

TABLE OF CONTENTS

FOREWORD	1
1. EXECUTIVE SUMMARY	4
2. IDENTITY AND PHYSICAL/CHEMICAL PROPERTIES	6
3. ANALYTICAL METHODS	8
4. SOURCES OF HUMAN AND ENVIRONMENTAL EXPOSURE	9
5. ENVIRONMENTAL TRANSPORT, DISTRIBUTION, AND TRANSFORMATION	10
6. ENVIRONMENTAL LEVELS AND HUMAN EXPOSURE	10
6.1 Environmental levels	10
6.2 Human exposure	11
7. COMPARATIVE KINETICS AND METABOLISM IN LABORATORY ANIMALS AND HUMANS	12
7.1 Absorption	12
7.1.1 Inhalation	12
7.1.2 Oral	13
7.1.3 Dermal	13
7.2 Metabolism	13
7.3 Distribution	13
7.4 Excretion	14
8. EFFECTS ON LABORATORY MAMMALS AND <i>IN VITRO</i> TEST SYSTEMS	14
8.1 Single exposure	14
8.1.1 Inhalation and intratracheal instillation	14
8.1.2 Other routes	15
8.2 Irritation and sensitization	15
8.3 Short-term exposure	16
8.3.1 Inhalation	16
8.3.2 Oral	16
8.3.3 Dermal	16
8.4 Medium-term exposure	16
8.4.1 Inhalation	16
8.4.2 Oral	17
8.5 Long-term exposure and carcinogenicity	17
8.5.1 Inhalation	17
8.5.2 Oral	18
8.5.3 Other routes	20
8.6 Genotoxicity and related end-points	20
8.7 Reproductive toxicity	20
8.8 Immunological and neurological effects	21
9. EFFECTS ON HUMANS	21
9.1 Acute beryllium disease	22

9.2	Chronic beryllium disease	22
9.3	Irritation	23
9.4	Epidemiological studies on chronic beryllium disease	23
9.5	Epidemiological studies on lung cancer	25
9.6	Reproductive toxicity	31
10.	EFFECTS ON OTHER ORGANISMS IN THE LABORATORY AND FIELD	31
10.1	Aquatic environment	31
10.2	Terrestrial environment	33
10.3	Microorganisms	33
11.	EFFECTS EVALUATION	33
11.1	Evaluation of health effects	33
11.1.1	Hazard identification and dose-response assessment	33
11.1.1.1	Non-cancer — oral	33
11.1.1.2	Non-cancer — inhalation	34
11.1.1.3	Cancer weight-of-evidence	35
11.1.2	Criteria for setting tolerable intakes/concentrations or guidance values for beryllium.	35
11.1.2.1	Non-cancer — oral	35
11.1.2.2	Non-cancer — inhalation	36
11.1.2.3	Cancer	36
11.1.3	Sample risk characterization	37
11.1.4	Uncertainties and degree of confidence in human health risk characterization	37
11.2	Evaluation of environmental effects	38
12.	PREVIOUS EVALUATIONS BY INTERNATIONAL BODIES	39
	REFERENCES	40
	APPENDIX 1 — SOURCE DOCUMENTS	48
	APPENDIX 2 — CICAD PEER REVIEW	49
	APPENDIX 3 — CICAD FINAL REVIEW BOARD	49
	APPENDIX 4 — BENCHMARK DOSE ANALYSIS FOR ORAL TOLERABLE INTAKE	50
	INTERNATIONAL CHEMICAL SAFETY CARDS	52
	RÉSUMÉ D'ORIENTATION	66
	RESUMEN DE ORIENTACIÓN	69