

TABLE OF CONTENTS

FOREWORD	1
1. EXECUTIVE SUMMARY	4
2. IDENTITY AND PHYSICAL/CHEMICAL PROPERTIES	5
3. ANALYTICAL METHODS.....	6
3.1 Ambient air.....	6
3.2 Emission studies	6
3.3 Passive sampling	6
3.4 Dust	7
3.5 Water	7
3.6 Biological samples.....	7
4. SOURCES OF HUMAN AND ENVIRONMENTAL EXPOSURE	7
4.1 Natural sources	7
4.2 Anthropogenic sources	7
4.2.1 Production	7
4.2.2 Uses.....	7
4.2.3 Other anthropogenic sources.....	7
4.2.3.1 Formation during combustion of fuels in gasoline- and diesel-powered engines	8
4.2.3.2 Formation during wood combustion	8
4.2.3.3 Formation during cooking processes	9
4.2.3.4 Formation during tobacco smoking	9
4.3 Estimated global release	9
4.3.1 Emissions to the atmosphere	9
4.3.2 Emissions to the hydrosphere.....	10
5. ENVIRONMENTAL TRANSPORT, DISTRIBUTION, TRANSFORMATION, AND ACCUMULATION	10
5.1 Transport and distribution between media	10
5.2 Transformation	10
5.3 Accumulation	11
6. ENVIRONMENTAL LEVELS AND HUMAN EXPOSURE	11
6.1 Environmental levels	11
6.1.1 Atmosphere	11
6.1.1.1 Ambient air	11
6.1.1.2 Indoor air	12
6.1.1.3 Workplace air.....	12
6.1.2 Hydrosphere	13
6.1.3 Geosphere.....	13
6.1.4 Biosphere	13
6.1.4.1 Occurrence in plants	13
6.1.4.2 Occurrence in food.....	13
6.1.4.3 Occurrence in humans.....	13
6.2 Human exposure.....	13

7. COMPARATIVE KINETICS AND METABOLISM IN LABORATORY ANIMALS AND HUMANS	14
7.1 Absorption and distribution	14
7.2 Metabolism	14
7.3 Mode of action.....	14
8. EFFECTS ON LABORATORY MAMMALS AND IN VITRO TEST SYSTEMS	15
8.1 Single exposure	15
8.2 Irritation and sensitization	15
8.3 Short-term and medium-term exposure	15
8.3.1 Oral exposure	15
8.3.2 Inhalation exposure	15
8.3.3 Other routes of exposure	15
8.4 Long-term exposure and carcinogenicity	16
8.5 Genotoxicity and related end-points.....	17
8.5.1 In vitro.....	17
8.5.2 In vivo	17
8.5.3 DNA adducts.....	17
8.6 Reproductive and developmental toxicity	24
8.7 Immunotoxicity	24
8.8 Neurotoxicity.....	24
9. EFFECTS ON HUMANS	25
9.1 Irritating effects	25
9.2 Effects of smoking.....	25
9.3 Studies of cancer risk.....	25
10. EFFECTS ON OTHER ORGANISMS IN THE LABORATORY AND FIELD	25
10.1 Aquatic environment	25
10.2 Terrestrial environment	27
11. EFFECTS EVALUATION	27
11.1 Evaluation of health effects	27
11.1.1 Hazard identification and dose-response assessment	27
11.1.2 Criteria for setting a tolerable concentration for 2-butenal	29
11.1.3 Sample risk characterization	29
11.1.4 Uncertainties in the evaluation of health risks	30
11.2 Evaluation of environmental effects.....	30
11.2.1 Assessment end-points	30
11.2.2 Sample risk characterization	31
11.2.3 Uncertainties in the evaluation of environmental effects	31
12. PREVIOUS EVALUATIONS BY IOMC BODIES	31
REFERENCES.....	32
APPENDIX 1 — ACRONYMS AND ABBREVIATIONS	39
APPENDIX 2 — SOURCE DOCUMENTS.....	39
APPENDIX 3 — CICAD PEER REVIEW	40

APPENDIX 4 — CICAD FINAL REVIEW BOARD.....	41
INTERNATIONAL CHEMICAL SAFETY CARD.....	42
RÉSUMÉ D'ORIENTATION	44
RESUMEN DE ORIENTACIÓN	46