

**DRAFT
TOXICOLOGICAL PROFILE FOR
CADMIUM**

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 Cadmium was released in 1999. This present edition supersedes any previously released draft or final profile.

Toxicological profiles are revised and republished as necessary. 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. We plan to revise these documents in response to public comments and as additional data become available. Therefore, we encourage comments that will make the toxicological profile series of the greatest use.

Comments should be sent to:

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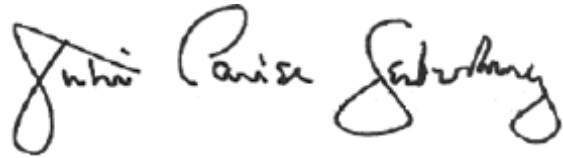
Background Information

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 prepare 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 December 7, 2005 (70 FR 72840). For prior versions of the list of substances, see Federal Register notices dated 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); February 28, 1994 (59 FR 9486); April 29, 1996 (61 FR 18744); November 17, 1997 (62 FR 61332); October 21, 1999 (64 FR 56792); October 25, 2001 (66 FR 54014) and November 7, 2003 (68 FR 63098). Section 104(i)(3) of CERCLA, as amended, directs the Administrator of ATSDR to prepare a toxicological profile for each substance on the list.

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.



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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@AOEC.ORG • Web Page: <http://www.aoec.org/>.

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, 25 Northwest Point Boulevard, Suite 700, Elk Grove Village, IL 60007-1030 • Phone: 847-818-1800 • FAX: 847-818-9266.

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THE PROFILE HAS UNDERGONE THE FOLLOWING ATSDR INTERNAL REVIEWS:

1. 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.
2. 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.
3. Data Needs Review. The Applied Toxicology Branch reviews data needs sections to assure consistency across profiles and adherence to instructions in the Guidance.
4. Green Border Review. Green Border review assures the consistency with ATSDR policy.

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PEER REVIEW

A peer review panel was assembled for cadmium. The panel consisted of the following members:

1. Maryka H. Bhattacharyya, Ph.D., Senior Biochemist, Biosciences Division (BIO), Argonne National Laboratory, Lemont, Illinois 60439,
2. Masayuki Ikeda, Ph.D., M.D., Professor, Kyoto Industrial Health Association, Kyoto, Japan 604-8472, and
3. Zahir A Shaikh, Ph.D., Professor of Pharmacology and Toxicology, Director of the Center for Molecular Toxicology, University of Rhode Island, Kingston, Rhode Island 02881.

These experts collectively have knowledge of cadmium's 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.

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.

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CONTENTS

DISCLAIMER ii

UPDATE STATEMENT iii

FOREWORD v

QUICK REFERENCE FOR HEALTH CARE PROVIDERS vii

CONTRIBUTORS ix

PEER REVIEW xi

CONTENTS xiii

LIST OF FIGURES xvii

LIST OF TABLES xix

1. PUBLIC HEALTH STATEMENT 1

 1.1 WHAT IS CADMIUM? 2

 1.2 WHAT HAPPENS TO CADMIUM WHEN IT ENTERS THE ENVIRONMENT? 2

 1.3 HOW MIGHT I BE EXPOSED TO CADMIUM? 3

 1.4 HOW CAN CADMIUM ENTER AND LEAVE MY BODY? 4

 1.5 HOW CAN CADMIUM AFFECT MY HEALTH? 5

 1.6 HOW CAN CADMIUM AFFECT CHILDREN? 6

 1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO CADMIUM? 7

 1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO CADMIUM? 7

 1.9 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 8

 1.10 WHERE CAN I GET MORE INFORMATION? 9

2. RELEVANCE TO PUBLIC HEALTH 11

 2.1 BACKGROUND AND ENVIRONMENTAL EXPOSURES TO CADMIUM IN THE UNITED STATES 11

 2.2 SUMMARY OF HEALTH EFFECTS 12

 2.3 MINIMAL RISK LEVELS (MRLs) 15

3. HEALTH EFFECTS 43

 3.1 INTRODUCTION 43

 3.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 43

 3.2.1 Inhalation Exposure 45

 3.2.1.1 Death 45

 3.2.1.2 Systemic Effects 48

 3.2.1.3 Immunological and Lymphoreticular Effects 92

 3.2.1.4 Neurological Effects 93

 3.2.1.5 Reproductive Effects 94

 3.2.1.6 Developmental Effects 97

 3.2.1.7 Cancer 98

 3.2.2 Oral Exposure 102

 3.2.2.1 Death 102

 3.2.2.2 Systemic Effects 103

 3.2.2.3 Immunological and Lymphoreticular Effects 159

 3.2.2.4 Neurological Effects 160

 3.2.2.5 Reproductive Effects 161

 3.2.2.6 Developmental Effects 164

 3.2.2.7 Cancer 167

3.2.3	Dermal Exposure.....	170
3.2.3.1	Death	170
3.2.3.2	Systemic Effects	170
3.2.3.3	Immunological and Lymphoreticular Effects.....	171
3.2.3.4	Neurological Effects	173
3.2.3.5	Reproductive Effects.....	173
3.2.3.6	Developmental Effects.....	173
3.2.3.7	Cancer.....	173
3.3	GENOTOXICITY	173
3.4	TOXICOKINETICS	180
3.4.1	Absorption.....	181
3.4.1.1	Inhalation Exposure.....	181
3.4.1.2	Oral Exposure.....	182
3.4.1.3	Dermal Exposure.....	185
3.4.2	Distribution	187
3.4.2.1	Inhalation Exposure.....	187
3.4.2.2	Oral Exposure.....	187
3.4.2.3	Dermal Exposure.....	189
3.4.3	Metabolism.....	189
3.4.4	Elimination and Excretion.....	189
3.4.4.1	Inhalation Exposure.....	190
3.4.4.2	Oral Exposure.....	190
3.4.4.3	Dermal Exposure.....	191
3.4.5	Physiologically Based Pharmacokinetic (PBPK)/Pharmacodynamic (PD) Models	191
3.4.5.1	Summary of Cadmium PBPK Models.....	193
3.4.5.2	Cadmium PBPK Model Comparison	193
3.4.5.3	Discussion of Cadmium Models	193
3.5	MECHANISMS OF ACTION	205
3.5.1	Pharmacokinetic Mechanisms.....	205
3.5.2	Mechanisms of Toxicity.....	208
3.5.3	Animal-to-Human Extrapolations	212
3.6	TOXICITIES MEDIATED THROUGH THE NEUROENDOCRINE AXIS	213
3.7	CHILDREN'S SUSCEPTIBILITY	214
3.8	BIOMARKERS OF EXPOSURE AND EFFECT	219
3.8.1	Biomarkers Used to Identify or Quantify Exposure to Cadmium.....	220
3.8.2	Biomarkers Used to Characterize Effects Caused by Cadmium.....	223
3.9	INTERACTIONS WITH OTHER CHEMICALS	226
3.10	POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE.....	229
3.11	METHODS FOR REDUCING TOXIC EFFECTS.....	229
3.11.1	Reducing Peak Absorption Following Exposure	230
3.11.2	Reducing Body Burden.....	231
3.11.3	Interfering with the Mechanism of Action for Toxic Effects	233
3.12	ADEQUACY OF THE DATABASE.....	234
3.12.1	Existing Information on Health Effects of Cadmium	235
3.12.2	Identification of Data Needs	235
3.12.3	Ongoing Studies.....	247
4.	CHEMICAL AND PHYSICAL INFORMATION.....	249
4.1	CHEMICAL IDENTITY.....	249
4.2	PHYSICAL AND CHEMICAL PROPERTIES.....	249

5. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL	255
5.1 PRODUCTION	255
5.2 IMPORT/EXPORT	261
5.3 USE.....	261
5.4 DISPOSAL.....	262
6. POTENTIAL FOR HUMAN EXPOSURE	265
6.1 OVERVIEW.....	265
6.2 RELEASES TO THE ENVIRONMENT	269
6.2.1 Air	270
6.2.2 Water.....	275
6.2.3 Soil	276
6.3 ENVIRONMENTAL FATE.....	278
6.3.1 Transport and Partitioning.....	278
6.3.2 Transformation and Degradation	283
6.3.2.1 Air.....	283
6.3.2.2 Water	283
6.3.2.3 Sediment and Soil.....	283
6.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT	284
6.4.1 Air	284
6.4.2 Water.....	286
6.4.3 Sediment and Soil	287
6.4.4 Other Environmental Media.....	288
6.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE	293
6.6 EXPOSURES OF CHILDREN	303
6.7 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES	305
6.8 ADEQUACY OF THE DATABASE.....	307
6.8.1 Identification of Data Needs	307
6.8.2 Ongoing Studies	311
7. ANALYTICAL METHODS.....	315
7.1 BIOLOGICAL MATERIALS	315
7.2 ENVIRONMENTAL SAMPLES.....	317
7.3 ADEQUACY OF THE DATABASE.....	320
7.3.1 Identification of Data Needs	324
7.3.2 Ongoing Studies	324
8. REGULATIONS, ADVISORIES, AND GUIDELINES.....	327
9. REFERENCES	333
10. GLOSSARY	449
APPENDICES	
A. ATSDR MINIMAL RISK LEVELS AND WORKSHEETS	A-1
B. USER'S GUIDE.....	B-1
C. ACRONYMS, ABBREVIATIONS, AND SYMBOLS.....	C-1
D. INDEX	D-1

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LIST OF FIGURES

2-1. Combined Chronic Oral Cadmium Intakes ($\mu\text{g}/\text{kg}/\text{day}$) and Inhalation Cadmium Exposures ($\mu\text{g}/\text{m}^3$) that Achieve a Urinary Cadmium Excretion of $0.5 \mu\text{g}/\text{g}$ Creatinine at Age 55 Years Predicted by the Cadmium Pharmacokinetic Model and the International Commission on Radiological Protection (ICRP) Human Respiratory Tract Model.....	24
2-2. Estimates of the UCD_{10} from Environmental Exposure Dose-Response Studies.....	39
2-3. Urinary Cadmium ($\mu\text{g}/\text{g}$ creatinine) and Renal Cortex Cadmium Concentration ($\mu\text{g}/\text{g}$ wet tissue) Predicted by the Cadmium Pharmacokinetic Model.....	40
3-1. Levels of Significant Exposure to Cadmium - Inhalation	67
3-2. Levels of Significant Exposure to Cadmium - Oral	128
3-3. Conceptual Representation of a Physiologically Based Pharmacokinetic (PBPK) Model for a Hypothetical Chemical Substance.....	194
3-4. A Schematic Representation of the Nordberg-Kjellström Model.....	196
3-5. A Schematic Representation of the Shank Model	201
3-6. Existing Information on Health Effects of Cadmium.....	236
6-1. Frequency of NPL Sites with Cadmium Contamination	266
6-2. Frequency of NPL Sites with Cadmium Compounds Contamination.....	267

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LIST OF TABLES

2-1. Summary of Human Studies Finding Dose-Response Relationships Between Biomarkers of Renal Dysfunction and Cadmium Exposure	32
2-2. Selected Benchmark Dose Estimations of Urinary Cadmium Levels Associated with Increases in the Prevalence of Low Molecular Weight Proteinuria.....	35
2-3. Selected Studies of Dose-Response Relationship for Cadmium-Induced Low Molecular Weight Proteinuria	37
3-1. Levels of Significant Exposure to Cadmium - Inhalation	49
3-2. Comparison of Lung Effects Across Intermediate-Duration Inhalation Studies	76
3-3. Severity of Respiratory Effects in Rats and Mice Exposed to Cadmium Oxide for 13 Weeks.....	77
3-4. Summary of Occupational Exposure Studies Examining Renal Effects	85
3-5. Guidelines for Interpreting β 2-microglobulin Levels.....	89
3-6. Levels of Significant Exposure to Cadmium - Oral	104
3-7. Summary of Human Studies Examining Renal Effects.....	143
3-8. Benchmark Dose Estimations of Urinary Cadmium Levels.....	153
3-9. Levels of Significant Exposure to Cadmium - Dermal.....	172
3-10. Genotoxicity of Cadmium <i>In Vivo</i>	174
3-11. Genotoxicity of Cadmium <i>In Vitro</i>	177
3-12. Assumed Model Parameters and Some Physiologic Parameters for the Nordberg-Kjellström Model	197
3-13. Estimated Parameters, Rate of Uptake, Rate Constants, and Biological Half-Lives in Selected Mouse Organs After Subcutaneous and Oral Administrations of $^{109}\text{CdCl}_2$	204
3-14. Ongoing Studies on Cadmium.....	248
4-1. Chemical Identity of Cadmium and Compounds	250
4-2. Physical and Chemical Properties of Cadmium and Compounds	252
5-1. Facilities that Produce, Process, or Use Cadmium	256
5-2. Facilities that Produce, Process, or Use Cadmium Compounds.....	258
6-1. Releases to the Environment from Facilities that Produce, Process, or Use Cadmium.....	271

6-2. Releases to the Environment from Facilities that Produce, Process, or Use Cadmium Compounds 273

6-3. Mean Concentrations of Cadmium for FDA’s Total Diet Study Market Baskets 91-3 through 97-1 290

6-4. Geometric Mean and Selected Percentile Blood Concentrations (µg/L) of Cadmium in the U.S. Population From 1999 to 2002..... 295

6-5. Geometric Mean and Selected Percentile Urine Concentrations (Creatine Corrected) (µg/L) of Cadmium in the U.S. Population From 1999 to 2002 296

6-6. Geometric Mean and Selected Percentile Urine Concentrations (µg/L) of Cadmium in the U.S. Population From 1999 to 2002..... 297

6-7. Blood Cadmium Concentrations, Geometric Means, Adjusted Proportional Change in Means, and 95th Percentiles in New York City Adults in Population Subgroups..... 298

6-8. Occupations with Potential Exposure to Cadmium and Cadmium Compounds 301

6-9. Estimated Number of Workers Potentially Exposed to Various Chemicals in the Workplace in 1981–1983..... 302

6-10. Ongoing Studies on Cadmium..... 312

7-1. Analytical Methods for Determining Cadmium in Biological Materials 318

7-2. Analytical Methods for Determining Cadmium in Environmental Samples..... 321

7-3. Ongoing Analytical Methods Studies on Cadmium 326

8-1. Regulations, Advisories, and Guidelines Applicable to Cadmium 329