

CONTENTS

NOTE TO THE READER	1
LIST OF PARTICIPANTS	37
PREAMBLE.....	9
A. GENERAL PRINCIPLES AND PROCEDURES	9
1. Background.....	9
2. Objective and scope.....	10
3. Selection of agents for review	11
4. Data for the <i>Monographs</i>	11
5. Meeting participants.....	12
6. Working procedures.....	13
B. SCIENTIFIC REVIEW AND EVALUATION.....	14
1. Exposure data	15
2. Studies of cancer in humans	16
3. Studies of cancer in experimental animals.....	20
4. Mechanistic and other relevant data.....	23
5. Summary.....	26
6. Evaluation and rationale.....	27
References.....	31
GENERAL REMARKS	33
BITUMENS AND BITUMEN EMISSIONS.....	39
1. Exposure Data	39
1.1 Identification of the agent: definitions and classifications.....	39
1.2 Methods of analysis	51
1.3 Production and use.....	55
1.4 Occurrence and exposure	69
1.5 Regulations and guidelines	88
2. Cancer in Humans.....	90
2.1 Introduction	90
2.2 Cohort studies	91
2.3 Case-control studies.....	124
2.4 Meta-analyses.....	138
3. Cancer in Experimental Animals	140
3.1 Mouse	140

3.2 Rat	153
3.3 Rabbit	154
3.4 Guinea-pig.....	155
4. Mechanistic and Other Relevant Data.....	155
4.1 Overview of the mechanisms of carcinogenesis of PAHs	155
4.2 Absorption, distribution, metabolism, and excretion of bitumens and bitumen fume.....	164
4.3 Genetic and related effects.....	170
4.4 Other effects relevant to carcinogenesis	189
4.5 Mechanistic considerations	193
5. Summary of Data Reported.....	196
5.1 Exposure data	196
5.2 Human carcinogenicity data	197
5.3 Animal carcinogenicity data	200
5.4 Mechanistic and other relevant data.....	202
6. Evaluation	203
6.1 Cancer in humans	203
6.2 Cancer in experimental animals	203
6.3 Mechanistic and other relevant data.....	203
6.4 Overall evaluation	204
6.5 Rationale	204
References.....	204

SOME N- AND S-HETEROCYCLIC POLYCYCLIC AROMATIC HYDROCARBONS.....221

1. Exposure Data	221
1.1 Identification of the agents.....	221
1.2 Analysis	225
1.3 Production and use.....	226
1.4 Occurrence and exposure	226
1.5 Regulations and guidelines	229
2. Cancer in Humans.....	229
3. Cancer in Experimental Animals	229
3.1 Benz[<i>a</i>]acridine	229
3.2 Benz[<i>c</i>]acridine.....	230
3.3 Dibenz[<i>a,h</i>]acridine.....	235
3.4 Dibenz[<i>a,j</i>]acridine	241
3.5 Dibenz[<i>c,h</i>]acridine.....	246
3.6 Carbazole	248
3.7 7 <i>H</i> -Dibenzo[<i>c,g</i>]carbazole	252
3.8 Dibenzothiophene	257
3.9 Benzo[<i>b</i>]naphtho[2,1- <i>d</i>]-thiophene	257
4. Mechanistic and Other Relevant Data.....	258
4.1 Benz[<i>a</i>]acridine	258
4.2 Benz[<i>c</i>]acridine.....	260
4.3 Dibenz[<i>a,h</i>]acridine	262
4.4 Dibenz[<i>a,j</i>]acridine	266
4.5 Dibenz[<i>c,h</i>]acridine.....	271

4.6 Carbazole	274
4.7 7H-Dibenzo[<i>c,g</i>]carbazole	275
4.8 Dibenzothiophene	280
4.9 Benzo[<i>b</i>]naphtho[2,1- <i>d</i>]thiophene	283
5. Summary of Data Reported	285
5.1 Exposure data	285
5.2 Human carcinogenicity data	285
5.3 Animal carcinogenicity data	285
5.4 Mechanistic and other relevant data	287
6. Evaluation	292
6.1 Cancer in humans	292
6.2 Cancer in experimental animals	292
6.3 Overall evaluation	292
References	292
GLOSSARY	305
LIST OF ABBREVIATIONS	309
CUMULATIVE CROSS INDEX TO IARC MONOGRAPHS.....	311