TOXICOLOGICAL PROFILE FOR 1,2-DIBROMO-3-CHLOROPROPANE

Agency for Toxic Substances and Disease Registry U.S. Public Health Service

DISCLAIMER

The use of company or product name(s) is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry.

FOREWORD

The Superfund Amendments and Reauthorization Act (SARA) of 1986 (Public Law 99-499) extended and amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund). This public law directed the Agency for Toxic Substances and Disease Registry (ATSDR) to prepare toxicological profiles for hazardous substances which are most commonly found at facilities on the CERCLA National Priorities List and which pose the most significant potential threat to human health, as determined by ATSDR and the Environmental Protection Agency (EPA). The lists of the 250 most significant hazardous substances were published in the Federal Register on April 17, 1987; on October 20, 1988; on October 26, 1989; and on October 17, 1990. A revised list of 275 substances was published on October 17, 1991.

Section 104(i)(3) of CERCLA, as amended, directs the Administrator of ATSDR to prepare a toxicological profile for each substance on the lists. Each profile must include the following content:

- (A) An examination, summary, and interpretation of available toxicological information and epidemiological evaluations on the hazardous substance in order 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 which present a significant risk to human health of acute, subacute, and chronic health effects.
- (C) Where appropriate, an identification of toxicological testing needed to identify the types or levels of exposure that may present significant risk of adverse health effects in humans.

This toxicological profile is prepared in accordance with guidelines developed by ATSDR and EPA. The original guidelines were published in the <u>Federal Register</u> on April 17, 1987. Each profile will be revised and republished as necessary.

The ATSDR toxicological profile is intended to characterize succinctly the toxicological and adverse health effects information for the hazardous substance being described. Each profile identifies and reviews the key literature (that has been peer-reviewed) that describes a hazardous substance's toxicological properties. Other pertinent literature is also presented but 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.

Foreword

Each toxicological profile begins with a public health statement, which 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 will be identified by ATSDR, the National Toxicology Program (NTP) of the Public Health Service, and EPA. The focus of the profiles is on health and toxicological information; therefore, we have included this information in the beginning of the document.

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 our assessment of all relevant toxicological testing and information that has been peer reviewed. It has been reviewed by scientists from ATSDR, the Centers for Disease Control, the NTP, and other federal agencies. It has also been reviewed by a panel of nongovernment peer reviewers. Final responsibility for the contents and views expressed in this toxicological profile resides with ATSDR.

William L. Roper, M.D., M.P.H.

William L. Roper

Administrator
Agency for Toxic Substances and

Disease Registry

CONTENTS

FORE	WORI						•	iii
LIST	OF	FIGURES					.•	ix
LIST	OF	TABLES					٠	хi
1.	PUBI	LIC HEALT	TH STATEM	NT				1
	1.1			OMO-3-CHLOROPROPANE?				1
	1.2			XPOSED TO 1,2-DIBROMO-3-CHLOROPROPANE? .				2
	1.3			OMO-3-CHLOROPROPANE ENTER AND LEAVE MY BO				3
	1.4			OMO-3-CHLOROPROPANE AFFECT MY HEALTH? .		·		3
	1.5			AL TEST TO DETERMINE WHETHER I HAVE BEEN	•	•		
				IBROMO-3-CHLOROPROPANE?				4
	1.6			IONS HAS THE FEDERAL GOVERNMENT MADE TO	•	•	·	
			T HUMAN HI					5
	1.7			MORE INFORMATION?				5
	,	WILLIAM	0111 1 011		• •	•	•	-
2.	HEAT	TH EFFE	CTS					7
	2.1							7
	2.2			ALTH EFFECTS BY ROUTE OF EXPOSURE				7
		2.2.1		n Exposure				8
		2.2.1	2.2.1.1	Death				8
			2.2.1.2	Systemic Effects				9
			2.2.1.3	Immunological Effects				24
			2.2.1.4	Neurological Effects				25
			2.2.1.5	Developmental Effects				25
			2.2.1.6	Reproductive Effects				26
			2.2.1.7	Genotoxic Effects				27
			2.2.1.7	Cancer				28
		2.2.2						28
		2.2.2	2.2.2.1	sure				28
			2.2.2.1	Death				29
			2.2.2.2	Systemic Effects				43
			2.2.2.3					43
			2.2.2.4	Neurological Effects				44
			2.2.2.5					44
			2.2.2.7	Reproductive Effects				46
			2.2.2.7	Genotoxic Effects		٠	٠	
		2 2 2		Cancer		•	•	46
		2.2.3	2.2.3.1	posure		٠	٠	47 4.7
			2.2.3.1	Death				47 47
				Systemic Effects				47
			2.2.3.3	Immunological Effects				49
			2.2.3.4	Neurological Effects				49
			2.2.3.5	Developmental Effects				49
			2.2.3.6	Reproductive Effects				49

																			49
																			49
2.3	TOXICO	KINETICS																	50
	2.3.1	Absorpti	on																50
		2.3.1.1	Inhalati	on Expo	sur	е													50
		2.3.1.2	Oral Exp	osure															50
		2.3.1.3	Dermal F	Exposure															50
	2.3.2	Distribu																	50
																			50
		2.3.2.2		-															50
		2.3.2.3																	51
	2.3.3			•															51
																			53
																			53
																			53
																			54
2 4	RETEVA																		54
																			67
2.5																			07
	2.5.1																		68
	252																	•	00
	2.3.2																		69
2 (TAIMEDA																		70
																			70
	MITIGA	TION OF TO	DXICOLOGI	CAL EFF	FCI	5	•		٠	•	•		•	•	•	٠	٠	•	70
2.9	ADEQUA	CY OF THE	DATABASE			٠.	٠_		•	٠			•		•	•	•	•	72
	2.9.1																		
		3-chloro	propane .			•	•		•	•	•		•	•	•	•	•		72
	2.9.2	Data Nee	ds												٠		•	•	74
	2.9.3	On-going	Studies						•									•	79
																			81
3.1	CHEMIC.	AL IDENTI	ГҮ																81
3.2	PHYSIC.	AL AND CH	EMICAL PF	OPERTIE	S.													•	81
PRODU																			85
	PRODUC	TION																	85
4.2	IMPORT	/EXPORT																	85
4.3	USE .																		85
4.4	DISPOS	AL																	86
POTE	NTIAL F	OR HUMAN I	EXPOSURE																87
5.1																			87
5.2	RELEAS	ES TO THE	ENVIRONM	IENT .															88
	5.2.1																		88
																			88
																			90
5.3																			90
٠. ٠						•	•								•		•		70
	5.3.1	Trangnor	t and Par	titioni	no														90
	3.1 3.2 PRODI 4.1 4.2 4.3 4.4 POTEI 5.1	2.3.1 2.3.2 2.3.2 2.3.3 2.3.4 2.4 RELEVA 2.5 BIOMAR 2.5.1 2.5.2 2.6 INTERA 2.7 POPULA 2.8 MITIGA 2.9 ADEQUA 2.9.1 2.9.2 2.9.3 CHEMICAL AN 3.1 CHEMIC 3.2 PHYSIC PRODUCTION, 4.1 PRODUC 4.2 IMPORT 4.3 USE 4.4 DISPOS POTENTIAL F 5.1 OVERVI 5.1 OVERVI 5.2 RELEAS 5.2.1 5.2.2 5.2.3 5.3 ENVIRO	2.2.3.8 2.3 TOXICOKINETICS 2.3.1 Absorptice 2.3.1.1 2.3.1.2 2.3.1.3 2.3.2 Distribute 2.3.2.1 2.3.2.2 2.3.2.3 2.3.3 Metabolice 2.3.4.1 2.3.4.2 2.3.4.3 2.4 RELEVANCE TO PUCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	2.2.3.8 Cancer . 2.3 TOXICOKINETICS 2.3.1 Absorption 2.3.1.1 Inhalati	2.2.3.8 Cancer	2.2.3.8 Cancer	2.2.3.8 Cancer 2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.1 Inhalation Exposure 2.3.2.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.6 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.7 Dermal Exposure 2.5.1 Biomarkers Used to Identify an 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characteriz 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characteriz 2.9-Dibromo-3-chloropropane 2.5.2 Data Needs 2.9.1 Existing Information on Health 3-chloropropane 2.9.2 Data Needs 2.9.1 Existing Information on Health 3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 GHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 RELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.2.3.8 Cancer 2.3 TOXICOKINETICS 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.6 Toral Exposure 2.3.4.7 Dermal Exposure 2.5.1 Biomarkers Used to Identify and/oral Exposure 2.5.2 Biomarkers Used to Identify and/oral Exposure 2.5.2 Biomarkers Used to Characterize Injection of the Interval Exposure 2.5.2 Biomarkers Used to Characterize Injection of Toxicological Exposure 2.5.2 Biomarkers Used to Characterize Injection of Toxicological Exposure 2.5.1 Existing Information on Health Exposure 2.5.2 Data Needs 2.5.1 Existing Information on Health Exposure 2.5.2 Data Needs 2.5.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 RELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.2.3.8 Cancer	2.2.3.8 Cancer 2.3.1 TOXICOKINETICS 2.3.1.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.1 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.4 Inhalation Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.4 RELEVANCE TO PUBLIC HEALTH 2.5 BIOMARKERS OF EXPOSURE AND EFFECT 2.5.1 Biomarkers Used to Identify and/or Qual, 2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effect 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effect 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effect 2.5.1 Biomarkers Used to Characterize Effect 2.5.2 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 2.8 MITIGATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACY OF THE DATABASE 2.9.1 Existing Information on Health Effects 3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 RELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.2.3.8 Cancer 2.3.1 TOXICOKINETICS 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.2 Oral Exposure 2.3.2.1 Inhalation Exposure 2.3.2.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4 Oral Exposure 2.3.2 Oral Exposure 2.3.4 Oral Exposure 2.3.2 Oral Exposure 2.3.4 Oral Exposure 2.3.2 Oral Exposure 2.3.2 Oral Exposure 2.3.4 Oral Exposure 2.3.4 Oral Exposure 2.3.2 Oral Exposure 2.3.2 Oral Exposure 2.3.2 Oral Exposure 2.3.4 O	2.2.3.8 Cancer 2.3 TOXICOKINETICS 2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.2.1 Inhalation Exposure 2.3.2.1 Inhalation Exposure 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Metabolism 2.3.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.6 Excretion 2.5.1 Biomarkers Oral Exposure 2.5.1 Biomarkers Used to Identify and/or Quantify 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Canda 1,2-Dibromo-3-chloropropane 2.5.2 Dibromo-3-chloropropane 2.5.2 Dibromo-3-chloropropane 2.6 INTERACTIONS WITH OTHER CHEMICALS 2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 2.8 MITIGATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACOY OF THE DATABASE 2.9.1 Existing Information on Health Effects of 1	2.2 3.8 Cancer 2.3 TOXICOKINETICS 2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.1 Inhalation Exposure 2.3.2.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Metabolism 2.3.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.5.1 Biomarkers Used to Identify and/or Quantify Figure 1	2.2.3.8 Cancer 2.3 TOXICOKINETICS 2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Metabolism 2.3.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.5.1 Biomarkers Used to Identify and/or Quantify Exp 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Identify and/or Quantify Exp 1,2-Dibromo-3-chloropropane 2.5 Biomarkers Used to Characterize Effects Caused 1,2-Dibromo-3-chloropropane 2.6 INTERACTIONS WITH OTHER CHEMICALS 2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 2.8 MITIGATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACY OF THE DATABASE 2.9.1 Existing Information on Health Effects of 1,2-D 3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 RELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.2.3.8 Cancer 2.3 TOXICOKINETICS 2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Metabolism 2.3.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Oral Exposure 2.3.4.1 Sexposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.6 RELEVANCE TO PUBLIC HEALTH 2.5 BIOMARKERS OF EXPOSURE AND EFFECT 2.5.1 Biomarkers Used to Identify and/or Quantify Exposure 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Identify and/or Quantify Exposure 2.6 INTERACTIONS WITH OTHER CHEMICALS 2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 2.8 MITIGATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACY OF THE DATABASE 2.9.1 Existing Information on Health Effects of 1,2-Dibromation on Graph Studies 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL 4.4 DISPOSAL 4.4 DISPOSAL 5.2 Water 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.1 Inhalation Exposure 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Oral Exposure 2.5.1 Biomarker Upublic Health 2.5 BIOMARKERS OF EXPOSURE AND EFFECT 2.5.1 Biomarkers Used to Identify and/or Quantify Exposure 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.6 INTERACTIONS WITH OTHER CHEMICALS 2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 2.8 MITICATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACY OF THE DATABASE 2.9.1 Existing Information on Health Effects of 1,2-Dibrom 3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 RELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.2.3.8 Cancer 2.3 TOXICOKINETICS 2.3.1.1 Absorption 2.3.1.2 Oral Exposure 2.3.1.2 Oral Exposure 2.3.1.3 Dermal Exposure 2.3.2.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.3 Metabolism 2.3.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Dermal Exposure 2.3.4.3 Dermal Exposure 2.5.4 RELEVANCE TO PUBLIC HEALTH 2.5 BIOMARKERS OF EXPOSURE AND EFFECT 2.5.1 Biomarkers Used to Identify and/or Quantify Exposure to 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.6 INTERACTIONS WITH OTHER CHEMICALS 2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 2.8 MITICATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACY OF THE DATABASE 2.9.1 Existing Information on Health Effects of 1,2-Dibromo-3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION, IMPORT, USE, AND DISPOSAL 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 RELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.2.3.8 Cancer 2.3 TOXICOKINETICS 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.2 Distribution 2.3.2.1 Inhalation Exposure 2.3.2.2 Distribution 2.3.2.3 Metabolism 2.3.4.3 Dermal Exposure 2.3.4.3 Metabolism 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.1 Inhalation Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.5 Dermal Exposure 2.5 BIOMARKERS OF EXPOSURE AND EFFECT 2.5 BIOMARKERS Used to Identify and/or Quantify Exposure to 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 BIOMARKERS Used to Characterize Effects 2.9 POPULATIONS WITH OTHER CHEMICALS 2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE MITICATION OF TOXICOLOGICAL EFFECTS 2.9 ADEQUACY OF THE DATABASE 2.9.1 Existing Information on Health Effects of 1,2-Dibromo-3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 NELEASES TO THE ENVIRONMENT 5.2.1 Air 5.2.2 Water 5.2.3 Soil	2.3 TOXICOKINETICS 2.3.1 Absorption 2.3.1.1 Inhalation Exposure 2.3.1.2 Oral Exposure 2.3.1.2 Oral Exposure 2.3.1.2 Distribution 2.3.2.2 Distribution 2.3.2.2 Oral Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.3 Dermal Exposure 2.3.2.4 Oral Exposure 2.3.2.5 Dermal Exposure 2.3.2.5 Dermal Exposure 2.3.4 Excretion 2.3.4.1 Inhalation Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.3 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Oral Exposure 2.3.4.3 Dermal Exposure 2.3.4.5 Dermal Exposure 2.3.4.2 Oral Exposure 2.3.4.2 Dermal Exposure 2.5.1 Biomarkers Used to Identify and/or Quantify Exposure to 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.5.2 Biomarkers Used to Characterize Effects Caused by 1,2-Dibromo-3-chloropropane 2.9.1 Existing Information on Health Effects of 1,2-Dibromo-3-chloropropane 2.9.2 Data Needs 2.9.1 Existing Information on Health Effects of 1,2-Dibromo-3-chloropropane 2.9.2 Data Needs 2.9.3 On-going Studies CHEMICAL AND PHYSICAL INFORMATION 3.1 CHEMICAL IDENTITY 3.2 PHYSICAL AND CHEMICAL PROPERTIES PRODUCTION, IMPORT, USE, AND DISPOSAL 4.1 PRODUCTION 4.2 IMPORT/EXPORT 4.3 USE 4.4 DISPOSAL POTENTIAL FOR HUMAN EXPOSURE 5.1 OVERVIEW 5.2 Water 5.2.3 Soil 5.3 ENVIRONMENTAL FATE

		5.3.2	Transfor	mation	and	Deg:	rad	ati	on														92
			5.3.2.1	Air																			92
			5.3.2.2	Water																			92
			5.3.2.3																				93
	5.4		MONITORE																				94
		5.4.1	Air																				94
		5.4.2	Water .																				94
		5.4.3	Soil .																				96
		5.4.4	Other Er	vironme	ental	Me	dia																97
	5.5		L POPULAT																				98
	5.6	POPULA:	TIONS WIT	H POTE	TIAL	LY I	HIG	H E	ΣΧP	ost	JRE:	S											99
	5.7		CY OF THE																				99
		5.7.1	Data Nee	ds																			99
		5.7.2	On-going	Studie	es .	•		•	٠								• .			•		•	102
6.	ANAL	YTICAL 1	METHODS																				103
	6.1	BIOLOG	ICAL MATE	RIALS																			103
	6.2		NMENTAL S																				103
	6.3		CY OF THE																				107
		6.3.1	Data Nee	ds																			107
		6.3.2	On-going	Studie	es .						•										•		108
7.	REGU	LATIONS	AND ADVI	SORIES	• ,•				•											•			109
8.	REFE	RENCES																					113
9.	GLOS	SARY .				•		•	•		•		•		•	•	•	•	•			•	137
APP	ENDIC	ES																					
	Α. Ι	USER'S (GUIDE .										٠	•				•					A-1
	В.	ACRONYMS	S, ABBREV	TATIONS	S, AN	D S	MB	OLS	;														B-1
	C. 1	PEER REV	JIEW																				C-1

¥ (4)

LIST OF FIGURES

2-1	Inhalation	18
2-2	Levels of Significant Exposure to 1,2-Dibromo-3-chloropropane - Oral	37
2-3	The Metabolism of 1,2-Dibromo-3-chloropropane in Rats	52
2-4	Existing Information on Health Effects of 1,2-Dibromo- 3-chloropropane	73
5-1	Frequency of NPL Sites with Dibromochloropropane Contamination	89

LIST OF TABLES

2-1	Inhalation	10
2-2	Levels of Significant Exposure to 1,2-Dibromo-3-chloropropane - Oral	30
2 - 3	Levels of Significant Exposure to 1,2-Dibromo-3-chloropropane - Dermal	48
2-4	Genotoxicity of 1,2-Dibromo-3-chloropropane <u>In Vivo</u>	64
2-5	Genotoxicity of 1,2-Dibromo-3-chloropropane <u>In Vitro</u>	65
3-1	Chemical Identity of 1,2-Dibromo-3-chloropropane	82
3 - 2	Physical and Chemical Properties of 1,2-Dibromo-3-chloropropane	83
5-1	Levels of 1,2-Dibromo-3-chloropropane in Potable Water	95
6-1	Analytical Methods for Determining 1,2-Dibromo-3-chloropropane in Biological Materials	104
6-2	Analytical Methods for Determining 1,2-Dibromo-3-chloropropane in Environmental Samples	105
7-1	Regulations and Guidelines Applicable to 1,2-Dibromo-3-chloropropane	110