

TSCA Cancer Hazard Warning Rule

Development of the List of Carcinogens

1. THE CARCINOGEN ASSESSMENT GROUP

In order to assist various EPA program offices, the Carcinogen Assessment Group (CAG) of the Office of Health and Environmental Assessment in EPA's Office of Research and Development has compiled a list of chemicals which have been demonstrated to cause cancer in humans, or to cause cancer in animals and therefore are likely to be capable of causing cancer in humans. Substances to be labeled as carcinogens for this regulation were selected from the CAG list. The CAG analyzes the carcinogenicity of chemicals and mixtures and, where appropriate, assesses the degree of the risk associated with human exposure to known or suspected carcinogens. The CAG has no role in determining whether or how to regulate substances presumed to present a human cancer risk.

The sources of information used in justifying the placement of chemicals on this list are of two types: (a) chemicals which the Carcinogen Assessment Group previously has analyzed and has determined to pose a potential human cancer risk; and (b) chemicals whose carcinogenicity CAG reviewed in connection with promulgating this proposal because one or more of three organizations -- the International Agency for Research on Cancer (IARC), the National Cancer Institute (NCI), and the Food and

Drug Administration (FDA) of the U.S. Department of Health and Human Services -- had concluded that these chemicals posed a human cancer risk. (Chemicals regulated as carcinogens by the Occupational Safety and Health Administration (OSHA) and the Consumer Product Safety Commission (CPSC) are also on this list but are not noted as such since they have been evaluated as being carcinogens by one of the other organizations previously mentioned). Each chemical falling into the latter category was placed on the list of carcinogens only after CAG evaluated the studies upon which IARC, NCI, or FDA relied and if CAG agreed with the evaluation of IARC, NCI, or FDA that the chemical presented a potential human cancer risk.

There are inconsistencies between the CAG evaluation and evaluations performed by IARC with respect to certain chemicals because the CAG reviewed information not available to or not used by IARC. Subsection 3 will identify these chemicals. There are also discrepancies between CAG evaluations and IARC evaluations with respect to chemicals inducing certain lesions such as lung adenomas or hepatomas in mice, or chemicals demonstrated to induce malignant tumors in a single long-term bioassay. IARC characterizes these chemicals as having "limited" evidence of carcinogenicity. Although IARC does not characterize chemicals which have induced tumors in one long-term bioassay as having "sufficient" evidence of carcinogenicity, EPA may conclude that there is "substantial" evidence concerning the carcinogenicity of these chemicals. The discrepancies between EPA's and IARC's characterization of these compounds are a result of differences

in the criteria used in making the respective classifications. A reading of the IARC summaries for those compound on the CAG list of carcinogens but not evaluated by IARC as having "sufficient" evidence of carcinogenicity will reveal that IARC does evaluate the compounds in this category as having evidence of carcinogenicity. Subsection 3 will identify these chemicals, too, and will briefly explain differences in the conclusions reached.

The list of substances to be labeled as carcinogens is not comprehensive. As the CAG continues to analyze chemicals for carcinogenicity, chemicals which do not now appear on the list will be added to it. The CAG has not yet reviewed all IARC, NCI, and FDA evaluations concerning the carcinogenicity of chemicals. A continuing review of these evaluations and those conducted by OSHA and CPSC may result in periodic revisions of the present list.

2. DERIVATION OF THE LIST OF CARCINOGENS

(a) Substances Which the Carcinogen Assessment Group Had Previously Evaluated as Presenting a Potential Human Cancer Risk

The CAG evaluates substances for possible carcinogenicity according to the procedures outlined in the Agency's Interim Cancer Assessment Procedures (41 Fed. Reg. 21402, May 25, 1976). These guidelines are consistent with the Interagency Regulatory Liaison Group's Scientific Basis for Identification of Potential

Carcinogens and Estimation of Risks (Journal of the National Cancer Institute 63 (1):243-268 1979, 44 Fed. Reg. 39858, July 6, 1979), and the Regulatory Council Statement on Regulation of Chemical Carcinogens (44 Fed. Reg. 60037, October 17, 1979).

Evidence concerning the carcinogenicity of chemical substances is of three types: (1) epidemiologic evidence derived from studies of exposed human populations; (2) experimental evidence derived from long-term bioassays on animals; and (3) supportive or suggestive evidence derived from studies of chemical structure or from short-term mutagenicity, cell transformation or other tests that are believed to correlate with carcinogenic activity.

The CAG evaluates all available evidence on the carcinogenicity of a chemical before reaching a conclusion, based on the "weight of the evidence", about the chemical's potential human cancer risk. Judgments about the weight of evidence indicating a compound is a carcinogen involve considerations of the quality and adequacy of the data and the kinds of responses induced by the suspect carcinogen. The best evidence that an agent is a human carcinogen comes from epidemiological studies in conjunction with confirmatory animal tests. Substantial evidence is provided by animal tests that demonstrate the induction of malignant tumors in one or more species including benign tumors that are generally recognized as early stages of malignancies. Suggestive evidence includes indirect tests of tumorigenic activity, such as mutagenicity, in-vitro cell transformation, and initiation-promotion skin tests in mice. Ancillary data that bear

on judgments about carcinogenic potential, e.g., evidence from systematic studies that relate chemical structure to carcinogenicity are also considered.

Substances were placed on the CAG list only if they had been demonstrated to induce malignant tumors in one or more animal species, or to induce benign tumors that are generally recognized as early stages of malignancies, and/or if positive epidemiological studies indicated they were carcinogenic.

(b) Substances Which CAG and IARC, NCI, or FDA Have
Evaluated As Carcinogens

In selecting compounds evaluated as carcinogens by IARC, NCI, and FDA for inclusion on the list of carcinogens, the CAG utilized the criteria described in the preceding section (2a) upon which to base its decisions.

(i) Substances Which IARC Has Evaluated as Carcinogens

The International Agency for Research on Cancer (IARC), is an independently financed organization within the World Health Organization. The headquarters of the Agency are Lyon, France, and it has Regional Centers in Jamaica, Kenya, and Singapore.

IARC conducts a program of research concentrating particularly on the epidemiology of cancer and the study of potential carcinogens in the human environment. Its field studies are supplemented by biological and chemical research

carried out in the Agency's laboratories in Lyon and through collaborative research agreements in national research institutions in many countries. IARC also conducts a program for the education and training of personnel for cancer research.

In 1971, IARC initiated a program to evaluate chemicals for possible human carcinogenicity. International working groups, comprised of experts in chemical carcinogenesis and related fields, have evaluated chemicals for IARC, and these evaluations have been published in monographs. IARC monographs are recognized as authoritative sources of information on the carcinogenicity of chemicals. Agencies in twenty-four countries, including EPA, routinely consult IARC monographs in evaluating chemicals for carcinogenicity (IARC 1978 p.12). IARC's experts, like the experts associated with the CAG, consider the quality, quantity, and content of the available literature in reaching conclusions about a chemical's carcinogenicity. Although both IARC and CAG believe that long-term animal data are sufficient to predict possible human risk (IARC 1978, p.19), IARC divides positive evidence that a chemical produces tumors in experimental animals into two categories: "sufficient" evidence of carcinogenicity, and "limited" evidence of carcinogenicity. According to IARC's criteria, "sufficient" evidence of carcinogenicity is provided by long-term bioassays that show a statistically-significant increased incidence of malignant tumors: (a) in multiple species or strains of animals, and/or (b) in multiple experiments (routes and/or doses), and/or (c) to an unusual degree (with regard to incidence, site, type and/or

precocity of onset). Additional evidence may be provided by data concerning carcinogenic dose-response, mutagenicity or chemical structure relationships.

Compounds are evaluated by IARC as possessing only "limited" evidence of carcinogenicity if (a) the experimental data do not allow a causal relationship to be established between administration of the chemical and induction of carcinogenic lesions in the animals, or (b) if only certain tumors, which normally occur spontaneously in the animals, develop after administration of the compound (ie. lung tumors and hepatomas in mice).

An IARC working group of experts evaluates the pertinent data for each chemical individually. Since the quality, quantity, and substance of the available data vary widely among chemicals, IARC, like CAG, relies on expert judgment rather than rigid guidelines in determining a chemical's probable carcinogenicity. The most recent compilation of IARC chemical carcinogenicity evaluations is presented in a supplement to the first 20 monographs, (IARC, 1979). In deciding which of the chemicals IARC has evaluated as carcinogens should be included on its list of carcinogens, the Carcinogen Assessment Group relied on this document as well as on information cited in other IARC publications.

At the time of CAG's review, IARC had evaluated approximately 450 compounds and industrial processes for carcinogenicity and had characterized 142 of these as possessing "sufficient" evidence of carcinogenicity based on animal

experiments. It was not possible for CAG to review and evaluate all of these for possible inclusion on this list of carcinogens. The exclusion of some compounds which IARC evaluated as having sufficient evidence of carcinogenicity based on animal experiments does not mean that the CAG does not think they are carcinogens. It simply means they were not evaluated.

The CAG did, however, evaluate the pertinent evidence concerning each compound IARC evaluated as being carcinogenic for humans (Group 1, IARC, 1979) or probably carcinogenic for humans (Group 2, IARC, 1979) based on human evidence. With the exception of oxymethalone, the CAG agreed with IARC that the data supports the evaluation of these compounds as carcinogens. The opinion of CAG is that the available data supporting the evaluation of oxymethalone as a carcinogen is only suggestive.

Several other compounds included in IARC's group 1 and group 2 human carcinogens are not included in the labeling rule. Although they are on the CAG list, they are not subject to this regulation because they are used exclusively as foods or drugs and are exempt from regulation under TSCA, not because the Agency does not agree that they are carcinogens.

(ii) Substances Which the National Cancer Institute
Has Evaluated As Carcinogens

The conduct of cancer bioassay experiments to determine whether chemicals have the capability to produce cancer in animals has been sponsored by the Carcinogenesis Testing Program,

Division of Cancer Cause and Prevention of the National Cancer Institute, and National Institutes of Health, now part of the National Toxicology Program. The chemicals selected for cancer bioassay are tested under rigidly defined conditions, generally using both sexes of two animal species (rat and mouse) and dosing at an estimated maximum tolerated dose and at one-half the maximum tolerated dose for the lifetime of the animals. The results of these tests are published in a technical report series.

The CAG, in preparing evaluations of chemicals which the Agency is considering regulating, consults pertinent NCI bioassay reports. An examination of the CAG's evaluations of substances will reveal that in many cases NCI bioassays formed a partial basis for the CAG's conclusions about the substances' carcinogenicity.

As was the case for compounds evaluated by IARC as having sufficient evidence of carcinogenicity based on animal experiments, it was not possible for CAG to evaluate each of the approximately 200 chemicals tested by NCI for carcinogenicity. Only certain compounds were evaluated by CAG. The CAG agreed with the findings of the positive NCI bioassays for these and placed them on the list of carcinogens.

(iii) Substances Which FDA Has Concluded Are
Carcinogens

The FDA is charged with insuring that foods, drugs, and cosmetics are pure and unadulterated and that their use does not result in an unreasonable risk to human health. In regulating suspected carcinogens, FDA relies on all available data in its assessments of carcinogenicity. FDA has initiated regulatory action against two compounds included on the CAG list on the basis of carcinogenicity; only one of them, saccharin is on the TSCA inventory. Reports concerning the evaluation of this compound have not been prepared by CAG, IARC, or NCI. Like CAG and IARC, FDA relies on all available data in its assessments of carcinogenicity.

The CAG has reviewed the pertinent data and agrees with FDA's conclusions about the carcinogenicity of saccharin. Information concerning FDA's assessment of the carcinogenicity of saccharin is found in FDA's proposed rule to regulate its uses as a food additive, as an over the counter drug, in cosmetics, and in animal drugs and feed (42 FR No. 73 pp.10006-20010. April 15, 1977). Based on available evidence, FDA has concluded that saccharin has been demonstrated to cause bladder tumors in rats.

3. Inconsistencies Between CAG and IARC, Conclusions With
Respect to the Carcinogenicity of Specific Chemicals

Certain compounds were evaluated by the CAG as having substantial evidence of carcinogenicity but were not evaluated by IARC as having sufficient evidence of carcinogenicity. In some instances the discrepancies stem from the fact that the CAG evaluations were performed after the IARC evaluations were prepared and, therefore, CAG was able to utilize data not available to the IARC reviewers. Carcinogens in this category are:

Chlorobenzilate

Chloroform

Epichlorohydrin

In other cases the discrepancies are due to differences in criteria used in categorizing the compounds. The CAG considers a compound to have substantial evidence of carcinogenicity if positive results of tumor formation (malignant or benign and generally recognized as early stages of malignancies) are obtained in one adequate animal test. IARC, on the other hand, requires the development of malignant tumors in two or more tests (doses, routes of administration) or to an unusual degree in one test before categorizing a compound as having sufficient evidence of carcinogenicity. IARC considers certain lesions (i.e. lung tumors and hepatomas in mice) as only providing limited evidence of carcinogenicity. Compounds classified by the CAG as having

substantial evidence of carcinogenicity but by IARC as not having sufficient evidence of carcinogenicity due to differences in criteria are:

Chrysene

DDT

Ethyleneimine

1,1,2-Trichloroethane

(Note: These compounds are evaluated by IARC to have evidence of carcinogenicity)

5/29/80

References

IARC (International Agency for Research on Cancer). 1978. IARC monographs on the evaluation of the carcinogenic risk of chemicals to humans. Vol. 17. Some N-Nitroso Compounds. Lyon, France. 364 pp.

IARC (International Agency for Research on Cancer). 1979. IARC monographs on the evaluation of the carcinogenic risk of chemicals to humans. Supplement 1. Chemicals and industrial processes associated with cancer in humans. Lyon, France. 71 pp.

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Acrylonitrile (CAG, IARC) 107-13-1^{bx/}

Amitrole (IARC) 61-82-5^{bx/}

Arsenic and Arsenic Compounds (CAG, IARC) 7440-38-2^{b/bx/}

Asbestos (CAG, IARC) 1332-21-4^{bx/}

Auramine (IARC) 2465-27-2^{bx/}

Benz(a)anthracene (IARC) 56-55-3

Benzene (CAG, IARC) 71-43-2^{bx/}

Benzidine (CAG, IARC) 92-87-5

Benzo(a)pyrene (IARC) 50-32-8

Beryllium and Beryllium Compounds (CAG, IARC) 7440-41-7^{b/}

Cadmium and Cadmium Compounds (CAG, IARC) 7440-43-9^{b/bx/}

Carbon Tetrachloride (CAG, IARC) 56-23-5^{bx/}

Chloroalkyl Ethers

Bis(chloromethyl)ether (BCME) (CAG, IARC) 542-88-1

Chloromethyl methyl ether (CMME), technical grade (IARC) 107-30-2

Chlordane (CAG, NCI) 12789-03-6^{bx/}

^{a/} This is not a comprehensive list of all chemicals having substantial evidence of carcinogenicity. This is a list of chemicals for which cancer hazard warning labels may be required under TSCA.

^{bx/} This substance is registered for use in pesticides but was reported for, and is included in, the TSCA inventory; when distributed for use as a pesticide and labeled in accordance with FIFRA, it will not be subject to TSCA requirements.

^{b/} CAS number applies only to the basic chemical.

Chlorinated Ethanes

1,2-Dichloroethane [Ethylene Chloride, Ethylene Dichloride

(EDC)] 107-06-2 (CAG, IARC, NCI) bx/

Hexachloroethane (CAG) 67-72-11, bx/

1,1,2,2-Tetrachloroethane (CAG) 79-34-5 bx/

1,1,2-Trichloroethane (CAG, NCI, IARC) 79-00-5 c/ bx/

Chlorobenzilate (CAG) 510-15-6 bx/

Chloroform (CAG, IARC) 67-66-3 bx/

Chromium Compounds, Hexavalent (CAG, IARC) d/ bx/

Chrysene (IARC) 218-01-9 c/

Coal Tar and Soot (CAG, included in IARC's soots, tars, and oils designation) e/ bx/

Creosote (CAG) 8001-53-9 bx/

DDT (Dichlorodiphenyltrichloroethane) (CAG) 50-29-3 bx/

Dibenz(a,h)anthracene (IARC) 53-70-3

1,2-Dibromo-3-chloropropane (DBCP) (CAG, IARC, NCI) 96-12-8 bx/

1,2-Dibromoethane [Ethylene Bromide, Ethylene Dibromide (EDB)]
(NCI, CAG, IARC) 106-93-4 bx/

3,3'-Dichlorobenzidine (DCB) (CAG, IARC) 91-94-1

Diepoxybutane (IARC) 1464-53-5

Dihydrosafrole (IARC) 94-58-6

3,3'-Dimethoxybenzidine (o-Dianisidine) (IARC) 119-90-4

c/ Evaluated by IARC as not having sufficient evidence of carcinogenicity.

d/ Examples: Calcium chromate 13765-19-0; chromic acid 18454-12-1; chromium oxide 1333-82-0.

e/ CAS numbers for coal tar are 65996-90-9, 65996-89-6, and 8007-45-2.

p-Dimethylaminoazobenzene (IARC) 60-11-7
7,12-Dimethylbenz(a)anthracene (See references) 57-97-6
3,3'-Dimethylbenzidine (o-Tolidine) (IARC) 119-93-7
Dimethylcarbamoyl Chloride (IARC) 79-44-7
1,1-Dimethylhydrazine (IARC) 57-14-7
Dimethyl Sulfate (IARC) 77-78-1
2,4-Dinitrotoluene (CAG, NCI) 121-14-2
1,4-Dioxane (NCI) 123-91-1^{bx/}
1,2-Diphenylhydrazine (CAG) 122-66-7
Epichlorohydrin (CAG) 106-89-8^{bx}
Ethyleneimine (Aziridine) (IARC) 151-56-4 ^{c/}
Ethylene Oxide (CAG, IARC) 75-21-8^{bx/}
Ethylenethiourea (IARC) 96-45-7^{bx/}
Ethyl Methanesulfonate (IARC) 62-50-0
Formaldehyde (CAG) 50-0-0^{bx/}
Hexachlorobenzene (CAG, IARC) 118-74-1^{bx/}
Hexachlorobutadiene (CAG) 87-68-3
Hexachlorocyclohexane (HCH)^{bx/}
 α HCH (CAG) 319-84-6
 β HCH (CAG) 319-85-7
 γ HCH (Lindane) (CAG) 58-89-9^{bx/}
Hydrazine (IARC) 302-01-2^{bx/}
Indeno(1,2,3-cd)pyrene (IARC) 193-39-5
Isosafrole (IARC) 120-58-1
Lasiocarpine (IARC, NCI) 303-34-4
3-Methylcholanthrene (See references) 56-49-5
4,4'-Methylenebis(2-Chloroaniline) (MOCA) (IARC) 101-14-4

Methyl Iodide (CAG, IARC) 74-88-4
Methyl Methanesulfonate (IARC) 66-27-3
N-Methyl-N'-nitro-N-nitrosoguanidine (IARC) 70-25-7
Methylthiouracil (IARC) 56-04-2 f/
Mitomycin C (IARC) 50-07-7 f/
1-Naphthylamine, technical grade (CAG) 134-32-7
2-Naphthylamine (IARC) 91-59-8
Nickel and Nickel Compounds (CAG, IARC) 7440-02-0 b/bx/
5-Nitro-o-toluidine (NCI) 99-55-8
Nitrosamines
 N-Nitrosodiethanolamine (IARC) 1116-54-7
 N-Nitrosodiethylamine (DENA) (CAG, IARC) 55-18-5
 N-Nitrosodimethylamine (DMNA) (CAG, IARC) 62-75-9
 N-Nitrosodi-n-butylamine (IARC) 924-16-3
 N-Nitrosodi-n-propylamine (IARC) 621-64-7
 N-Nitroso-N-Ethylurea (NEU) (CAG, IARC) 759-73-9
 N-Nitroso-N-Methylurea (NMU) (CAG, IARC) 684-93-5
 N-Nitroso-N-methylurethane (IARC) 615-53-2
 N-Nitrosopiperidine (IARC) 100-75-4
 N-Nitrosopyrrolidine (IARC) 930-55-2
Pentachloronitrobenzene (PCNB) (CAG) 82-68-8 bx/
Phenacetin (IARC) 62-44-2 f/
Polychlorinated Biphenyls (PCBs) (CAG, IARC) 1336-36-3
1,3-Propane Sultone (IARC) 1120-71-4

f/ This substance was reported for, and is included in, the TSCA Inventory; when distributed as a drug, it will not be subject to TSCA requirements.

Propylthiouracil (IARC) 51-52-5 f/
Reserpine (NCI) 50-55-5 f/
Saccharin (FDA) 81-07-2 g/bx/
Safrole (CAG, IARC) 94-59-7 g/bx/
Selenium Sulfide (NCI) 7488-56-4 bx/
Tetrachloroethylene (Perchloroethylene) (CAG, NCI) 127-18-4 bx/
Thioacetamide (IARC) 62-55-5
Thiourea (IARC) 62-56-6 bx/
o-Toluidine Hydrochloride (NCI) 636-21-5
Trichloroethylene (CAG, NCI) 79-01-6 bx/
2,4,6-Trichlorophenol (NCI) 88-06-2 bx/
Tris(2,3-dibromopropyl)phosphate (IARC, NCI) 126-72-7
Trypan Blue, commercial grade (IARC) 72-57-1
Urethane (IARC) 51-79-6 (Ethyl carbamate)
Vinyl Chloride (CAG, IARC) 75-10-4
Vinylidene Chloride (CAG) 75-35-4

g/ This substance was reported for, and is included in, the TSCA inventory; when distributed as a food or food additive, it will not be subject to TSCA requirements.

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CARCINOGENS EVALUATED BY IARC

CHEMICAL	IARC MONOGRAPH/PAGE
Acrylonitrile	<u>19</u> , 73
Amitrole	<u>7</u> , 31
Arsenic & Arsenic Compounds	<u>2</u> , 48
Asbestos	<u>2</u> , 17; <u>7</u> , 319; <u>14</u> , <u>15</u> , 341; <u>17</u> , 351
Auramine	<u>1</u> , 69; <u>7</u> , 319
Benz(a)anthracene	<u>3</u> , 45
Benzene	<u>7</u> , 203; <u>11</u> , 295
Benzidine	<u>1</u> , 80
Benzo(a)pyrene	<u>3</u> , 91
Beryllium and Beryllium Compounds	<u>1</u> , 17
Cadmium and Cadmium Compounds	<u>2</u> , 74; <u>11</u> , 39
Carbon Tetrachloride	<u>1</u> , 53; <u>20</u> , 371
Chloroalkyl Ethers	
Bis (chloromethyl) ether	<u>4</u> , 231; <u>13</u> , 243,
Chloromethyl methyl ether, technical grade	<u>4</u> , 239
Chlorinated Ethanes	
1,2-Dichloroethane	<u>20</u> , 429
1,1,2-Trichloroethane*	<u>20</u> , 515

* Evaluated by IARC as not having sufficient evidence of carcinogenicity.

Chloroform	<u>20</u> , 401
Chromium Compounds, Hexavalent	<u>2</u> , 100
Chrysene*	<u>3</u> , 159
Dibenz(a,h)anthracene	<u>3</u> , 178
1,2-Dibromo-3-chloropropane	<u>15</u> , 139
1,2-Dibromoethane	<u>15</u> , 195
3,3'-Dichlorobenzidine	<u>4</u> , 49
Diepoxybutane	<u>11</u> , 115
Dihydrosafrole	<u>1</u> , 170; <u>10</u> , 233
3,3'-Dimethoxybenzidine	<u>4</u> , 41
p-Dimethylaminoazobenzene	<u>8</u> , 125
3,3'-Dimethylbenzidine	<u>1</u> , 87
Dimethylcarbamoyl Chloride	<u>12</u> , 77
1,1-Dimethylhydrazine	<u>4</u> , 137
Dimethyl Sulfate	<u>4</u> , 271
Ethyleneimine*	<u>9</u> , 37
Ethylenethiourea	<u>7</u> , 45
Ethyl Methanesulfonate	<u>7</u> , 245
Hexachlorobenzene	<u>20</u> , 155
Hydrazine	<u>4</u> , 127
Indeno(1,2,3-cd)pyrene	<u>3</u> , 229
Isosafrole	<u>1</u> , 169; <u>10</u> , 232
Lasiocarpine	<u>10</u> , 281
4,4'-Methylenebis(2-Chloroaniline)	<u>4</u> , 65
Methyl Iodide	<u>15</u> , 245
Methyl Methanesulfonate	<u>7</u> , 253
N-Methyl-N'-nitro-N-nitrosoguanidine	<u>4</u> , 183

Methylthiouracil	<u>7</u> , 53
Mitomycin C	<u>10</u> , 171
1-Naphthylamine, technical grade	<u>4</u> , 87; <u>8</u> , 349
2-Naphthylamine	<u>4</u> , 97
Nickel and Nickel Compounds	<u>2</u> , 126; <u>7</u> , 319; <u>11</u> , 75
NITROSAMINES	
N-Nitrosodiethanolamine	<u>17</u> , 77
N-Nitrosodiethylamine	<u>1</u> , 107; <u>11</u> , 295; <u>17</u> , 83
N-Nitrosodimethylamine	<u>1</u> , 95, <u>17</u> , 125
N-Nitrosodi-n-butylamine	<u>4</u> , 197, <u>17</u> , 51
N-Nitrosodi-n-propylamine	<u>17</u> , 177
N-Nitroso-N-Ethylurea	<u>1</u> , 135, <u>17</u> , 191
N-Nitroso-N-Methylurea	<u>1</u> , 125, <u>17</u> , 227
N-Nitroso-N-Methylurethane	<u>4</u> , 211
N-Nitrosopiperidine	<u>17</u> , 287
N-Nitrosopyrrolidine	<u>17</u> , 313
Phenacetin	<u>13</u> , 141
Polychlorinated Biphenyls	<u>7</u> , 261; <u>18</u> , 43
1,3-Propane Sultone	<u>4</u> , 253; <u>13</u> , 243
Propylthiouracil	<u>7</u> , 67
Safrole	<u>1</u> , 169, <u>10</u> , 231
Soots, tars, and oils	<u>3</u> , 22
Thioacetamide	<u>7</u> , 77
Thiourea	<u>7</u> , 95
Tris(2,3-dibromopropyl)phosphate	<u>20</u> , 575

Trypan Blue (commercial grade)	<u>8</u> , 267
Urethane (Ethyl carbanate)	<u>7</u> , 111
Vinyl Chloride	<u>7</u> , 291; <u>19</u> , 377

Copies of IARC Monographs can be purchased from: WHO Publications Center, 49 Sheridan Avenue, Albany, New York 12210; Franklin Institute Press, Benjamin Franklin Parkway, Philadelphia, Pennsylvania 19103; or the UN Bookshop, New York, New York 10017.

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NATIONAL CANCER INSTITUTE

CHEMICAL EVALUATED AS BEING CARCINOGENIC BY NCI CARCINOGENESIS TECHNICAL

REPORT SERIES NUMBER

Chlordane	8
1,2-Dibromo-3-chloropropane (DBCP)	28
1,2-Dibromoethane	86
1,2-Dichloroethane [Ethylene Chloride, Ethylene Dichloride (EDC)]	55
2,4-Dinitrotoluene	54
1,4-Dioxane	80
Lasiocarpine	39
5-Nitro-o-toluidine	107
Reserpine	193
Selenium Sulfide	194
Tetrachloroethylene (Perchloroethylene)	13
o-Toluidine Hydrochloride	153

Trichloroethylene	2
2,4,6,-Trichlorophenol	155
Tris (2,3-dibromopropyl) phosphate	76

Copies of the NCI reports may be purchased for the National
Technical Information Service, US Department of Labor,
5285 Port Royal Road, Springfield, VA 22161.

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CARCINOGENS FOR WHICH CAG REPORTS HAVE BEEN PREPARED

Acrylonitrile

Arsenic

Asbestos

Benzene

Benzidine

Beryllium

Cadmium

Carbon Tetrachloride

Chloralkyl Ethers

Bis (chloromethyl) Ether (BCME)

Chlordane

Chlorinated Ethanes

1,2-Dichloroethane

Hexachloroethane

1,1,2,2-Tetrachloroethane

1,1,2-Trichloroethane

Chlorobenzilate

Chloroform

Chromium

Coal Tar

Creosote

DDT (Dichlorophenyltrichloroethane)

1,2-Dibromo-3-chloropropane (DBCP)

1,2-Dibromoethane [Ethylene Dibromide (EDB)]
3,3-Dichlorobenzidine (DCB)
2,4-Dinitrotoluene
1,2-Diphenylhydrazine
Epichlorohydrin
Ethylene Oxide
Formaldehyde
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclohexane (HCH, BHC)
Methyl Iodide
1-Naphthylamine, technical grade
Nickel
Nitrosamines
 N-Nitrosodimethylamine (DMNA)
 N-Nitrosodiethylamine (DENA)
 N-Nitroso-N-Methylurea (NMU)
 N-Nitroso-N-Ethylurea (NEU)
Pentachloronitrobenzene (PCNB)
Polychlorinated Biphenyls (PCBs)
Safrole
Tetrachloroethylene (Perchloroethylene)
Trichloroethylene
Vinyl Chloride
Vinylidene Chloride

CAG reports -- subject to confidentiality claims -- will be available from the Freedom of Information Office, Environmental Protection Agency (A-101), Washington, D.C. 20460. To ensure prompt attention, requests should be marked TSCA/CAG.

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TSCA Cancer Hazard Warning Rule

References for Well Known Carcinogens for Which Reports
Have not Been Prepared by CAG or IARC

7, 12-Dimethylbenz(a)anthracene

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3-Methylcholanthrene

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