

**TOXICOLOGICAL PROFILE FOR
POLYCHLORINATED BIPHENYLS (PCBs)**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry**

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DISCLAIMER

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UPDATE STATEMENT

A toxicological Profile for PCBs, Draft for Public Comment, was released in December 1998. This edition supercedes any previously released draft or final profile. Toxicological profiles are revised and republished as necessary, but no less than once every three years.

For information regarding the update status of previously released profiles, contact ATSDR at:

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FOREWORD

This toxicological profile is prepared in accordance with guidelines* developed by the Agency for Toxic Substances and Disease Registry (ATSDR) and the Environmental Protection Agency (EPA). The original guidelines were published in the *Federal Register* on April 17, 1987. Each profile will be revised and republished as necessary.

The ATSDR toxicological profile succinctly characterizes the toxicologic and adverse health effects information for the hazardous substance described therein. Each peer-reviewed profile identifies and reviews the key literature that describes a hazardous substance's toxicologic properties. Other pertinent literature is also presented, but is described in less detail than the key studies. The profile is not intended to be an exhaustive document; however, more comprehensive sources of specialty information are referenced.

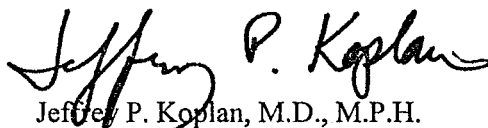
The focus of the profiles is on health and toxicologic information; therefore, each toxicological profile begins with a public health statement that describes, in nontechnical language, a substance's relevant toxicological properties. Following the public health statement is information concerning levels of significant human exposure and, where known, significant health effects. The adequacy of information to determine a substance's health effects is described in a health effects summary. Data needs that are of significance to protection of public health are identified by ATSDR and EPA.

Each profile includes the following:

- (A) The examination, summary, and interpretation of available toxicologic information and epidemiologic evaluations on a hazardous substance to ascertain the levels of significant human exposure for the substance and the associated acute, subacute, and chronic health effects;
- (B) A determination of whether adequate information on the health effects of each substance is available or in the process of development to determine levels of exposure that present a significant risk to human health of acute, subacute, and chronic health effects; and
- (C) Where appropriate, identification of toxicologic testing needed to identify the types or levels of exposure that may present significant risk of adverse health effects in humans.

The principal audiences for the toxicological profiles are health professionals at the Federal, State, and local levels; interested private sector organizations and groups; and members of the public.

This profile reflects ATSDR's assessment of all relevant toxicologic testing and information that has been peer-reviewed. Staff of the Centers for Disease Control and Prevention and other Federal scientists have also reviewed the profile. In addition, this profile has been peer-reviewed by a nongovernmental panel and was made available for public review. Final responsibility for the contents and views expressed in this toxicological profile resides with ATSDR.



Jeffrey P. Koplan, M.D., M.P.H.

Administrator

Agency for Toxic Substances and
Disease Registry

Disease Registry

*Legislative Background

The toxicological profiles are developed in response to the Superfund Amendments and Reauthorization Act (SARA) of 1986 (Public law 99-499) which amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund). This public law directed ATSDR to prepared toxicological profiles for hazardous substances most commonly found at facilities on the CERCLA National Priorities List and that pose the most significant potential threat to human health, as determined by ATSDR and the EPA. The availability of the revised priority list of 275 hazardous substances was announced in the *Federal Register* on November 17, 1997 (62 FR 61332). For prior versions of the list of substances, see *Federal Register* notices dated April 29, 1996 (61 FR 18744); April 17, 1987 (52 FR 12866); October 20, 1988 (53 FR 41280); October 26, 1989 (54 FR 43619); October 17, 1990 (55 FR 42067); October 17, 1991 (56 FR 52166); October 28, 1992 (57 FR 48801); and February 28, 1994 (59 FR 9486). Section 104(i)(3) of CERCLA, as amended, directs the Administrator of ATSDR to prepare a toxicological profile for each substance on the list.

QUICK REFERENCE FOR HEALTH CARE PROVIDERS

Toxicological Profiles are a unique compilation of toxicological information on a given hazardous substance. Each profile reflects a comprehensive and extensive evaluation, summary, and interpretation of available toxicologic and epidemiologic information on a substance. Health care providers treating patients potentially exposed to hazardous substances will find the following information helpful for fast answers to often-asked questions.

Primary Chapters/Sections of Interest

Chapter 1: Public Health Statement: The Public Health Statement can be a useful tool for educating patients about possible exposure to a hazardous substance. It explains a substance's relevant toxicologic properties in a nontechnical, question-and-answer format, and it includes a review of the general health effects observed following exposure.

Chapter 2: Relevance to Public Health: The Relevance to Public Health Section evaluates, interprets, and assesses the significance of toxicity data to human health.

Chapter 3: Health Effects: Specific health effects of a given hazardous compound are reported by *type of health effect* (death, systemic, immunologic, reproductive), by *route of exposure*, and by *length of exposure* (acute, intermediate, and chronic). In addition, both human and animal studies are reported in this section.

NOTE: Not all health effects reported in this section are necessarily observed in the clinical setting. Please refer to the Public Health Statement to identify general health effects observed following exposure.

Pediatrics: Four new sections have been added to each Toxicological Profile to address child health issues:

- Section 1.6** **How Can (Chemical X) Affect Children?**
- Section 1.7** **How Can Families Reduce the Risk of Exposure to (Chemical X)?**
- Section 3.7** **Children's Susceptibility**
- Section 6.6** **Exposures of Children**

Other Sections of Interest:

- Section 3.8** **Biomarkers of Exposure and Effect**
 - Section 3.11** **Methods for Reducing Toxic Effects**
-

ATSDR Information Center

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E-mail: atsdric@cdc.gov **Internet:** <http://www.atsdr.cdc.gov>

The following additional material can be ordered through the ATSDR Information Center:

Case Studies in Environmental Medicine: Taking an Exposure History—The importance of taking an exposure history and how to conduct one are described, and an example of a thorough exposure history is provided. Other case studies of interest include *Reproductive and Developmental Hazards*; *Skin Lesions and Environmental Exposures*; *Cholinesterase-Inhibiting Pesticide Toxicity*; and numerous chemical-specific case studies.

Managing Hazardous Materials Incidents is a three-volume set of recommendations for on-scene (prehospital) and hospital medical management of patients exposed during a hazardous materials incident. Volumes I and II are planning guides to assist first responders and hospital emergency department personnel in planning for incidents that involve hazardous materials. Volume III—*Medical Management Guidelines for Acute Chemical Exposures*—is a guide for health care professionals treating patients exposed to hazardous materials.

Fact Sheets (ToxFAQs) provide answers to frequently asked questions about toxic substances.

Other Agencies and Organizations

The National Center for Environmental Health (NCEH) focuses on preventing or controlling disease, injury, and disability related to the interactions between people and their environment outside the workplace. *Contact:* NCEH, Mailstop F-29, 4770 Buford Highway, NE, Atlanta, GA 30341-3724 • Phone: 770-488-7000 • FAX: 770-488-7015.

The National Institute for Occupational Safety and Health (NIOSH) conducts research on occupational diseases and injuries, responds to requests for assistance by investigating problems of health and safety in the workplace, recommends standards to the Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA), and trains professionals in occupational safety and health. *Contact:* NIOSH, 200 Independence Avenue, SW, Washington, DC 20201 • Phone: 800-356-4674 or NIOSH Technical Information Branch, Robert A. Taft Laboratory, Mailstop C-19, 4676 Columbia Parkway, Cincinnati, OH 45226-1998 • Phone: 800-35-NIOSH.

The National Institute of Environmental Health Sciences (NIEHS) is the principal federal agency for biomedical research on the effects of chemical, physical, and biologic environmental agents on human health and well-being. *Contact:* NIEHS, PO Box 12233, 104 T.W. Alexander Drive, Research Triangle Park, NC 27709 • Phone: 919-541-3212.

Referrals

The Association of Occupational and Environmental Clinics (AOEC) has developed a network of clinics in the United States to provide expertise in occupational and environmental issues. *Contact:* AOEC, 1010 Vermont Avenue, NW, #513, Washington, DC 20005 • Phone: 202-347-4976 • FAX: 202-347-4950 • e-mail: aoec@dgs.dgsys.com • AOEC Clinic Director: <http://occ-env-med.mc.duke.edu/oem/aoec.htm>.

The American College of Occupational and Environmental Medicine (ACOEM) is an association of physicians and other health care providers specializing in the field of occupational and environmental medicine. *Contact:* ACOEM, 55 West Seegers Road, Arlington Heights, IL 60005 • Phone: 847-228-6850 • FAX: 847-228-1856.

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THE PROFILE HAS UNDERGONE THE FOLLOWING ATSDR INTERNAL REVIEWS:

1. Green Border Review. The Green Border Review assures the consistency of the profile with ATSDR policy.
2. Health Effects Review. The Health Effects Review Committee examines the health effects chapter of each profile for consistency and accuracy in interpreting health effects and classifying end points.
3. Minimal Risk Level Review. The Minimal Risk Level Workgroup considers issues relevant to substance-specific minimal risk levels (MRLs), reviews the health effects database of each profile, and makes recommendations for derivation of MRLs.
4. Data Needs Review. The Research Implementation Branch reviews data needs sections to assure consistency across profiles and adherence to instructions in the Guidance.

PEER REVIEW

A peer review panel was assembled for polychlorinated biphenyls (PCBs). The panel consisted of the following members:

1. Larry Hansen, University of Illinois, College of Veterinary Medicine, Urbana, Illinois;
2. Joseph Jacobson, Wayne State University, Detroit, Michigan;
3. Helen Tryphonas, Bureau of Chemical Safety, Frederick G. Banting Research Center, Ottawa, Ontario, Canada;
4. John Vena, University at Buffalo, Social and Preventive Medicine, Buffalo, New York

These experts collectively have knowledge of PCBs physical and chemical properties, toxicokinetics, key health end points, mechanisms of action, human and animal exposure, and quantification of risk to humans. All reviewers were selected in conformity with the conditions for peer review specified in Section 104(I)(13) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended.

Scientists from the Agency for Toxic Substances and Disease Registry (ATSDR) have reviewed the peer reviewers' comments and determined which comments will be included in the profile. A listing of the peer reviewers' comments not incorporated in the profile, with a brief explanation of the rationale for their exclusion, exists as part of the administrative record for this compound. A list of databases reviewed and a list of unpublished documents cited are also included in the administrative record.

The citation of the peer review panel should not be understood to imply its approval of the profile's final content. The responsibility for the content of this profile lies with the ATSDR.

CONTENTS

FOREWORD	v
QUICK REFERENCE FOR HEALTH CARE PROVIDERS	vii
CONTRIBUTORS	ix
PEER REVIEW	xi
LIST OF FIGURES	xix
LIST OF TABLES	xxi
1. PUBLIC HEALTH STATEMENT	1
1.1 WHAT ARE POLYCHLORINATED BIPHENYLS?	1
1.2 WHAT HAPPENS TO POLYCHLORINATED BIPHENYLS WHEN THEY ENTER THE ENVIRONMENT?	2
1.3 HOW MIGHT I BE EXPOSED TO POLYCHLORINATED BIPHENYLS?	3
1.4 HOW CAN POLYCHLORINATED BIPHENYLS ENTER AND LEAVE MY BODY?	5
1.5 HOW CAN POLYCHLORINATED BIPHENYLS AFFECT MY HEALTH?	5
1.6 HOW CAN POLYCHLORINATED BIPHENYLS AFFECT CHILDREN?	7
1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO POLYCHLORINATED BIPHENYLS?	9
1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO POLYCHLORINATED BIPHENYLS?	10
1.9 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?	11
1.10 WHERE CAN I GET MORE INFORMATION?	12
2. RELEVANCE TO PUBLIC HEALTH	15
2.1 Background and Environmental Exposures to PCBs in the United States	15
2.2 Summary of Health Effects	16
2.3 Minimal Risk Levels	27
3. HEALTH EFFECTS	33
3.1 INTRODUCTION	33
3.2 DISCUSSION OF HEALTH EFFECTS	90
3.2.1 Death	90
3.2.1.1 Human Studies	90
3.2.1.2 Animal Studies	90
3.2.2 Systemic Effects	92
3.2.2.1 Respiratory	92
3.2.2.1.1 Human Studies	92
3.2.2.1.2 Animal Studies	94
3.2.2.2 Cardiovascular	94
3.2.2.2.1 Human Studies	94
3.2.2.2.2 Animal Studies	96

3.2.2.3	Gastrointestinal	97
3.2.2.3.1	Human Studies	97
3.2.2.3.2	Animal Studies	98
3.2.2.4	Hematological	99
3.2.2.4.1	Human Studies	99
3.2.2.4.2	Animal Studies	100
3.2.2.5	Musculoskeletal	102
3.2.2.5.1	Human Studies	102
3.2.2.5.2	Animal Studies	102
3.2.2.6	Hepatic Effects	103
3.2.2.6.1	Summary	103
3.2.2.6.2	Human Studies	103
3.2.2.6.2.1	Liver Enzymes, Enlargement, and Pathology	103
3.2.2.6.2.2	Serum Lipids, Triglycerides, and Cholesterol	106
3.2.2.6.2.3	Porphyria	108
3.2.2.6.2.4	Evaluation of Human Studies	108
3.2.2.6.3	Animal Studies	110
3.2.2.6.3.1	Liver Enzymes, Enlargement, and Pathology	110
3.2.2.6.3.2	Serum Lipids, Triglycerides, and Cholesterol	116
3.2.2.6.3.3	Porphyria	118
3.2.2.6.3.4	Other Hepatic Effects	119
3.2.2.6.3.5	Evaluation of Animal Studies	119
3.2.2.7	Renal Effects	120
3.2.2.7.1	Human Studies	120
3.2.2.7.2	Animal Studies	120
3.2.2.8	Endocrine Effects	122
3.2.2.8.1	Summary	122
3.2.2.8.2	Human Studies	123
3.2.2.8.3	Animal Studies	126
3.2.2.9	Dermal Effects	136
3.2.2.9.1	Summary	136
3.2.2.9.2	Human Studies	136
3.2.2.9.2.1	Occupational Exposure	136
3.2.2.9.2.2	Accidental Exposure	137
3.2.2.9.2.3	Evaluation of Human Studies	138
3.2.2.9.3	Animal Studies	139
3.2.2.9.4	Evaluation of Animal Studies	140
3.2.2.10	Ocular Effects	141
3.2.2.10.1	Summary	141
3.2.2.10.2	Human Studies	141
3.2.2.10.2.1	Occupational Exposure	141
3.2.2.10.2.2	Accidental Exposure	142
3.2.2.10.2.3	Evaluation of Human Studies	142
3.2.2.10.3	Animal Studies	143
3.2.2.10.4	Evaluation of Animal Studies	144
3.2.2.11	Body Weight Effects	144
3.2.2.11.1	Human Studies	144
3.2.2.11.2	Animal Studies	144
3.2.2.12	Other Systemic Effects	146
3.2.3	Immunological and Lymphoreticular Effects	146
3.2.3.1	Summary	146

3.2.3.2	Human Studies	147
3.2.3.3	Animal Studies	153
3.2.3.3.1	Inhalation Exposure	153
3.2.3.3.2	Oral Exposure	153
3.2.3.3.3	Dermal Exposure	161
3.2.3.3.4	Other Routes of Exposure	161
3.2.3.3.5	Evaluation of Animal Studies	162
3.2.4	Neurological Effects	165
3.2.4.1	Summary	165
3.2.4.2	Human Studies	166
3.2.4.2.1	Neurobehavioral Effects	166
3.2.4.2.1.1	Contaminated Fish Consumption	166
3.2.4.2.1.2	General Population Exposure	173
3.2.4.2.1.3	Occupational Exposure	182
3.2.4.2.1.4	Accidental Exposure	183
3.2.4.2.2	Neurophysiological Effects	184
3.2.4.2.3	Evaluation of Human Studies	184
3.2.4.3	Animal Studies	188
3.2.4.3.1	Neurobehavioral Effects	188
3.2.4.3.2	Neurochemical Effects	195
3.2.4.3.3	Other Neurological Effects	198
3.2.4.3.4	Evaluation of Animal Studies	199
3.2.5	Reproductive Effects	202
3.2.5.1	Summary	202
3.2.5.2	Human Studies	203
3.2.5.2.1	Female Reproductive Effects	203
3.2.5.2.2	Male Reproductive Effects	209
3.2.5.2.3	Evaluation of Human Studies	212
3.2.5.3	Animal Studies	215
3.2.5.3.1	Female Reproductive Effects	215
3.2.5.3.2	Male Reproductive Effects	222
3.2.5.3.3	Evaluation of Animal Studies	225
3.2.6	Developmental Effects	227
3.2.6.1	Summary	227
3.2.6.2	Human Studies	229
3.2.6.2.1	Growth and Development	229
3.2.6.2.1.1	Contaminated Fish Consumption	229
3.2.6.2.1.2	General Population Exposure	234
3.2.6.2.1.3	Occupational Exposure	237
3.2.6.2.1.4	Accidental Exposure	238
3.2.6.2.2	Evaluation of Human Studies	238
3.2.6.3	Animal Studies	241
3.2.6.3.1	Birth Weight and Early Development	241
3.2.6.3.2	Evaluation of Animal Studies	245
3.2.7	Genotoxic Effects	246
3.2.7.1	Summary	246
3.2.7.2	<i>In Vivo</i> Studies	246
3.2.7.3	<i>In Vitro</i> Studies	249
3.2.7.4	Evaluation of Genotoxicity Studies	249
3.2.8	Cancer	251
3.2.8.1	Summary	251

3.2.8.2	Human Studies	251
3.2.8.2.1	Liver, Biliary Tract, and Gall Bladder	251
3.2.8.2.2	Gastrointestinal Tract	256
3.2.8.2.3	Rectum	257
3.2.8.2.4	Skin	258
3.2.8.2.5	Brain and Central Nervous System	261
3.2.8.2.6	Hematological	262
3.2.8.2.7	Breast	264
3.2.8.2.8	Other Sites	269
3.2.8.2.9	Evaluation of Human Studies	271
3.2.8.3	Animal Studies	275
3.2.8.3.1	Inhalation Exposure	275
3.2.8.3.2	Oral Exposure	275
3.2.8.3.3	Dermal Exposure	282
3.2.8.3.4	Evaluation of Animal Studies	283
3.3	HEALTH EFFECTS IN WILDLIFE POTENTIALLY RELEVANT TO HUMAN HEALTH	285
3.3.1	Overview	285
3.3.2	Health Effects in Wildlife	290
3.4	TOXICOKINETICS	295
3.4.1	Absorption	296
3.4.1.1	Inhalation Exposure	296
3.4.1.2	Oral Exposure	297
3.4.1.3	Dermal Exposure	302
3.4.2	Distribution	305
3.4.2.1	Inhalation Exposure	311
3.4.2.2	Oral Exposure	312
3.4.2.3	Dermal Exposure	315
3.4.2.4	Other Routes of Exposure	315
3.4.3	Metabolism	316
3.4.4	Elimination and Excretion	322
3.4.4.1	Inhalation Exposure	322
3.4.4.2	Oral Exposure	322
3.4.4.3	Dermal Exposure	334
3.4.4.4	Other Routes of Exposure	334
3.4.5	Physiologically Based Pharmacokinetic (PBPK)/Pharmacodynamic (PD) Models	336
3.4.5.1	Summary of the PBPK Model	337
3.4.5.2	Description of the Model	339
3.4.5.3	Discussion of the Model	340
3.4.5.4	Validation of the Model	345
3.4.5.5	Prediction of Congener Specific PBPK Model Parameters	346
3.5	MECHANISMS OF ACTION	348
3.5.1	Pharmacokinetic Mechanisms	348
3.5.2	Mechanisms of Toxicity	352
3.5.3	Animal-to-Human Extrapolations	370
3.6	ENDOCRINE DISRUPTION	372
3.7	CHILDREN'S SUSCEPTIBILITY	380
3.8	BIOMARKERS OF EXPOSURE AND EFFECT	394
3.8.1	Biomarkers Used to Identify or Quantify Exposure to Polychlorinated Biphenyls	395
3.8.2	Biomarkers Used to Characterize Effects Caused by Polychlorinated Biphenyls	399
3.9	INTERACTIONS WITH OTHER CHEMICALS	401

3.10	POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE	410
3.11	METHODS FOR REDUCING TOXIC EFFECTS	411
3.11.1	Reducing Peak Absorption Following Exposure	411
3.11.2	Reducing Body Burden	412
3.11.3	Interfering with the Mechanism of Action for Toxic Effects	412
3.12	ADEQUACY OF THE DATABASE	413
3.12.1	Existing Information on Health Effects of Polychlorinated Biphenyls	414
3.12.2	Identification of Data Needs	417
3.12.3	Ongoing Studies	435
4.	CHEMICAL AND PHYSICAL INFORMATION	443
4.1	CHEMICAL IDENTITY	443
4.2	PHYSICAL AND CHEMICAL PROPERTIES	444
5.	PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL	467
5.1	PRODUCTION	467
5.2	IMPORT/EXPORT	468
5.3	USE	469
5.4	DISPOSAL	471
6.	POTENTIAL FOR HUMAN EXPOSURE	477
6.1	OVERVIEW	477
6.2	RELEASES TO THE ENVIRONMENT	481
6.2.1	Air	482
6.2.2	Water	483
6.2.3	Soil	485
6.3	ENVIRONMENTAL FATE	486
6.3.1	Transport and Partitioning	486
6.3.2	Transformation and Degradation	502
6.3.2.1	Air	502
6.3.2.2	Water	506
6.3.2.3	Sediment and Soil	507
6.4	LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT	519
6.4.1	Air	520
6.4.2	Water	528
6.4.3	Sediment and Soil	532
6.4.4	Other Environmental Media	536
6.5	GENERAL POPULATION AND OCCUPATIONAL EXPOSURE	556
6.6	EXPOSURES OF CHILDREN	568
6.7	POPULATIONS WITH POTENTIALLY HIGH EXPOSURES	576
6.8	ADEQUACY OF THE DATABASE	587
6.8.1	Identification of Data Needs	587
6.8.2	Ongoing Studies	592
7.	ANALYTICAL METHODS	595
7.1	BIOLOGICAL SAMPLES	597
7.2	ENVIRONMENTAL SAMPLES	603
7.3	ADEQUACY OF THE DATABASE	609
7.3.1	Identification of Data Needs	609
8.	REGULATIONS AND ADVISORIES	615

9. REFERENCES	627
10. GLOSSARY	759

APPENDICES

A. ATSDR MINIMAL RISK LEVELS AND WORKSHEETS	A-1
Table A1.	A-10
Table A2.	A-14
B. USER'S GUIDE	B-1
C. ACRONYMS, ABBREVIATIONS, AND SYMBOLS	C-1
D. INDEX	D-1
E. SUMMARY REPORT FOR THE EXPERT PANEL REVIEW of April 13, 2000	E-1

LIST OF FIGURES

3-1	Levels of Significant Exposure to PCB Mixtures - Inhalation	42
3-2	Levels of Significant Exposure to PCB Mixtures - Oral	78
3-3.	Metabolic Pathways for Polychlorinated Biphenyls	323
3-4.	Conceptual Representation of a Physiologically Based Pharmacokinetic (PBPK) Model for a Hypothetical Chemical Substance	338
3-5.	Existing Information on Health Effects of Polychlorinated Biphenyls	415
6-1.	Frequency of NPL Sites with PCB Contamination	478
6-2.	Pathways for OH Radical-initiated Reaction of 3-Chlorobiphenyl	505
6-3.	Pathways for Aerobic Degradation of PCBs	509
6-4.	Possible Mechanism for Reductive Dechlorination by Anaerobic Microorganisms	515
6-5.	1998 Fish Advisories for Polychlorinated Biphenyls	582

LIST OF TABLES

3-1	Levels of Significant Exposure to PCBs - Inhalation	39
3-2	Levels of Significant Exposure to PCBs - Oral	43
3-3	Levels of Significant Exposure to PCBs - Dermal	88
3-4	Genotoxicity of Polychlorinated Biphenyls <i>In Vivo</i>	248
3-5	Genotoxicity of Polychlorinated Biphenyls <i>In Vitro</i>	250
3-6.	PCB Hazard Identification in Wildlife	287
3-7.	Net Gastrointestinal Absorption or Excretion of PCBs in Humans and Dependence on Congener-Specific Blood Lipid Levels	300
3-8.	Mean PCB Concentrations (Microgram Per Kilogram Lipid Basis) in Autopsy Tissue Samples from Greenlanders	310
3-9.	Apparent Half-lives (Years) of PCB Congeners from Multiple Studies	326
3-10.	Apparent Half-lives (Years) of PCB Mixtures from Multiple Studies	328
3-11.	Volumes and Flow Rates in Several Tissues of Four Species	341
3-12.	Metabolism Rate Constant (k) from the Physiologic Model	342
3-13.	Tissue-to-blood Distribution Coefficients for Parent Polychlorinated Biphenyls (R) and Metabolites (R')	343
3-14.	Kidney Clearance (k_k) and Biliary Clearance (k_g) for Selected Polychlorinated Biphenyls in Several Species	344
3-15.	Ongoing Studies on the Health Effects of PCBs	436
3-16.	Ongoing Studies on the Human Health Effects of PCBs Sponsored by ATSDR	441
4-1.	Chemical Identity of Selected Technical Polychlorinated Biphenyls or Aroclors	445
4-2.	Chemical Identity of Polychlorinated Biphenyl Congeners and Homologs	447
4-3.	Physical and Chemical Properties of Some Aroclors	453
4-4.	Approximate Weight Percent of PCB Homologs in Some Aroclors	456
4-5.	Polychlorinated Biphenyl Congener Compositions (in Weight Percent) ^a in Aroclors	457

4-6. Concentrations of Chlorinated Dibenzofurans (CDFs) in Commercial Polychlorinated Biphenyl Mixtures	465
4-7. Physical and Chemical Properties of Several Congeners of Polychlorinated Biphenyls	466
5-1. Summary of Former End Uses for Various Aroclors	470
5-2. Facilities that Manufacture or Process Polychlorinated Biphenyls	472
6-1. Releases to the Environment from Facilities that Manufacture or Process Polychlorinated Biphenyls	484
6-2. Percentage of Loss of Polychlorinated Biphenyls from the Great Lakes Waters	492
6-3. Bioconcentration Factors (BCFs) and Bioaccumulation Factors (BAFs) for Select Congeners and Total Polychlorinated Biphenyls in Various Aquatic Organisms	494
6-4. Bioconcentration Factors (BCFs) for Various Aroclors in Fresh Water Species	495
6-5. Bioconcentration Factors (BCFs) for Various Aroclors in Salt Water Species	496
6-6. Field Measured Bioaccumulation Factors for Isomeric Groups of Polychlorinated Biphenyls ..	498
6-7. Observed Soil and Sediment Sorption Coefficients (K_{oc}) for Polychlorinated Biphenyls Congeners	500
6-8. Plant Uptake (Bioaccumulation) of PCBs	503
6-9. Positions of Chlorines Removed by Each Dechlorination Process	513
6-10. Atmospheric Concentrations of Polychlorinated Biphenyls	522
6-11. PCB Concentrations in Water Samples Collected from the Great Lakes	529
6-12. Comparison of PCB Levels (ng/L) in Rainwater Samples from the 1970s to the 1990s	531
6-13. Polychlorinated Biphenyl Residues in Domestic Raw Foods for Fiscal Years 1969–1976	537
6-14. Mean PCB Concentrations in Fish from the Great Lakes Region	542
6-15. Mean PCB Concentrations in Fish	543
6-16. Mean Total PCB Levels in Standard Fillets of Fish Collected from the Vicinity of a Superfund Site	546
6-17. Mean PCB Concentrations in Fish from Remote Areas	548
6-18. Mean Concentration of PCBs in Crustaceans	550
6-19. Mean PCB Concentrations in Animals	552

6-20. Mean PCB Concentrations in Blubber of Sea Mammals	554
6-21. Serum Polychlorinated Biphenyl (PCB) Levels in Non-occupationally Exposed U.S. Populations That Do Not Consume Fish from PCB-Contaminated Waters (1973–1996)	558
6-22. Estimated Daily Dietary Intake ($\mu\text{g}/\text{kg}/\text{day}$) of Polychlorinated Biphenyls for Adults, Toddlers, and Infants	561
6-23. Mean Daily Intakes of PCBs Per Unit of Body Weight ($\mu\text{g}/\text{kg}$ body weight/day)	562
6-24. Children Total Diet Studies — PCB Intakes from 265 Foods for the Years 1991–1997	563
6-25. Adult Total Diet Studies — PCB Intakes from 265 Foods for the Years 1991–1997	564
6-26. Serum Polychlorinated Biphenyl (PCB) Levels in Populations with Occupational Exposure	567
6-27. Mean Concentration of PCBs in Human Breast Milk	571
6-28. Serum Polychlorinated Biphenyl (PCB) Levels in Non-occupationally Exposed U.S. Populations that Consume Fish from PCB-contaminated Waters (1973–1995)	578
6-29. Ongoing Studies on Environmental Fate and Treatment of Polychlorinated Biphenyls	593
7-1. EPA Method 1668-Estimated Method Detection Limits (EMDL) and Estimated Minimal Levels (EML) of Selected PCB Congeners	598
7-2. Analytical Methods for Determining Polychlorinated Biphenyls in Biological Samples	599
7-3. Analytical Methods for Determining Polychlorinated Biphenyls in Environmental Samples ...	604
7-4. NIST Standard Reference Materials for the Determination of Polychlorinated Biphenyls (PCBs)	610
7-5. Analytical Methods for Determining Biomarkers for Polychlorinated Biphenyls	611
8-1. Regulations and Guidelines Applicable to PCBs	619