Amolops orphnocnemis*	AMOR	Anura
A	Pacific Chorus Frog	*Pseudacris regilla*	HYRE	Anura
A	Pacific Giant Salamander	*Dicamptodon tenebrosus*	DITE	Caudata
A	Pacific Lowland Treefrog	*Hyla grylatta*	HYGA	Anura
A	Palm Torrent Frog	*Taudactylus liemi*	TALI	Anura
A	Palmate Newt	*Triturus helveticus*	TRHE	Caudata
A	Panther Flying Frog	*Rhacophorus pardalis*	RHPA	Anura
A	Peocilus Sucker Frog	*Amolops poecilus*	AMPO	Anura
A	Phaeomerus Sucker Frog	*Amolops phaeomerus*	AMPH	Anura
A	Pickerel Frog	*Rana palustris*	RAPA	Anura
A	Pico Blanco Robber Frog	*Eleutherodactylus hylaeformis*	ELHY	Anura
A	Pico Blanco Toad	*Bufo fastidiosus*	BUFA	Anura
A	Pig Frog	*Rana grylio*	RAGR	Anura
A	Pigmy Salamander	*Desmognathus wrighti*	DEWR	Caudata
A	Pine Barrens Treefrog	*Hyla andersonii*	HYAN	Anura
A	Pine Woods Treefrog	*Hyla femoralis*	HYFE	Anura
A	Plains Leopard Frog	*Rana blairi*	RABL	Anura
A	Poison Frog species	*Dendrobates* species	DEXX	Anura
A	Pool Frog	*Rana lessonae*	RALE	Anura
A	Puerto Rican Coqui	*Eleutherodactylus coqui*	ELCO	Anura
A	Purcell's African Ghost Frog	*Heleophryne purcelli*	HEOR	Anura
A	Queensland Barred Frog	*Mixophyes fleayi*	MIFL	Anura
A	Quito Stubfoot Toad	*Atelopus ignescens*	ATIG	Anura
A	Rainforest Frog species	*Cophixalus* species	COXX	Anura
A	Rana brevipoda	*Rana brevipoda*	RABR	Anura
A	Rana bufo???	*Rana bufo*	RABU	Anura

Appendix 1b - Species Common Names - 6

Class	Common Name*	Scientific Name*	Code	Order
A	Rana fusca	*Rana fusca*	RAFU	Anura
A	Ranid species	*Rana* species	RAXX	Anura
A	Rattle Froglet	*Crinia glauerti*	CRGL	Anura
A	Ravine Salamander	*Plethodon richmondi*	PLRS	Caudata
A	Red-Backed Salamander	*Plethodon cinereus*	PLCI	Caudata
A	Red-Legged Froglet	*Crinia georgiana*	CRGE	Anura
A	Red-spotted Newt species	*Notophthalmus* species	NOXX	Anura
A	Red Legged Frog	*Rana aurora*	RAAU	Anura
A	Redbelly Newt	*Taricha rivularis*	TARI	Caudata
A	Relict Leopard Frog	*Rana onca*	RAON	Anura
A	Ribbed Newt species	*Pleorodeles* species	PLXX	Caudata
A	Rio Grande Frog	*Rana berlandieri*	RABE	Anura
A	River Frog	*Rana heckscheri*	RAHC	Anura
A	Roughskin Newt	*Taricha granulosa*	TAGR	Caudata
A	Royal Ghost Frog	*Heleophryne regis*	HERE	Anura
A	Sabah Splash Frog	*Staurois latopalmatus*	STLA	Anura
A	Sani Pass Frog	*Rana dracomontana*	RADR	Anura
A	Santa Cruz Black Salamander	*Aneides flavipunctatus niger*	ANFN	Caudata
A	Santa Cruz Long-toed Salamander	*Ambystoma macrodactylum croceum*	AMMC	Caudata
A	Schlegel's Flying Frog	*Rhacophoros schlegelii*	RHSC	Anura
A	Schlegel's Java Frog	*Rana chalconota*	RACO	Anura
A	Seal Salamander	*Desmognathus monticola*	DEMO	Caudata
A	Senegal Running Frog	*Kassina senegalensis*	KASE	Anura
A	Sharpsnout Torrent Frog	*Taudactylus acutirostris*	TAAC	Anura
A	Shovelnose Salamander	*Leurognathus marmoratus*	LEMA	Caudata
A	Shy Robber Frog	*Eleutherodactylus trepidotus*	ELTR	Anura
A	Sierra Newt	*Taricha torosa sierrae*	TATS	Caudata
A	Silver-banded Banana Frog	*Afrixalus fornasini*	AFFO	Anura
A	Silvery Salamander	*Ambystoma platineum*	AMPL	Caudata
A	Skeleton Gorge Ghost Frog	*Heleophryne rosei*	HERO	Anura
A	Skipper Frog	*Rana cyanophlyctis*	RACY	Anura
A	Slender Treefrog	*Litoria adelaidensis*	LIAD	Anura
A	Smallmouth Salamander	*Ambystoma texanum*	AMTE	Caudata
A	Smooth Newt	*Triturus vulgaris*	TRVU	Caudata
A	South African Clawed Frog	*Xenopus laevis laevis*	XELL	Anura
A	Southern Chorus Frog	*Pseudacris nigrata*	PSNI	Anura
A	Southern Cricket Frog	*Acris gryllus*	ACGR	Anura
A	Southern Dusky Salamander	*Desmognathus auriculatus*	DEFA	Caudata
A	Southern Gastric Brooding Frog	*Rheobatrachus silus*	RHSI	Anura
A	Southern Leopard Frog	*Rana utricularia*	RAUT	Anura
A	Southern Spadefoot Toad	*Scaphiopus multiplicata*	SCMU	Anura
A	Southern Toad	*Bufo terrestris*	BUTE	Anura
A	Southern Torrent Salamander	*Rhyacotriton variegatus*	RHVA	Caudata
A	Spanish Ribbed Newt	*Pleorodeles waltl*	PLWA	Caudata
A	Spotted Frog	*Rana pretiosa*	RAPR	Anura
A	Spotted Grass Frog	*Limnodynastes tasmaniensis*	LITA	Anura
A	Spotted Salamander	*Ambystoma maculatum*	AMMA	Caudata
A	Spring Frog	*Rana dalmatina*	RADA	Anura
A	Spring Peeper	*Pseudacris crucifer*	PSCR	Anura

Class	Common Name*	Scientific Name*	Code	Order
A	Spring Salamander	*Gyrinophilus porphyriticus*	GYPO	Caudata
A	Springbok Frog	*Rana springbokensis*	STSP	Anura
A	Square-marked Toad	*Bufo regularis*	BURE	Anura
A	Squirrel Treefrog	*Hyla squirella*	HYSQ	Anura
A	Strawberry Poison Frog	*Dendrobates pumilio*	DEBU	Anura
A	Striped Frog	*Rana fasciata*	STFA	Anura
A	Striped Newt	*Notophthalmus perstriatus*	NOPE	Caudata
A	Sungei Tawan Toad	*Bufo juxtasper*	BUJU	Anura
A	Swamp Burrowing Frog	*Heleioporus inornatus*	HEIO	Anura
A	Swedish Swamp Frog	*Rana arvalis*	RAAR	Anura
A	Swellendam Cape Toad	*Capensibufo tradouwi*	CATR	Anura
A	Tago Frog	*Rana tagoe*	RATA	Anura
A	Tailed Frog	*Ascaphus truei*	ASTR	Anura
A	Three-toed Amphiuma	*Amphiuma tridactylum*	AMTR	Caudata
A	Tiger Salamander	*Ambystoma tigrinum*	AMTI	Caudata
A	Tlaloc's Leopard Frog	*Rana tlaloci*	RATL	Anura
A	Toad species	*Bufo* species	BUXX	Anura
A	Torrent Treefrog	*Litoria nannotis*	LINA	Anura
A	Treefrog species	*Hyla* species	HYXX	Anura
A	Tremblay's Salamander	*Ambystoma tremblayi*	AMTM	Caudata
A	Trilling Frog	*Neobatrachus centralis*	NECE	Anura
A	Tropical Lungless Salamander species	*Bolitoglossa minutula*	BOMI	Caudata
A	Tsushima Frog	*Rana tsushimensis*	RATS	Anura
A	Tusked Frog	*Adelotus brevis*	ADBR	Anura
A	Two-lined Salamander	*Eurycea bislineata bislineata*	EUBB	Caudata
A	unknown amphibian species	unknown amphibian species	XXXA	unknown
A	unknown anuran amphibian	unknown anuran species	XXAA	Anura
A	unknown frog species	unknown frog species	XXFR	Anura
A	unknown newt	*Diemictylus viridescens*	DIVI	Caudata
A	unknown newt species	unknown newt species	XXNE	Caudata
A	unknown salamander species	*Heideotriton wallacei*	HEWA	Caudata
A	unknown salamander species	unknown salamander species	XXXS	Caudata
A	unknown toad species	*Bufo divergens*	BUDI	Anura
A	unknown toad species	*Bufo vulgaris*	BUVU	Anura
A	unknown toad species	unknown toad species	XXTD	Anura
A	unknown treefrog	*Hyla calypsa*	HYCL	Anura
A	unknown tropical frog	*Prostherapis trinitatis*	PRTR	Anura
A	unknown tropical frog species	*Eupemphix pustulosus*	EUPU	Anura
A	Veragoa Stubfoot Toad	*Atelopus varius*	ATVA	Anura
A	Volcan Barba Treefrog	*Hyla picadoi*	HYPI	Anura
A	West African Screeching Frog	*Arthroleptis poecilonotus*	ARPO	Anura
A	Western Banjo Frog	*Limnodynastes dorsalis*	LYDO	Anura
A	Western Chorus Frog	*Pseudacris triseriata*	PSTR	Anura
A	Western Green Frog	*Litoria moorei*	LIMO	Anura
A	Western Long-toed Salamander	*Ambystoma macrodactylum macrodactylum*	AMMM	Caudata
A	Western Redback Salamander	*Plethodon vehiculum*	PLVE	Caudata
A	Western Spadefoot Toad	*Spea hammondii*	SCHA	Anura
A	Western Spotted Frog	*Rana pretiosa pretiosa*	RAPP	Anura

Appendix 1b - Species Common Names - 8

Class	Common Name*	Scientific Name*	Code	Order
A	Western Toad	*Bufo boreas*	BUBO	Anura
A	White-lipped Frog	*Leptodactylus typhonius*	LETY	Anura
A	White-throated Froglet	*Crinia insignifera*	CRIN	Anura
A	Wood Frog	*Rana sylvatica*	RASY	Anura
A	Woodhouse's Toad	*Bufo woodhousii*	BUWO	Anura
A	Woodland Salamander	*Plethodon metcalfi*	PLME	Caudata
A	Wrinkled Frog	*Rana rugosa*	RARU	Anura
A	Wyoming Toad	*Bufo hemiophrys baxteri*	BUHB	Anura
A	Yavapai Leopard Frog	*Rana yavapiensis*	RAYA	Anura
A	Yellowbelly Toad	*Bombina variegata*	BOVA	Anura
A	Yonahlossee Salamander	*Plethodon yonahlossee*	PLYO	Caudata
A	Yosemite Toad	*Bufo canorus*	BUCN	Anura
R	African Beauty Racer	*Psammophis sibilans*	PSSI	Squamata
R	African Slender-snouted Crocodile	*Crocodlus cataphractus*	CRCA	Crocodylia
R	African Softshell Turtle	*Trionyx spinifer*	TRSP	Testudines
R	African Striped Mabuya	*Mabuya striata*	MAST	Squamata
R	American Alligator	*Alligator mississippiensis*	ALMI	Crocodylia
R	American Crocodile	*Crocodylus acutus*	CRAC	Crocodylia
R	Asp Viper	*Vipera aspis*	VIAS	Squamata
R	Australian Dragon Lizard species	*Amphibolurus barbatus*	AMBA	Squamata
R	Australian Freshwater Crocodile	*Crocodylus johnstoni*	CRJO	Crocodylia
R	Australian Snake-eyed Skink	*Cryptoblepharus plagiocephalus*	CRPL	Squamata
R	Ball Python	*Python regius*	PYRG	Squamata
R	Banded Water Snake	*Nerodia fasciata*	NEFA	Squamata
R	Bark Snake	*Hemirhagerrhis nototaenia*	HENO	Squamata
R	Black Caiman	*Melanosuchus niger*	MENI	Crocodylia
R	Black Pine Snake	*Pituophis melanoleucus lodingi*	PIML	Squamata
R	Black Rat Snake	*Elaphe obsoleta obsoleta*	ELOO	Squamata
R	Black Tiger Snake	*Notechis ater*	NOAT	Squamata
R	Blanding's Turtle	*Emydoidea blandingii*	EMBL	Testudines
R	Boa Constrictor	*Boa constrictor*	BOCO	Squamata
R	Bojer's Burrowing Skink	*Scelotes bojerii*	SCBO	Squamata
R	Boomslang	*Dispholidus typus*	DITY	Squamata
R	Boulenger's Morethia	*Morethia boulengeri*	MOBO	Squamata
R	Box Turtle	*Terrapene carolina*	TECA	Testudines
R	Broad-snouted Spectacled Caiman	*Caiman latirostris*	CALA	Crocodylia
R	Brown House Snake	*Lamprophis fuliginosus*	LAFU	Squamata
R	Brown Tree Snake	*Boiga irregularis*	BOIR	Squamata
R	Brown Water Snake	*Nerodia taxispilota*	NATA	Squamata
R	Bull Snake	*Pituophis catenifer sayi*	PISA	Squamata
R	Burton's Snake Lizard	*Lialis burtonis*	LIBU	Squamata
R	Caiman species	*Caiman* species	CAXX	Squamata
R	Cape Dwark Gecko	*Lygodactylus capensis*	LYCA	Squamata
R	Cape Wolf Snake	*Lycophidion capense*	LYCP	Squamata
R	Capian Turtle	*Mauremys caspica rivulata*	MACR	Testudines
R	Carpet Python	*Morelia spilotes variegata*	MOSV	Squamata
R	Caucasica Agama	*Agama caucasica*	AGCA	Squamata
R	Chicken Snake	*Elaphe quadrivittata*	ELQU	Squamata
R	Chihuahuan Spotted Whiptail	*Cnemidophorus exsanguis*	CNEX	Squamata

Appendix 1b - Species Common Names - 9

Class	Common Name*	Scientific Name*	Code	Order
R	Clark's Spiny Lizard	*Sceloporus clarkii*	SCCL	Squamata
R	Coachwhip	*Masticophis flagellum*	MAFL	Squamata
R	Coast Horned Lizard	*Phrynosoma coronatum*	PHCO	Squamata
R	Coastal Legless Lizard	*Aprasia pulchella*	APPU	Squamata
R	Cobra species	*Naja* species	NAXX	Squamata
R	Collett's Black Snake	*Pseudechis colletti*	PSCO	Squamata
R	Common Agama	*Agama agama*	AGAG	Squamata
R	Common Death Adder	*Acanthophis antarcticus*	ACAN	Squamata
R	Common Egg-eating Snake	*Dasypeltis scabra*	DASC	Squamata
R	Common Eurasian Lizard species	*Lacerta muralis*	LAMU	Squamata
R	Common Garter Snake	*Thamnophis sirtalis*	THSI	Squamata
R	Common Green Turtle	*Chelonia mydas*	CHMY	Testudines
R	Common King Snake	*Lampropeltis getula*	LAGE	Squamata
R	Common map Turtle	*Graptemys geographica*	GRGE	Testudines
R	Common Mud Turtle	*Kinosternon subrubrum*	KISU	Testudines
R	Common Snapping Turtle	*Chelydra serpentina serpentina*	CHSE	Testudines
R	Common Water Snake	*Nerodia sipedon sipedon*	NASI	Squamata
R	Cooter Turtle / Red-bellied Turtle	*Pseudemys scripta*	PSSC	Testudines
R	Copperhead	*Agkistrodon contortrix*	AGCO	Squamata
R	Coppertail ctenotus	*Ctenotus taeniolatus*	CTTA	Squamata
R	Cornsnake	*Elaphe guttata*	ELGU	Squamata
R	Cuban Crocodile	*Crocodylus rhombifer*	CRRH	Crocodylia
R	Curl Snake	*Suta suta*	SUSU	Squamata
R	Dark Ground Skink	*Leiolopisma nigriplantare*	LENI	Squamata
R	Delicate Skink	*Lampropholis delicata*	LADE	Squamata
R	Desert Grassland Whiptail	*Cnemidophorus uniparens*	CNUN	Squamata
R	Desert Horned Lizard	*Phrynosoma platyrhinos*	PHPL	Squamata
R	Desert Tortoise	*Gopherus agassizii*	GOAG	Testudines
R	DiamondBack Terrapin	*Malaclemys terrapin*	MATE	Testudines
R	Diamondback Water Snake	*Nerodia rhombifer*	NERH	Squamata
R	Distinguished Lerista	*Lerista distinguenda*	LEDI	Squamata
R	Dugite	*Pseudonaja affinis*	PSAF	Squamata
R	Dwarf Caiman	*Palaeosuchus palperbosos*	PAPA	Crocodylia
R	Dwarf Lizard	*Lacerta parva*	LAPA	Squamata
R	Eastern Brown Snake	*Pseudonaja textilis*	PSTE	Squamata
R	Eastern Diamondback Rattlesnake	*Crotalus adamanteus*	CRAD	Squamata
R	Eastern Hognose Snake	*Heterodon platirhinos*	HEPL	Squamata
R	Eastern Indigo Snake	*Drymarchon corais couperi*	DRCC	Squamata
R	Eastern King Snake	*Lampropeltis getula getula*	LAGG	Squamata
R	Eastern Ribbon Snake	*Thamnophis sauritus*	THSA	Squamata
R	Eastern Tiger Snake	*Telescopus semiannulatus*	TESE	Squamata
R	Egyptian Cobra	*Naja haje*	NAHA	Squamata
R	Egyptian Saw-scaled Viper	*Eryx pyramidum*	ERPY	Squamata
R	Emerald Lizard	*Lacerta viridis*	LAVI	Squamata
R	European pond Turtle	*Emys orbicularis*	EMOR	Testudines
R	Eyelash Palm Pit Viper	*Bothriechis schlegelii*	BOSC	Squamata
R	Eyelid Skink species	*Eumeces* species	EUXX	Squamata
R	False Gharial	*Tomistoma schlegelii*	TOSC	Squamata
R	Fence Lizard	*Sceloporus undalatus*	SCUN	Squamata

Class	Common Name*	Scientific Name*	Code	Order
R	Fine-lined Skink	*Hemiergis initialis*	HEIN	Squamata
R	Fire Racer	*Coluber jugularis*	COJU	Squamata
R	Five-lined Skink	*Eumeces fasciatus*	EUFA	Squamata
R	Florida East Coast Terrapin	*Malaclemys terrapin tequesta*	MATT	Testudines
R	Florida King Snake	*Lampropeltis getula floridana*	LAGF	Squamata
R	Florida Pine Snake	*Pituophis melanoleucus mugitis*	PIMM	Squamata
R	Florida Redbelly Turtle	*Pseudemys nelsoni*	PSNE	Testudines
R	Flowered Racer	*Coluber florulentus*	COFL	Squamata
R	Forest Carlia	*Carlia tetradactyla*	CATE	Crocodylia
R	Fox Snake	*Elaphe vulpina*	ELVU	Squamata
R	FreshWater Crocodile	*Crocodylus novaeguineae*	CRNO	Crocodylia
R	Gallot's Lizard	*Gallotia galloti*	GAGA	Squamata
R	Garter Snake species	*Thamnophis* species	THXX	Squamata
R	Gharial	*Gavialis gangeticus*	GAGN	Crocodylia
R	Girard's Skink	*Cyclodina aenea*	CYAE	Squamata
R	Gopher Snake	*Pituophis catenifer*	PICA	Squamata
R	Gopher Tortoise	*Gopherus polyphemus*	GOPO	Testudines
R	Gould's Black-headed Snake	*Unechis gouldii*	UNGO	Squamata
R	Graham's Crayfish Snake	*Regina grahami*	REGR	Squamata
R	Granite Night Lizard	*Xantusia henshawi*	XAHE	Squamata
R	Grass Snake	*Natrix natrix*	NANA	Squamata
R	Grass Snake species	*Natrix* species	NTXX	Squamata
R	Gray-Brown Menetia	*Menetia greyi*	MEGR	Squamata
R	Great Basin Whiptail	*Cnemidophorus tigris tigris*	CNTT	Squamata
R	Greater Earless Lizard	*Cophosaurus texanus*	COTE	Squamata
R	Green Anole	*Anolis carolinensis*	ANCA	Squamata
R	Greiberg's Blind Snake	*Typhlina australis*	TYAU	Squamata
R	Ground Agama	*Agama aculeata*	AGAC	Squamata
R	Ground Skink species	*Scincella* species	SCXY	Squamata
R	Guichenot's Skink	*Lampropholis guichenoti*	LAGU	Squamata
R	Gulf Coast Box Turtle	*Terrapene carolina major*	TECM	Testudines
R	Gunther's Black-headed Snake	*Unechis nigriceps*	UNNI	Squamata
R	Habu Poisonous Snake	*Trimeresurus flavoviridis*	TRFL	Squamata
R	Haitian Boa	*Epicrates striatus*	EPST	Squamata
R	Hardegger's Orangetail Lizard	*Philochortus hardeggeri*	PHHA	Squamata
R	Hawksbill Turtle	*Eretmochelys imbricata*	ERIM	Testudines
R	Herald Snake	*Crotaphopeltis hotamboeia*	CRHT	Squamata
R	Hermann's Tortoise	*Testudo hermanni*	TEHE	Testudines
R	Horned Viper	*Cerastes cerastes*	CECE	Squamata
R	House Snake	*Boaedon fuliginosus*	BOFU	Squamata
R	Indian Leaf-toed Gecko	*Hemidactylus flaviviridis*	HEFL	Squamata
R	Indian Python	*Python molurus bivittatus*	PYMB	Squamata
R	Indian Sand Agama	*Psammophilus dorsalis*	PSDO	Squamata
R	Italian Wall Lizard	*Podarcis sicula sicula*	POSS	Squamata
R	Jacky Lizard	*Amphibolurus muricatus*	AMMU	Squamata
R	Japanese Mamushi	*Agkistrodon blomhoffi*	AGBB	Squamata
R	Java File Snake	*Acrochordus javanicas*	ACJA	Squamata
R	Jeremie Anole	*Anolis coelestinus*	ANCO	Squamata
R	Kemp's Ridley Turtle	*Lepidochelys kempii*	LEKE	Testudines

Class	Common Name*	Scientific Name*	Code	Order
R	Kenya Sand Boa	*Eryx colubrinus*	ERCO	Squamata
R	King Brown Snake	*Pseudechis australis*	PSAU	Squamata
R	King Snake species	*Lampropeltis* species	LAXX	Squamata
R	Kirk's Rock Agama	*Agama kirkii*	AGKI	Squamata
R	Labillardier's ctenotus	*Ctenotus labillardieri*	CTLA	Squamata
R	Lake Erie Water Snake	*Nerodia sipedon insularum*	NESN	Squamata
R	Lanza's Spiny Agama	*Agama spinosa*	AGSP	Squamata
R	Largescale Leaf-toed Gecko	*Hemidactylus macropholis*	HEMA	Squamata
R	Leaf-toed Gecko species	*Hemidactylus* species	HEXX	Squamata
R	Leatherback Turtle	*Dermochelys coriacea*	DECO	Testudines
R	Leopard Tortoise	*Geochelone pardalis*	GEPA	Testudines
R	Leschenault's Leaf-toed Gecko	*Hemidactylus leschenaultii*	HELE	Squamata
R	Lidless Skink species	*Panaspis dahomeyense*	PADA	Squamata
R	Loggerhead Turtle	*Caretta caretta*	CACA	Testudines
R	Macklot's Python	*Liasis mackloti*	LIMA	Squamata
R	Many-eyed Gecko	*Diplodactylus polyophthalmus*	DIPO	Squamata
R	McGregor's New Zealand Skink	*Cyclodina macgregori*	CYMA	Squamata
R	Midland Painted Turtle	*Chrysemys picta marginata*	CHPM	Testudines
R	Milk Snake	*Lampropeltis doliata triangulum*	LADT	Squamata
R	Mississippi Green Water Snake	*Nerodia cyclopion*	NECY	Squamata
R	Mojave Black Collared Lizard	*Crotaphytus bicinctores*	CRCB	Squamata
R	Monitor species	*Varanus* species	VAXX	Squamata
R	Montpellier Snake	*Malpolon monspessulanus*	MAMO	Squamata
R	Mud Snake	*Farancia abacura*	FAAB	Squamata
R	Mugger Crocodile	*Crocodylus palustris*	CRPA	Crocodylia
R	Namaqua Sand Lizard	*Pedioplanis namaquensis*	PENA	Squamata
R	Napoleon Skink	*Egernia napoleonis*	EGNA	Squamata
R	Narrow-snouted Spectacled Caiman	*Caiman crocodilus*	CACC	Crocodylia
R	Nevada Shovelnose Snake	*Chionactis occcipatalis talpina*	CHOT	Squamata
R	New Guinea Frog-eating Snake	*Stegonotus modestus*	STMO	Squamata
R	New Mexico Whiptail	*Cnemidophorus neomexicanus*	CNNE	Squamata
R	Nile Crocodile	*Crocodylus niloticus*	CRNI	Crocodylia
R	North American Softshell Turtle species	*Apalone* species	APXX	Testudines
R	Northern alligator Lizard	*Elgaria coerulea*	ELCE	Squamata
R	Northern Brown Snake	*Storeria dekayi*	STDE	Squamata
R	Northern Ringneck Snake	*Diadophis punctatus edwardsii*	DIPE	Squamata
R	Northern Vine Snake	*Thelotornis kirtlandii*	THKI	Squamata
R	Northern Water Snake	*Nerodia sipedon*	NESI	Squamata
R	Northwestern Garter Snake	*Thamnophis ordinoides*	THOR	Squamata
R	Nyassa File Snake	*Mehelya nyassae*	MENY	Squamata
R	Obscure Morethia	*Morethia obscura*	MOOB	Squamata
R	Okavango Dwark Gecko	*Lygodactylus chobiensis*	LYCH	Squamata
R	Olive Python	*Liasis olivaceus*	LIOL	Squamata
R	Olive Ridley Turtle	*Lepidochelys olivacea*	LEOL	Testudines
R	Ornamental Snake	*Denisonia maculata*	DEMA	Squamata
R	Ornate Day Gecko	*Phelsuma ornata*	PHOR	Squamata
R	Pacific Pond Turtle	*Clemmys marmorata*	CLMA	Testudines
R	Painted Turtle	*Chrysemys picta*	CHPI	Testudines

Class	Common Name*	Scientific Name*	Code	Order
R	Palestine Viper	*Vipera palestinae*	VIPA	Squamata
R	Parker's Leaf-toed Gecko	*Hemidactylus parkeri*	HEPA	Squamata
R	Perentie	*Varanus giganteus*	VAGI	Squamata
R	Pine Snake	*Pituophis melanoleucus*	PIME	Squamata
R	Plainbelly Water Snake	*Nerodia erythrogaster*	NEER	Squamata
R	Plains Garter Snake	*Thamnophis radix*	THRA	Squamata
R	Plateau Spotted Whiptail	*Cnemidophorus septemvittatus*	CNSP	Squamata
R	Pond Turtle species	*Clemmys caspica*	CLCA	Testudines
R	Puerto Rican Ameiva	*Ameiva exsul*	AMEX	Squamata
R	Racer	*Coluber constrictor*	COCO	Squamata
R	Ragazzi's Cylindrical Skink	*Chalcides ragazzi*	CHRA	Squamata
R	Rainbow Ameiva	*Ameiva undalata*	AMUN	Squamata
R	Rainbow Skink	*Mabuya quinquetaeniata*	MAQU	Squamata
R	Rainbow Snake	*Abastor erythrogrammus*	ABER	Squamata
R	Rat Snake	*Elaphe obsoleta*	ELOB	Squamata
R	Red-bellied Water Snake	*Nerodia erythrogaste*	NAEY	Squamata
R	Red-eared Slider	*Trachemys scripta*	TRSC	Testudines
R	Redbelly Black Snake	*Pseudechis porphyriacus*	PSPO	Squamata
R	Redbelly Snake	*Storeria occipitomaculata*	STOC	Squamata
R	Reticulate Python	*Python reticulatus*	PYRE	Squamata
R	Robecchi's Agama	*Agama robecchii*	AGRO	Squamata
R	Robust ctenotus	*Ctenotus robustus*	CTRO	Squamata
R	Rock Rattlesnake	*Crotalus lepidus*	CRLE	Squamata
R	Rough-earth Snake	*Haldea striatula*	HAST	Squamata
R	rough Green Snake	*Opheodrys aestivus*	OPAE	Squamata
R	Round Island Boa	*Casarea dussumieri*	CADU	Squamata
R	Round Island Burrowing boa	*Bolyeria multocarinata*	BOMU	Squamata
R	Round Island Day Gecko	*Phelsuma guentheri*	PHGU	Squamata
R	Rubber Boa	*Charina bottae*	CHBO	Squamata
R	Sagebrush Lizard	*Sceloporus graciosus*	SCGR	Squamata
R	Saltwater Crocodile	*Crocodylus porosus*	CRPO	Crocodylia
R	San-Pedro Side-blotched Lizard	*Uta palmeri*	UTPA	Squamata
R	Sanannah Variable Mabuya	*Mabuya varia varia*	MAVV	Squamata
R	Sand Lizard	*Lacerta agilis*	LAAG	Squamata
R	Sand Lizard species	*Pediplanic lineoocellata*	PELI	Squamata
R	Sand Monitor	*Varanus gouldii*	VAGO	Squamata
R	Sand Racer species	*Psammophis trivirgatus*	PSTI	Squamata
R	Savannah Lidless Skink	*Panaspis wahlbergi*	PAWA	Squamata
R	Sea Turtle species	*Chelonia* species	CHXX	Testudines
R	Serpent Island Gecko	*Nactus serpensinsula*	NASE	Squamata
R	Shingleback Skink	*Tiliqua rugosa*	TIRU	Squamata
R	Side-blotched Lizard	*Uta stansburiana*	UTST	Squamata
R	Six-lined Racerunner	*Cnemidophorus sexlineatus*	CNSE	Squamata
R	Smith's Leaf-toed Gecko	*Hemidactylus smithi*	HESM	Squamata
R	Smith's Racerunner	*Pseuderemias smithi*	PSSM	Squamata
R	Smooth-fronted Caiman	*Paleosuchus trigonatus*	PATI	Crocodylia
R	Smooth Green Snake	*Opheodrys vernalis*	OPVE	Squamata
R	Snake-eyed Skink	*Cryptoblepharus boutonii*	CRBO	Squamata
R	Somali Writhing Skink	*Lygosoma somalicum*	LYSO	Squamata

Class	Common Name*	Scientific Name*	Code	Order
R	Somalian Puff Adder	*Bitis arietans somalica*	BIAS	Squamata
R	Sonoran Mud Turtle	*Kinosternon sonoriense*	KISO	Testudines
R	Sonoran Spotted Whiptail	*Cnemidophorus sonorae*	CNSO	Squamata
R	Southern Alligator Lizard	*Elgaria multicarinata*	GEMU	Squamata
R	Southern Black Racer	*Coluber constrictor priapus*	COCP	Squamata
R	Southern Fence Lizard	*Sceloporus undulatus undulatus*	SCUU	Squamata
R	Southern Flap-shelled Turtle	*Lissemys punctata granosa*	LIPG	Testudines
R	Southern Hognose Snake	*Heterodon simus*	HESI	Squamata
R	Southern Longtail Lizard	*Latastia longicaudata*	LALO	Squamata
R	Southern Water Snake	*Nerodia fasciata floridana*	NEFF	Squamata
R	Southern Water Snake species	*Nerodia fasciata compressicauda*	NEFC	Squamata
R	Spiny Lizard species	*Sceloporus* species	SCXX	Squamata
R	Spiny Softshell	*Apalone spinifera*	APSP	Testudines
R	Spotted Black Snake	*Pseudechis guttatus*	PSGU	Squamata
R	Spotted Sticky-toed Gecko	*Hoplodactylus maculatus*	HOMA	Squamata
R	Spotted Turtle	*Clemmys guttata*	CLGU	Testudines
R	Sudan Mabuya	*Mabuya brevicollis*	MABR	Squamata
R	Taylor's Strange Agama	*Xenagama taylori*	XETA	Squamata
R	Telford's Ground Skink	*Leiolopisma telfairii*	LETE	Squamata
R	Texas Spiny Lizard	*Sceloporus olivaceus*	SCOL	Squamata
R	Texas Spiny Softshell	*Apalone spinifera emoryi*	APSE	Testudines
R	Texas Spotted Whiptail	*Cnemidophorus gularis*	CNGU	Squamata
R	Timber Rattlesnake	*Crotalus horridus*	CRHO	Squamata
R	Tree Lizard	*Urosaurus ornatus*	UROR	Squamata
R	Trilinear Ground Skink	*Leiolopisma trilineata*	LETR	Squamata
R	Tuatara	*Sphenodon punctatus*	SPPU	Squamata
R	unknown Eyelid Skink	*Eumeces oshimensis*	EUOS	Squamata
R	unknown Hognose Snake	*Heterodon contortix*	HECO	Squamata
R	unknown reptile species	unknown Reptilian species	XXXR	unknown
R	unknown Sea Snake	unknown sea snake species	XXSS	Squamata
R	unknown skink species	*Oligosoma maccanni*	OLMA	Squamata
R	unknown snake species	unknown snake or serpentene species	XXSN	Squamata
R	unknown turtle species	unknown or various turtle species	XXXT	Testudines
R	unknown Typical Agama species	*Agama stellio stellio*	AGSS	Squamata
R	Utah Banded Gecko	*Coleonyx variegatus utahensis*	COVU	Squamata
R	Variable Agama	*Calotes versicolor*	CAVE	Squamata
R	Viviparous Lizard	*Lacerta vivipara*	LAVV	Squamata
R	Wall Lizard species	*Podarcis* species	POXX	Squamata
R	Warren's Galliwasp Lizard	*Diploglossus warreni*	DIWA	Squamata
R	Water Moccasin	*Agkistrodon piscivorus*	AGPI	Squamata
R	Water Snake species	*Nerodia* species	NEXX	Squamata
R	Western Aquatic Garter Snake	*Thamnophis couchii*	THCO	Squamata
R	Western Chuckwalla	*Sauromalus obesus obesus*	SAOB	Squamata
R	Western Coachwhip Snake	*Masticophis flagellum testaceus*	MAFT	Squamata
R	Western Fence Lizard	*Sceloporus occidentalis*	SCOC	Squamata
R	Western Hognose Snake	*Heterodon nasicus*	HENS	Squamata
R	Western Rattlesnake	*Crotalus viridis*	CRVI	Squamata
R	Western Ribbon Snake	*Thamnophis proximus*	THPR	Squamata
R	Western Skink	*Eumeces skiltonianus*	EUSK	Squamata

Class	Common Name*	Scientific Name*	Code	Order
R	Western Terrestrial Garter Snake	*Thamnophis elegans*	THEL	Squamata
R	Western Whiptail	*Cnemidophorus tigris*	CNTI	Squamata
R	Whiptail Lizard species	*Cnemidophorus* species	CNXX	Squamata
R	Whitaker's New Zealand Skink	*Cyclodina whitakeri*	CYWH	Squamata
R	White-dotted ctenotus	*Ctenotus delli*	CTDE	Squamata
R	White-throated Monitor	*Varanus albigularis microstictus*	VAAM	Squamata
R	Wood Turtle	*Clemmys insculpta*	CLIN	Testudines
R	Yacare Caiman	*Caiman yacare*	CAYA	Crocodylia
R	Yarrow's Spiny Lizard	*Sceloporus jarrovi*	SCJA	Squamata
R	Yellow-blotched Map Turtle	*Graptemys flavimaculata*	GRFL	Testudines
R	Yellow Anaconda	*Eunectes notaeus*	EUNO	Squamata
R	Yellow Mud Turtle	*Kinosternon flavescens*	KIFL	Testudines
R	Yellow Rat Snake	*Elaphe obsoleta quadrivittata*	ELOQ	Squamata
R	Yellowbelly Water Snake	*Enhydris plumbea*	ENPL	Squamata

Appendix 1c: Species scientific names in alphabetical order grouped by Class with corresponding common name, species code and Order[i]

Class	Scientific Name*	Common Name*	Code	Order
X	unknown species	unknown amphibian or reptile species	XXXX	unknown
X	various amphibians and reptiles	various species of amphibians/reptiles	XXXV	various
A	*Acris crepitans*	Northern Cricket Frog	ACCR	Anura
A	*Acris crepitans blanchardi*	Blanchard's Cricket Frog	ACCB	Anura
A	*Acris gryllus*	Southern Cricket Frog	ACGR	Anura
A	*Adelotus brevis*	Tusked Frog	ADBR	Anura
A	*Afrixalus fornasini*	Silver-banded Banana Frog	AFFO	Anura
A	*Afrixalus spinifrons*	Natal Banana Frog	AFSP	Anura
A	*Alytes obstetricans*	Olive Midwife Toad	ALOB	Anura
A	*Ambystoma californiense*	California Tiger Salamander	AMCA	Caudata
A	*Ambystoma cingulatum*	Flatwood Salamander	AMCI	Caudata
A	*Ambystoma gracile*	Northwestern Salamander	AMGR	Caudata
A	*Ambystoma jeffersonianum*	Jefferson Salamander	AMJE	Caudata
A	*Ambystoma laterale*	Blue-Spotted Salamander	AMLA	Caudata
A	*Ambystoma laterale-jeffersonianum*	hybrid complexes of salamanders	AMLJ	Caudata
A	*Ambystoma macrodactylum croceum*	Santa Cruz Long-toed Salamander	AMMC	Caudata
A	*Ambystoma m. macrodactylum*	Western Long-toed Salamander	AMMM	Caudata
A	*Ambystoma maculatum*	Spotted Salamander	AMMA	Caudata
A	*Ambystoma mexicanum*	Axolotl	AMME	Caudata
A	*Ambystoma opacum*	Marbled Salamander	AMOP	Caudata
A	*Ambystoma platineum*	Silvery Salamander	AMPL	Caudata
A	*Ambystoma* species	Mole Salamander species	AMXX	Caudata
A	*Ambystoma talpoideum*	Mole Salamander	AMTA	Caudata
A	*Ambystoma texanum*	Smallmouth Salamander	AMTE	Caudata
A	*Ambystoma tigrinum*	Tiger Salamander	AMTI	Caudata
A	*Ambystoma tremblayi*	Tremblay's Salamander	AMTM	Caudata
A	*Amolops orphnocnemis*	Orphnocnemis Sucker Frog	AMOR	Anura
A	*Amolops phaeomerus*	Phaeomerus Sucker Frog	AMPH	Anura
A	*Amolops poecilus*	Peocilus Sucker Frog	AMPO	Anura
A	*Amphiuma tridactylum*	Three-toed Amphiuma	AMTR	Caudata
A	*Aneides aeneus*	Green Salamander	ANAE	Caudata
A	*Aneides ferreus*	Clouded Salamander	ANFE	Caudata
A	*Aneides flavipunctatus niger*	Santa Cruz Black Salamander	ANFN	Caudata
A	*Aneides lugubris*	Arboreal Salamander	ANLU	Caudata
A	*Ansonia leptopus*	Matang Stream Toad	ANLE	Anura
A	*Ansonia spinulifer*	Kina Balu Stream Toad	ANSP	Anura
A	*Arthroleptis poecilonotus*	West African Screeching Frog	ARPO	Anura
A	*Ascaphus truei*	Tailed Frog	ASTR	Anura
A	*Atelopus chiriquiensis*	Lewis' Stubfoot Toad	ATCH	Anura
A	*Atelopus ignescens*	Quito Stubfoot Toad	ATIG	Anura
A	*Atelopus varius*	Veragoa Stubfoot Toad	ATVA	Anura
A	*Batrachoseps attenatus*	California Slender Salamander	BAAT	Caudata
A	*Batrachoseps wrighti*	Oregon Slender Salamander	RAWR	Caudata
A	*Bolitoglossa marmorea*	Crater Salamander	BOMA	Caudata
A	*Bolitoglossa minutula*	Tropical Lungless Salamander species	BOMI	Caudata
A	*Bolitoglossa nigrescens*	Cordillera Central Salamander	BONI	Caudata
A	*Bombina bombina*	Firebelly Toad	BOBO	Anura
A	*Bombina orientalis*	Oriental Firebelly Toad	BOOR	Anura

Appendix 1c - Species Scientific Names - 2

Class	Scientific Name*	Common Name*	Code	Order
A	*Bombina variegata*	Yellowbelly Toad	BOVA	Anura
A	*Bufo americanus*	American Toad	BUAM	Anura
A	*Bufo andrewsi*	Andrews' Toad	BUAN	Anura
A	*Bufo arenarum*	Common Toad	BUAR	Anura
A	*Bufo asper*	Java Toad	BUAS	Anura
A	*Bufo boreas*	Western Toad	BUBO	Anura
A	*Bufo bufo*	Common European Toad	BUBU	Anura
A	*Bufo calamita*	Natterjack Toad	BUCA	Anura
A	*Bufo canorus*	Yosemite Toad	BUCN	Anura
A	*Bufo cognatus*	Great Plains Toad	BUCO	Anura
A	*Bufo debilis debilis*	Eastern Green Toad	BUDD	Anura
A	*Bufo divergens*	unknown toad species	BUDI	Anura
A	*Bufo fastidiosus*	Pico Blanco Toad	BUFA	Anura
A	*Bufo fowleri*	Fowler's Toad	BUFO	Anura
A	*Bufo gargarizans*	Chusan Island Toad	BUGR	Anura
A	*Bufo gariepensis*	Karroo Toad	BUGA	Anura
A	*Bufo halophilus*	California Toad	BUHA	Anura
A	*Bufo hemiophrys*	Canadian Toad	BUHE	Anura
A	*Bufo hemiophrys baxteri*	Wyoming Toad	BUHB	Anura
A	*Bufo japonicus*	Japanese Toad	BUBJ	Anura
A	*Bufo juxtasper*	Sungei Tawan Toad	BUJU	Anura
A	*Bufo maculatus*	Hallowell's Toad	BUMC	Anura
A	*Bufo marinus*	Giant Toad	BUMA	Anura
A	*Bufo melanostictus*	Black Spined Toad	BUME	Anura
A	*Bufo periglenes*	Alajuela Toad	BUPE	Anura
A	*Bufo punctatus*	Baird's Spotted Toad	BUPU	Anura
A	*Bufo quercicus*	Oak Toad	BUQU	Anura
A	*Bufo rangeri*	Kei Road Toad	BURA	Anura
A	*Bufo regularis*	Square-marked Toad	BURE	Anura
A	*Bufo* species	Toad species	BUXX	Anura
A	*Bufo terrestris*	Southern Toad	BUTE	Anura
A	*Bufo valliceps*	Gulf Coast Toad	BUVA	Anura
A	*Bufo viridis*	European Green Toad	BUVI	Anura
A	*Bufo vulgaris*	unknown toad species	BUVU	Anura
A	*Bufo woodhousii*	Woodhouse's Toad	BUWO	Anura
A	*Cacosternum namaquense*	Namaqua Metal Frog	CANA	Anura
A	*Cacosternum nanum*	Mozambique Metal Frog	CANN	Anura
A	*Capensibufo tradouwi*	Swellendam Cape Toad	CATR	Anura
A	*Caudiverbera caudiverbera*	Helmeted Water Toad	CACU	Anura
A	*Centrolene* species	Giant Glass Frog species	CEXX	Anura
A	*Ceratophrys ornata*	Ornate Horned Frog	CEOR	Anura
A	*Chiromantis xerampelina*	African Gray Treefrog	CHXE	Anura
A	*Cophixalus* species	Rainforest Frog species	COXX	Anura
A	*Crinia georgiana*	Red-Legged Froglet	CRGE	Anura
A	*Crinia glauerti*	Rattle Froglet	CRGL	Anura
A	*Crinia insignifera*	White-throated Froglet	CRIN	Anura
A	*Crinia pseudinsignifera*	Darling Plateau Froglet	CRPS	Anura
A	*Cryptobranchus alleganiensis*	Eastern hellbender	CRAA	Caudata
A	*Cryptobranchus alleganiensis*	Hellbender	CRAL	Caudata
A	*Cynops pyrrhogaster*	Japanese Firebelly Newt	CYPY	Caudata

Appendix 1c - Species Scientific Names - 3

Class	Scientific Name*	Common Name*	Code	Order
A	*Demognathus quadramaculatus*	Blackbelly Salamander	DEQU	Caudata
A	*Dendrobates histrionicus sylvaticus*	Harlequin Poison Frog	DEHS	Anura
A	*Dendrobates pumilio*	Strawberry Poison Frog	DEBU	Anura
A	*Dendrobates* species	Poison Frog species	DEXX	Anura
A	*Desmognathus auriculatus*	Southern Dusky Salamander	DEFA	Caudata
A	*Desmognathus fuscus*	Dusky Salamander	DEFU	Caudata
A	*Desmognathus monticola*	Seal Salamander	DEMO	Caudata
A	*Desmognathus ochrophaeus*	Mountain Dusky Salamander	DEOC	Caudata
A	*Desmognathus welteri*	Black Mountain Salamander	DEWE	Caudata
A	*Desmognathus wrighti*	Pigmy Salamander	DEWR	Caudata
A	*Dicamptodon copei*	Cope's Giant Salamander	DICO	Caudata
A	*Dicamptodon ensatus*	California Giant Salamander	DIEN	Caudata
A	*Dicamptodon tenebrosus*	Pacific Giant Salamander	DITE	Caudata
A	*Diemictylus viridescens*	unknown newt	DIVI	Caudata
A	*Eleutherodactylus angelicus*	Angel Robber Frog	ELAN	Anura
A	*Eleutherodactylus buckleyi*	Buckley's Robber Frog	ELBU	Anura
A	*Eleutherodactylus chloronotus*	Green Robber Frog	ELCH	Anura
A	*Eleutherodactylus coqui*	Puerto Rican Coqui	ELCO	Anura
A	*Eleutherodactylus cruentus*	Chiriqui Robber Frog	ELCR	Anura
A	*Eleutherodactylus hylaeformis*	Pico Blanco Robber Frog	ELHY	Anura
A	*Eleutherodactylus jasperi*	Cayey Robber Frog	ELJA	Anura
A	*Eleutherodactylus karlschmidti*	Karl's Robber Frog	ELKA	Anura
A	*Eleutherodactylus melanostictus*	Black-lined Robber Frog	ELME	Anura
A	*Eleutherodactylus podiciferus*	Cerro Utyum Robber Frog	ELPO	Anura
A	*Eleutherodactylus punctariolus*	Bob's Robber Frog	ELPU	Anura
A	*Eleutherodactylus trepidotus*	Shy Robber Frog	ELTR	Anura
A	*Ensatina eschscholtzi oregonensis*	Oregon Ensatina	ENEO	Caudata
A	*Ensatina eschscholtzii*	Ensatina	ENES	Caudata
A	*Eupemphix pustulosus*	unknown tropical frog species	EUPU	Anura
A	*Eurycea bislineata*	Northern Two-lined Salamander	EUBI	Caudata
A	*Eurycea bislineata bislineata*	Two-lined Salamander	EUBB	Caudata
A	*Eurycea longicauda*	Longtail Salamander	EULO	Caudata
A	*Eurycea longicauda longicauda*	Longtailed Salamander	EULL	Caudata
A	*Eurycea lucifuga*	Cave Salamander	EULU	Caudata
A	*Eurycea quadridigitata*	Dwarf Salamander	EUQU	Caudata
A	*Gastrophryne carolinensis*	Eastern Narrowmouth Toad	GACA	Anura
A	*Gyrinophilus porphyriticus*	Spring Salamander	GYPO	Caudata
A	*Heideotriton wallacei*	unknown salamander species	HEWA	Caudata
A	*Heleioporus eyrei*	Moaning Frog	HEEY	Anura
A	*Heleioporus inornatus*	Swamp Burrowing Frog	HEIO	Anura
A	*Heleophryne hewitti*	Hewitt's African Ghost Frog	HEHE	Anura
A	*Heleophryne natalensis*	Natal Ghost Frog	HENA	Anura
A	*Heleophryne purcelli*	Purcell's African Ghost Frog	HEOR	Anura
A	*Heleophryne regis*	Royal Ghost Frog	HERE	Anura
A	*Heleophryne rosei*	Skeleton Gorge Ghost Frog	HERO	Anura
A	*Hemidactylium scutatum*	Four-toed Salamander	HESC	Caudata
A	*Hydromantoides platycephalus*	Mount Lyell Salamander	HYPL	Caudata
A	*Hyla andersonii*	Pine Barrens Treefrog	HYAN	Anura
A	*Hyla arborea*	European Treefrog	HYAJ	Anura
A	*Hyla cadaverina*	California Chorus Frog	HYCA	Anura

Appendix 1c - Species Scientific Names - 4

Class	Scientific Name*	Common Name*	Code	Order
A	*Hyla calypsa*	unknown treefrog	HYCL	Anura
A	*Hyla chrysoscelis*	Cope's Gray Treefrog	HYCH	Anura
A	*Hyla cinerea*	Green Treefrog	HYCI	Anura
A	*Hyla crepitans*	Emerald-eyed Treefrog	HYCE	Anura
A	*Hyla femoralis*	Pine Woods Treefrog	HYFE	Anura
A	*Hyla gratiosa*	Barking Treefrog	HYGR	Anura
A	*Hyla grylatta*	Pacific Lowland Treefrog	HYGA	Anura
A	*Hyla japonica*	Japanese Treefrog	HYJA	Anura
A	*Hyla picadoi*	Volcan Barba Treefrog	HYPI	Anura
A	*Hyla pseudopuma*	Gunther's Costa Rican Treefrog	HYPS	Anura
A	*Hyla rivularis*	American Cinchona Plantation Treefrog	HYRI	Anura
A	*Hyla* species	Treefrog species	HYXX	Anura
A	*Hyla squirella*	Squirrel Treefrog	HYSQ	Anura
A	*Hyla vasta*	Hispaniola Treefrog	HYVA	Anura
A	*Hyla versicolor*	Gray Treefrog	HYVE	Anura
A	*Hynobius retardatus*	Noboribetsu Salamander	HYRT	Caudata
A	*Hyperolius marmoratus*	Marbled Reed Frog	HYMA	Anura
A	*Hyperolius semidiscus*	Hewitt's Reed Frog	HYSE	Anura
A	*Kassina senegalensis*	Senegal Running Frog	KASE	Anura
A	*Lepidobatrachus laevis*	Budgett's Frog	LELA	Anura
A	*Leptobrachium montanum*	Mountain Spadefoot Toad	LEMO	Anura
A	*Leptodactylus typhonius*	White-lipped Frog	LETY	Anura
A	*Leptolalax gracilis*	Matang Asian Toad	LEGR	Anura
A	*Leurognathus marmoratus*	Shovelnose Salamander	LEMA	Caudata
A	*Limnodynastes dorsalis*	Western Banjo Frog	LYDO	Anura
A	*Limnodynastes ornatus*	Ornate Burrowing Frog	LIOR	Anura
A	*Limnodynastes peronii*	Brown-Striped Frog	LIPE	Anura
A	*Limnodynastes* species	Australian Swamp Frog species	LIXX	Anura
A	*Limnodynastes tasmaniensis*	Spotted Grass Frog	LITA	Anura
A	*Litoria adelaidensis*	Slender Treefrog	LIAD	Anura
A	*Litoria caerulea*	Australasian Treefrog species	LICA	Anura
A	*Litoria ewingii*	Australian Brown Treefrog	LIEW	Anura
A	*Litoria genimaculata*	Brown-Spotted Treefrog	LIGE	Anura
A	*Litoria gracilenta*	Dainty Green Treefrog	LIGR	Anura
A	*Litoria lorica*	Alexandra Greek Treefrog	LILO	Anura
A	*Litoria moorei*	Western Green Frog	LIMO	Anura
A	*Litoria nannotis*	Torrent Treefrog	LINA	Anura
A	*Litoria nyakalensis*	Henrietta Creek Treefrog	LINY	Anura
A	*Litoria rheocola*	Atherton Tableland Treefrog	LIRH	Anura
A	*Litoria xanthomera*	Lime Treefrog	LIXA	Anura
A	*Microhyla ornata*	Ornate Rice Frog	MIOR	Anura
A	*Mixophyes fleayi*	Queensland Barred Frog	MIFL	Anura
A	*Mixophyes iteratus*	Giant Barred Frog	MIIT	Anura
A	*Natalobatrachus bonebergi*	Natal Diving Frog	NABO	Anura
A	*Necturus lewisi*	Neuse River Waterdog	NELE	Caudata
A	*Necturus maculosus*	Mudpuppy	NEMA	Caudata
A	*Neobatrachus centralis*	Trilling Frog	NECE	Anura
A	*Notophthalmus perstriatus*	Striped Newt	NOPE	Caudata
A	*Notophthalmus* species	Red-spotted Newt species	NOXX	Anura
A	*Notophthalmus viridescens*	Eastern Newt	NOVI	Caudata

Appendix 1c - Species Scientific Names - 5

Class	Scientific Name*	Common Name*	Code	Order
A	*Notophthalmus viridescens louisianensis*	Central Newt	NOVL	Caudata
A	*Notophthalmus viridescens virdescens*	Eastern Red-spotted Newt	NOVV	Caudata
A	*Nyctimystes dayi*	Day's Big-eyed Treefrog	NYDA	Anura
A	*Oedipina grandis*	Cerro Pando Worm Salamander	OEGR	Caudata
A	*Osornophryne antisana*	Napo Plump Toad	OSAN	Anura
A	*Paramesotriton hongkongensis*	Hong Kong Warty Newt	PAHO	Caudata
A	*Pedostibes hosii*	Boulenger's Asian Tree Toad	PEHO	Anura
A	*Pelobates fuscus*	Common Eurasian Spadefoot Toad	PEFU	Anura
A	*Peltophryne lemur*	Lowland Carribean Toad	PELE	Anura
A	*Phrynobatrachus natalensis*	Natal River Frog	PHNA	Anura
A	*Phyllobates vittatus*	Golden Poison Frog	PHVI	Anura
A	*Phyllodactylus marmoratus*	MarmoRatus Leaf-toad Froglet	PHMA	Anura
A	*Pleorodeles poireti*	Algerian Ribbed Newt	PLPO	Caudata
A	*Pleorodeles* species	Ribbed Newt species	PLXX	Caudata
A	*Pleorodeles waltl*	Spanish Ribbed Newt	PLWA	Caudata
A	*Plethodon cinereus*	Red-Backed Salamander	PLCI	Caudata
A	*Plethodon dunni*	Dunn's Salamander	PLDU	Caudata
A	*Plethodon elongatus*	Del Norte Salamander	PLEL	Caudata
A	*Plethodon glutinosus*	Northern Slimy Salamander	PLGL	Caudata
A	*Plethodon huldae*	Huldae Woodland Salamander	PLHU	Caudata
A	*Plethodon idahoensis*	Cour D'alene Salamander	PLID	Caudata
A	*Plethodon jordani*	Jordan's Salamander	PLJO	Caudata
A	*Plethodon kentucki*	Cumberland Plateau Salamander	PLKE	Caudata
A	*Plethodon metcalfi*	Woodland Salamander	PLME	Caudata
A	*Plethodon nettingi*	Cheat Mountain Salamander	PLNE	Caudata
A	*Plethodon richmondi*	Ravine Salamander	PLRS	Caudata
A	*Plethodon vehiculum*	Western Redback Salamander	PLVE	Caudata
A	*Plethodon yonahlossee*	Yonahlossee Salamander	PLYO	Caudata
A	*Pleurodema thaul*	Chile Four-eyed Frog	PLTH	Anura
A	*Pogona minor*	Dwarf Bearded Dragon	POMI	Squamata
A	*Poyntonia paludicola*	Kogelberg Reserve Frog	POPA	Anura
A	*Prostherapis trinitatis*	unknown tropical frog	PRTR	Anura
A	*Pseudacris maculata*	Boreal Chorus Frog	PSMA	Anura
A	*Pseudacris crucifer*	Spring Peeper	PSCR	Anura
A	*Pseudacris nigrata*	Southern Chorus Frog	PSNI	Anura
A	*Pseudacris ornata*	Ornate Chorus Frog	PSOR	Anura
A	*Pseudacris regilla*	Pacific Chorus Frog	HYRE	Anura
A	*Pseudacris triseriata*	Western Chorus Frog	PSTR	Anura
A	*Pseudophryne guentheri*	Gunther's Toadlet	PSGE	Anura
A	*Pseudotriton ruber ruber*	Northern Red Salamander	PSRR	Caudata
A	*Ptychadena mossambica*	Mozambique Grassland Frog	PTMO	Anura
A	*Rana amurensis*	Khabarovsk Frog	RAAM	Anura
A	*Rana angolensis*	Angola Frog	RAAN	Anura
A	*Rana areolata*	Crawfish Frog	RAAE	Anura
A	*Rana arvalis*	Swedish Swamp Frog	RAAR	Anura
A	*Rana aurora*	Red Legged Frog	RAAU	Anura
A	*Rana berlandieri*	Rio Grande Frog	RABE	Anura
A	*Rana blairi*	Plains Leopard Frog	RABL	Anura
A	*Rana blythi*	Blythi True Frog	RABY	Anura
A	*Rana boylii*	Foothill Yellow-Legged Frog	RABO	Anura

Appendix 1c - Species Scientific Names - 6

Class	Scientific Name*	Common Name*	Code	Order
A	*Rana brevipoda*	Rana brevipoda	RABR	Anura
A	*Rana bufo*	Rana bufo???	RABU	Anura
A	*Rana cascadae*	Cascades Frog	RACS	Anura
A	*Rana catesbeiana*	Bullfrog	RACA	Anura
A	*Rana chalconota*	Schlegel's Java Frog	RACO	Anura
A	*Rana chensinensis*	Inkiapo Frog	RACH	Anura
A	*Rana clamitans*	Green Frog	RACL	Anura
A	*Rana cyanophlyctis*	Skipper Frog	RACY	Anura
A	*Rana dalmatina*	Spring Frog	RADA	Anura
A	*Rana dracomontana*	Sani Pass Frog	RADR	Anura
A	*Rana esculenta*	Edible Frog	RAES	Anura
A	*Rana fasciata*	Striped Frog	STFA	Anura
A	*Rana finchi*	Finch True Frog	RAFI	Anura
A	*Rana fusca*	Rana fusca	RAFU	Anura
A	*Rana fuscigula*	Brown-throated Frog	RAFS	Anura
A	*Rana grayii*	Gray's Spotted Frog	STGR	Anura
A	*Rana grylio*	Pig Frog	RAGR	Anura
A	*Rana heckscheri*	River Frog	RAHC	Anura
A	*Rana hexadactyla*	Indian Green Frog	RAHE	Anura
A	*Rana hosii*	Mount Dulit Frog	RAHO	Anura
A	*Rana hymenopus*	Natal Drakensberg Frog	STHY	Anura
A	*Rana ibanorum*	Ibanorum True Frog	RAIB	Anura
A	*Rana ingeri*	Ingeri True Frog	RAIN	Anura
A	*Rana japonica*	Agile Frog	RAJA	Anura
A	*Rana kuhli*	Kuhli True Frog	RAKU	Anura
A	*Rana lessonae*	Pool Frog	RALE	Anura
A	*Rana limnocharis*	Indian Rice Frog	RALI	Anura
A	*Rana luteiventris*	Columbia Spotted Frog	RALU	Anura
A	*Rana malabarica*	Malabar Hills Frog	RAMA	Anura
A	*Rana muscosa*	Mountain Yellow-Legged Frog	RAMU	Anura
A	*Rana nigromaculata*	Black-Spotted Frog	RANI	Anura
A	*Rana onca*	Relict Leopard Frog	RAON	Anura
A	*Rana palustris*	Pickerel Frog	RAPA	Anura
A	*Rana perezi*	Coruna Frog	RAPE	Anura
A	*Rana pipiens*	Northern Leopard Frog	RAPI	Anura
A	*Rana pretiosa*	Spotted Frog	RAPR	Anura
A	*Rana pretiosa pretiosa*	Western Spotted Frog	RAPP	Anura
A	*Rana ridibunda*	Marsh Frog	RARI	Anura
A	*Rana ridibunda-esculenta hybrid*	Common Frog hybrid	RARE	Anura
A	*Rana rugosa*	Wrinkled Frog	RARU	Anura
A	*Rana septentrionalis*	Mink Frog	RASE	Anura
A	*Rana signata*	Matang Frog	RASI	Anura
A	*Rana* species	Ranid species	RAXX	Anura
A	*Rana sphenocephala*	Florida Leopard Frog	RASP	Anura
A	*Rana springbokensis*	Springbok Frog	STSP	Anura
A	*Rana sylvatica*	Wood Frog	RASY	Anura
A	*Rana tagoe*	Tago Frog	RATA	Anura
A	*Rana temporaria*	European Common Frog	RATE	Anura
A	*Rana tigrina*	Asian Bullfrog	RATI	Anura
A	*Rana tlaloci*	Tlaloc's Leopard Frog	RATL	Anura

Appendix 1c - Species Scientific Names - 7

Class	Scientific Name*	Common Name*	Code	Order
A	*Rana tsushimensis*	Tsushima Frog	RATS	Anura
A	*Rana utricularia*	Southern Leopard Frog	RAUT	Anura
A	*Rana vertebralis*	Ice Frog	RAVE	Anura
A	*Rana virgatipes*	Carpenter Frog	RAVI	Anura
A	*Rana wageri*	Natal Uplands Frog	STWA	Anura
A	*Rana yavapiensis*	Yavapai Leopard Frog	RAYA	Anura
A	*Rhacophoros schlegelii*	Schlegel's Flying Frog	RHSC	Anura
A	*Rhacophorus gauni*	Inger's Flying Frog	RHGA	Anura
A	*Rhacophorus pardalis*	Panther Flying Frog	RHPA	Anura
A	*Rheobatrachus silus*	Southern Gastric Brooding Frog	RHSI	Anura
A	*Rheobatrachus vitellinus*	Northern Gastric-brooding Frog	RHVI	Anura
A	*Rhyacotriton olympicus*	Olympic Salamander	RHOL	Caudata
A	*Rhyacotriton variegatus*	Southern Torrent Salamander	RHVA	Caudata
A	*Salamandra salamandra*	European Fire Salamander	SASA	Caudata
A	*Scaphiopus couchii*	Couch's Spadefoot Toad	SCCO	Anura
A	*Scaphiopus holbrookii*	Eastern Spadefoot Toad	SCHO	Anura
A	*Scaphiopus holbrookii holbrookii*	Eastern Spadefoot Toad var	SCHH	Anura
A	*Scaphiopus multiplicata*	Southern Spadefoot Toad	SCMU	Anura
A	*Scinax nasica*	Lesser Snouted Treefrog	SCNA	Anura
A	*Siren intermedia*	Lesser Siren	SIIN	Caudata
A	*Spea hammondii*	Western Spadefoot Toad	SCHA	Anura
A	*Spea intermontana*	Great Basin Spadefoot Toad	SCIN	Anura
A	*Sphenophryne* species	Land Frog species	SPXX	Anura
A	*Staurois latopalmatus*	Sabah Splash Frog	STLA	Anura
A	*Staurois natator*	Mindanao Splash Frog	STNA	Anura
A	*Taricha granulosa*	Roughskin Newt	TAGR	Caudata
A	*Taricha rivularis*	Redbelly Newt	TARI	Caudata
A	*Taricha torosa*	California Newt	TATO	Caudata
A	*Taricha torosa sierrae*	Sierra Newt	TATS	Caudata
A	*Taudactylus acutirostris*	Sharpsnout Torrent Frog	TAAC	Anura
A	*Taudactylus diurnus*	Mount Glorious Torrent Frog	TADI	Anura
A	*Taudactylus eungellensis*	Eungella Dayfrog	TAEU	Anura
A	*Taudactylus liemi*	Palm Torrent Frog	TALI	Anura
A	*Taudactylus rheophilus*	Mountain Torrent Frog	TARH	Anura
A	*Tompterna cryptotis*	Catequero Bullfrog	TOCR	Anura
A	*Tompterna delalandii*	African Bullfrog	TODE	Anura
A	*Tompterna marmorata*	Marbled Bullfrog	TOMA	Anura
A	*Triturus alpestris*	Laurenti's AlPine Newt	TRAL	Caudata
A	*Triturus carnifex*	Great Crested Newt	TRCC	Caudata
A	*Triturus cristatus*	Northern Crested Newt	TRCR	Caudata
A	*Triturus helveticus*	Palmate Newt	TRHE	Caudata
A	*Triturus vulgaris*	Smooth Newt	TRVU	Caudata
A	unknown amphibian species	unknown amphibian species	XXXA	unknown
A	unknown anuran species	unknown anuran amphibian	XXAA	Anura
A	unknown frog species	unknown frog species	XXFR	Anura
A	unknown newt species	unknown newt species	XXNE	Caudata
A	unknown salamander species	unknown salamander species	XXXS	Caudata
A	unknown toad species	unknown toad species	XXTD	Anura
A	*Xenopus borealis*	Marsabit Clawed Frog	XEBO	Anura
A	*Xenopus gilli*	Cape Clawed Frog	XEGI	Anura

Class	Scientific Name*	Common Name*	Code	Order
A	*Xenopus laevis*	African Clawed Frog	XELA	Anura
A	*Xenopus laevis laevis*	South African Clawed Frog	XELL	Anura
A	*Xenopus muelleri*	Muller's Clawed Frog	XEMU	Anura
R	*Abastor erythrogrammus*	Rainbow Snake	ABER	Squamata
R	*Acanthophis antarcticus*	Common Death Adder	ACAN	Squamata
R	*Acrochordus javanicas*	Java File Snake	ACJA	Squamata
R	*Agama aculeata*	Ground Agama	AGAC	Squamata
R	*Agama agama*	Common Agama	AGAG	Squamata
R	*Agama caucasica*	Caucasica Agama	AGCA	Squamata
R	*Agama kirkii*	Kirk's Rock Agama	AGKI	Squamata
R	*Agama robecchii*	Robecchi's Agama	AGRO	Squamata
R	*Agama spinosa*	Lanza's Spiny Agama	AGSP	Squamata
R	*Agama stellio stellio*	unknown Typical Agama species	AGSS	Squamata
R	*Agkistrodon blomhoffi*	Japanese Mamushi	AGBB	Squamata
R	*Agkistrodon contortrix*	Copperhead	AGCO	Squamata
R	*Agkistrodon piscivorus*	Water Moccasin	AGPI	Squamata
R	*Alligator mississippiensis*	American Alligator	ALMI	Crocodylia
R	*Ameiva exsul*	Puerto Rican Ameiva	AMEX	Squamata
R	*Ameiva undalata*	Rainbow Ameiva	AMUN	Squamata
R	*Amphibolurus barbatus*	Australian Dragon Lizard species	AMBA	Squamata
R	*Amphibolurus muricatus*	Jacky Lizard	AMMU	Squamata
R	*Anolis carolinensis*	Green Anole	ANCA	Squamata
R	*Anolis coelestinus*	Jeremie Anole	ANCO	Squamata
R	*Apalone* species	North American Softshell Turtle species	APXX	Testudines
R	*Apalone spinifera*	Spiny Softshell	APSP	Testudines
R	*Apalone spinifera emoryi*	Texas Spiny Softshell	APSE	Testudines
R	*Aprasia pulchella*	Coastal Legless Lizard	APPU	Squamata
R	*Bitis arietans somalica*	Somalian Puff Adder	BIAS	Squamata
R	*Boa constrictor*	Boa Constrictor	BOCO	Squamata
R	*Boaedon fuliginosus*	House Snake	BOFU	Squamata
R	*Boiga irregularis*	Brown Tree Snake	BOIR	Squamata
R	*Bolyeria multocarinata*	Round Island Burrowing boa	BOMU	Squamata
R	*Bothriechis schlegelii*	Eyelash Palm Pit Viper	BOSC	Squamata
R	*Caiman crocodilus*	Narrow-snouted Spectacled Caiman	CACC	Crocodylia
R	*Caiman latirostris*	Broad-snouted Spectacled Caiman	CALA	Crocodylia
R	*Caiman* species	Caiman species	CAXX	Squamata
R	*Caiman yacare*	Yacare Caiman	CAYA	Crocodylia
R	*Calotes versicolor*	Variable Agama	CAVE	Squamata
R	*Caretta caretta*	Loggerhead Turtle	CACA	Testudines
R	*Carlia tetradactyla*	Forest Carlia	CATE	Crocodylia
R	*Casarea dussumieri*	Round Island Boa	CADU	Squamata
R	*Cerastes cerastes*	Horned Viper	CECE	Squamata
R	*Chalcides ragazzi*	Ragazzi's Cylindrical Skink	CHRA	Squamata
R	*Charina bottae*	Rubber Boa	CHBO	Squamata
R	*Chelonia mydas*	Common Green Turtle	CHMY	Testudines
R	*Chelonia* species	Sea Turtle species	CHXX	Testudines
R	*Chelydra serpentina serpentina*	Common Snapping Turtle	CHSE	Testudines
R	*Chionactis occcipatalis talpina*	Nevada Shovelnose Snake	CHOT	Squamata
R	*Chrysemys picta*	Painted Turtle	CHPI	Testudines
R	*Chrysemys picta marginata*	Midland Painted Turtle	CHPM	Testudines

Class	Scientific Name*	Common Name*	Code	Order
R	*Clemmys caspica*	Pond Turtle species	CLCA	Testudines
R	*Clemmys guttata*	Spotted Turtle	CLGU	Testudines
R	*Clemmys insculpta*	Wood Turtle	CLIN	Testudines
R	*Clemmys marmorata*	Pacific Pond Turtle	CLMA	Testudines
R	*Cnemidophorus exsanguis*	Chihuahuan Spotted Whiptail	CNEX	Squamata
R	*Cnemidophorus gularis*	Texas Spotted Whiptail	CNGU	Squamata
R	*Cnemidophorus neomexicanus*	New Mexico Whiptail	CNNE	Squamata
R	*Cnemidophorus septemvittatus*	Plateau Spotted Whiptail	CNSP	Squamata
R	*Cnemidophorus sexlineatus*	Six-lined Racerunner	CNSE	Squamata
R	*Cnemidophorus sonorae*	Sonoran Spotted Whiptail	CNSO	Squamata
R	*Cnemidophorus* species	Whiptail Lizard species	CNXX	Squamata
R	*Cnemidophorus tigris*	Western Whiptail	CNTI	Squamata
R	*Cnemidophorus tigris tigris*	Great Basin Whiptail	CNTT	Squamata
R	*Cnemidophorus uniparens*	Desert Grassland Whiptail	CNUN	Squamata
R	*Coleonyx variegatus utahensis*	Utah Banded Gecko	COVU	Squamata
R	*Coluber constrictor*	Racer	COCO	Squamata
R	*Coluber constrictor priapus*	Southern Black Racer	COCP	Squamata
R	*Coluber florulentus*	Flowered Racer	COFL	Squamata
R	*Coluber jugularis*	Fire Racer	COJU	Squamata
R	*Cophosaurus texanus*	Greater Earless Lizard	COTE	Squamata
R	*Crocodlus cataphractus*	African Slender-snouted Crocodile	CRCA	Crocodylia
R	*Crocodylus acutus*	American Crocodile	CRAC	Crocodylia
R	*Crocodylus johnstoni*	Australian Freshwater Crocodile	CRJO	Crocodylia
R	*Crocodylus niloticus*	Nile Crocodile	CRNI	Crocodylia
R	*Crocodylus novaeguineae*	FreshWater Crocodile	CRNO	Crocodylia
R	*Crocodylus palustris*	Mugger Crocodile	CRPA	Crocodylia
R	*Crocodylus porosus*	Saltwater Crocodile	CRPO	Crocodylia
R	*Crocodylus rhombifer*	Cuban Crocodile	CRRH	Crocodylia
R	*Crotalus adamanteus*	Eastern Diamondback Rattlesnake	CRAD	Squamata
R	*Crotalus horridus*	Timber Rattlesnake	CRHO	Squamata
R	*Crotalus lepidus*	Rock Rattlesnake	CRLE	Squamata
R	*Crotalus viridis*	Western Rattlesnake	CRVI	Squamata
R	*Crotaphopeltis hotamboeia*	Herald Snake	CRHT	Squamata
R	*Crotaphytus bicinctores*	Mojave Black Collared Lizard	CRCB	Squamata
R	*Cryptoblepharus boutonii*	Snake-eyed Skink	CRBO	Squamata
R	*Cryptoblepharus plagiocephalus*	Australian Snake-eyed Skink	CRPL	Squamata
R	*Ctenotus delli*	White-dotted ctenotus	CTDE	Squamata
R	*Ctenotus labillardieri*	Labillardier's ctenotus	CTLA	Squamata
R	*Ctenotus robustus*	Robust ctenotus	CTRO	Squamata
R	*Ctenotus taeniolatus*	Coppertail ctenotus	CTTA	Squamata
R	*Cyclodina aenea*	Girard's Skink	CYAE	Squamata
R	*Cyclodina macgregori*	McGregor's New Zealand Skink	CYMA	Squamata
R	*Cyclodina whitakeri*	Whitaker's New Zealand Skink	CYWH	Squamata
R	*Dasypeltis scabra*	Common Egg-eating Snake	DASC	Squamata
R	*Denisonia maculata*	Ornamental Snake	DEMA	Squamata
R	*Dermochelys coriacea*	Leatherback Turtle	DECO	Testudines
R	*Diadophis punctatus edwardsii*	Northern Ringneck Snake	DIPE	Squamata
R	*Diplodactylus polyophthalmus*	Many-eyed Gecko	DIPO	Squamata
R	*Diploglossus warreni*	Warren's Galliwasp Lizard	DIWA	Squamata
R	*Dispholidus typus*	Boomslang	DITY	Squamata

Appendix 1c - Species Scientific Names - 10

Class	Scientific Name*	Common Name*	Code	Order
R	*Drymarchon corais couperi*	Eastern Indigo Snake	DRCC	Squamata
R	*Egernia napoleonis*	Napoleon Skink	EGNA	Squamata
R	*Elaphe guttata*	Cornsnake	ELGU	Squamata
R	*Elaphe obsoleta*	Rat Snake	ELOB	Squamata
R	*Elaphe obsoleta obsoleta*	Black Rat Snake	ELOO	Squamata
R	*Elaphe obsoleta quadrivittata*	Yellow Rat Snake	ELOQ	Squamata
R	*Elaphe quadrivittata*	Chicken Snake	ELQU	Squamata
R	*Elaphe vulpina*	Fox Snake	ELVU	Squamata
R	*Elgaria coerulea*	Northern alligator Lizard	ELCE	Squamata
R	*Elgaria multicarinata*	Southern Alligator Lizard	GEMU	Squamata
R	*Emydoidea blandingii*	Blanding's Turtle	EMBL	Testudines
R	*Emys orbicularis*	European pond Turtle	EMOR	Testudines
R	*Enhydris plumbea*	Yellowbelly Water Snake	ENPL	Squamata
R	*Epicrates striatus*	Haitian Boa	EPST	Squamata
R	*Eretmochelys imbricata*	Hawksbill Turtle	ERIM	Testudines
R	*Eryx colubrinus*	Kenya Sand Boa	ERCO	Squamata
R	*Eryx pyramidum*	Egyptian Saw-scaled Viper	ERPY	Squamata
R	*Eumeces fasciatus*	Five-lined Skink	EUFA	Squamata
R	*Eumeces oshimensis*	unknown Eyelid Skink	EUOS	Squamata
R	*Eumeces skiltonianus*	Western Skink	EUSK	Squamata
R	*Eumeces* species	Eyelid Skink species	EUXX	Squamata
R	*Eunectes notaeus*	Yellow Anaconda	EUNO	Squamata
R	*Farancia abacura*	Mud Snake	FAAB	Squamata
R	*Gallotia galloti*	Gallot's Lizard	GAGA	Squamata
R	*Gavialis gangeticus*	Gharial	GAGN	Crocodylia
R	*Geochelone pardalis*	Leopard Tortoise	GEPA	Testudines
R	*Gopherus agassizii*	Desert Tortoise	GOAG	Testudines
R	*Gopherus polyphemus*	Gopher Tortoise	GOPO	Testudines
R	*Graptemys flavimaculata*	Yellow-blotched Map Turtle	GRFL	Testudines
R	*Graptemys geographica*	Common map Turtle	GRGE	Testudines
R	*Haldea striatula*	Rough-earth Snake	HAST	Squamata
R	*Hemidactylus flaviviridis*	Indian Leaf-toed Gecko	HEFL	Squamata
R	*Hemidactylus leschenaultii*	Leschenault's Leaf-toed Gecko	HELE	Squamata
R	*Hemidactylus macropholis*	Largescale Leaf-toed Gecko	HEMA	Squamata
R	*Hemidactylus parkeri*	Parker's Leaf-toed Gecko	HEPA	Squamata
R	*Hemidactylus smithi*	Smith's Leaf-toed Gecko	HESM	Squamata
R	*Hemidactylus* species	Leaf-toed Gecko species	HEXX	Squamata
R	*Hemiergis initialis*	Fine-lined Skink	HEIN	Squamata
R	*Hemirhagerrhis nototaenia*	Bark Snake	HENO	Squamata
R	*Heterodon contortix*	unknown Hognose Snake	HECO	Squamata
R	*Heterodon nasicus*	Western Hognose Snake	HENS	Squamata
R	*Heterodon platirhinos*	Eastern Hognose Snake	HEPL	Squamata
R	*Heterodon simus*	Southern Hognose Snake	HESI	Squamata
R	*Hoplodactylus maculatus*	Spotted Sticky-toed Gecko	HOMA	Squamata
R	*Kinosternon flavescens*	Yellow Mud Turtle	KIFL	Testudines
R	*Kinosternon sonoriense*	Sonoran Mud Turtle	KISO	Testudines
R	*Kinosternon subrubrum*	Common Mud Turtle	KISU	Testudines
R	*Lacerta agilis*	Sand Lizard	LAAG	Squamata
R	*Lacerta muralis*	Common Eurasian Lizard species	LAMU	Squamata
R	*Lacerta parva*	Dwarf Lizard	LAPA	Squamata

Class	Scientific Name*	Common Name*	Code	Order
R	*Lacerta viridis*	Emerald Lizard	LAVI	Squamata
R	*Lacerta vivipara*	Viviparous Lizard	LAVV	Squamata
R	*Lampropeltis doliata triangulum*	Milk Snake	LADT	Squamata
R	*Lampropeltis getula*	Common King Snake	LAGE	Squamata
R	*Lampropeltis getula floridana*	Florida King Snake	LAGF	Squamata
R	*Lampropeltis getula getula*	Eastern King Snake	LAGG	Squamata
R	*Lampropeltis* species	King Snake species	LAXX	Squamata
R	*Lamprophis fuliginosus*	Brown House Snake	LAFU	Squamata
R	*Lampropholis delicata*	Delicate Skink	LADE	Squamata
R	*Lampropholis guichenoti*	Guichenot's Skink	LAGU	Squamata
R	*Latastia longicaudata*	Southern Longtail Lizard	LALO	Squamata
R	*Leiolopisma nigriplantare*	Dark Ground Skink	LENI	Squamata
R	*Leiolopisma telfairii*	Telford's Ground Skink	LETE	Squamata
R	*Leiolopisma trilineata*	Trilinear Ground Skink	LETR	Squamata
R	*Lepidochelys kempii*	Kemp's Ridley Turtle	LEKE	Testudines
R	*Lepidochelys olivacea*	Olive Ridley Turtle	LEOL	Testudines
R	*Lerista distinguenda*	Distinguished Lerista	LEDI	Squamata
R	*Lialis burtonis*	Burton's Snake Lizard	LIBU	Squamata
R	*Liasis mackloti*	Macklot's Python	LIMA	Squamata
R	*Liasis olivaceus*	Olive Python	LIOL	Squamata
R	*Lissemys punctata granosa*	Southern Flap-shelled Turtle	LIPG	Testudines
R	*Lycophidion capense*	Cape Wolf Snake	LYCP	Squamata
R	*Lygodactylus capensis*	Cape Dwark Gecko	LYCA	Squamata
R	*Lygodactylus chobiensis*	Okavango Dwark Gecko	LYCH	Squamata
R	*Lygosoma somalicum*	Somali Writhing Skink	LYSO	Squamata
R	*Mabuya brevicollis*	Sudan Mabuya	MABR	Squamata
R	*Mabuya quinquetaeniata*	Rainbow Skink	MAQU	Squamata
R	*Mabuya striata*	African Striped Mabuya	MAST	Squamata
R	*Mabuya varia varia*	Sanannah Variable Mabuya	MAVV	Squamata
R	*Malaclemys terrapin*	DiamondBack Terrapin	MATE	Testudines
R	*Malaclemys terrapin tequesta*	Florida East Coast Terrapin	MATT	Testudines
R	*Malpolon monspessulanus*	Montpellier Snake	MAMO	Squamata
R	*Masticophis flagellum*	Coachwhip	MAFL	Squamata
R	*Masticophis flagellum testaceus*	Western Coachwhip Snake	MAFT	Squamata
R	*Mauremys caspica rivulata*	Capian Turtle	MACR	Testudines
R	*Mehelya nyassae*	Nyassa File Snake	MENY	Squamata
R	*Melanosuchus niger*	Black Caiman	MENI	Crocodylia
R	*Menetia greyi*	Gray-Brown Menetia	MEGR	Squamata
R	*Morelia spilotes variegata*	Carpet Python	MOSV	Squamata
R	*Morethia boulengeri*	Boulenger's Morethia	MOBO	Squamata
R	*Morethia obscura*	Obscure Morethia	MOOB	Squamata
R	*Nactus serpensinsula*	Serpent Island Gecko	NASE	Squamata
R	*Naja haje*	Egyptian Cobra	NAHA	Squamata
R	*Naja* species	Cobra species	NAXX	Squamata
R	*Natrix natrix*	Grass Snake	NANA	Squamata
R	*Natrix* species	Grass Snake species	NTXX	Squamata
R	*Nerodia cyclopion*	Mississippi Green Water Snake	NECY	Squamata
R	*Nerodia erythrogaste*	Red-bellied Water Snake	NAEY	Squamata
R	*Nerodia erythrogaster*	Plainbelly Water Snake	NEER	Squamata
R	*Nerodia fasciata*	Banded Water Snake	NEFA	Squamata

Class	Scientific Name*	Common Name*	Code	Order
R	*Nerodia fasciata compressicauda*	Southern Water Snake species	NEFC	Squamata
R	*Nerodia fasciata floridana*	Southern Water Snake	NEFF	Squamata
R	*Nerodia rhombifer*	Diamondback Water Snake	NERH	Squamata
R	*Nerodia sipedon*	Northern Water Snake	NESI	Squamata
R	*Nerodia sipedon insularum*	Lake Erie Water Snake	NESN	Squamata
R	*Nerodia sipedon sipedon*	Common Water Snake	NASI	Squamata
R	*Nerodia* species	Water Snake species	NEXX	Squamata
R	*Nerodia taxispilota*	Brown Water Snake	NATA	Squamata
R	*Notechis ater*	Black Tiger Snake	NOAT	Squamata
R	*Oligosoma maccanni*	unknown Skink species	OLMA	Squamata
R	*Opheodrys aestivus*	rough Green Snake	OPAE	Squamata
R	*Opheodrys vernalis*	Smooth Green Snake	OPVE	Squamata
R	*Palaeosuchus palperbosos*	Dwarf Caiman	PAPA	Crocodylia
R	*Paleosuchus trigonatus*	Smooth-fronted Caiman	PATI	Crocodylia
R	*Panaspis dahomeyense*	Lidless Skink species	PADA	Squamata
R	*Panaspis wahlbergi*	Savannah Lidless Skink	PAWA	Squamata
R	*Pedioplanis namaquensis*	Namaqua Sand Lizard	PENA	Squamata
R	*Pediplanic lineoocellata*	Sand Lizard species	PELI	Squamata
R	*Phelsuma guentheri*	Round Island Day Gecko	PHGU	Squamata
R	*Phelsuma ornata*	Ornate Day Gecko	PHOR	Squamata
R	*Philochortus hardeggeri*	Hardegger's Orangetail Lizard	PHHA	Squamata
R	*Phrynosoma coronatum*	Coast Horned Lizard	PHCO	Squamata
R	*Phrynosoma platyrhinos*	Desert Horned Lizard	PHPL	Squamata
R	*Pituophis catenifer*	Gopher Snake	PICA	Squamata
R	*Pituophis catenifer sayi*	Bull Snake	PISA	Squamata
R	*Pituophis melanoleucus*	Pine Snake	PIME	Squamata
R	*Pituophis melanoleucus lodingi*	Black Pine Snake	PIML	Squamata
R	*Pituophis melanoleucus mugitis*	Florida Pine Snake	PIMM	Squamata
R	*Podarcis sicula sicula*	Italian Wall Lizard	POSS	Squamata
R	*Podarcis* species	Wall Lizard species	POXX	Squamata
R	*Psammophilus dorsalis*	Indian Sand Agama	PSDO	Squamata
R	*Psammophis sibilans*	African Beauty Racer	PSSI	Squamata
R	*Psammophis trivirgatus*	Sand Racer species	PSTI	Squamata
R	*Pseudechis australis*	King Brown Snake	PSAU	Squamata
R	*Pseudechis colletti*	Collett's Black Snake	PSCO	Squamata
R	*Pseudechis guttatus*	Spotted Black Snake	PSGU	Squamata
R	*Pseudechis porphyriacus*	Redbelly Black Snake	PSPO	Squamata
R	*Pseudemys nelsoni*	Florida Redbelly Turtle	PSNE	Testudines
R	*Pseudemys scripta*	Cooter Turtle / Red-bellied Turtle	PSSC	Testudines
R	*Pseuderemias smithi*	Smith's Racerunner	PSSM	Squamata
R	*Pseudonaja affinis*	Dugite	PSAF	Squamata
R	*Pseudonaja textilis*	Eastern Brown Snake	PSTE	Squamata
R	*Python molurus bivittatus*	Indian Python	PYMB	Squamata
R	*Python regius*	Ball Python	PYRG	Squamata
R	*Python reticulatus*	Reticulate Python	PYRE	Squamata
R	*Regina grahami*	Graham's Crayfish Snake	REGR	Squamata
R	*Sauromalus obesus obesus*	Western Chuckwalla	SAOB	Squamata
R	*Sceloporus clarkii*	Clark's Spiny Lizard	SCCL	Squamata
R	*Sceloporus graciosus*	Sagebrush Lizard	SCGR	Squamata
R	*Sceloporus jarrovi*	Yarrow's Spiny Lizard	SCJA	Squamata

Class	Scientific Name*	Common Name*	Code	Order
R	*Sceloporus occidentalis*	Western Fence Lizard	SCOC	Squamata
R	*Sceloporus olivaceus*	Texas Spiny Lizard	SCOL	Squamata
R	*Sceloporus* species	Spiny Lizard species	SCXX	Squamata
R	*Sceloporus undalatus*	Fence Lizard	SCUN	Squamata
R	*Sceloporus undulatus undulatus*	Southern Fence Lizard	SCUU	Squamata
R	*Scelotes bojerii*	Bojer's Burrowing Skink	SCBO	Squamata
R	*Scincella* species	Ground Skink species	SCXY	Squamata
R	*Sphenodon punctatus*	Tuatara	SPPU	Squamata
R	*Stegonotus modestus*	New Guinea Frog-eating Snake	STMO	Squamata
R	*Storeria dekayi*	Northern Brown Snake	STDE	Squamata
R	*Storeria occipitomaculata*	Redbelly Snake	STOC	Squamata
R	*Suta suta*	Curl Snake	SUSU	Squamata
R	*Telescopus semiannulatus*	Eastern Tiger Snake	TESE	Squamata
R	*Terrapene carolina*	Box Turtle	TECA	Testudines
R	*Terrapene carolina major*	Gulf Coast Box Turtle	TECM	Testudines
R	*Testudo hermanni*	Hermann's Tortoise	TEHE	Testudines
R	*Thamnophis couchii*	Western Aquatic Garter Snake	THCO	Squamata
R	*Thamnophis elegans*	Western Terrestrial Garter Snake	THEL	Squamata
R	*Thamnophis ordinoides*	Northwestern Garter Snake	THOR	Squamata
R	*Thamnophis proximus*	Western Ribbon Snake	THPR	Squamata
R	*Thamnophis radix*	Plains Garter Snake	THRA	Squamata
R	*Thamnophis sauritus*	Eastern Ribbon Snake	THSA	Squamata
R	*Thamnophis sirtalis*	Common Garter Snake	THSI	Squamata
R	*Thamnophis* species	Garter Snake species	THXX	Squamata
R	*Thelotornis kirtlandii*	Northern Vine Snake	THKI	Squamata
R	*Tiliqua rugosa*	Shingleback Skink	TIRU	Squamata
R	*Tomistoma schlegelii*	False Gharial	TOSC	Squamata
R	*Trachemys scripta*	Red-eared Slider	TRSC	Testudines
R	*Trimeresurus flavoviridis*	Habu Poisonous Snake	TRFL	Squamata
R	*Trionyx spinifer*	African Softshell Turtle	TRSP	Testudines
R	*Typhlina australis*	Greiberg's Blind Snake	TYAU	Squamata
R	*Unechis gouldii*	Gould's Black-headed Snake	UNGO	Squamata
R	*Unechis nigriceps*	Gunther's Black-headed Snake	UNNI	Squamata
R	unknown or various turtle species	unknown Turtle species	XXXT	Testudines
R	unknown reptile species	unknown reptile species	XXXR	unknown
R	unknown sea snake species	unknown Sea Snake	XXSS	Squamata
R	unknown snake or serpentene species	unknown snake species	XXSN	Squamata
R	*Urosaurus ornatus*	Tree Lizard	UROR	Squamata
R	*Uta palmeri*	San-Pedro Side-blotched Lizard	UTPA	Squamata
R	*Uta stansburiana*	Side-blotched Lizard	UTST	Squamata
R	*Varanus albigularis microstictus*	White-throated Monitor	VAAM	Squamata
R	*Varanus giganteus*	Perentie	VAGI	Squamata
R	*Varanus gouldii*	Sand Monitor	VAGO	Squamata
R	*Varanus* species	Monitor species	VAXX	Squamata
R	*Vipera aspis*	Asp Viper	VIAS	Squamata
R	*Vipera palestinae*	Palestine Viper	VIPA	Squamata
R	*Xantusia henshawi*	Granite Night Lizard	XAHE	Squamata
R	*Xenagama taylori*	Taylor's Strange Agama	XETA	Squamata

Appendix 2a: Contaminant codes found in Tables 1 through 6, with corresponding contaminant name, CAS number, trade name (where available) and other classifying information[j].

Contaminant Code	Common Name	CAS No.	Trade Name	Type
1,1-dimethylhydrazine	1,1-dimethylhydrazine	57-14-7	Dimizine, Dimazine	other
1,2-dichloroethane	1,2-dichloroethane	107-06-2		other
1,2-dihydroxynaphthalene	1,2-dihydroxynaphthalene	574-00-5		other
1,2-dimethyl-benzene	1,2-dimethyl-benzene, o-xylene, orthoxylene	95-47-6		other
1,2-dimethylhydrazine	1,2-dimethylhydrazine	540-73-8		other
1,3,5-cycloheptatriene	1,3,5-Cycloheptatriene	522-25-2		other
1,3-dichloropropane	1,3-dichloropropane	142-28-9		other
1,3-dichloropropanol	1,3-dichloropropanol (1,3-dichloro-2-propanol)	96-23-1		other
1,5,9-cyclododecatriene	1,5,9-cyclododecatriene	676-22-2		other
1,5-cyclo-octadiene	1,5-cyclooctadiene	1552-12-1		other
1-4-dichloronaphthalene	1-4-dichloronaphthalene	1825-31-6		PAH
1-amino-2-propanol	1-amino-2-propanol	78-96-6		other
1-chloronaphthalene	1-chloronaphthalene	90-13-1		PAH
1-methyl-4(tert)butylbenzene	1-methyl-4(tert)butylbenzene, toluene	98-51-1		other
1R, aS-cypermethrin	1Rm aS-cypermethrin	67375-30-8		pesticide
1RS-resmethrin	1RS-resmethrin	10453-86-8		pesticide
2,2-DPA	2,2-DPA, Propionic Acid, 2,2-dichloro-sodium salt	127-20-8	Dalapon	pesticide
2,3,4,5-TCB	2,3,4,5-tetrachloro-4-biphenylol, hydroxy-PCB			PCB
2,4,5-T	2,4,5-trichlorophenoxyacetic acid	93-76-5	Agent Orange	pesticide
2,4,5-trichloro-4-biphenylol	2,4,5-trichloro-4-biphenylol, hydroxy-PCB			PCB
2,4,6 trichlorophenol	2,4,6 trichlorophenol, 2,4,6-T, Phenachlor	88-06-2		pesticide
2,4-D	2,4-dichloro-phenoxyacetic acid	94-75-7		pesticide
2,4-D amine	2,4-dichloro-phenoxyacetic acid amine			pesticide
2,4-D butoxyethanol ester	2,4-D butoxyethanol ester	1929-73-3		pesticide
2,4-D butylate	2,4-dichloro-phenoxyacetic acid butylate			pesticide
2,4-D iso-octyl ester	2,4-dichloro-phenoxyacetic acid isooctyl ester	25168-26-7	Agroxone 5	pesticide
2,4-D sodium	2,4-dichloro-phenoxyacetic acid sodium	2702-72-9		pesticide
2,4-dichloroaniline	2,4-dichloroaniline	554-00-7		pesticide
2-AAF	2-acetylaminofluorene, , N-2-fluorenylacetamide	53-96-3		PAH
2-AF	2-aminofluorene	153-78-6		PAH
2-butanol	2-butanol, sec-butyl alcohol	78-92-2		other
2-ethylhexanoic acid	2-ethylhexanoic acid	149-57-5		other
2-methoxyethanol	2-methoxyethanol, diethylene glycol monomethyl ether	109-86-4		other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
2-methyl-2-propanol	2-methyl-2-propanol, tert-butyl alcohol	75-65-0		other
2-methylpentanoic acid	2-methylpentanoic acid	97-61-0		other
2-phenoxyethanol	2-phenoxyethanol	122-99-6		other
3,5,5-trimethyl-1-hexanol	3,5,5-trimethyl-1-hexanol, 3,5,5-trimethylhexanol	3452-97-9		other
3,6-dioxo-1,8-octanediol	3,6,-dioxo-1,8,-octanediol			other
3-bromopropylene	allyl bromide, 3-bromopropene, 3-bromo-1-propene, 3-bromopropylene	106-95-6		other
3-chloropropylene	allyl chloride, 3-chloropropene, 3-chloro-1-propene, 3-chloropropylene	107-05-1		other
3-methylcholanthrene	3-methylchol-anthrene	56-49-5		other
^3H	tritium, 3H	10028-17-8		radiation
4,4'-dichlorobiphenyl	4,4'-dichlorobiphenyl	2050-68-2		PCB
4-aminopyridine	4-aminopyridine, 4-pyridinamine, fampridine	504-24-5		other
4-chlorobiphenyl	4-chlorobiphenyl	2051-62-9		PCB
4-methyl-2-pentanol	4-methyl-2-pentanol, methylamyl alcohol, methylisobutyl	108-11-2		other
4245-77-6	n-ethyl-n-nitro-n-nitrosoguanidine	4245-77-6		other
57-97-6	7,12-dimethyl-benz[a]anthracene, 9,10-dimethyl-1,2-benzanthracene	57-97-6		PAH
6-aminonicotinamide	6-aminonicotinamide	329-89-5		other
6-chloropicolinic acid	6-chloro-2-picolinic acid, 6-chloropicolinic acid	4684-94-0		pesticide
7-penicillamine	7-penicillamine	52-66-4		other
9AA	9-aminoacridine hydrochloride, 9AA	134-50-9		other
a-terthienyl	a-terthienyl, alpha-terthienyl	1081-34-1		other
acephate	acephate	30560-19-1	Orthene	pesticide
acetaminophen	acetaminophen	103-90-2		other
acetone	acetone	67-64-1		other
acridine	acridine, acridrine	260-94-6		other
acridine orange	acridine orange	65-61-2		other
acrolein	acrolein	107-02-8	Aqualin, Magnacide	pesticide
acrylonitrile	acrylonitrile			other
actinomycin D	actinomycin D, D actinomycin	50-76-0		other
adifenphos	adifenphos			pesticide
Aerozine-50	Aerozine-50		Aerozine-50	other
Ag	silver, Ag	7440-22-4		metal
agricultural fertilizers	effluent, agricultural, agricultural fertilizers			other
AH	acetylhydrazide, AH			other
AH5183	2-(4-phenylpiperidino)cyclohexanol, AH5183			other
Al	aluminum, Al, aluminium, aluminum chloride, aluminium chloride	7429-90-5		metal
alachlor	alachlor	15972-60-8	Lasso	pesticide
alcohol	unknown alcohol			other
aldicarb	aldicarb	116-06-3		pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
aldrin	aldrin	309-00-2	Octalene	pesticide
algicide	unknown algicide			pesticide
alkylbenzene sulfonate	alkylbenzene sulfonate	42615-29-2		other
allethrin	allethrin, prallethrin, pallethrine	584-79-2	Pynamin	pesticide
allylamine	allylamine, 2-propen-1-amine, 2-propenyl amine	107-11-9		other
alpha-chaconine	alpha-chaconine			other
alpha-solanine	alpha-solanine	20562-02-1		other
amaranth	amaranth, red dye	915-67-3		other
ambithion	ambithion mixture, fenitrothion and malathion	121-75-5 and 122-14-5		pesticide
aminocarb	aminocarb	2032-59-9	Matacil, Bayer 44 646	pesticide
aminopiperazin	aminopiperazin			other
aminopyrine	aminopyrine, antipyrine	58-15-1 and 60-80-0		pH
amitrole	Amitrole, Amitrol-t	61-82-5	Weedazol	pesticide
ammonium carbonate	ammonium carbonate	10361-29-2		other
ammonium hydroxide	ammonium hydroxide	1336-21-6		other
ammonium nitrate	ammonium nitrate	6484-52-2		other
amoben	amobam, amoben, chloramben	133-90-4		pesticide
anilazine/ triazine	anilazine, triazine	101-05-3	Bortrysan	pesticide
aniline	aniline	62-53-3		pesticide
ansar	Ansar 592 HC	75-60-5	Ansar 592 HC, Phytar	pesticide
anthracene	anthracene	120-12-7		PAH
arco	arco			pesticide
arginine vasotocin	arginine vasotocin			other
Aroclor 1242	Aroclor 1242, Arochlor 1242	1336-36-3, 53		PCB
Aroclor 1254	Aroclor 1254, Arochlor 1254	11097-69-1		PCB
Aroclor 1260	Aroclor 1260, Arochlor 1260	1336-36-3, 11		PCB
aromatic petroleum crude	petroleum products, aromatic petroleum crude			other
Arosurf 66-E2	monomolecular organic surface film		Arosurf 66-E2	other
artificial light	radiation, artificial light			radiation
As	arsenic, As	7440-38-2		other
ASA	acetylsalicylic acid	530-75-6		other
ascorbic acid	ascorbic acid, Vitamin C	50-81-7		other
asomate	asomate			pesticide
asozine	asozine, asozin, methylarsenic sulfide	2533-82-6		pesticide
aspartame	aspartame	22839-47-0		other
atrazine	atrazine	1912-24-9	Gesaprim	pesticide
atrazine, alachlor	atrazine and alachlor, atrazine and alaclor			pesticide
atropine, soman	atropine and soman	51-55-8, 96-64-0		other
azacytidine	5-azacytidine, azacytidine, ladakamycin, 5-azacytidine	320-67-2	Mylosar	other
azinphos-methyl	azinphos-methyl	86-50-0	Guthion, Gusathion M	pesticide
Ba	barium, Ba	7440-39-3		metal

Contaminant Code	Common Name	CAS No.	Trade Name	Type
Bacillus sphaeris	Bacillus sphaeris			other
BaP	benzo(a)pyrene, BaP	50-32-8		PAH
Bayer 22408	Bayer 22408			pesticide
Bayer 29952	Bayer 29952	2703-13-1		pesticide
Bayer 34042	Bayer 34042			pesticide
Bayer 37289	Bayer 37289	327-98-0		pesticide
Bayer 38920	Bayer 38920			pesticide
Bayer 44831	Bayer 44831			pesticide
Be	beryllium, Be	7440-41-7		metal
bendiocarb	bendiocarb	22781-23-3		pesticide
benlate	benlate, benomyl	17804-35-2	Benlate	pesticide
benthiocarb/ thiobencarb	benthiocarb, thiobencarb	28249-77-6	Saturn M, Bolero	pesticide
benzene	benzene	71-43-2		other
benzene hydrochloride	benzene hydrochloride	608-73-1		pesticide
benzomate	benzomate			pesticide
benzpyrene	benzpyrene, benzo(e)pyrene	192-97-2		PAH
beryllium sulfate	beryllium sulfate	13510-49-1		other
BHC	benzene hexachloride, hexachlorobenzene, BHC, HCB	118-74-1	Voronit C, BHC, HCB	pesticide
bioresmethrin	bioresmethrin, cismethrin	28434-01-7		pesticide
bis(2-hydroxyethyl) ether	bis(2-hydroxy-ethyl) ether	111-46-6		other
bis(2-hydroxypropyl) amine	bis(2-hydroxy-propyl) amine	110-97-5		other
bis(2-propenyl) amine	bis(2-propenyl) amine			other
bis(3-hydroxyethyl) ether	bis(3-hydroxy-ethyl) ether			other
boric acid	boric acid	10043-35-3		pesticide
boron	boron, B	7440-42-8		other
BPMC	BPMC, fenobucarb	3766-81-2	Baycarb, Osbac, Bassa	pesticide
brodifacoum	brodifacoum	56073-10-0	Talon, Ratak+	pesticide
bromocyclen	bromocyclen	1715-40-8	Alugan	pesticide
bromodeoxyuridine	5-bromodeoxyuridine, thymidine			other
bromoform	bromoform	75-25-2		other
BTH14	Bacillus thuringiensis var. israele, BTH14		B.t.	pesticide
buprofezin	buprofezin	69327-76-0	Applaud	pesticide
butachlor	butachlor	23184-66-9	Machete	pesticide
butylate	butylate	2008-41-5		pesticide
butylated hydroxyanisole	butylated hydroxyanisole	25013-16-5	BHA	pesticide
butyric acid	butyric acid	107-92-6		other
BZH	benzoic hydrazide, BZH, benzhydrazide, benzhyrdazine	613-94-5		other
ß-aminopropionitrile fumarate	ß-aminopropionitrile fumarate	2079-89-2		other
ßAPN	ß-aminopropionitrile, ßAPN, 3-aminopropionitrile	151-18-8		other
ßNF	b-napthoflavone, ß-napthoflavone, ßNF	6051-87-2		other
Ca, pH	pH, calcium, Ca			metal + pH

Contaminant Code	Common Name	CAS No.	Trade Name	Type
cadmium nitrate	cadmium nitrate	10325-94-7		metal
cadmium sulfate	cadmium sulfate	10124-36-4		metal
caffeine	caffeine	58-08-2		other
calcium chloride	calcium chloride	14674-72-7		other
calcium oxide	calcium oxide	1305-78-8		pesticide
CAMA	CAMA, Calcium Acid Methane Arsonate	5902-95-4		pesticide
caprolactam	caprolactam	105-60-2	CAP	other
captan	captan, Captan (F)	133-06-2	Merpan	pesticide
carbaryl	carbaryl	63-25-2	Sevin	pesticide
carbaryl, UV-B	carbaryl, UV-B, radiation			pesticide and radiation
carbendazim	carbendazim	10605-21-7	Bavistin, Derosal, Delsene	pesticide
carbofuran	carbofuran	1563-66-2	Furadan	pesticide
carbon disulfide	carbon disulfide	75-15-0		pesticide
carbophenothion	Carbophenothion	786-19-6	Trithion	pesticide
carbophos	carbophos			pesticide
carboxylic acids	various, carboxylic acids			other
catechol	1,2-dihydroxybenzene, catechol, naphthalene intermediate	120-80-9		PAH
CCl_4	carbon tetrachloride, CCl_4	56-23-5		other
Cd	cadmium, Cd	7440-43-9		metal
Cd, Mg	cadmium, magnesium			metal
Cd, Zn	cadmium, zinc			metal
$CdCl_2$	cadmium chloride, $CdCl_2$	10108-64-2		metal
$CdCl_2$, Cd	cadmium, cadmium chloride, $CdCl_2$, Cd			metal
CDD	cytochalasin D, CDD	22144-77-0		other
Cekapur	Cekapur			other
chemical manufacture plant	effluent, industrial, chemical manufacture plant			other
chloranil	chloranil	118-75-2	Spergon	pesticide
chlordane	chlordane or cis-chlordane or trans-chlordane or oxychlordane	57-74-9, 5103-71-9, 5103-74-2, 27304-13-8		pesticide
chlordimeform	chlordimeform	6164-98-3	Fundal, Spanove, Galecron	pesticide
chlorfenvinphos	chlorfenvinphos	470-90-6		pesticide
chloroaniline	chloroaniline, p-chloroaniline	106-47-8		pesticide
chlorobenzene	chlorobenzene	108-90-7		pesticide
chlorocresol	chlorocresol, 4-chloro-2-methyl phenol, 4-chloro-m-cresol, MCPA	59-50-7		pesticide
chloroform	chloroform	67-66-3		other
chlorophenols	various, chlorophenols			other
chloropyrifos	chlorpyrifos, chloropyrifos	2921-88-2	Dursban, Lorsban	pesticide
chlorothalonil	chlorothalonil	1897-47-6	Exotherm Termil, Bravo, Daconil 2787	pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
chlorpyrifos-methyl	chlorpyrifos-methyl, chlorpyrifos-ethyl analog	5598-13-0		pesticide
chromium salts	chromium salts	9066-50-6		metal
cismethrin	cismethrin, bioresmethrin	35764-59-1		pesticide
Citrex	Citrex S-5, Citrex		Citrex, Tienen, Belgium	other
Cl	chlorine, Cl	7782-50-5		other
$ClNO_2$	ammonia, nitrite, chlorine, $ClNO_2$			other
Co	cobalt, Co	7440-48-4		metal
$CoCl_2$	cobalt chloride, $CoCl_2$, cobalt dichloride, cobaltous chloride	7646-79-9		metal
colchicine	colchicine	64-86-8		other
Congo red	Congo red, sodium diphenyldiaxo-bis-alpha-napthylamine sulfonate	573-58-0		other
copper sulfate	copper sulfate	7758-99-8		metal
CORT	corticosterone, steroid hormone, CORT	50-22-6		other
cotinine	cotinine, nicotine metabolite	486-56-6		other
coumaphos	coumaphos	56-72-4		pesticide
cow manure	effluent, agricultural, cow manure			other
Cr	chromium, Cr	7440-47-3		metal
Cr, Zn, Fe	Chromium, Zinc, Iron (Cr, Zn, Fe)			metal
cresol	cresol, o-cresol	1319-77-3		other
crotoxyphos	crotoxyphos	7700-17-6		pesticide
crude oil	oil, crude, petroleum products			other
cruformate	cruformate	299-86-5		pesticide
Cs	cesium, radiocesium, Cs	7440-46-2		radiation
Cs, Sr, ^3H	cesium, strontium, tritium, Cs, Sr, ^3H			radiation
Cu	copper, Cu, copper chloride, $CuCl_2$	7440-50-8		metal
Cu, Zn	copper and zinc, Cu, Zn			metal
cyanatryn	cyanatryn	21689-84-9		pesticide
cyanazine	cyanazine, 1,3,5-triazine, simizine	21725-46-2		pesticide
cyanide	cyanide	57-12-5		other
cyclohexanone	cyclohexanone	108-94-1		other
cycloheximide	cycloheximide	66-81-9		pesticide
cyclophosphamide	cyclophosphamide	6065-19-2	CP	other
cyfluthrin	cyfluthrin	68359-37-5		pesticide
cyhalothrin	cyhalothrin	68085-85-8	Grenade	pesticide
cypermethrin	alphamethrin, FASTAC 10EC, cypermethrin	52315-07-8	Ambush C, Cymbush	pesticide
cytosine arabinoside	cytosine arabinoside, cytarabine	147-94-4		other
d-tubocurine	d-tubocurine, chondrocurine, d-tubocurarine	477-58-7		other
dairy effluent	effluent, industrial, dairy effluent			other
DDA	DDA, 2,2-bis(p-chlorophenyl)-acetic acid	83-05-6		other
DDC	dithiocarbamate, DDC, diethyldithiocarbamic acid sodium salt	148-18-5	Dithane	pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
DDCN	DDCN, DDT metabolite, bis(p-chlorophenyl)acetonitrile			pesticide
DDD	DDD, p,p-DDD, TDE, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, DDT metabolite	72-54-8		pesticide
DDE	DDE, DDT metabolite	72-55-9		pesticide
DDMU	DDMU, DDT metabolite			pesticide
DDOH	DDOH, 2,2-bis(p-chlorphenyl)-ethanol, DDT metabolite	2642-82-2		pesticide
DDT	DDT, p,p-DDT, dichlorodiphenyltrichloroethane	50-29-3	Gesarol, Guesarol, Neocid, DDT	pesticide
DEF	DEF, tribufos	78-48-8		pesticide
defenuron	defenuron			pesticide
DEHP	di-2-ethylhexyl-phthalate, DEHP	117-81-7		other
deltamethrin	deltamethrin, decamethrin, cis-deltamethrin	52918-63-5	Decis	pesticide
demeton	demeton	298-03-3		pesticide
DES	diethylstilbestrol, DES	56-53-1		other
des-cyano-deltamethrin	des-cyano-deltamethrin			pesticide
detergent	other, unknown detergent			other
DFP	diisopropyl fluorophosphate, DFP, Isofluorphate	55-91-4		pesticide
di gu shuang	di gu shuang			pesticide
diazepam	diazepam	439-14-5		other
diazinon	diazinon	333-41-5	Basudin, Diazitol	pesticide
dicamba	dicamba	1918-00-9	Banvel, Mediben	pesticide
dichlobenil	dichlobenil	1194-65-6	Casoron	pesticide
dichlone	dichlone	117-80-6	Phygon	pesticide
dichlorfenthion	dichlofenthion, dichlorfenthion	97-17-6		pesticide
dichlorobenzene	dichlorobenzene, p-dichlorobenzene	106-46-7		pesticide
dichloroglyoxime	dichloroglyoxime			other
dichlorvos	dichlorvos, DDVP, phosphoric acid 2,2 dichlorovinyl d, DDVP	62-73-7	Nuvan, Dedevap, Nogos, Vapona	pesticide
dicofol	dicofol, dichlorobenzophenone is a metabolite of dicofol	115-32-2	Kelthane	pesticide
dicrotophos	dicrotophos, dichrotophos	141-66-2	Bidrin, Carbicron, Ektafos	pesticide
dieldrin	dieldrin	60-57-1	Octalox	pesticide
diesel	fuel, diesel, petroleum products			other
diethanolamine	diethanolamine, bis(2-hydroxy-ethyl) amine, diethylolamine	111-42-2	DEIA	other
diflubenzuron	diflubenzuron	35367-38-5	Dimilin	pesticide
diisononylphthalate	diisononylphthalate	28553-12-0		other
dimefox	Dimefox	115-26-4		pesticide
dimethachlon	dimethachlon, dimethachlor	50563-36-5		pesticide
dimethoate	dimethoate	60-51-5	Rogor, Cygon, Perfekthion, Roxion, Fostion MM	pesticide
dimethyl disulfide	dimethyl disulfide	624-92-0		other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
dinitrocresol	dinitrocresol, dinitro-o-cresol, DNC, DNOC, dinitrophenol	534-52-1		pesticide
dinocap	Dinocap, dinitrophenol derivative	131-72-6		pesticide
dinoseb	Dinoseb	88-85-7		pesticide
dioctylphthalate	dioctylphthalate, di(2-ethylhexyl) phthalate	117-84-0		other
dioxathion	dioxathion	78-34-2		pesticide
dioxins	polychlorinated dibenzo-p-dioxins, PCDD			other
diphacin	Diphacin	82-66-6		other
diquat	diquat dibromide	85-00-7		pesticide
diquat, nabam	diquat, nabam	85-00-7, 142-59-6		pesticide
distillery effluent	effluent, industrial, distillery effluent		Travancore Sugars and Chemicals effluent	other
disulfoton	disulfoton	298-04-4		pesticide
diuron	diuron, [3-(3,4-dichlorophenyl)-1, or 1-dimethyl-urea	330-54-1		pesticide
DMN	dimethylnitrosamine, DMN, N-nitrosodimethylamine	62-75-5		other
DMSA	meso-2,3-dimercaptosuccinic acid, Succimer, DMSA, DMS	304-55-2	Succimer	other
DMSO	dimethylsulfoxide, DMSO, dimethylsulphoxide	67-68-5		other
DNP	dinitrophenol, DNP, a-dinitrophenol, 2,4-dinitrophenol	51-28-5		other
DODPA	dioctyldiphenylamine, DODPA	101-67-7		other
Domal	Domal, detergent		Domal	other
Dosanex	Dosanex, metoxuron	19937-59-8		pesticide
DPH	diphenylhydantoin, DPH, phenytoin	57-41-0		other
DRC-1339	DRC-1339	95-74-9		pesticide
DRC-1347	DRC-1347			pesticide
DRC-2698	DRC-2698			pesticide
duo sai wan	duo sai wan			pesticide
EB	estradiol benzoate, EB	50-50-0		other
EBP	EBP	13286-32-3	Kitazin	pesticide
edrophonium	edrophonium			other
EDS	ethane dimethane sulfonate, EDS			other
emetine	emetine	483-18-1		other
EMF	electromagnetic field, EMF			other
emisan	mercurial fungicide Emisan	123-88-6	Emisan	pesticide
endosulfan	endosulfan, endosulphan	115-29-7	Thiodan, Cyclodan, Beosit, Malix, Thimul, Thifor	pesticide
endothall	endothall, mono(n,n-dimethylalkylamine) salt	145-73-3		pesticide
endrin	endrin	72-20-8		pesticide
epichlorohydrin	epichlorohydrin	106-89-8	ECH	other
epinephrine	epinephrine	51-43-4		other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
eptam	Eptam, EPTC	759-94-4		pesticide
esfenvalerate	esfenvalerate	66230-04-4	Sumi-alfa, Sumi-alpha	pesticide
estradiol	estradiol, estradiol-17ß, 17ß-estradiol	50-28-2		other
ethanol	ethanol	64-17-5		other
ethanolamine	2-aminoethanol, ethanolamine	414-43-5		other
ethidium bromide	ethidium bromide	1239-45-8		other
ethion	ethion	563-12-2		pesticide
ethoprop	ethoprop	13194-48-4		pesticide
ethyl acetate	ethyl acetate	141-78-6		other
ethyl acetoacetate	ethyl acetoacetate	141-97-9		other
ethyl guthion	ethyl guthion	2642-71-9		pesticide
ethyl propionate	ethyl propionate, propanoic acid ethyl ester	105-37-3		other
ethylene dibromide	ethylene dibromide, dibromoethane	106-93-4		other
ethylene glycol	1,2-ethanediol, ethylene glycol	107-21-1	antifreeze	other
ethylenediamine	ethylenediamine	107-15-3		pesticide
ethyleneimine, aziridine	ethyleneimine, aziridine	151-56-4		other
ethylenethiourea	ethylene thiourea	96-45-7		pesticide
ethylmethane sulfonate	ethylmethane sulfonate	62-50-0		other
ethylnitrosurea	ethylnitrosurea, n-ethyl-n-nitrosourea	759-73-9		other
ethylpropionate	ethylproprionate	105-73-7		other
eulan wa new	eulan wa new			pesticide
Fadrozole	Fadrozole, CGS 16949			pesticide and other
famphur	famphur	52-85-7		pesticide
Fe	iron, Fe	7439-89-6		metal
fei fu san	fei fu san			pesticide
fenamiphos	fenamiphos	22224-92-6		pesticide
fenitrothion	fenitrothion	122-14-5	Accothion, Folithion, Sumithion	pesticide
fenoprop	fenoprop, Silvex	93-72-1	Kuron	pesticide
fenpropathrin	fenpropathrin, fenpropanate	39515-41-8		pesticide
fensulfothion	fensulfothion	115-90-2		pesticide
fenthion	fenthion	55-38-9	Baycid, Baytex, Entex, Lebaycid, Tiguvon	pesticide
fentin	fentin	668-34-8	Brestan, Brestan 60, Du-Ter	pesticide
fentin-acetate	fentin acetate	900-95-8		pesticide
fenubucarb, chlorpyrifos	fenubucarb and chlorpyrifos		Brodan	pesticide
fenvalerate	fenvalerate, ssfenvalerate	51630-58-1	Sumicidin, Belmark, Pydrin	pesticide
ferbam	ferbam	14484-64-1		pesticide
FIT	FIT, alkanesulfonate-based liquid		FIT	other
FLII MLO	FLII MLO			pesticide
flocoumafen	flocoumafen	90035-08-8	Storm, Stratagem	pesticide
flumethrin	flumethrin			pesticide
fluoranthene	fluoranthene	206-44-0		PAH

Contaminant Code	Common Name	CAS No.	Trade Name	Type
fluoranthene, UV	fluoranthene, UV, radiation			PAH and radiation
fluoride	fluoride	16984-48-8	Fluoride	other
fluoroacetamide	fluoroacetamide	640-19-7	Compound 1081	pesticide
fluorouracil	fluorouracil, 5-fluorouracil	51-21-8	Efudex, Fluracil, Timaxin, Adrucil	other
fonophos	fonophos	944-22-9		pesticide
formalin	formalin, formaldehyde, methaldehyde	50-00-0		pesticide
formamide	formamide	75-12-7		other
fuel oil	fuel oil, petroleum products		Bunker #6 fuel oil	other
fuel oil blend	fuel oil, coal derived blend, petroleum products			other
furans	polychlorinated dibenzofurans, PCDF, chlorinated dibenzofuran			other
G-27365	G-27365			pesticide
G-28029	G-28029	2275-14-1		pesticide
G-30493	G-30493			pesticide
G-30494	G-30494, methyl phenkapton	3735-23-7		pesticide
GABA	gamma-aminobutyric acid, GABA	56-12-2		other
garlic	other, crushed garlic			other
Garlon 3A	triethylamine salt of triclopyr	55335-06-2	Garlon 3A	pesticide
GC-3582	GC-3582			pesticide
Ge	Germanium, Ge	7440-56-4		other
gentisic acid	2,5-dihydroxybenzoic acid, gentisic acid	490-79-9		other
gibberellin	gibberellin			other
glutathione	glutathione	70-18-8		other
glycerol formal	glycerol formal	4740-78-7		other
glyphosate	glyphosate (isopropylamine salt of)	1071-83-6	Roundup 360, Roundup, Polado, Touchdown (surfactant added to the salt)	pesticide
groundwater	effluent, agricultural, industrial, municipal groundwater runoff			other
growmore	growmore		Growmore	other
halothane	halothane, bromochlorotrifluorethane	151-67-7		other
HCH, alpha, lindane	HCH, alpha, lindane, (hexachlorobenzene)	319-84-6	Lindane	pesticide
HCH, beta, lindane	HCH, beta, lindane, (hexachlorobenzene)	319-85-7	Lindane	pesticide
hepta-carboxylporphyrin	hepta-carboxylporphyrin			other
heptachlor	heptachlor	76-44-8		pesticide
heptachlor epoxide	heptachlor epoxide, HE	1024-57-3		pesticide
heptanoic acid	heptanoic acid	111-14-8		other
heptanol	heptanol	53535-33-4		other
hexachloroethane	hexachloroethane	67-72-1		other
hexachlorophene	hexachlorophene	70-30-4		pesticide
hexamethyl-phosphoramide	hexamethyl-phosphoramide, hempa	680-31-9		other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
hexanoic acid	hexanoic acid, caproic acid	10051-44-2		other
hexaporphyrin	hexaporphyrin			other
hexazinone	hexazinone	51235-04-2	Velpar	pesticide
Hg	mercury, Hg, methylmercury, organic mercury	7439-97-6		metal
hopcide	hopcide	3942-54-9		pesticide
HPB	hexadecylpyridinium bromide, HPB	140-72-7	Bromocet, Cetasol	other
hun mie wei	hun mie wei			pesticide
hydrazine	hydrazine	302-01-2		other
hydrazine sulfate	hydrazine sulfate	10034-93-2		other
hydrocarbons	various, hydrocarbons or organic compounds			pesticide
hydroxyurea	hydroxyurea	127-07-1		other
I	iodine, I	7553-56-2		other
imidacloprid	imidacloprid	138261-41-3	Admire	pesticide
imidazole	imidazole	288-32-4		other
INA	isonicotinic acid	55-22-1		other
indomethacin	indomethacin	53-86-1		other
industrial effluent	effluent, industrial in river water			other
Ingran	Ingran			pesticide
iprobenfos	5-benzyl diisopropyl phosphorothiol, IBP, iprobenfos IPB	26087-47-8		pesticide
iron methanoarsenate	iron methanoarsenate			pesticide
iron sulfate	iron sulfate, ferrous sulfate, iron	7720-78-7		metal
isazophos	isazophos, isazofos	42509-80-8		pesticide
isobutyl alcohol	2-methyl-1-propanol, isobutyl alcohol	78-83-1		other
isocarbophos	isocarbophos			pesticide
isofenphos	isofenphos	25311-71-1	Oftanol	pesticide
isoniazid	isoniazid	54-85-3		other
isoprocarb	isoprocarb	2631-40-5	Etrofolan	pesticide
isoprothiolane	isoprothiolane	50512-35-1	Fuji-one	pesticide
isovalerianic acid	3-methylbutyric acid, isovaleric acid, 3-methylbutanoic acid	503-74-2		other
JKU0422	1-[2,6-dichloro4-(trifluoromethyl)phenyl]-3-methyl-4-[(trifluoromethyl)thio]-1H-pyrazole			pesticide
K (fertilizer)	potassium based fertilizer, muriate of potash, K			other
kadethrin	kadethrin, cis-kadethrin, RU 15525	58769-20-3	Kadethrin, RU 15525	pesticide
Kasugamycin	kasugamycin	6980-18-3	kasumin	pesticide
KCl	potassium chloride, KCl	7447-40-7		other
kepone	kepone, chlordecone	143-50-0	Kepone	pesticide
ketamine hydrochloride	ketamine hydrochloride	1867-66-9		other
lanthanum	lanthanum	7439-91-0		metal
LAS	linear chain alkylbenzene-sulphonat			other
leptophos	leptophos	21609-90-5		pesticide
leptophosoxon	leptophosoxon, leptophos metabolite			pesticide
Leunarex	Leunarex			other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
Li	lithium, Li	7439-93-2		metal
lindane	HCH, gamma, lindane, g-BHC (hexachlorobenzene),(benzene hexachloride)	58-89-9	Lindane	pesticide
Linuron	Linuron	330-55-2	Linuron	pesticide
lithium carbonate	lithium carbonate	554-13-2		metal
lithium chloride	lithium chloride	7447-41-8		metal
M99	entorphine		M99	other
MAFA	MAFA			pesticide
malachite green	malachite green	569-64-2		other
malaoxon	malaoxon, malathion metabolite	1634-78-2		pesticide
malathion	malathion	121-75-5	Cythion, Malathion	pesticide
mancozeb	mancozeb	8018-01-7	Dithane	pesticide
maneb	maneb (Maneb 80)	12427-38-2	Manzate, Dithane M-22	pesticide
MCPA	2-methyl-4-chlorophenoxyacetic acid, MCPA, MCP	94-74-6	Agroxone, Cornox, Methoxone	pesticide
meldrin	meldrin			pesticide
mercury(II)chloride	mercuric chloride, mercury(II)chloride, mercury bichloride	7487-94-7	Merfusan, Mersil	metal and pesticide
merphos	merphos, tributyl phosphorotrithioite	150-50-5	Folex	pesticide
Mervinphos (OP)	Mervinphos (OP)			pesticide
mesotocin	mesotocin			other
MET	multi-effect Triazole			pesticide
metal oxides	various, metal oxides			metal
metalaxyl	metalaxyl	57837-19-1	Metalaxyl, Ridomil	pesticide
metals	various, metals			metal
metamidophos	metamidophos, methamidophos, metamidofos	10265-92-6	Bayer 71628	pesticide
methallibure	methallibure	926-93-2		other
methane sulfonate	methane sulfonate, tricaine			other
methidathion	methidathion	950-37-8	Supracide	pesticide
methimazole	methimazole	60-56-0		other
methiocarb	methiocarb	2032-65-7	Mesurol, Bayer 37 344, Draza	pesticide
methomyl	methomyl	16752-77-5	Lannate	pesticide
methoprene	methoprene	41205-06-5	Altosid, Precor	pesticide
methotrexate	methotrexate	59-05-2		other
methoxychlor	methoxychlor	72-43-5		pesticide
methoxyfluorane	methoxyfluorane, 2,2-dichloro-1,1-difluoroethylmethyl ether	76-38-0		other
methyl demeton	methyl demeton	8022-00-2		pesticide
methyl ethyl ketone	methyl ethyl ketone	78-93-3	PVC primer	other
methyl fluoroacetate	methyl fluoroacetate			other
methyl isothiocyanate	methyl isothiocyanate	556-61-6	Trapex	pesticide
methyl mercury chloride	methyl mercury chloride	115-09-3		metal
methylarsonic acid	methylarsonic acid, MSMA, monosodium methyl arsonate, DSMA, disodium methyl arsonate	124-58-3	Ansar, Buenv, Daconate	pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
methylcarbamate	methyl carbamate	598-55-0		pesticide
methylene chloride	methylene chloride, dichloromethane	75-09-2	Solmethine	other
methylhydrazine	methylhydrazine	60-34-4	component of jet fuel	other
metolachlor	metolachlor	51218-45-2		pesticide
metribuzin	metribuzin	21087-64-9	Metribuzin	pesticide
mevinphos	mevinphos	7786-34-7		pesticide
mexacarbate	mexacarbate	315-18-4	Zectran	pesticide
Mg	magnesium, Mg	7439-95-4		metal
Mg, Cd	magnesium and cadmium, Mg, Cd			metal
Mg, Co	magnesium and cobalt, Mg, Co			metal
Mg, Ni	magnesium and nickel, Mg, Ni			metal
Mg, Pb, Cd, Mn, Hg	magnesium, lead, cadmium, manganese, Mg, Pb, Cd, Mn			metal
Mg, Zn	magnesium and zinc, Mg, Zn			metal
microbes	biological, micropollutants in drinking water			other
mie chu wei	mie chu wei			pesticide
Mimic 240LV	Mimic 240LV, Tebufenozide, RH-5992	112410-23-8		pesticide
mine drainage	effluent, industrial, mine drainage (includes iron, copper, zinc)			metal
mipafox	mipafox	371-86-8		pesticide
mirex	mirex		Mirex	pesticide
Mn	manganese, Mn	7439-96-5		metal
MNNG	n-methyl-n-nitro-n-nitrosoguanidine, MNNG	70-25-7		other
Mo	molybdenum, Mo	7439-98-7		metal
MO-338	chlornitrofen, MO-338	1836-77-7		pesticide
molinate	molinate, Yalan	2212-67-1	Ordram	pesticide
monochloramine	monochloramine, chloramide, chloramine, hydrazine intermediate	10599-90-3		other
monocrotophos	monocrotophos	6923-22-4	Azodrin, Nuvacron	pesticide
MPP+	1-methyl-4-phenylpyridinium, MPTP metabolite	48134-75-4	cyperquat chloride	pesticide
MPTP	1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine, 1,2,3,6-tetrahydropyridine…	28289-54-5		pesticide
MTBE	methyl tert-butyl ether, tert-butyl methylether, TMBE, MTBE	1634-04-4		other
MTMC	MTMC, metalocarb	1129-41-5	Tsumacide, Metacrate	pesticide
myclobutanil	myclobutanil	88671-89-0	Nova	pesticide
Myristate	12-o-tetraecanoyl phorbol-13-acetate, Porbol Acetate, Myristate	16561-29-8	Porbol Acetate, Myristate	other
n-butanol	n-butanol, 1-butanol, 1-butyl alcohol	71-36-3		other
n-butyl sulphide	butyl sulphide, n-butyl sulphide	544-40-1		other
n-heptanol	n-heptanol, n-heptyl alcohol	111-70-6		other
n-nitrosoatrazine	n-nitrosoatrazine	7090-25-7		pesticide
n-nitrosodiethanol	n-nitrosodiethanol	1116-54-7		other
N-nitrosodiethanolamine	N-Nitrosodiethanolamine	55-18-5		other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
N-nitrosodimethylamine	N-nitrosodimethylamine	62-75-9		other
n-propanol	n-propanol, 1-propanol, n-propyl alcohol	71-23-8		other
Na acetate	sodium acetate, Na acetate	127-09-3		other
Na3NTA	trisodium nitrilotriacetate, Na3NTA	5064-31-3		other
nabam	nabam	142-59-6	Parzate, Dithane D-14	pesticide
NaCl	sodium chloride, NaCl	7647-14-5	sodium chloride	other
NaDEDC	sodium diethyldithiocarbamate, NaDEDC			pesticide
naled	naled	300-76-5	Dibrom	pesticide
NaPCP	pentachlorophenol salt, sodium pentachlorophenate, NaPCP	131-52-2		pesticide
naphthalene	naphthalene	91-20-3		PAH
neostigmine	neostigmine	59-99-4		pesticide
nereistoxin	nereistoxin, cartap, carbomothioic acid	15263-52-2 and 15263-33-3	Cartap, Padan, , Cadan, Vegetox, Patap	pesticide
NH3	ammonia, NH3			other
NH3, temp	ammonia, temperature			other
NH4, pH	pH, ammonia, NH4,			pH and other
NH4Cl, NH3	ammonia, NH3, ammonium chloride			other
NH4Cl, NH3, Cl	ammonia, NH3, chlorine, NH4Cl			other
Ni	nickel, Ni, nickel chloride, NiCl	7440-02-0		metal
Ni dinuthyldithiocarbamate san	Ni dibutyldithiocarbamate sankel	13927-77-0		pesticide
Ni subsulfide	Nickel subsulfide	12035-72-2		metal
nickel sulfate	nickel sulfate	7786-81-4		metal
niclosamide	Niclosamide	50-65-7	Bayluscide, Bayer 73	pesticide
nicotine	nicotine	54-11-5		other
nifurpirinol	nifurpirinol	13411-16-0	Furanace	pesticide
nitrate	ammonia, nitrate			other
nitrite	ammonia, nitrite			other
nitrobenzene	nitrobenzene	98-95-3		pesticide
nitrofen	nitrofen	1836-75-5		pesticide
NMU	methylnitrosourea, n-methyl-n-nitrosourea, NMU	684-93-5		other
noise	traffic noise, noise pollution			
non-contaminant study	non-contaminant study or review (general ecology and other studies)			
nonachlor	nonachlor, cis-nonachlor, trans-nonachlor	3734-49-4		PCB
nonylphenol	nonylphenol	25154-52-3		pesticide
NPAN	phenyl-a-naphthylamine, n-phenyl-a-naphthylamine, NPAN	90-30-2		other
NPE	nonylphenolethoxylate, NPE	51811-79-7		other
NRDC	NRDC 119			pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
NTA	nitrilotriacetic acid, nitrilotriacetate, NTA	139-13-9		other
o-toluidine	o-toluidine	95-53-4		other
OCB	PCBs and Ocs			other
OCS	octachlorostyrene, OCS	29082-74-4		pesticide
octanoic acid	octanoic acid	124-07-2		other
oil refinery	effluent, industrial, oil refinery			other
omethoate	omethoate	1113-02-6	Folimate	pesticide
OMPA	Octamethyl Pyrophosphoramide, OMPA	152-16-9	OMPA	pesticide
OPAN	octyl-phenyl-a-naphthylamine, OPAN, petroleum products	51772-35-1		other
organism toxin	biological, organism toxin			other
organochlorines	various, organochlorine compounds, OC, chlorinated hydrocarbons		DDT, DDD, DDE, g-hexachlorocyclohexane	pesticide
organophosphates	various, organophosphates			pesticide
Otroc	Otroc			other
oxamyl	oxamyl	23135-22-0	Vydate	pesticide
oxytocin	oxytocin	50-56-6		other
ozone	ozone, oxygen3, O3	10028-15-6		other
p-nitrotoluene	p-nitrotoluene, para-methylnitrobenzene	99-99-0		other
PA-14	PA-14			other
PAH	polycyclic aromatic hydrocarbons, PAH			PAH
paraoxon	paraoxon, parathion metabolite	311-45-5		pesticide
paraquat	paraquat	4685-14-7	Gramoxone, Dextrone X, Esgram	pesticide
paraquat dichloride	paraquat dichloride	1910-42-5	Gramoxone, Dextrone X, Esgram	pesticide
parasite	biological, parasite			other
parathion	parathion	56-38-2	Thiophos, Bldan, Folidol, Fosferno, Niran	pesticide
parathion-methyl	methyl parathion, parathion-methyl	298-00-0	Folidol, Metacid, Bladan M, Nitrox 80	pesticide
pathogen	biological, fungal or bacterial pathogen			other
Pb	lead, Pb, lead chloride	7439-92-1		metal
Pb acetate	lead acetate, Pb acetate	301-04-2		metal
Pb nitrate	lead nitrate, Pb nitrate	10099-74-8		metal
PCB	polychlorinated biphenyls, PCB			PCB
PCB 126	PCB 126			PCB
pentachlorobenzene	pentachlorobenzene	608-96-5		pesticide
pentachlorophenol	pentachlorophenol	608-93-5	sodium pentachlorophenate	pesticide
pentanoic acid	pentanoic acid	109-52-4		other

Contaminant Code	Common Name	CAS No.	Trade Name	Type
permethrin	permethrin	52645-53-1	Ambush, Ambushfog, Perthrine, Picket, Pounce, Talcord, Outflank, Stockade, Coopex, Perigen, Stomoxin, Stomoxin P and many others.	pesticide
perylene	perylene	198-55-0		PAH
pesticides	various, pesticides			pesticide
petroleum	petroleum, petroleum products			other
pH	pH, acidification			pH
pH, Al	pH, aluminium, Al			metal + pH
pH, Al, As	pH, aluminum, arsenic, Al, As			metal + pH
pH, Al, Ba	pH, aluminum, barium, Al, Ba			metal + pH
pH, Al, Be	pH, aluminum, beryllium, Al, Be			metal + pH
pH, Al, Cr	pH, aluminum, chromium, Al, Cr			metal + pH
pH, Al, Cu	pH, aluminum, copper, Al, Cu			metal + pH
pH, Al, Cu, Fe, Zn, Pb	pH, aluminum, copper, iron, zinc, Al, Cu, Fe, Zn			metal + pH
pH, Al, Fe	pH, aluminum, iron, Fe, Al			metal + pH
pH, Al, Mg	pH, aluminum, magnesium, Mg			metal + pH
pH, Al, Mn	pH, aluminum, manganese, Mn			metal + pH
pH, Al, Ni	pH, aluminum, nickel, Ni			metal + pH
pH, Al, Pb	pH, aluminum, lead, Pb, Al			metal + pH
pH, Al, Se	pH, aluminum, selenium, Se			metal + pH
pH, Al, Sr	pH, aluminum, strontium, Sr			metal + pH
pH, Al, V	pH, aluminum, vanadium, Al, V			metal + pH
pH, Al, Zn	pH, aluminum, zinc, Al, Zn			metal + pH
pH, Cd	pH, cadmium, Cd			metal + pH
pH, Cr	pH, chromium, Cr			metal + pH
pH, Cu	pH, copper, Cu			metal + pH
pH, Fe	pH, iron, Fe			metal + pH
pH, Pb	pH, lead, Pb			metal + pH
pH, TPT	pH, triphenyltin hydroxide, TPT			metal + pH
pH, Zn	pH, zinc, Zn			metal + pH
phenanthra-quinone	phenanthra-quinone, phenanthrenequinone	84-11-7		pesticide
phenanthrene	phenanthrene	85-01-8		PAH
phenazine	phenazine	92-82-0		pesticide
phencyclidine	phencyclidine, angel dust, PCP	77-10-1	Angel dust	other
phenobarbital	phenobarbital	50-06-6		other
phenol	phenol	108-95-2		other
phenothrin	phenothrin, d-phenothrin	26002-80-2	D-Phenothrin, Sumithrin	pesticide
phentolamine	phentolamine, phenotolamine	50-60-2		other
phenyl mercury acetate	phenyl mercury acetate, phenylmercuric acetate	62-38-74		metal and pesticide
phorate	phorate	298-02-2		pesticide
phosalone	phosalone	2310-17-0	Zolone	pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
phosdrin	phosdrin	26718-65-0	Phosdrin	pesticide
phosmet	phosmet	732-11-6	Imidan	pesticide
phosphamidon	phosphamidon	13171-21-6	Dimecron	pesticide
phoxim	phoxim	14816-18-3	Baythion, Volanton	pesticide
physostigmine	physostigmine	57-47-6		pesticide
picloram	picloram	1918-02-1	Tordon	pesticide
pig manure	effluent, agricultural, pig manure			other
pindone	pindone	83-26-1		other
piper nigrum	other, black pepper			other
piperonyl butoxide	piperonyl butoxide	51-03-6		pesticide
pirimiphos ethyl	pirimiphos ethyl	223505-41-1	Fernex	pesticide
plastic, metal and hydrocarbon	various, plastics, metals and hydrocarbons			other
pollution	general, pollution			other
polyamines	various, polyamines: putrescine, spermidine, spermine			other
polyoxin	polyoxin	19396-06-6		pesticide
potassium chromate	potassium chromate	7789-00-6		metal
potassium dichromate	potassium dichromate, potassium bichromate	7778-50-9		metal
potassium ferricyanide	potassium ferricyanide			other
primicarb	pirimicarb	23103-98-2	Pirimor, Aphox	pesticide
Procaine	Procaine hydrochloride	59-46-1		other
procymidone	procymidone	32809-16-8	Sumisdex	pesticide
prolactin	prolactin, luteotropin, LTH	9002-62-4		other
Prolin	Prolin			other
prometryne	prometryne	7287-19-6	Gesagard 50, Caparol	pesticide
propachlor	propachlor	2136-76-0		pesticide
propanil	propanil	709-98-8	Stam F-34, Surcopur, Rogue	pesticide
propanoic acid butyl ester	propanoic acid butyl ester, 2-propionic acid butyl ether ester	590-01-2		pesticide
propanolol	propanolol	525-66-6		other
propetamphos	propetamphos	31218-83-4		pesticide
propionic acid	propionic acid	79-09-4		other
propoxur	propoxur	114-26-1	Baygon, Blattanex, Unden, Undene	pesticide
propylene glycol	propylene glycol	57-55-6		other
prothiophos	prothiophos, prothiofos	34643-46-4		pesticide
PSCP	phenyl saliginen cyclic phosphate, PSCP			other
pseudoephedrine	pseudoephedrine, ephedrine			other
Pu	plutonium, Pu	7440-07-5		radiation
pulp and paper	effluent, industrial, pulp and paper plant			other
Pyramin	pyramin, choridazon	1698-60-8		pesticide
pyrazophos	pyrazophos	13457-18-6	Afugan, Curamil, Missle	pesticide
pyrene	pyrene	129-00-0		PAH

Contaminant Code	Common Name	CAS No.	Trade Name	Type
pyrethrin	pyrethrin, pyrethrum	121-29-9/8003-34-7	Lion Mosquito Coil	pesticide
pyrethroids	various, pyrethroids			pesticide
pyridaphenthion	pyridaphenthion	119-12-0	Ofunack	pesticide
pyridine	pyridine	110-86-1		pesticide
q-hexane	q-hexane	110-54-3		other
quinacrine	quinacrine	83-89-6		other
quinaldine	quinaldine, 2-methylquinoline, 2-methyl-2-quinoline, 2,6-dimethyl-quinoline	91-63-4		other
quinalphos/ chinalphos	quinalphos, chinalphos	13593-03-8	Ekalux, Ekalux Forte	pesticide
quinoline	quinoline	91-22-5		other
quinoxaline	quinoxaline	91-19-0		other
radiation	radiation			radiation
retinoic acid	retinoic acid, all-trans	302-79-4		other
rifampicin	rifampicin, rifampin	13292-46-1		other
ronnel	ronnel, fenchlorophos	299-84-3	Nankor, Trolene, Korlan	pesticide
rotenone	rotenone	83-79-4		pesticide
Ru	Rubidium, Ru			metal
rubber effluent	effluent, industrial, rubber plant effluent			other
Rupon	Rupon		Rupon	other
S	sulfur, S	7704-34-9		other
s-bioallethrin	s-bioallethrin	28434-00-6		pesticide
saccharin	saccharin	81-07-2		other
Saffan	alfaxalone, alfadolone acetate		Saffan	other
salicylaldehyde	salicylaldehyde	90-02-8		other
salicylic acid	salicylic acid	69-72-7		other
salinity	general, salinity, sea water			other
sarin	Sarin, isopropyl methyl phosphofluoridate	107-44-8	Sarin	other
Sb	antimony, Sb	7440-36-0		metal
SC	succinylcholine, SC	306-40-1		other
Scent-Off Repellant Buds	Scent-Off Repellant Buds			pesticide
SDBSA	sodium dodecylbenzene-sulfonic acid, SDBSA			other
Se	selenium, Se	7782-49-2		metal
semicarbazide hydrochloride	semicarbazide hydrochloride	563-41-7		other
serotonin	serotonin	50-67-9		other
sewage	effluent, municipal, sewage			other
sha chong dan	sha chong dan			pesticide
sha chong shuang	sha chong shuang			pesticide
silver nitrate	silver nitrate	7761-88-8		metal
skin	biological, skin of amphibians			other
SLA4685	SLA4685			pesticide
SLA4722	SLA4722			pesticide
Sn	tin, Sn	7440-31-5		metal

Contaminant Code	Common Name	CAS No.	Trade Name	Type
sodium aluminium silicate	sodium aluminium silicate			metal and other
sodium arsenate	sodium arsenate	7778-43-0		other
sodium bromide	sodium bromide, BrNa	7647-15-6		metal
sodium butyrate	butyric acid salts, sodium butyrate	156-54-7		other
sodium cyclamate	sodium cyclamate, cyclamic acid salt	139-05-9		other
sodium fluoracetate	sodium monofluoroacetate, sodium fluoroacetate, sodium fluoracetate	62-74-8	Compound 1080	pesticide
sodium fluoride	sodium fluoride, NaF	7681-49-4		other
sodium fluorocrotonate	sodium fluorocrotonate			other
sodium hypochlorite	sodium hypochlorite	7681-52-9		other
sodium hypochlorite, Cl	sodium hypochlorite, Cl			pesticide
sodium nitrate	sodium nitrate, $NaNO_3$, ammonia	7631-99-4		pesticide
sodium nitrite	sodium nitrite	7632-00-0		other
sodium selenate	sodium selenate	13410-01-0		pesticide
sodium selenite	sodium selenite	10102-18-8		other
sodium sulfide	sodium sulfide	1313-82-2		other
sodium thiocyanate	sodium thiocyanate, thiocyanate sodium	540-72-7		other
sodium thiosulfate	sodium thiosulfate	7772-98-7		other
soil	effluent, industrial, municipal, hazardous waste-site soil samples			other
solanidine	solanidine	80-78-4		other
soman	soman	96-64-0		pesticide
sour water	effluent, industrial, coal-gasification sour water, petroleum products			other
Sr	strontium, strontium-90, Sr	7440-24-6	Stronium	metal
strychnine	strychnine alkaloid	57-24-9		other
styrene	styrene	100-42-5		other
sulfotep	sulfotep	3689-24-5		pesticide
sulfuric acid	sulfuric acid, H2SO4			other
swep	swep	1918-18-9		pesticide
tabun	tabun	77-81-6		pesticide
tack trap	tack trap and pine gum			pesticide
tamoxifen	tamoxifen			other
tannery wastes	effluent, industrial, tannery wastes			other
tar	tar, petroleum products			other
taurine	taurine, 2-aminoethanesulfonic acid	107-35-7		other
TBS	tetrapropylene benzene sulphonate	11067-81-5		other
TBT	tributyltin, TBT	688-73-3		pesticide
TCA	Nata, TCA-sodium	76-03-9		pesticide
TCB	3,4,3',4'-tetrachlorobiphenyl, TCB	32598-13-3		PCB
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin, TCDD, chlorinated dibenzo-p-dioxin	1746-01-6		other
TEEP	TEEP			pesticide
temephos	temephos	3383-96-8	Abate, Abathion	pesticide
temperature	temperature			other
TEPP	tetramethyl pyrophosphate, TEPP	107-49-3		pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
terbufos	terbufos	13071-79-9		pesticide
TETD	tetraethylthiuram disulphide, TETD, disulfiram	97-77-8	Disulfiram	pesticide
TETM	tetraethylthiuram monosulfide, TETM	95-95-6	Sulfiram	pesticide
tetrachloro-phthalide	tetrachloro-phthalide, tetrachloro-fthalide	27355-22-2		pesticide
tetrachlorobenzene	tetrachlorobenzene	634-66-2		pesticide
tetrachlorvinphos	tetrachlorvinphos	22248-79-9	Gardona, Rabond	pesticide
tetrahydrofuran	tetrahydrofuran	109-99-9		other
tetramethrin	tetramethrin	7696-12-0		pesticide
TF128	TF128			pesticide
TFM	trifluoromethyl-4-nitro phenol, 3-trifluoromethyl-4-nitro phenol, TFM	88-30-2		pesticide
thalium	thalium, thallium	7440-28-0		pesticide and metal
thallium sulfate	thallium sulfate	7446-18-6		pesticide and metal
thanite	thanite	115-31-1		pesticide
theobromine	theobromine	83-67-0		other
theophylline	theophylline, 1,3-dimethylxanthine	58-55-9		other
thiabendazole	thiabendazole	148-79-8		pesticide
thiocyclam	thiocyclam	31895-21-3		pesticide
thiophanate-methyl	thiophanate-methyl	23564-05-8		pesticide
thiosemicarbazide	thiosemicarbazide	79-19-6		pesticide
thiram	thiram (F)	137-26-8		pesticide
thorium	thorium, Th	7440-29-1		metal
thyroxine	thyroxine	51-48-9		other
TME	effluent, industrial, textile mill, TME			other
TMT	trimethyltin, TMT	1631-73-8		other
toluene	toluene	108-88-3; 2037-26-5		other
toluene diisocyanate	toluene diisocyanate, toluene 2,4-diisocyante	584-84-9		other
TOTP	triorthotolyl phosphate, TOTP			other
toxaphene/ camphechlor	toxaphene, camphechlor, campheclor	8001-35-2		pesticide
TP	testosterone propionate, TP	57-85-2		other
TPN	tetrachlorisophthalonitrile, TPN, chlorothalonil	1897-45-6		pesticide
TPT	triphenyltin hydroxide, TPT	76-87-9		pesticide
trematode	biological, trematode			other
tri-o-tolyl phosphate/ TTP	tri-o-tolyl phosphate, TTP	78-30-8		pesticide
triadimeform	triadimeform	43121-43-3		pesticide
triazophos	triazophos	24017-47-8		pesticide
Tribunil	Tribunil	18691-97-9		pesticide
Tricaine	MS-222, Tricaine	886-86-2		other
trichloroacetaldehyde/ chloral	trichloroacetaldehyde, chloral	302-17-0		pesticide
trichlorobenzene	trichlorobenzene	12002-48-1		pesticide

Contaminant Code	Common Name	CAS No.	Trade Name	Type
trichloroethylene	trichloroethylene	79-01-6		other
trichlorphon	trichlorphon	52-68-6	Tugon, Dylox, Dipterex, Neguvon, Foschlor	pesticide
tricyclazole	tricyclazole	41814-78-2		pesticide
tricyclohexyltin hydroxide	tricyclohexyltin hydroxide	1321-70-5		
tridemorph	tridemorph	81412-43-3	Calixin	pesticide
triethylene glycol	triethylene glycol	112-27-6		other
trifluralin	trifluralin	1582-09-8	Treflan, Elancolan	pesticide
Tritox-30	DDT, Tritox-30, Tritox	545-06-2	Tritox - 30	pesticide
tryclopyr	tryclopyr	64470-88-8	Garlon	pesticide
trypan blue	trypan blue	72-57-1		other
tryptophan	tryptophan	73-22-3		other
TSP	TSP, trisodium phosphate	7601-54-9		other
TTX	tetrodotoxin, TTX, tarichatoxin, tetrodoxin	4368-28-9		other
tuzet	tuzet	2445-07-0	Urbacid, Tuzet, Monzet	pesticide
U	uranium, U	7440-61-1		other and radiation
unknown or various	unknown or a possible variety of factors or not available or not translated from English			other
urea	urea, ammonium nitrate based fertilizer			other
urethane	urethane	51-79-6		pesticide
uroporphyrin	uroporphyrin			other
UV	UV, radiation			radiation
UV, anthracene	UV, anthracene, radiation			PAH and radiation
UV, AQ	UV, 9,10-anthraquinone, radiation			PAH and radiation
UV, BA	UV, benz(a)anthracene, radiation, BA			PAH and radiation
UV, BAA	UV, 7,12-benz(a)anthraquinone, radiation			PAH and radiation
UV, BaP	UV, Benzo(a)pyrene, radiation, BaP			PAH and radiation
UV, DBA	UV, dibenz(a,h)anthracene, radiation			PAH and radiation
UV, dieldrin	UV, dieldrin, radiation			pesticide and radiation
UV, DMA	UV, 9,10-dimethylanthracene, radiation			PAH and radiation
UV, DMBA	UV, dimethyl benz(a)athracene, radiation, DMBA			PAH and radiation
UV, methoprene	methoprene, UV, radiation			radiation and pesticide
UV-B	UV-B, radiation			radiation
V	vanadium, V	7440-62-2		metal

Contaminant Code	Common Name	CAS No.	Trade Name	Type
valproic acid	valproic acid	99-66-1		other
valproic acid salts	valproic acid salts	1069-66-5		other
various	various, contaminants			other
vasotocin	vasotocin			other
verbenalol	verbenalin, 5-cis-verbenal, verbenol, verbenalol	548-37-8		other
VIN	vinblastine sulfate, VIN	143-67-9		other
vinclozolin	vinclozolin	50471-44-8		other
virus	biological, viral pathogen			other
W	tungsten, W	7440-33-7		metal
warfarin	warfarin	81-81-2		
waste water	effluent, municipal, waste water			other
water	effluent, industrial, purification system water			other
Weedex	Weedex	122-34-9	Weedex	pesticide
xylenes	xylenes, mixed	1330-20-7		other
ye quing shuang	ye quing shuang			pesticide
yi ji dao fen san	yi ji dao fen san			pesticide
zinc methanearsonate	zinc methanearsonate			pesticide
zineb	zineb	12122-67-6	Dithane Z-78, Tiezene, Parzate	pesticide
Zn	zinc, Zn, zinc chloride	7440-66-6		metal
ZnSO4	zinc sulphate, ZnSO4, zinc sulfate	7733-02-0		metal

Appendix 2b: Contaminants sorted by contaminant category with corresponding contaminant code and common name/trade names[j] where available. (Pesticides follow a table of more general contaminants; within pesticides, insecticides follow the table of non-insecticides.)

Category	Contaminant Code	Common Name/Trade Name
general	1,1-dimethylhydrazine	1,1-dimethylhydrazine
general	1,2-dichloroethane	1,2-dichloroethane
general	1,2-dihydroxynaphthalene	1,2-dihydroxynaphthalene
general	1,2-dimethyl-benzene	1,2-dimethyl-benzene, o-xylene, orthoxylene, 1,2-dimethylbenzene
general	1,2-dimethylhydrazine	1,2-dimethylhydrazine
general	1,3,5-cycloheptatriene	1,3,5-Cycloheptatriene
general	1,3-dichloropropane	1,3-dichloropropane
general	1,3-dichloropropanol	1,3-dichloropropanol (1,3-dichloro-2-propanol)
general	1,5,9-Cyclododecatriene	1,5,9-Cyclododecatriene
general	1,5-Cyclo-octadiene	1,5-Cyclooctadiene
general	1-amino-2-propanol	1-amino-2-propanol
general	1-methyl-4(tert)butylbenzene	1-methyl-4(tert)butylbenzene, toluene
general	2-butanol	2-butanol, sec-butyl alcohol
general	2-ethylhexanoic acid	2-ethylhexanoic acid
general	2-methoxyethanol	2-methoxyethanol, diethylene glycol monomethyl ether
general	2-methyl-2-propanol	2-methyl-2-propanol, tert-butyl alcohol
general	2-methylpentanoic acid	2-methylpentanoic acid
general	2-phenoxyethanol	2-phenoxyethanol
general	3,5,5-trimethyl-1-hexanol	3,5,5-trimethyl-1-hexanol, 3,5,5-trimethylhexanol
general	3,6-dioxo-1,8-octanediol	3,6,-dioxo-1,8,-octanediol
general	3-bromopropylene	allyl bromide, 3-bromopropene, 3-bromo-1-propene, 3-bromopropylene
general	3-chloropropylene	allyl chloride, 3-chloropropene, 3-chloro-1-propene, 3-chloropropylene
general	3-methylcholanthrene	3-methylchol-anthrene
general	4245-77-6	n-ethyl-n-nitro-n-nitrosoguanidine
general	4-aminopyridine	4-aminopyridine, 4-pyridinamine, fampridine
general	4-methyl-2-pentanol	4-methyl-2-pentanol, methylamyl alcohol, methylisobutyl
general	6-aminonicotinamide	6-aminonicotinamide
general	7-penicillamine	7-penicillamine
general	9AA	9-aminoacridine hydrochloride, 9AA
general	acetaminophen	acetaminophen
general	acetone	acetone
general	acridine	acridine, acridrine
general	acridine orange	acridine orange
general	acrylonitrile	acrylonitrile
general	actinomycin D	actinomycin D, Dactinomycin
general	Aerozine-50	Aerozine-50
general	agricultural fertilizers	effluent, agricultural, agricultural fertilizers
general	AH5183	2-(4-phenylpiperidino)cyclohexanol, AH5183
general	alcohol	unknown alcohol
general	alkylbenzene sulfonate	alkylbenzene sulfonate
general	allylamine	allylamine, 2-propen-1-amine, 2-propenyl amine

Appendix 2b - Contaminant Type - 2

Category	Contaminant Code	Common Name/Trade Name
general	alpha-chaconine	alpha-chaconine
general	alpha-solanine	alpha-solanine
general	amaranth	amaranth, red dye
general	aminopiperazin	aminopiperazin
general	ammonium carbonate	ammonium carbonate
general	ammonium hydroxide	ammonium hydroxide
general	ammonium nitrate	ammonium nitrate
general	arginine vasotocin	arginine vasotocin
general	aromatic petroleum crude	petroleum products, aromatic petroleum crude
general	Arosurf 66-E2	monomolecular organic surface film
general	As	arsenic, As
general	ASA	acetylsalicylic acid
general	ascorbic acid	ascorbic acid, Vitamin C
general	aspartame	aspartame
general	a-terthienyl	a-terthienyl, alpha-terthienyl
general	AH	acetylhydrazide, AH
general	atropine, soman	atropine and soman
general	azacytidine	5-azacytidine, azacytidine, ladakamycin, 5-azacytidine
general	*Bacillus sphaeris*	*Bacillus sphaeris*
general	benzene	benzene
general	beryllium sulfate	beryllium sulfate
general	bis(2-hydroxyethyl) ether	bis(2-hydroxy-ethyl) ether
general	bis(2-hydroxypropyl) amine	bis(2-hydroxy-propyl) amine
general	bis(2-propenyl) amine	bis(2-propenyl) amine
general	bis(3-hydroxyethyl) ether	bis(3-hydroxy-ethyl) ether
general	boron	boron, B
general	bromodeoxyuridine	5-bromodeoxyuridine, thymidine
general	bromoform	bromoform
general	butyric acid	butyric acid
general	BZH	benzoic hydrazide, BZH, benzhydrazide, benzhyrdazine
general	caffeine	caffeine
general	calcium chloride	calcium chloride
general	caprolactam	caprolactam
general	carboxylic acids	various, carboxylic acids
general	CCl4	carbon tetrachloride, CCl4
general	CDD	cytochalasin D, CDD
general	Cekapur	Cekapur
general	chemical manufacture plant	effluent, industrial, chemical manufacture plant
general	chloroform	chloroform
general	chlorophenols	various, chlorophenols
general	Citrex	Citrex S-5, Citrex
general	Cl	chlorine, Cl
general	ClNO2	ammonia, nitrite, chlorine, ClNO2
general	colchicine	colchicine
general	Congo red	Congo red, sodium diphenyldiaxo-bis-alpha-napthylamine sulfonate
general	CORT	corticosterone, steroid hormone, CORT
general	cotinine	cotinine, nicotine metabolite
general	cow manure	effluent, agricultural, cow manure
general	cresol	cresol, o-cresol

Appendix 2b - Contaminant Type - 3

Category	Contaminant Code	Common Name/Trade Name
general	crude oil	oil, crude, petroleum products
general	cyanide	cyanide
general	cyclohexanone	cyclohexanone
general	cyclophosphamide	cyclophosphamide
general	cytosine arabinoside	cytosine arabinoside, cytarabine
general	dairy effluent	effluent, industrial, dairy effluent
general	DDA	DDA, 2,2-bis(p-chlorophenyl)-acetic acid
general	DEHP	di-2-ethylhexyl-phthalate, DEHP
general	DES	diethylstilbestrol, DES
general	detergent	general, unknown detergent
general	diazepam	diazepam
general	dichloroglyoxime	dichloroglyoxime
general	diesel	fuel, diesel, petroleum products
general	diethanolamine	diethanolamine, bis(2-hydroxy-ethyl) amine, diethylolamine
general	diisononylphthalate	diisononylphthalate
general	dimethyl disulfide	dimethyl disulfide
general	dioctylphthalate	dioctylphthalate, di(2-ethylhexyl) phthalate
general	dioxins	polychlorinated dibenzo-p-dioxins, PCDD
general	diphacin	Diphacin
general	distillery effluent	effluent, industrial, distillery effluent
general	DMN	dimethylnitrosamine, DMN, N-nitrosodimethylamine
general	DMSA	meso-2,3-dimercaptosuccinic acid, Succimer, DMSA, DMS
general	DMSO	dimethylsulfoxide, DMSO, dimethylsulphoxide
general	DNP	dinitrophenol, DNP, a-dinitrophenol, 2,4-dinitrophenol
general	DODPA	dioctyldiphenylamine, DODPA
general	Domal	Domal, detergent
general	DPH	diphenylhydantoin, DPH, phenytoin
general	d-tubocurine	d-tubocurine, chondrocurine, d-tubocurarine
general	EB	estradiol benzoate, EB
general	edrophonium	edrophonium
general	EDS	ethane dimethane sulfonate, EDS
general	emetine	emetine
general	EMF	electromagnetic field, EMF
general	epichlorohydrin	epichlorohydrin
general	epinephrine	epinephrine
general	estradiol	estradiol, estradiol-17ß, 17ß-estradiol
general	ethanol	ethanol
general	ethanolamine	2-aminoethanol, ethanolamine
general	ethidium bromide	ethidium bromide
general	ethyl acetate	ethyl acetate
general	ethyl acetoacetate	ethyl acetoacetate
general	ethyl propionate	ethyl propionate, propanoic acid ethyl ester
general	ethylene dibromide	ethylene dibromide, dibromoethane
general	ethylene glycol	1,2-ethanediol, ethylene glycol
general	ethyleneimine, aziridine	ethyleneimine, aziridine
general	ethylmethane sulfonate	ethylmethane sulfonate
general	ethylnitrosurea	ethylnitrosurea, n-ethyl-n-nitrosourea
general	ethylpropionate	ethylproprionate
general	FIT	FIT, alkanesulfonate-based liquid
general	fluoride	fluoride

Appendix 2b - Contaminant Type - 4

Category	Contaminant Code	Common Name/Trade Name
general	fluorouracil	fluorouracil, 5-fluorouracil
general	formamide	formamide
general	fuel oil	fuel oil, petroleum products
general	fuel oil blend	fuel oil, coal derived blend, petroleum products
general	furans	polychlorinated dibenzofurans, PCDF, chlorinated dibenzofuran
general	GABA	gamma-aminobutyric acid, GABA
general	garlic	general, crushed garlic
general	Ge	Germanium, Ge
general	gentisic acid	2,5-dihydroxybenzoic acid, gentisic acid
general	gibberellin	gibberellin
general	glutathione	glutathione
general	glycerol formal	glycerol formal
general	groundwater	effluent, agricultural, industrial, municipal groundwater runoff
general	growmore	Growmore
general	halothane	halothane, bromochlorotrifluorethane
general	hepta-carboxylporphyrin	hepta-carboxylporphyrin
general	heptanoic acid	heptanoic acid
general	heptanol	heptanol
general	hexachloroethane	hexachloroethane
general	hexamethyl-phosphoramide	hexamethyl-phosphoramide, hempa
general	hexanoic acid	hexanoic acid, caproic acid
general	hexaporphyrin	hexaporphyrin
general	HPB	hexadecylpyridinium bromide, HPB
general	hydrazine	hydrazine
general	hydrazine sulfate	hydrazine sulfate
general	hydroxyurea	hydroxyurea
general	I	iodine, I
general	imidazole	imidazole
general	INA	isonicotinic acid
general	indomethacin	indomethacin
general	industrial effluent	effluent, industrial in river water
general	isobutyl alcohol	2-methyl-1-propanol, isobutyl alcohol
general	isoniazid	isoniazid
general	isovalerianic acid	3-methylbutyric acid, isovaleric acid, 3-methylbutanoic acid
general	K (fertilizer)	potassium based fertilizer, muriate of potash, K
general	KCl	potassium chloride, KCl
general	ketamine hydrochloride	ketamine hydrochloride
general	LAS	linear chain alkylbenzene-sulphonat, LAS
general	Leunarex	Leunarex
general	M99	entorphine
general	malachite green	malachite green
general	mesotocin	mesotocin
general	methallibure	methallibure
general	methane sulfonate	methane sulfonate, tricaine
general	methimazole	methimazole
general	methotrexate	methotrexate
general	methoxyfluorane	methoxyfluorane, 2,2-dichloro-1,1-difluoroethylmethyl ether
general	methyl ethyl ketone	methyl ethyl ketone
general	methyl fluoroacetate	methyl fluoroacetate
general	methylene chloride	methylene chloride, dichloromethane

Appendix 2b - Contaminant Type - 5

Category	Contaminant Code	Common Name/Trade Name
general	methylhydrazine	methylhydrazine
general	microbes	biological, micropollutants in drinking water
general	MNNG	n-methyl-n-nitro-n-nitrosoguanidine, MNNG
general	monochloramine	monochloramine, chloramide, chloramine, hydrazine intermediate
general	MTBE	methyl tert-butyl ether, tert-butyl methylether, TMBE, MTBE
general	Myristate	12-o-tetraecanoyl phorbol-13-acetate, Porbol Acetate, Myristate
general	Na acetate	sodium acetate, Na acetate
general	Na3NTA	trisodium nitrilotriacetate, Na3NTA
general	NaCl	sodium chloride, NaCl
general	n-butanol	n-butanol, 1-butanol, 1-butyl alcohol
general	n-butyl sulphide	butyl sulphide, n-butyl sulphide
general	NH3	ammonia, NH3
general	NH3, temp	ammonia, temperature
general	NH4Cl, NH3	ammonia, NH3, ammonium chloride
general	NH4Cl, NH3, Cl	ammonia, NH3, chlorine, NH4Cl
general	n-heptanol	n-heptanol, n-heptyl alcohol
general	nicotine	nicotine
general	nitrate	ammonia, nitrate
general	nitrite	ammonia, nitrite
general	NMU	methylnitrosourea, n-methyl-n-nitrosourea, NMU
general	n-nitrosodiethanol	n-nitrosodiethanol
general	N-nitrosodiethanolamine	N-Nitrosodiethanolamine
general	N-nitrosodimethylamine	N-nitrosodimethylamine
general	noise	traffic noise, noise pollution
general	non-contaminant study	non-contaminant study or review (general ecology and general studies)
general	NPAN	phenyl-a-naphthylamine, n-phenyl-a-naphthylamine, NPAN
general	n-propanol	n-propanol, 1-propanol, n-propyl alcohol
general	NPE	nonylphenolethoxylate, NPE
general	NTA	nitrilotriacetic acid, nitrilotriacetate, NTA
general	OCB	PCBs and Ocs
general	octanoic acid	octanoic acid
general	oil refinery	effluent, industrial, oil refinery
general	OPAN	octyl-phenyl-a-naphthylamine, OPAN, petroleum products
general	organism toxin	biological, organism toxin
general	o-toluidine	o-toluidine
general	Otroc	Otroc
general	oxytocin	oxytocin
general	ozone	ozone, oxygen3, O3
general	PA-14	PA-14
general	parasite	biological, parasite
general	pathogen	biological, fungal or bacterial pathogen
general	pentanoic acid	pentanoic acid
general	petroleum	petroleum, petroleum products
general	phencyclidine	phencyclidine, angel dust, PCP
general	phenobarbital	phenobarbital
general	phenol	phenol
general	phentolamine	phentolamine, phenotolamine
general	pig manure	effluent, agricultural, pig manure
general	pindone	pindone

Appendix 2b - Contaminant Type - 6

Category	Contaminant Code	Common Name/Trade Name
general	piper nigrum	general, black pepper
general	plastic, metal and hydrocarbon	various, plastics, metals and hydrocarbons
general	p-nitrotoluene	p-nitrotoluene, para-methylnitrobenzene
general	pollution	general, pollution
general	polyamines	various, polyamines: putrescine, spermidine, spermine
general	potassium ferricyanide	potassium ferricyanide
general	Procaine	Procaine hydrochloride
general	prolactin	prolactin, luteotropin, LTH
general	Prolin	Prolin
general	propanolol	propanolol
general	propionic acid	propionic acid
general	propylene glycol	propylene glycol
general	PSCP	phenyl saliginen cyclic phosphate, PSCP
general	pseudoephedrine	pseudoephedrine, ephedrine
general	pulp and paper	effluent, industrial, pulp and paper plant
general	q-hexane	q-hexane
general	quinacrine	quinacrine
general	quinaldine	quinaldine, 2-methylquinoline, 2-methyl-2-quinoline, 2,6-dimethyl-quinoline
general	quinoline	quinoline
general	quinoxaline	quinoxaline
general	retinoic acid	retinoic acid, all-trans
general	rifampicin	rifampicin, rifampin
general	rubber effluent	effluent, industrial, rubber plant effluent
general	Rupon	Rupon
general	S	sulfur, S
general	saccharin	saccharin
general	Saffan	alfaxalone, alfadolone acetate
general	salicylaldehyde	salicylaldehyde
general	salicylic acid	salicylic acid
general	salinity	general, salinity, sea water
general	sarin	Sarin, isopropyl methyl phosphofluoridate
general	SC	succinylcholine, SC
general	SDBSA	sodium dodecylbenzene-sulfonic acid, SDBSA
general	semicarbazide hydrochloride	semicarbazide hydrochloride
general	serotonin	serotonin
general	sewage	effluent, municipal, sewage
general	skin	biological, skin of amphibians
general	sodium arsenate	sodium arsenate
general	sodium butyrate	butyric acid salts, sodium butyrate
general	sodium cyclamate	sodium cyclamate, cyclamic acid salt
general	sodium fluoride	sodium fluoride, NaF
general	sodium fluorocrotonate	sodium fluorocrotonate
general	sodium hypochlorite	sodium hypochlorite
general	sodium nitrite	sodium nitrite
general	sodium selenite	sodium selenite
general	sodium sulfide	sodium sulfide
general	sodium thiocyanate	sodium thiocyanate, thiocyanate sodium
general	sodium thiosulfate	sodium thiosulfate

Appendix 2b - Contaminant Type - 7

Category	Contaminant Code	Common Name/Trade Name
general	soil	effluent, industrial, municipal, hazardous waste-site soil
general	solanidine	solanidine
general	sour water	effluent, industrial, coal-gasification sour water, petroleum products
general	ß-aminopropionitrile fumarate	ß-aminopropionitrile fumarate
general	ßAPN	ß-aminopropionitrile, ßAPN, 3-aminopropionitrile
general	ßNF	b-napthoflavone, ß-napthoflavone, ßNF
general	strychnine	strychnine alkaloid
general	styrene	styrene
general	sulfuric acid	sulfuric acid, H2SO4
general	tamoxifen	tamoxifen
general	tannery wastes	effluent, industrial, tannery wastes
general	tar	tar, petroleum products
general	taurine	taurine, 2-aminoethanesulfonic acid
general	TBS	tetrapropylene benzene sulphonate, TBS
general	TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin, TCDD, dioxin
general	temperature	temperature
general	tetrahydrofuran	tetrahydrofuran
general	theobromine	theobromine
general	theophylline	theophylline, 1,3-dimethylxanthine
general	thyroxine	thyroxine
general	TME	effluent, industrial, textile mill, TME
general	TMT	trimethyltin, TMT
general	toluene	toluene
general	toluene diisocyanate	toluene diisocyanate, toluene 2,4-diisocyante
general	TOTP	triorthotolyl phosphate, TOTP
general	TP	testosterone propionate, TP
general	trematode	biological, trematode
general	Tricaine	MS-222, Tricaine
general	trichloroethylene	trichloroethylene
general	tricyclohexyltin hydroxide	tricyclohexyltin hydroxide
general	triethylene glycol	triethylene glycol
general	trypan blue	trypan blue
general	tryptophan	tryptophan
general	TSP	TSP, trisodium phosphate
general	TTX	tetrodotoxin, TTX, tarichatoxin, tetrodoxin
general	unknown or various	unknown or a possible variety of factors or not available or not translated from English
general	urea	urea, ammonium nitrate based fertilizer
general	uroporphyrin	uroporphyrin
general	valproic acid	valproic acid
general	valproic acid salts	valproic acid salts
general	various	various, contaminants
general	vasotocin	vasotocin
general	verbenalol	verbenalin, 5-cis-verbenal, verbenol, verbenalol
general	VIN	vinblastine sulfate, VIN
general	vinclozolin	Vinclozolin
general	virus	biological, viral pathogen
general	warfarin	Warfarin
general	waste water	effluent, municipal, waste water

Appendix 2b - Contaminant Type - 8

Category	Contaminant Code	Common Name/Trade Name
general	water	effluent, industrial, purification system water
general	xylenes	xylenes, mixed
general/radiation	U	uranium, U
metal	Ag	silver, Ag
metal	Al	aluminum, Al, aluminium, aluminum chloride
metal	Ba	barium, Ba
metal	Be	beryllium, Be
metal	cadmium nitrate	cadmium nitrate
metal	cadmium sulfate	cadmium sulfate
metal	Cd	cadmium, Cd
metal	Cd, Mg	cadmium and magnesium, Cd, Mg
metal	Cd, Zn	Cadmium, Zinc, Cd, Zn
metal	$CdCl_2$	cadmium chloride, $CdCl_2$
metal	$CdCl_2$, Cd	cadmium, cadmium chloride, $CdCl_2$, Cd
metal	chromium salts	chromium salts
metal	Co	cobalt, Co
metal	$CoCl_2$	cobalt chloride, $CoCl_2$, cobalt dichloride, cobaltous chloride
metal	copper sulfate	copper sulfate
metal	Cr	chromium, Cr
metal	Cr, Zn, Fe	Chromium, Zinc, Iron (Cr,Zn,Fe)
metal	Cu	copper, Cu, copper chloride, $CuCl_2$
metal	Cu, Zn	copper and zinc, Cu, Zn
metal	Fe	iron, Fe
metal	Hg	mercury, Hg, methylmercury, organic mercury
metal	iron sulfate	iron sulfate, ferrous sulfate, iron
metal	lanthanum	lanthanum
metal	Li	lithium, Li
metal	lithium carbonate	lithium carbonate
metal	lithium chloride	lithium chloride
metal	metal oxides	various, metal oxides
metal	metals	various, metals
metal	methyl mercury chloride	methyl mercury chloride
metal	Mg	magnesium, Mg
metal	Mg, Cd	magnesium and cadmium, Mg, Cd
metal	Mg, Co	magnesium and cobalt, Mg, Co
metal	Mg, Ni	magnesium and nickel, Mg, Ni
metal	Mg, Pb, Cd, Mn, Hg	magnesium, lead, cadmium, manganese, Mg, Pb, Cd, Mn
metal	Mg, Zn	magnesium and zinc, Mg, Zn
metal	mine drainage	effluent, industrial, mine drainage (includes iron, copper, zinc)
metal	Mn	manganese, Mn
metal	Mo	molybdenum, Mo
metal	Ni	nickel, Ni, nickel chloride, NiCl
metal	Ni subsulfide	Nickel subsulfide
metal	nickel sulfate	nickel sulfate
metal	Pb	lead, Pb, lead chloride
metal	Pb acetate	lead acetate, Pb acetate
metal	Pb nitrate	lead nitrate, Pb nitrate
metal	potassium chromate	potassium chromate
metal	potassium dichromate	potassium dichromate, potassium bichromate
metal	Ru	Rubidium, Ru

Appendix 2b - Contaminant Type - 9

Category	Contaminant Code	Common Name/Trade Name
metal	Sb	antimony, Sb
metal	Se	selenium, Se
metal	silver nitrate	silver nitrate
metal	Sn	tin, Sn
metal	sodium bromide	sodium bromide, BrNa
metal	Sr	strontium, strontium-90, Sr
metal	thorium	thorium, Th
metal	V	vanadium, V
metal	W	tungsten, W
metal	Zn	zinc, Zn, zinc chloride
metal	ZnSO4	zinc sulphate, ZnSO4, zinc sulfate
metal and general	sodium aluminium silicate	sodium aluminium silicate
metal and pesticide	mercury(II)chloride	mercuric chloride, mercury(II)chloride, mercury bichloride
metal and pesticide	phenyl mercury acetate	phenyl mercury acetate, phenylmercuric acetate
metal and pH	Ca, pH	pH, calcium, Ca
metal and pH	pH, Al	pH, aluminium, Al
metal and pH	pH, Al, As	pH, aluminum, arsenic, Al, As
metal and pH	pH, Al, Ba	pH, aluminum, barium, Al, Ba
metal and pH	pH, Al, Be	pH, aluminum, beryllium, Al, Be
metal and pH	pH, Al, Cr	pH, aluminum, chromium, Al, Cr
metal and pH	pH, Al, Cu	pH, aluminum, copper, Al, Cu
metal and pH	pH, Al, Cu, Fe, Zn, Pb	pH, aluminum, copper, iron, zinc, Al, Cu, Fe, Zn
metal and pH	pH, Al, Fe	pH, aluminum, iron, Fe, Al
metal and pH	pH, Al, Mg	pH, aluminum, magnesium, Mg
metal and pH	pH, Al, Mn	pH, aluminum, manganese, Mn
metal and pH	pH, Al, Ni	pH, aluminum, nickel, Ni
metal and pH	pH, Al, Pb	pH, aluminum, lead, Pb, Al
metal and pH	pH, Al, Se	pH, aluminum, selenium, Se
metal and pH	pH, Al, Sr	pH, aluminum, strontium, Sr
metal and pH	pH, Al, V	pH, aluminum, vanadium, Al, V
metal and pH	pH, Al, Zn	pH, aluminum, zinc, Al, Zn
metal and pH	pH, Cd	pH, cadmium, Cd
metal and pH	pH, Cr	pH, chromium, Cr
metal and pH	pH, Cu	pH, copper, Cu
metal and pH	pH, Fe	pH, iron, Fe
metal and pH	pH, Pb	pH, lead, Pb
metal and pH	pH, TPT	pH, triphenyltin hydroxide, TPT
metal and pH	pH, Zn	pH, zinc, Zn
PAH	1-4-dichloronaphthalene	1-4-dichloronaphthalene
PAH	1-chloronaphthalene	1-chloronaphthalene
PAH	2-AAF	2-acetylaminofluorene, 2-AAF, N-2-fluorenylacetamide
PAH	2-AF	2-aminofluorene, 2-AF
PAH	57-97-6	7,12-dimethyl-benz[a]anthracene, 9,10-dimethyl-1,2-benzanthracene
PAH	anthracene	anthracene
PAH	BaP	benzo(a)pyrene, BaP
PAH	benzpyrene	benzpyrene, benzo(e)pyrene
PAH	catechol	1,2-dihydroxybenzene, catechol, naphthalene intermediate
PAH	fluoranthene	fluoranthene
PAH	naphthalene	naphthalene

Appendix 2b - Contaminant Type - 10

Category	Contaminant Code	Common Name/Trade Name
PAH	PAH	polycyclic aromatic hydrocarbons, PAH
PAH	perylene	perylene
PAH	phenanthrene	phenanthrene
PAH	pyrene	pyrene
PAH and radiation	fluoranthene, UV	fluoranthene, UV, radiation
PAH and radiation	UV, anthracene	UV, anthracene, radiation
PAH and radiation	UV, AQ	UV, 9,10-anthraquinone, radiation
PAH and radiation	UV, BA	UV, benz(a)anthracene, radiation, BA
PAH and radiation	UV, BAA	UV, 7,12-benz(a)anthraquinone, radiation
PAH and radiation	UV, BaP	UV, Benzo(a)pyrene, radiation, BaP
PAH and radiation	UV, DBA	UV, dibenz(a,h)anthracene, radiation
PAH and radiation	UV, DMA	UV, 9,10-dimethylanthracene, radiation
PAH and radiation	UV, DMBA	UV, dimethyl benz(a)athracene, radiation, DMBA
PCB	2,3,4,5-TCB	2,3,4,5-tetrachloro-4-biphenylol, hydroxy-PCB
PCB	2,4,5-trichloro-4-biphenylol	2,4,5-trichloro-4-biphenylol, hydroxy-PCB
PCB	4,4'-dichlorobiphenyl	4,4'-dichlorobiphenyl
PCB	4-chlorobiphenyl	4-chlorobiphenyl
PCB	Aroclor 1242	Aroclor 1242, Arochlor 1242
PCB	Aroclor 1254	Aroclor 1254, Arochlor 1254
PCB	Aroclor 1260	Aroclor 1260, Arochlor 1260
PCB	nonachlor	nonachlor, cis-nonachlor, trans-nonachlor
PCB	PCB	polychlorinated biphenyls, PCB
PCB	PCB 126	PCB 126
PCB	TCB	3,4,3',4'-tetrachlorobiphenyl, TCB
pH	aminopyrine	aminopyrine, antipyrine
pH	pH	pH, acidification
pH and general	NH4, pH	pH, ammonia, NH4,
radiation	^3H	tritium, ^3H
radiation	artificial light	radiation, artificial light
radiation	Cs	cesium, radiocesium, Cs
radiation	Cs, Sr, ^3H	cesium, strontium, tritium, Cs, Sr, 3H
radiation	Pu	plutonium, Pu
radiation	radiation	radiation
radiation	UV	UV, radiation
radiation	UV-B	UV-B, radiation
radiation and pesticide	UV, methoprene	methoprene, UV, radiation

Appendix 2b - Contaminant Type - 11

Category	Pesticide Type	Contaminant Code	Common Name/Trade name
pesticide	fungicide	2,4,6 trichlorophenol	2,4,6 trichlorophenol, 2,4,6-T, Phenachlor
pesticide	fungicide	adifenphos	adifenphos
pesticide	fungicide	amoben	amobam, amoben, chloramben
pesticide	fungicide	anilazine/triazine	anilazine, triazine
pesticide	fungicide	aniline	aniline
pesticide	fungicide	asomate	asomate
pesticide	fungicide	asozine	asozine, asozin, methylarsenic sulfide
pesticide	fungicide	benlate	benlate, benomyl
pesticide	fungicide	boric acid	boric acid
pesticide	fungicide	calcium oxide	calcium oxide
pesticide	fungicide	CAMA	CAMA, Calcium Acid Methane Arsonate
pesticide	fungicide	captan	captan, Captan (F)
pesticide	fungicide	carbendazim	carbendazim
pesticide	fungicide	chloroaniline	chloroaniline, p-chloroaniline
pesticide	fungicide	chlorothalonil	chlorothalonil
pesticide	fungicide	cycloheximide	cycloheximide
pesticide	fungicide	DDC	dithiocarbamate, DDC, diethyldithiocarbamic acid sodium salt
pesticide	fungicide	di gu shuang	di gu shuang
pesticide	fungicide	dichlone	dichlone
pesticide	fungicide	dimethachlon	dimethachlon, dimethachlor
pesticide	fungicide	dinocap	Dinocap, dinitrophenol derivative
pesticide	fungicide	EBP	EBP
pesticide	fungicide	emisan	mercurial fungicide Emisan
pesticide	fungicide	ethylenediamine	ethylenediamine
pesticide	fungicide	ethylenethiourea	ethylene thiourea
pesticide and general	fungicide	Fadrozole	Fadrozole, CGS 16949
pesticide	fungicide	fentin	fentin
pesticide	fungicide	fentin-acetate	fentin-acetate, fentin acetate, fentin
pesticide	fungicide	ferbam	ferbam
pesticide	fungicide	formalin	formalin, formaldehyde, methaldehyde
pesticide	fungicide	hexachlorophene	hexachlorophene
pesticide	fungicide	isoprothiolane	isoprothiolane
pesticide	fungicide	kasugamycin	kasugamycin
pesticide	fungicide	MAFA	MAFA
pesticide	fungicide	mancozeb	mancozeb
pesticide	fungicide	maneb	maneb (Maneb 80)
pesticide	fungicide	MET	multi-effect Triazole
pesticide	fungicide	metalaxyl	metalaxyl
pesticide	fungicide	methyl isothiocyanate	methyl isothiocyanate
pesticide	fungicide	myclobutanil	myclobutanil
pesticide	fungicide	nabam	Nabam
pesticide	fungicide	NaDEDC	sodium diethyldithiocarbamate, NaDEDC
pesticide	fungicide	Ni dinuthyl-dithiocarbamate	Ni dibutyldithiocarbamate, sankel
pesticide	fungicide	nonylphenol	nonylphenol
pesticide	fungicide	phenanthra-quinone	phenanthra-quinone, phenanthrenequinone
pesticide	fungicide	phenazine	phenazine
pesticide	fungicide	polyoxin	polyoxin

Category	Pesticide Type	Contaminant Code	Common Name/Trade name
pesticide	fungicide	procymidone	procymidone
pesticide	fungicide	pyrazophos	pyrazophos
pesticide	fungicide	pyridine	pyridine
pesticide	fungicide	sodium hypochlorite, Cl	sodium hypochlorite, Cl
pesticide	fungicide	sodium nitrate	sodium nitrate, $NaNO_3$, ammonia
pesticide	fungicide	TETD	tetraethylthiuram disulphide, TETD, disulfiram
pesticide	fungicide	TETM	tetraethylthiuram monosulfide, TETM
pesticide	fungicide	tetrachloro-phthalide	tetrachloro-phthalide, tetrachloro-fthalide
pesticide	fungicide	TF128	TF128
pesticide	fungicide	thanite	thanite
pesticide	fungicide	thiophanate-methyl	thiophanate-methyl
pesticide	fungicide	thiram	thiram (F)
pesticide	fungicide	TPN	tetrachlorisophthalonitrile, TPN, chlorothalonil
pesticide	fungicide	TPT	triphenyltin hydroxide, TPT
pesticide	fungicide	triadimeform	triadimeform
pesticide	fungicide	tricyclazole	tricyclazole
pesticide	fungicide	tridemorph	tridemorph
pesticide	fungicide	tuzet	tuzet
pesticide	fungicide	urethane	urethane
pesticide	fungicide	ye quing shuang	ye quing shuang
pesticide	fungicide	zinc methanearsonate	zinc methanearsonate
pesticide	fungicide	zineb	zineb
pesticide	herbicide	2,2-DPA	2,2-DPA, Propionic Acid, 2,2-dichloro-sodium salt
pesticide	herbicide	2,4,5-T	2,4,5-trichlorophenoxyacetic acid, 2,4,5-T
pesticide	herbicide	2,4-D	2,4-dichloro-phenoxyacetic acid, 2,4-D
pesticide	herbicide	2,4-D amine	2,4-dichloro-phenoxyacetic acid amine, 2,4-D amine
pesticide	herbicide	2,4-D butoxyethanol ester	2,4-D butoxyethanol ester
pesticide	herbicide	2,4-D butylate	2,4-dichloro-phenoxyacetic acid butylate, 2,4-D butylate
pesticide	herbicide	2,4-D iso-octyl ester	2,4-dichloro-phenoxyacetic acid isooctyl ester, 2,4-D iso-octyl ester
pesticide	herbicide	2,4-D sodium	2,4-dichloro-phenoxyacetic acid sodium, 2,4-D sodium
pesticide	herbicide	6-chloropicolinic acid	6-chloro-2-picolinic acid, 6-chloropicolinic acid
pesticide	herbicide	acrolein	acrolein
pesticide	herbicide	alachlor	alachlor
pesticide	herbicide	algicide	unknown algicide
pesticide	herbicide	amitrole	Amitrole, Amitrol-t
pesticide	herbicide	ansar	Ansar 592 HC
pesticide	herbicide	atrazine	atrazine
pesticide	herbicide	atrazine, alachlor	atrazine and alachlor, atrazine and alaclor
pesticide	herbicide	butachlor	butachlor
pesticide	herbicide	butylate	butylate
pesticide	herbicide	butylated hydroxyanisole	butylated hydroxyanisole
pesticide	herbicide	chloranil	chloranil
pesticide	herbicide	chlorocresol	chlorocresol, 4-chloro-2-methyl phenol, 4-chloro-m-cresol, MCPA
pesticide	herbicide	cyanatryn	cyanatryn
pesticide	herbicide	cyanazine	cyanazine, 1,3,5-triazine, simizine
pesticide	herbicide	DEF	DEF, tribufos
pesticide	herbicide	defenuron	defenuron

Appendix 2b - Contaminant Type - 13

Category	Pesticide Type	Contaminant Code	Common Name/Trade name
pesticide	herbicide	dicamba	Dicamba
pesticide	herbicide	dichlobenil	dichlobenil
pesticide	herbicide	dinoseb	Dinoseb
pesticide	herbicide	diquat	diquat dibromide
pesticide	herbicide	diquat, nabam	diquat, nabam
pesticide	herbicide	diuron	diuron, [3-(3,4-dichlorophenyl)-1, or 1-dimethyl-urea
pesticide	herbicide	Dosanex	Dosanex, metoxuron
pesticide	herbicide	endothall	endothall, mono(n,n-dimethylalkylamine) salt
pesticide	herbicide	eptam	Eptam, EPTC
pesticide	herbicide	fenoprop	Fenoprop, Silvex
pesticide	herbicide	Garlon 3A	triethylamine salt of triclopyr
pesticide	herbicide	glyphosate	glyphosate (isopropylamine salt of)
pesticide	herbicide	hexazinone	hexazinone
pesticide	herbicide	Ingran	Ingran
pesticide	herbicide	iron methanoarsenate	iron methanoarsenate
pesticide	herbicide	Linuron	Linuron
pesticide	herbicide	MCPA	2-methyl-4-chlorophenoxyacetic acid, MCPA, MCP
pesticide	herbicide	merphos	merphos, tributyl phosphorotrithioite
pesticide	herbicide	methylarsonic acid	methylarsonic acid, MSMA, monosodium methyl arsonate, DSMA, disodium methyl arsonate
pesticide	herbicide	metolachlor	metolachlor
pesticide	herbicide	metribuzin	metribuzin
pesticide	herbicide	MO-338	chlornitrofen, MO-338
pesticide	herbicide	molinate	molinate, Yalan
pesticide	herbicide	MPP+	1-methyl-4-phenylpyridinium, MPTP metabolite
pesticide	herbicide	MPTP	1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine, 1,2,3,6-tetrahydropyridine
pesticide	herbicide	nitrobenzene	nitrobenzene
pesticide	herbicide	nitrofen	nitrofen
pesticide	herbicide	n-nitrosoatrazine	n-nitrosoatrazine
pesticide	herbicide	paraquat	paraquat
pesticide	herbicide	pentachlorophenol	pentachlorophenol
pesticide	herbicide	picloram	picloram
pesticide	herbicide	prometryne	prometryne
pesticide	herbicide	propachlor	propachlor
pesticide	herbicide	propanil	propanil
pesticide	herbicide	propanoic acid butyl ester	propanoic acid butyl ester, 2-propionic acid butyl ether ester
pesticide	herbicide	Pyramin	pyramin, choridazon
pesticide	herbicide	SLA4685	SLA4685
pesticide	herbicide	SLA4722	SLA4722
pesticide	herbicide	swep	swep
pesticide	herbicide	TCA	Nata, TCA-sodium
pesticide	herbicide	Tribunil	Tribunil
pesticide	herbicide	trifluralin	trifluralin
pesticide	herbicide	tryclopyr	tryclopyr
pesticide	lampricide	TFM	trifluoromethyl-4-nitro phenol, 3-trifluoromethyl-4-nitro phenol, TFM
pesticide	mollusc-icide	NaPCP	pentachlorophenol salt, sodium pentachlorophenate, NaPCP

Appendix 2b - Contaminant Type - 14

Category	Pesticide Type	Contaminant Code	Common Name/Trade name
pesticide	nematocide	thiabendazole	thiabendazole
pesticide	piscicide	niclosamide	niclosamide
pesticide	piscicide	rotenone	rotenone
pesticide	rodenticide	brodifacoum	brodifacoum
pesticide	rodenticide	flocoumafen	flocoumafen
pesticide	rodenticide	fluoroacetamide	fluoroacetamide
pesticide	rodenticide	Scent-Off Repellant Buds	Scent-Off Repellant Buds
pesticide	rodenticide	sodium fluoracetate	sodium monofluoroacetate, sodium fluoroacetate, sodium fluoracetate
pesticide	rodenticide	TBT	tributyltin, TBT
pesticide and metal	rodenticide	thalium	thalium, thallium
pesticide and metal	rodenticide	thallium sulfate	thallium sulfate
pesticide	rodenticide	thiosemicarbazide	thiosemicarbazide
pesticide	unknown	DRC-1339	DRC-1339
pesticide	unknown	DRC-1347	DRC-1347
pesticide	unknown	DRC-2698	DRC-2698
Pesticide	various	pesticides	various, pesticides

Appendix 2b - Contaminant Type - 15

Category	Insecticide Type	Contaminant Code	Common Name/Trade Name
pesticide	carbamate	aldicarb	aldicarb
pesticide	carbamate	aminocarb	aminocarb
pesticide	carbamate	bendiocarb	bendiocarb
pesticide	carbamate	benthiocarb/ thiobencarb	benthiocarb, thiobencarb
pesticide	carbamate	BPMC	BPMC, fenobucarb
pesticide	carbamate	carbaryl	carbaryl
pesticide and radiation	carbamate	carbaryl, UV-B	carbaryl, UV-B, radiation
pesticide	carbamate	carbofuran	carbofuran
pesticide	carbamate	hopcide	hopcide
pesticide	carbamate	isoprocarb	isoprocarb
pesticide	carbamate	methiocarb	methiocarb
pesticide	carbamate	methomyl	methomyl
pesticide	carbamate	methylcarbamate	methyl carbamate
pesticide	carbamate	mexacarbate	mexacarbate
pesticide	carbamate	MTMC	MTMC, metalocarb
pesticide	carbamate	oxamyl	oxamyl
pesticide	carbamate	physostigmine	physostigmine
pesticide	carbamate	primicarb	pirimicarb
pesticide	carbamate	propoxur	propoxur
pesticide	general	arco	arco
pesticide	general	BTH14	Bacillus thuringiensis var. israele, BTH14
pesticide	general	buprofezin	buprofezin
pesticide	general	carbon disulfide	carbon disulfide
pesticide	general	dinitrocresol	dinitrocresol, dinitro-o-cresol, DNC, DNOC, dinitrophenol
pesticide	general	eulan wa new	eulan wa new
pesticide	general	FLII MLO	FLII MLO
pesticide	general	imidacloprid	imidacloprid
pesticide	general	iprobenfos	5-benzyl diisopropyl phosphorothiol, IBP, iprobenfos
pesticide	general	methoprene	methoprene
pesticide	general	Mimic 240LV	Mimic 240LV, Tebufenozide, RH-5992
pesticide	general	nifurpirinol	nifurpirinol
pesticide	general	piperonyl butoxide	piperonyl butoxide
pesticide	general	sodium selenate	sodium selenate
pesticide	general	tack trap	tack trap and pine gum
pesticide	general	thiocyclam	thiocyclam
radiation and pesticide	general	UV, methoprene	methoprene, UV, radiation
pesticide	organochlorine	2,4-dichloroaniline	2,4-dichloroaniline
pesticide	organochlorine	aldrin	aldrin
pesticide	organochlorine	benzene hydrochloride	benzene hydrochloride
pesticide	organochlorine	benzomate	benzomate
pesticide	organochlorine	BHC	benzene hexachloride, hexachlorobenzene, BHC, HCB
pesticide	organochlorine	bromocyclen	bromocyclen
pesticide	organochlorine	chlordane	chlordane or cis-chlordane or trans-chlordane or oxychlordane
pesticide	organochlorine	chlordimeform	chlordimeform

Category	Insecticide Type	Contaminant Code	Common Name/Trade Name
pesticide	organochlorine	chlorobenzene	chlorobenzene
pesticide	organochlorine	DDCN	DDCN, DDT metabolite, bis(p-chlorophenyl)acetonitrile
pesticide	organochlorine	DDD	DDD, p,p-DDD, TDE, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, DDT metabolite
pesticide	organochlorine	DDE	DDE, DDT metabolite
pesticide	organochlorine	DDMU	DDMU, DDT metabolite
pesticide	organochlorine	DDOH	DDOH, 2,2-bis(p-chlorphenyl)-ethanol, DDT metabolite
pesticide	organochlorine	DDT	DDT, p,p-DDT, dichlorodiphenyltrichloroethane
pesticide	organochlorine	dichlorobenzene	dichlorobenzene, p-dichlorobenzene
pesticide	organochlorine	dicofol	dicofol, dichlorobenzophenone is a metabolite of dicofol
pesticide	organochlorine	dieldrin	dieldrin
pesticide	organochlorine	diflubenzuron	diflubenzuron
pesticide	organochlorine	endosulfan	endosulfan, endosulphan
pesticide	organochlorine	endrin	endrin
pesticide	organochlorine	fenubucarb, chlorpyrifos	fenubucarb and chlorpyrifos
pesticide	organochlorine	HCH, alpha, lindane	HCH, alpha, lindane, (hexachlorobenzene)
pesticide	organochlorine	HCH, beta, lindane	HCH, beta, lindane, (hexachlorobenzene)
pesticide	organochlorine	heptachlor	heptachlor
pesticide	organochlorine	heptachlor epoxide	heptachlor epoxide, HE
pesticide	organochlorine	JKU0422	1-[2,6-dichloro4-(trifluoromethyl)phenyl]-3-methyl-4-[(trifluoromethyl)thio]-1H-pyrazole
pesticide	organochlorine	kepone	kepone, chlordecone
pesticide	organochlorine	lindane	HCH, gamma, lindane, g-BHC (hexachlorobenzene),(benzene hexachloride)
pesticide	organochlorine	meldrin	meldrin
pesticide	organochlorine	methoxychlor	methoxychlor
pesticide	organochlorine	mirex	mirex
pesticide	organochlorine	OCS	octachlorostyrene, OCS
pesticide	organochlorine	OMPA	Octamethyl Pyrophosphoramide, OMPA
pesticide	organochlorine	organochlorines	various, organochlorine compounds, OC, chlorinated hydrocarbons
pesticide	organochlorine	paraquat dichloride	paraquat dichloride
pesticide	organochlorine	pentachlorobenzene	pentachlorobenzene
pesticide	organochlorine	TEEP	TEEP
pesticide	organochlorine	tetrachlorobenzene	tetrachlorobenzene
pesticide	organochlorine	toxaphene/ camphechlor	toxaphene, camphechlor, campheclor
pesticide	organochlorine	trichloroacetaldehyde/ chloral	trichloroacetaldehyde, chloral
pesticide	organochlorine	trichlorobenzene	trichlorobenzene
pesticide	organochlorine	Tritox-30	DDT, Tritox-30, Tritox
pesticide and radiation	organochlorine	UV, dieldrin	UV, dieldrin, radiation
pesticide	organophosphate	acephate	acephate
pesticide	organophosphate	ambithion	ambithion mixture, fenitrothion and malathion
pesticide	organophosphate	azinphos-methyl	azinphos-methyl
pesticide	organophosphate	Bayer 22408	Bayer 22408
pesticide	organophosphate	Bayer 29952	Bayer 29952

Category	Insecticide Type	Contaminant Code	Common Name/Trade Name
pesticide	organophosphate	Bayer 34042	Bayer 34042
pesticide	organophosphate	Bayer 37289	Bayer 37289
pesticide	organophosphate	Bayer 38920	Bayer 38920
pesticide	organophosphate	Bayer 44831	Bayer 44831
pesticide	organophosphate	carbophenothion	Carbophenothion
pesticide	organophosphate	carbophos	carbophos
pesticide	organophosphate	chlorfenvinphos	chlorfenvinphos
pesticide	organophosphate	chloropyrifos	chlorpyrifos, chloropyrifos
pesticide	organophosphate	chlorpyrifos-methyl	chlorpyrifos-methyl, chlorpyrifos-ethyl analog
pesticide	organophosphate	coumaphos	coumaphos
pesticide	organophosphate	crotoxyphos	crotoxyphos
pesticide	organophosphate	cruformate	cruformate
pesticide	organophosphate	demeton	demeton
pesticide	organophosphate	DFP	diisopropyl fluorophosphate, DFP, Isofluorphate
pesticide	organophosphate	diazinon	Diazinon
pesticide	organophosphate	dichlorfenthion	dichlofenthion, dichlorfenthion
pesticide	organophosphate	dichlorvos	dichlorvos, DDVP, phosphoric acid 2,2 dichlorovinyl d, DDVP
pesticide	organophosphate	dicrotophos	dicrotophos, dichrotophos
pesticide	organophosphate	dimefox	Dimefox
pesticide	organophosphate	dimethoate	dimethoate
pesticide	organophosphate	dioxathion	dioxathion
pesticide	organophosphate	disulfoton	disulfoton
pesticide	organophosphate	ethion	ethion
pesticide	organophosphate	ethoprop	ethoprop
pesticide	organophosphate	ethyl guthion	ethyl guthion
pesticide	organophosphate	famphur	famphur
pesticide	organophosphate	fenamiphos	fenamiphos
pesticide	organophosphate	fenitrothion	fenitrothion
pesticide	organophosphate	fensulfothion	fensulfothion
pesticide	organophosphate	fenthion	fenthion
pesticide	organophosphate	fonophos	fonophos
pesticide	organophosphate	G-27365	G-27365
pesticide	organophosphate	G-28029	G-28029
pesticide	organophosphate	G-30493	G-30493
pesticide	organophosphate	G-30494	G-30494, methyl phenkapton
pesticide	organophosphate	GC-3582	GC-3582
pesticide	organophosphate	isazophos	isazophos, isazofos
pesticide	organophosphate	isocarbophos	isocarbophos
pesticide	organophosphate	isofenphos	isofenphos
pesticide	organophosphate	leptophos	leptophos
pesticide	organophosphate	leptophosoxon	leptophosoxon, leptophos metabolite
pesticide	organophosphate	malaoxon	malaoxon, malathion metabolite
pesticide	organophosphate	malathion	malathion
pesticide	organophosphate	methamidophos	metamidophos, methamidophos, metamidofos
pesticide	organophosphate	methidathion	methidathion
pesticide	organophosphate	methyl demeton	methyl demeton
pesticide	organophosphate	mevinphos	mevinphos
pesticide	organophosphate	Mipafox	Mipafox
pesticide	organophosphate	monocrotophos	monocrotophos

Appendix 2b - Contaminant Type - 18

Category	Insecticide Type	Contaminant Code	Common Name/Trade Name
pesticide	organophosphate	naled	naled
pesticide	organophosphate	neostigmine	neostigmine
pesticide	organophosphate	omethoate	omethoate
pesticide	organophosphate	organophosphates	various, organophosphates
pesticide	organophosphate	paraoxon	paraoxon, parathion metabolite
pesticide	organophosphate	parathion	parathion
pesticide	organophosphate	parathion-methyl	methyl parathion, parathion-methyl
pesticide	organophosphate	phorate	phorate
pesticide	organophosphate	phosalone	phosalone
pesticide	organophosphate	phosdrin	phosdrin
pesticide	organophosphate	phosmet	phosmet
pesticide	organophosphate	phosphamidon	phosphamidon
pesticide	organophosphate	phoxim	phoxim
pesticide	organophosphate	pirimiphos ethyl	pirimiphos ethyl
pesticide	organophosphate	propetamphos	propetamphos
pesticide	organophosphate	prothiophos	prothiophos, prothiofos
pesticide	organophosphate	pyridaphenthion	pyridaphenthion
pesticide	organophosphate	quinalphos/ chinalphos	quinalphos, chinalphos
pesticide	organophosphate	ronnel	ronnel, fenchlorophos
pesticide	organophosphate	soman	soman
pesticide	organophosphate	sulfotep	sulfotep
pesticide	organophosphate	tabun	tabun
pesticide	organophosphate	temephos	temephos
pesticide	organophosphate	TEPP	tetramethyl pyrophosphate, TEPP
pesticide	organophosphate	terbufos	terbufos
pesticide	organophosphate	tetrachlorvinphos	tetrachlorvinphos
pesticide	organophosphate	triazophos	triazophos
pesticide	organophosphate	trichlorphon	trichlorphon
pesticide	organophosphate	tri-o-tolyl phosphate/ TTP	tri-o-tolyl phosphate, TTP
pesticide	pyrethroid	1R, aS-Cypermethrin	1Rm aS-Cypermethrin
pesticide	pyrethroid	1RS-resmethrin	1RS-resmethrin
pesticide	pyrethroid	allethrin	allethrin, prallethrin, pallethrine
pesticide	pyrethroid	bioresmethrin	bioresmethrin, cismethrin
pesticide	pyrethroid	cismethrin	cismethrin, bioresmethrin
pesticide	pyrethroid	cyfluthrin	cyfluthrin
pesticide	pyrethroid	cyhalothrin	cyhalothrin
pesticide	pyrethroid	cypermethrin	alphamethrin, FASTAC 10EC, cypermethrin
pesticide	pyrethroid	deltamethrin	deltamethrin, decamethrin, cis-deltamethrin
pesticide	pyrethroid	des-cyano-deltamethrin	des-cyano-deltamethrin
pesticide	pyrethroid	esfenvalerate	esfenvalerate
pesticide	pyrethroid	fenpropathrin	fenpropathrin, fenpropanate, s-Fenpropathrin,
pesticide	pyrethroid	fenvalerate	fenvalerate, ssfenvalerate
pesticide	pyrethroid	flumethrin	flumethrin
pesticide	pyrethroid	kadethrin	kadethrin, cis-kadethrin, RU 15525
pesticide	pyrethroid	NRDC	NRDC 119
pesticide	pyrethroid	permethrin	permethrin
pesticide	pyrethroid	phenothrin	phenothrin, d-phenothrin
pesticide	pyrethroid	pyrethrin	pyrethrin, pyrethrum
pesticide	pyrethroid	pyrethroids	various, pyrethroids
pesticide	pyrethroid	s-bioallethrin	s-bioallethrin

Appendix 2b - Contaminant Type - 19

Category	Insecticide Type	Contaminant Code	Common Name/Trade Name
pesticide	pyrethroid	tetramethrin	tetramethrin
pesticide	unknown	duo sai wan	duo sai wan
pesticide	unknown	fei fu san	fei fu san
pesticide	unknown	hun mie wei	hun mie wei
pesticide	unknown	mie chu wei	mie chu wei
pesticide	unknown	nereistoxin	nereistoxin, cartap, carbomothioic acid
pesticide	unknown	sha chong dan	sha chong dan
pesticide	unknown	sha chong shuang	sha chong shuang
pesticide	unknown	yi ji dao fen san	yi ji dao fen san
pesticide	various	hydrocarbons	various, hydrocarbons or organic compounds

Appendix 3: Province, state or country name corresponding to codes in Table 1.

Code	Province/State/Country
AL	Alabama
AK	Alaska
AB	Alberta
AZ	Arizona
AR	Arkansas
AUS	Australia
BC	British Columbia
CA	California
CAN	Canada
CO	Colorado
CT	Connecticut
DE	Delaware
FL	Florida
FR	France
GA	Georgia
HI	Hawaii
ID	Idaho
IL	Illinois
IN	Indiana
IA	Iowa
KS	Kansas
KY	Kentucky
LA	Louisiana
ME	Maine
MB	Manitoba
MD	Maryland
MA	Massachusetts
MI	Michigan
MN	Minnesota
MS	Mississippi
MO	Missouri
MT	Montana
NE	Nebraska
NV	Nevada
NB	New Brunswick
NJ	New Jersey
NM	New Mexico
NY	New York
NF	Newfoundland
NAM	North America
NC	North Carolina
ND	North Dakota
NWT	Northwest Territories
NS	Nova Scotia
OH	Ohio
OK	Oklahoma
ON	Ontario
OR	Oregon

Code	Province/State/Country
PA	Pennsylvania
PE	Prince Edward Island
PQ	Quebec
RI	Rhode Island
SK	Saskatchewan
SC	South Carolina
SD	South Dakota
TN	Tennessee
TX	Texas
USA	United States
UT	Utah
VT	Vermont
VA	Virginia
WA	Washington
DC	Washington, D.C.
WV	West Virginia
WI	Wisconsin
WY	Wyoming
YT	Yukon

Appendix 4: Descriptions of exposure route codes used in Tables 2, 3 and 4. Exposure route assignments to studies used standard methodology classifications. See the original reference for full details of study methodology.

Exposure Route	Exposure Route Term	Exposure Route Description
DERMAL	Dermal exposure	Exposure of contaminant(s) to animals by direct dermal application under laboratory conditions. See paper for specific details pertaining to this study.
ENVIRON	Environmental exposure	Exposure of contaminant(s) in external field surroundings as a source of toxicity to animals. Numerous contaminants may be involved and the source or concentration(s) may not be known. Direct exposure routes may include dermal, inhalation, and ingestion. This classification includes studies of environmental spills.
FETAX	Frog Embryo Teratogenesis Assay-*Xenopus* (FETAX)	In standard FETAX methodology, a range-finding and three replicate tests are performed on each test material. A control in which no test material has been added is used to provide 1) a measure of the acceptability of the test by indicating the quality of embryos and the suitability of the FETAX solution, test conditions and handling procedures, and 2) a basis for interpreting data from other treatments. Each test consists of several different concentrations of test material with two replicate dishes of each concentration. Each of the three tests is conducted using embryos from a different male/female pair of *Xenopus laevis*. A reference toxicant (6-aminonicotinamide) should be used as a quality control measure. The 96 h LC50 and 96 h EC50 (malformation) are determined by probit analysis and the TI (teratogenic index) is calculated by dividing the LC50 by the EC50. Growth inhibition is determined by measuring the head-tail length of each embryo and determining whether growth at a particular concentration is significantly different from that of the control. Other useful data can be collected (eg. pigmentation, locomotion and hatchability) to expand the utility of the test.
IMMER	Exposure through immersion	Exposure of contaminant(s) to animals in an aqueous solution in which they are submerged. This methodology is often the most common form of determining LC values under laboratory conditions.
INHAL	Exposure through inhalation	Exposure of contaminant(s) to animals is in gaseous form under laboratory conditions. Some dermal uptake may also occur under this conditions, however primary source of uptake is reported to be inhalation.
INJECT	Exposure through injection	Exposure of contaminant(s) to animals in aqueous form through injection (i.e. subdermal, intraperitoneal) under laboratory conditions.
ORAL	Oral dosing exposure	Exposure of contaminant(s) to animals often in liquid form by gavage under laboratory conditions.
PESTAPP	Pesticide application	Exposure of contaminant(s) to animals often in aqueous form sprayed in surrounding field environment.
pH	Exposure to altered pH	Exposure of altered acidity of substrate or surrounding water to animals under laboratory or field conditions (i.e. pH = 3.0).
pH+CONT	Exposure to altered pH in presence of contaminant	Exposure of a combination of altered acidity of substrate or surrounding water and contaminant(s) to animals under laboratory or field conditions (eg. low pH and aluminum).
RAD	Exposure to radiation	Exposure of ultraviolet radiation to animals under laboratory or field conditions. A common laboratory study might include exposure to UV and UV-B during various larval developmental stages.
SUBDERM	Subdermal exposure to contaminant	Exposure of contaminant(s) to animals, often in crystalline form, by surgically placing it under the skin.
TISPREP	Contaminant exposure to isolated tissue preparation	Exposure of contaminant(s) to animal tissues following dissection. Common studies within this category include ion transport, neurological effects or hematological status investigations.

Appendix 5: Descriptions of study endpoint codes used in Tables 2, 4 and 6. Study endpoint assignments used standard methodology classifications and the original reference may discuss other effects of exposure not presented here. See the original reference for full details of study methodology.

Study Endpoint	Endpoint Term	Study Endpoint Description
BEHAV	Behavioural observations	Contaminant exposure was associated with altered behaviour (i.e. avoidance, lethargy, paralysis).
DEVOBS	Developmental observations	Contaminant exposure was associated with alterations to various developmental processes or disruptions (i.e. growth, teratogenesis, delayed metamorphosis, polydactyly, limb regeneration). Endpoint may also refer to endocrine disrupting effects.
GENOTOX	DNA damage/ genotoxicity	Contaminant exposure was associated with DNA damage which may include increased frequencies of gamete loss due to cell death, embryo mortality (lethal mutations), cancer, heritable mutations and abnormal development.
HATSUC	Hatching success	Contaminant exposure was associated with alterations in hatching success, hatching rate etc. of eggs/embryos.
MORT	Mortality observations	Contaminant exposure was associated with death of animals.
PATH	Pathological observations	Contaminant exposure was associated with various infections in animals (i.e. tumors, viruses, parasites, fungal growth).
PHYSIO	Physiological observations	Contaminant exposure was associated with alterations in animal physiology (i.e. temperature tolerance, hematological status, ion balance, hormone level response).
POPSUR	Population surveys	Field populations were surveyed (i.e. presence/absence, species richness and density) following exposure to contaminant(s).
REPRO	Reproductive observations	Contaminant exposure was associated with altered reproductive activities (i.e. adult fertility, etc.).
RESIDUE	Tissue residues	Contaminant(s) exposure resulted in residues of the contaminant(s) appearing in tissues under laboratory or field conditions.

Appendix 6a: Glossary of Abbreviations and Units

ai	active ingredient
alb	albumen
appl	application
approx	approximate
AUS	Australia
avg	average
body wt	body weight
CAN	Canada
CNS	central nervous system
conc	concentration
cont	contaminant
d	day(s)
dif	different(ce)
DOC	dissolved organic compounds
dw	dry weight
ENU	ethylnitrosurea
EPP	endplate potentials
F	female
h	hour(s)
ha	hectare
Hb	haemoglobin
im	intramuscular injection
ip	intraperitoneal injection
ISC	short-circuit current
L	Lake
LDH	lactate dehydrogenase
LOEL	lowest observed effect level
LU	light units
M	male
MAS	metabolic activation system
max	maximum
MCIG	Minimum concentration to inhibit growth
min	minimum or minute(s)
mo	month(s)
MPC	maximum peak concentration
MT	metallothionein
ND	not detected; below detection limit
NOEL	no observed effect level
OCS	organochlorines
ORD	orchard site
PCB	polychlorinated biphenyls
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
rad	radiation

RBC	red blood cells
s	seconds
sig	significant(ly)
temp	temperature
TI	teratogenic index[1]
tox	toxicity
TU	toxic units (see Dawson and Wilke 1991b)
USA	United States
wk	week(s)
ww	wet weight
yr	year(s)

[1]TI is a measure of developmental hazard mostly associated with the FETAX asssay. TI values greater than 1.5 signify larger separation of the mortality and malformation concentration ranges and greater potential for all embryos to be malformed in the absence of significant embryo mortality. TI is calculated by dividing 96 hr LC50 by 96 hr EC50. (American Society for Testing and Materials 1991)

Appendix 6b: Relevant biological and toxicological terms and study classification terms used in the RATL database.

abnormalities/deformities - contaminant exposure study standard endpoint under *Development* in which contaminant exposure was associated with morphological abnormalities or deformities.

acute studies - study type classification conducted in a laboratory setting where mortality values were determined (e.g. LC50, LD50 etc.).

adult - standard life stage, sexually mature.

behaviour - contaminant exposure study standard endpoint classification in which contaminant exposure was associated with altered behaviour (e.g. avoidance, lethargy. predation).

contaminant review papers - standard study endpoint classification incorporating reviews of primary literature on contaminant effects in amphibians and reptiles.

dermal - contaminant exposure study standard methodology classification which presents contaminant(s) to animals by direct application to the dermal layer under laboratory conditions.

development - contaminant exposure study standard endpoint classification in which contaminant exposure was associated with alterations to various developmental processes.

ecology - RATL contains some literature on general amphibian or reptilian ecology not necessarily related to contaminant exposure, however, a comprehensive literature search was not done in this subject area.

egg/embryo - standard life stage, egg phase through embryo development to hatching.

environment - contaminant exposure study standard methodology classification which presents contaminant(s) from external field surroundings as a source of toxicity to animals. Numerous contaminants are involved and the source or concentration(s) may not be known. Direct exposure routes may include dermal, inhalation, and ingestion. This classification includes studies of environmental spills.

fertility - contaminant exposure study standard endpoint specific classification under *Hatching Success* in which contaminant exposure was associated with adult fertility, gamete production and viability.

FETAX - Frog Embyro Teratogenesis Assay - *Xenopus*. Standard embryonal development assay developed in 1983 for screening substances for toxic effects.

field studies - study type classification for studies conducted in a field setting.

fungal - contaminant exposure study standard endpoint specific classification under *Pathology* associated with fungal infections.

general ecology - standard study endpoint classification incorporating papers on general ecology, behaviour, habitat preferences, breeding habits etc. of amphibians and reptiles.

growth - contaminant exposure study standard endpoint classification under *Development* in which contaminant exposure was associated with alterations in body size of animals.

hatching success - contaminant exposure study standard endpoint specific classification in which contaminant exposure was associated with alterations in hatching success, hatching rate etc.

immersion - contaminant exposure study standard methodology classification which presents contaminant(s) to animals in an aqueous solution in which they are submerged. This methodology is often the most common form of determining acute toxicity values for amphibians under laboratory conditions.

inhalation - contaminant exposure study standard methodology classification which presents contaminant(s) to animals is gaseous form under laboratory conditions. Some dermal uptake may also occur under this conditions, however primary source of uptake is reported to be inhalation.

injection - contaminant exposure study standard methodology classification wherein contaminant(s) are presented to animals in aqueous form through injection (i.e. subdermal, intraperitoneal) under laboratory conditions.

juvenile - standard life stage, all limbs fully developed.

laboratory studies - study type classification for studies conducted in a laboratory environment.

larvae/tadpole - standard life stage, hatched larvae through metamorphic stages of tadpoles.

LC50 - 24, 48, 96 h - contaminant exposure study standard endpoint classification in which contaminant exposure was associated with 50 % mortality of population after 24, 48, or 96 h of exposure.

limb/tail regeneration - contaminant exposure study standard endpoint classification under *Development* with contaminant exposure associated with alterations in regeneration of limbs.

metamorphosis - contaminant exposure study standard endpoint specific classification under *Development* in which contaminant exposure was associated with alterations to metamorphosis (e.g. delayed metamorphosis, failure to complete metamorphosis).

mortality - contaminant exposure study standard endpoint classification in which contaminant exposure was associated with death of animals (but not acute toxicity study).

oral - contaminant exposure study standard methodology classification in which contaminant(s) were presented to animals often in liquid form by gavage under laboratory conditions.

other studies - research papers which contain information on general amphibian or reptilian ecology, and thermal effects, however, a comprehensive literature search was not done in subject areas other than those that are contaminant related.

parasite - contaminant exposure study standard endpoint specific classification under *Pathology* in which contaminant exposure was associated with the presence of parasites.

pathology - contaminant exposure study standard endpoint classification in which contaminant exposure was associated with various infections in animals (i.e. tumors, viruses, parasites, fungal growth).

pesticide application - contaminant exposure study standard methodology classification in which contaminant(s) were presented to animals often in aqueous form sprayed in surrounding field environment.

pH - contaminant exposure study standard methodology classification which presents altered acidity of substrate or surrounding water to animals under laboratory or field conditions.

pH+contaminant - contaminant exposure study standard methodology classification which presents a combination of altered acidity of substrate or surrounding water and contaminant(s) to animals under laboratory or field conditions (e.g. low pH and aluminum).

physiology - contaminant exposure study standard endpoint classification in which contaminant exposure was associated with alterations in animal physiology (i.e. temperature tolerance, hematological status, ion balance).

polydactyly- contaminant exposure study standard endpoint specific classification under *Development* in which contaminant exposure was associated with duplication of limbs, tails, or heads.

population status papers - study type classification incorporating primary literature or reviews on population declines (i.e. no direct contaminant exposure investigations).

population surveys - contaminant exposure study endpoint classification in which field population environments were surveyed (e.g. presence/absence, species richness and density) following exposure to contaminant(s).

radiation - contaminant exposure study standard methodology classification where ultraviolet radiation is presented to animals under laboratory or field conditions. A common laboratory study might include exposure to UV-b radiation during various larval developmental stages.

reproduction - contaminant exposure study standard endpoint specific classification under *Hatching Success* in which contaminant exposure was associated with reproductive biology (e.g. adult fertility, sex determination etc.).

residues - contaminant exposure study standard endpoint specific classification in which contaminant exposure was associated with tissue residues of the contaminant(s) under laboratory or field conditions.

review - study type classification that contains summarized literature on contaminant effects in amphibians and reptiles.

sex determination/ratio - contaminant exposure study standard endpoint specific classification under *Hatching Success* in which contaminant exposure was associated with alterations in gender determination of developing embryos.

subdermal - contaminant exposure study standard methodology classification which presents contaminant(s) to animals, often in crystalline form, by surgical placement under the skin.

temperature effects - standard study endpoint classification incorporating papers on general effects of temperature on amphibians and reptiles (i.e. no contaminant exposure).

temperature generation - RATL contains some literature pertaining to general amphibian or reptile thermal effects not related to contaminant exposure, however, a comprehensive literature search was not done in this subject area.

temperature tolerance - contaminant exposure study standard endpoint specific classification under *Pathology* in which contaminant exposure was associated with alterations in temperature tolerance in animals.

teratogenesis - contaminant exposure study standard endpoint specific classification under *Development* in which contaminant exposure is associated with teratogenic effects.

tissue injection - standard injection methodology exposure study standard endpoint specific classification under *Pathology* in which tissue injection was associated with pathological response to foreign tissue.

tissue preparation - contaminant exposure study standard methodology classification which presents contaminant(s) to animal tissues following dissection. Common studies within this category include ion transport, neurological effects or hematological status investigations.

tissue residues - contaminant exposure study standard endpoint specific classification in which contaminant exposure was associated with tissue residues of the contaminant(s) under laboratory or field conditions.

tumor - contaminant exposure study standard endpoint specific classification under *Pathology* in which contaminant exposure was associated with the presence of tumors.

viral - contaminant exposure study standard endpoint specific classification under *Pathology*.