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UNITED STATES DEPARTMENT OF LABOR
FRANCES PERKINS, Secretary
DIVISION OF LABOR STANDARDS
VERNE A. ZIMMER, Director

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OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

A Guide to Impairments To Be Looked for in Hazardous Occupations

(Revision of Bureau of Labor Statistics Bulletin No. 582)

By
LOUIS I. DUBLIN
Third Vice President and Statistician
and
ROBERT J. VANE
Supervisor of Occupational Ratings
Metropolitan Life Insurance Company

Bulletin No. 41

United States
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Contents

	Page
Preface	VII
Introduction	1
SECTION I.—Alphabetical list of hazardous occupations	4
SECTION II.—List of hazards, symptoms, occupations exposed, and methods of prevention	15
A. Abnormalities of air pressure	15
1. Compressed air (increased atmospheric pressure)	15
2. Altitude; rarefied air (decreased atmospheric pressure)	15
B. Abnormalities of temperature and humidity	17
1. Heat	18
2. Sudden variations of temperature	19
C. Dampness	20
D. Defective illumination	21
E. Dust	21
1. Organic dust	23
2. Inorganic dust containing free silica	24
3. Inorganic dust (except asbestos) containing no free silica	24
4. Asbestos	25
F. Infections	25
1. Anthrax	26
2. Fungus infections	26
3. Septic infections	27
4. Undulant fever (brucellosis)	27
G. Radiant energy	27
1. X-rays, radium, and other radioactive substances (radiothorium, mesothorium, etc.)	27
2. Ultraviolet and infrared rays	28
H. Repeated motion, pressure, shock, etc	29
J. Poisons	30
1. Acetaldehyde	31
2. Acetanilide	31
3. Acetone	31
4. Acridine	32
5. Acrolein	32
6. Aluminum	32
7. Ammonia	32
8. Amyl acetate	33
9. Amyl alcohol	33
10. Aniline and other amino compounds of benzol and its homologues	33
11. Antimony and its compounds	34
12. Arsenic and its compounds (except arseniuretted hydrogen)	34
13. Arseniuretted hydrogen (arsine)	35
14. Barium	35
15. Bensine (naphtha-gasoline)	36
16. Benzol (benzene) and its homologues (toluol and xylol)	36
17. Beryllium	37
18. Brass	37
19. Bromine	37
20. Butanone (methyl ethyl ketone)	38
21. Butyl acetate	38
22. Butyl alcohol	38
23. Cadmium	38
24. Calcium cyanamide (cyanamide)	38
25. Carbon dioxide	39
26. Carbon disulphide	39

SECTION II.—List of hazards, symptoms, occupations exposed, and methods of prevention—Continued.

J. Poisons—Continued.

		Page
27.	Carbon monoxide	39
28.	Carbon tetrachloride	40
29.	Cellosolve (mono-ethyl ether of ethylene glycol)	41
30.	Chloride of lime	41
31.	Chlorinated diphenyls	41
32.	Chlorinated hydrocarbons	42
33.	Chlorinated naphthalenes	42
34.	Chlorine	42
35.	Chlorodinitrobenzol	42
36.	Chloronitrobenzol	42
37.	Chloroprene (2- chloro-butadiene)	42
38.	Chromium compounds	43
39.	Cobalt	43
40.	Copper	43
41.	Cresol (cresylic acid)	43
42.	Cyanogen compounds	44
43.	Dichlorethylene	44
44.	Dichloroethyl ether	44
45.	Dimethyl sulphate	45
46.	Dinitrobenzol	45
47.	Dinitrophenol (1-2-4)	45
48.	Dioxan (diethylene dioxide)	45
49.	Ethyl benzene	45
50.	Ethyl bromide and ethyl chloride	46
51.	Ethylene dibromide	46
52.	Ethylene dichloride (dichlorethane)	46
53.	Ethylene oxide	47
54.	Ethyl silicates	47
55.	Fluorine and its compounds	47
56.	Formaldehyde	47
57.	Formic acid	47
58.	Furfural	47
59.	Gasoline	48
60.	Hexanone (methyl butyl ketone)	48
61.	Hexone (methyl isobutyl ketone)	48
62.	Hydrochloric acid	48
63.	Hydrocyanic acid	49
64.	Hydrofluoric acid	49
65.	Iron carbonyl	49
66.	Lead and its compounds	49
67.	Lead arsenate	50
68.	Magnesium	50
69.	Manganese	50
70.	Mercury and its compounds	51
71.	Metal fume fever	52
72.	Methanol (methyl alcohol)	52
73.	Methyl bromide	52
74.	Methyl cellosolve (ethylene glycol monomethyl ether)	52
75.	Methyl chloride	53
76.	Methylene chloride (dichloromethane)	53
77.	Methyl formate	53
78.	Naphtha	54
79.	Naphthols	54
80.	Naphthylamines	54
81.	Nickel	54
82.	Nickel carbonyl	54
83.	Nicotine	54
84.	Nitraniline	54
85.	Nitrobenzol and other nitro compounds of benzol and its homologues	54
86.	Nitroglycerin	55
87.	Nitronaphthalene	55
88.	Nitrous fumes and nitric acid	55
89.	Oxalic acid	56

CONTENTS

SECTION II.—List of hazards, symptoms, occupations exposed, and methods of prevention—Continued.

J. Poisons—Continued. Page

27. Carbon monoxide 39
28. Carbon tetrachloride 40
29. Cellosolve (mono-ethyl ether of ethylene glycol) 41
30. Chloride of lime 41
31. Chlorinated diphenyls 41
32. Chlorinated hydrocarbons 42
33. Chlorinated naphthalenes 42
34. Chlorine 42
35. Chlorodinitrobenzol 42
36. Chloronitrobenzol 42
37. Chloroprene (2- chloro-butadiene) 42
38. Chromium compounds 43
39. Cobalt 43
40. Copper 43
41. Cresol (cresylic acid) 43
42. Cyanogen compounds 44
43. Dichlorethylene 44
44. Dichloroethyl ether 44
45. Dimethyl sulphate 45
46. Dinitrobenzol 45
47. Dinitrophenol (1-2-4) 45
48. Dioxan (diethylene dioxide) 45
49. Ethyl benzene 45
50. Ethyl bromide and ethyl chloride 46
51. Ethylene dibromide 46
52. Ethylene dichloride (dichlorethane) 46
53. Ethylene oxide 47
54. Ethyl silicates 47
55. Fluorine and its compounds 47
56. Formaldehyde 47
57. Formic acid 47
58. Furfural 47
59. Gasoline 48
60. Hexanone (methyl butyl ketone) 48
61. Hexone (methyl isobutyl ketone) 48
62. Hydrochloric acid 48
63. Hydrocyanic acid 49
64. Hydrofluoric acid 49
65. Iron carbonyl 49
66. Lead and its compounds 49
67. Lead arsenate 50
68. Magnesium 50
69. Manganese 50
70. Mercury and its compounds 51
71. Metal fume fever 52
72. Methanol (methyl alcohol) 52
73. Methyl bromide 52
74. Methyl cellosolve (ethylene glycol monomethyl ether) 52
75. Methyl chloride 53
76. Methylene chloride (dichloromethane) 53
77. Methyl formate 53
78. Naphtha 54
79. Naphthols 54
80. Naphthylamines 54
81. Nickel 54
82. Nickel carbonyl 54
83. Nicotine 54
84. Nitraniline 54
85. Nitrobenzol and other nitro compounds of benzol and its homologues 54
86. Nitroglycerin 55
87. Nitronaphthalene 55
88. Nitrous fumes and nitric acid 55
89. Oxalic acid 56

SECTION II.—List of hazards, symptoms, occupations exposed, and methods of prevention—Continued.
J. Poisons—Continued. Page
90. Ozone 56
91. Pentanone (methyl propyl ketone) 56
92. Petroleum 56
93. Phenol 57
94. Phenyl hydrazine 57
95. Phosgene 57
96. Phosphorus 57
97. Phosphuretted hydrogen (phosphine) 58
98. Picric acid (trinitrophenol) 58
99. Potassium hydroxide 58
100. Pyridine 58
101. Radium 59
102. Selenium compounds 59
103. Silver 59
104. Sodium hydroxide 59
105. Sulphur chloride 59
106. Sulphur dioxide 59
107. Sulphuretted hydrogen (hydrogen sulphide) 60
108. Sulphuric acid 60
109. Tar and pitch 61
110. Tellurium compounds 61
111. Tetrachlorethane (acetylene tetrachloride) 62
112. Tetrachlorethylene (perchlorethylene) 62
113. Tetraethyl lead 62
114. Thallium 62
115. Thorium 63
116. Tin 63
117. Titanium oxide 63
118. Toluol 63
119. Trichlorethylene 63
120. Trinitrophenol 63
121. Trinitrotoluol 63
122. Triorthocresyl phosphate 63
123. Turpentine 64
124. Uranium 64
125. Vanadium 64
126. Vinyl chloride 64
127. Xylol 65
128. Zinc 65
SECTION III.—Dermatoses 66
SECTION IV.—Selected sources of information on industrial hygiene 69

Preface

The first edition of this guide to the hazards of occupations and to the symptoms of the diseases they cause was intended primarily to aid the medical examiners of the Metropolitan Life Insurance Co. in the discovery of impairments among applicants for insurance. The pamphlet soon attracted the attention of others not immediately interested in insurance medical examinations. Industrial physicians, directors of compensation boards, factory inspectors, safety engineers, industrial rehabilitation agents, faculties of medical colleges, and, most important of all, general practitioners of medicine, have made a call for this work and have expressed their approval of it. Subsequent editions have been equally well received. It has been reproduced either in whole or in part in a number of works by authorities on the subject of industrial hygiene. The present publication is a complete revision of Bulletin No. 582 of the United States Bureau of Labor Statistics, issued in 1933 under the same title.

The authors are convinced by their experience with these earlier editions that this bulletin has served a useful purpose, and that there is a vital need for a compilation of this kind, which makes readily available the most recent findings on industrial hazards to those who have not the time for a thorough study. Obviously, the extension of the compensation laws of the several States to include all occupational diseases, or an increasing number of them, has made it necessary for physicians to be familiar with at least their most common symptoms. Those who may wish to look further into the causes and effects of specific hazards will find detailed information in the sources referred to in the last section.

The two decades which have passed since the first edition of this bulletin was prepared have been years of tremendous expansion in the field of industrial hygiene. It has come to be recognized as an important branch of industrial management in which industrialists, physicians, engineers, chemists, laboratory technicians, statisticians, labor law administrators, workmen's compensation officials, and factory inspectors cooperate in the discovery of hazards, the nature of the injuries they cause, and in working out measures for their prevention. They have been years noteworthy for the large number of scientific investigations undertaken here and abroad to determine the causes of ill health among workmen and the effects of exposure to specific hazards. As a result of newer findings, we have had to revise many of our views on the effects of specific industrial exposures. Our idea that dusts, for example, were injurious in proportion to the hardness and sharpness of their particles, has been shown to be erroneous. It is now held that dusts are injurious in proportion to the amount of free silica or the amount of asbestos they contain. Our knowledge of the effects of many other hazards, long recognized as injurious, has been enhanced, and in addition a wealth of informa-

tion has been supplied on the effects of important new hazards, notably the volatile solvents and chemicals employed in the manufacture of synthetic resins, to mention only two.

In preparing this, the fourth edition of the pamphlet, the authors have endeavored to present the most recent thought on occupational hazards expressed in this vast literature on industrial hygiene. They realize full well the inadequacy of existing knowledge of the effects of many industrial hazards, and the amount of scientific research necessary before these effects are definitely known. They have not presumed to attempt to settle controversial questions, nor have they attempted to set up standards for the guidance of those whose responsibility it is to pass upon claims for compensation or damages. The symptoms, conditions, or diseases cited are those which are reported in the best works available on the several hazards. They have not been listed in the order of their importance, and many are perhaps of rather rare occurrence. Similarly, the occupations and industries listed are those in which the hazard may be present, and not necessarily those in which specific cases of injury have occurred. It should be recognized that even where poisons or other hazards are present the chances of injury may be slight. Some industries today, due to the excellence of the preventive measures they have instituted, are manufacturing or handling extremely toxic materials with virtually no danger to the workmen. There is every reason to believe that most, if not all, plants could eliminate the hazard of poisoning if management and employees worked together toward that end and this may be said of many other hazards.

A word of caution should be given to the layman against the use of the material presented here for self-diagnosis or for diagnosing the illness of others. That is a practice fraught with the gravest danger. The only people competent to make a diagnosis are physicians. They should be consulted without delay whenever there are signs or symptoms of ill health. The hazards covered now include "abnormalities of air pressure;" "abnormalities of temperature;" "dampness;" "defective illumination;" "dust;" "infections;" "radiant energy;" "repeated motion, pressure, shock, etc.;" the "poisons:" and "dermatoses." The number of poisonous substances considered has been increased from 94 to 128. The number of hazardous occupations listed has been increased to approximately 1,100.

The authors desire to acknowledge their indebtedness to the members of the medical profession of the United States and Canada who have so graciously received the previous editions and who have so enthusiastically cooperated in extending its scope. It would be impracticable to make personal acknowledgment of all the assistance which has been received in preparing this revision. Mention, however, should be made of the following authors and organizations from whose published works so large a part of the information used in the pamphlet was secured: Drs. Alice Hamilton, George M. Kober, Emery R. Hayhurst, Yandell Henderson, Howard W. Haggard, R. R. Sayers, W. F. Von Oettingen, L. Schwartz, L. Tulipan, W. D. McNally, H. F. Smyth, R. Prosser White, Carey P. McCord, Henry H. Kessler, Ethel Browning, and also the International Labor Office of the League of Nations, Harvard School of Public Health, United States Department

of Labor, United States Public Health Service, United States Bureau of Mines, and the Division of Industrial Hygiene of the New York State Department of Labor.

The authors are especially indebted to Dr. Anthony J. Lanza and Dr. William J. McConnell, assistant medical directors, and to Miss Eleanor Rantoul, all of the Metropolitan Life Insurance Co., for reviewing the entire manuscript, for assistance in the preparation of the text, and for many valuable criticisms suggested by their broad experience in the field of industrial medicine.

The detailed work of this compilation was carried out by Sol Ungar, Jules V. Quint, and Robert S. Levin of the Statistical Bureau of the Metropolitan Life Insurance Co.

LOUIS I. DUBLIN.
ROBERT J. VANE.

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OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

A Guide To Impairments To Be Looked For In Hazardous Occupations

Introduction

Many occupations have injurious effects on the physical condition of those engaged in them. The health of those who work with the poisons, such as lead, arsenic, mercury, picric acid, and so forth, or those who are exposed for long periods to dust, heat, humidity, or to the infectious materials, may be impaired seriously as the result of their work. The occupation is now recognized as of the very first importance as a factor in the causation of disability and even of death. We see this reflected in the frequent revisions of compensation laws to include an increasing number of occupational diseases. It is now generally recognized that patients come to physicians with pains and complaints of an indefinite character, but which in many instances are the effects of their occupation. With their attention directed to occupation as a possible factor, physicians are able to diagnose a great many obscure cases which previously had puzzled even the most competent clinicians. In this way they discover a great many more cases of disease of occupational origin than had before been thought possible.

The medical examiner should therefore be very careful to see if any of the usual diagnostic signs of poisoning, dust, heat, or other hazards which are known to be inherent in occupations are in evidence among his patients, where no other explanation of the case is readily available. In the case of those exposed to lead, such as paint mixers, painters, and so forth, the blue line on the gum, the pale, sallow appearance, and the trembling fingers, are significant as indications of chronic lead poisoning, and the physician should look for these signs. Physical symptoms and conditions which ordinarily might be passed by in this way become very important if they point to the possible effect of the occupation.

This handbook has been prepared to aid physicians in general practice, industrial hygienists, safety engineers, and others who come into close professional contact with those who are engaged in industrial processes. Nine major hazards of employment are listed: namely, "abnormalities of air pressure"; "abnormalities of temperature"; "dampness"; "defective illumination"; "dust"; "infections"; "radiant energy"; "repeated motion, pressure, or shock"; and the "poisons." A separate section of the bulletin is devoted to a discussion of the dermatoses. Long exposure to any of these will usually leave definite physical signs which the medical examiner can discover if he will look for them. To aid him in detecting the hazards and

their effects on the worker, two lists are presented. The first consists of the more common hazardous occupations, arranged alphabetically; the second consists of hazards, together with their effects or symptoms, as well as the occupations affected. After each occupation in the first list is a reference in code to the particular hazard in the second list. The capital letters after each occupation, A, B, C, and so forth, refer to the general hazard. The arabic numerals signify the particular hazard, as E 1, organic dust; E 2, inorganic dust containing free silica.

The following example will show how this guide may be of value to the general practitioner: A man who works as a presser, suffering from continuous headaches, visits his physician. The latter can find no cause for the patient's illness. The patient show no signs of disease other than the subjective symptoms which he describes. Perhaps the physician will recommend an examination of the subject's eyes, ears, and sinuses, which will prove negative. A correct diagnosis in a puzzling case such as this is much easier to determine when the occupation is ascertained and this guide is utilized. Alongside of "pressers" in the Alphabetical List of Hazardous Occupations, the physician finds the symbols H, J 27. "H" represents the hazard "repeated motion, pressure, shock"; "J" the hazard "poisons"; and 27 the particular hazard "carbon monoxide." Upon looking up the symptoms of these hazards in the second list, he finds that carbon monoxide produces headache. In such a case an effort should be made to discover if this poison exists as a hazard in the plant where the patient is employed. The remedy consists in the removal of the etiological factor—the specific poison.

The following procedure is therefore recommended: The medical examiner or physician should ascertain the occupation of the person undergoing examination. He should then look for it in the Alphabetical List of Hazardous Occupations (p. 4). If found there, it is possible that the person has been exposed to, and possibly is suffering from the effects of, some hazard of his occupation. The numerals will indicate the particular hazards of the occupation. The physician should then make special effort to discover the symptoms or signs referred to in the second list. By this means he can readily determine whether the person examined probably is suffering from the effect of his occupation. His examination is in this way made more illuminating. Physicians not specialists in occupational hygiene can thus learn to detect the effects of industry and, conversely, can eliminate the occupation as the cause when certain symptoms are observed which do not fit the usually observed effects of the occupation.

Medical examiners should remember that it is often necessary to keep in mind not only the present occupation but former ones as well. Persons suffering from certain ailments may no longer be engaged in the industry which was responsible for their condition. But careful inquiry into their occupational history will sometimes result in the recording of an occupation the effects of which are clearly those from which the patient is suffering. The medical profession must give occupational findings greater weight in forming their judgments regarding physical conditions and in diagnosing and treating disease.

It is hoped in this way that the medical profession will become more and more acquainted with occupational diseases and help in the move-

ment to discover and eliminate cases thereof. In our country it is still true that very large numbers of working people are constantly exposed to serious occupational hazards and suffer, often unnecessarily, very seriously, from the effects of such exposure. Occupational disease hazards can be brought under control if management and men work together. The greater interest of medical practitioners will help materially in the campaign of prevention. Medical schools can aid greatly in bringing about this result by giving due weight to the subject in their courses of study. Already the form and content of this pamphlet have recommended it to several schools, which report its value. In the same way, plant executives and safety engineers must take cognizance of the existence of these occupational diseases and look carefully into their own establishments to see to what degree the processes of their shops are devoid of the dangers which are usually associated with industrial operations. Factory inspectors, labor officials, and workmen's compensation boards will find it helpful in inspecting and evaluating the hazards of numerous industries. Many hazards may be revealed which they have not known were associated with the processes of manufacture, and of which the employers themselves have been ignorant. Those concerned with industrial rehabilitation should find this bulletin an aid in selecting occupations for those with arrested cases of tuberculosis or other organic diseases.

Section I.—Alphabetical List of Hazardous Occupations

Abrasives workers, B 1, E 1, 2, 3.
Acetaldehyde workers, J 1, 70.
Acetanilide workers, J 10.
Acetic acid makers, J 62, 70.
Acetone workers, J 3, 70.
Acetylene workers, E 3, J 3, 7, 13, 26, 27, 30, 38, 97. *See also* Carbide makers and Welders.
Acid dippers, C, J 13, 42, 62, 88, 108.
Acid finishers (glass), J 62, 66, 108.
Acid makers. *See* particular acid.
Acridine workers, J 4.
Acrolein workers, J 5.
Actors, J 66.
Agricultural workers. *See* Farmers.
Air-hammer operators, H.
Airplane-dope makers, J 3, 8, 16, 28, 57, 74, 111.
Airplane-hangar employees, J 15, 16, 28.
Airplane pilots, A 2, J 27.
Airplane pilots—crop dusting, A 2, J 12, 27, 66.
Airplane wing varnishers. *See* Varnishers.
Alcohol-distillery workers, J 8, 9, 16, 57, 70, 72.
Aldehyde pumpmen, J 1, 72.
Alkali salt makers, C, J 25, 34, 62, 106, 107.
Alloy makers, B 1, J 17, 27, 39, 68, 69, 81, 102, 125.
Aluminum extractors, J 64, 69.
Alum workers, J 108.
Amalgam makers, J 70.
Amber workers, J 66.
Ammonia workers, J 7, 24, 27.
Ammonium salt makers, B 1, J 7, 26, 42, 62, 108.
Ammonium sulphate makers, J 108.
Amyl-acetate workers, J 8, 9.
Amyl alcohol workers, J 9.
Amyl-nitrite makers, J 9.
Aniline dye makers. *See* Dye makers.
Aniline workers, J 10, 13, 16, 38, 62, 85, 88.
Animal hair dressers. *See* Hair workers.
Animal handlers, F 1, 2, 3.
Annealers, B 1, J 7.
Antifreeze makers, J 72.
Antimony extractors (refiners), B 1, J 11.
Antimony fluoride extractors, J 64.
Antipyrine makers, J 94.
Arsenic roasters, B 1, J 12.
Art-glass workers, J 8, 15, 64, 66, 72, 123.
Artificial-amber makers, J 76.
Artificial-flower makers, H, J 12, 28, 66, 70, 72.
Artificial-gem makers, J 114.
Artificial-ice makers, B 2, C, J 7, 106.
Artificial-leather workers, B 1, J 3, 8, 10, 12, 16, 20, 22, 72, 88, 108.
Artificial-manure makers. *See* Fertilizer makers.
Artificial-pearl makers, J 3, 8, 66, 88, 111.
Artificial-rubber makers. *See* Rubber (synthetic) makers.
Artificial-silk makers. *See* Rayon.
Artificial-stone makers, J 109.
Asbestos miners, E 4. *See also* Miners.
Asbestos products workers, B 1, E 4, J 16, 56, 109.
Ashmen, E 1, 3.
Asphalt workers, B 1, J 109.
Automobile mechanics. *See* Garage workers.
Automobile painters, C, J 16, 72. *See also* Painters.
Automobile radiator cleaners, J 89.
Aviation personnel (flying), A 2. *See also* Airplane pilots.
Aviators. *See* Airplane pilots.

Babbitt metal workers, J 11, 66.
Babbitters, J 11, 66.
Bacteriologists, F, F 1.
Bakers, B 2, E 1, G 2, J 25, 27.
Baking-powder makers, J 25.
Balloon (hydrogen) workers, J 13.
Balloon inflators, J 27.
Barbers, F, H.
Barium carbonate makers, J 14, 107.
Bar-mill workers (iron and steel), B 1.
Barometer makers, J 70.
Basic slag (artificial manure) workers, E 3.
Batch makers (glass works). *See* Glass mixers.
Batch makers (rubber works). *See* Compounders (rubber).
Baters (tannery), F 1.
Bathhouse attendants, F.
Battery (dry) makers, E 1, 3, J 8, 16, 38, 62, 66, 69, 70, 109.
Battery (storage) makers. *See* Storage battery makers.
Beamers (textiles), E 1.
Beamhouse workers (tannery), C, F 1.
Beatermen (paper and pulp), C, J 34.

Beauty parlor operatives, F, J 16.
Bed rubbers (stone), E 2, 3.
Bench molders. *See* Molders (foundry).
Benzene workers. *See* Benzol workers.
Benzine workers, J 15.
Benzol purifiers, J 16, 108.
Benzol-stillmen, B 1, J 16.
Benzol workers, J 16.
Beryllium alloy workers, J 17.
Beryllium extractors, J 64.
Bessemer-converter workers (iron and steel), B 1, J 27.
Beta-still operators (beta naphthol), B 1, J 108.
Bevelers, E 3.
Bicyclists, H.
Billet mill workers (iron and steel), B 1.
Bisque-kiln workers, B 1, E 2, 3, J 27.
Blacksmiths, B 1, G 2, H, J 25, 27, 42, 66.
Blanket makers, F 1.
Blasters, E 2, 3, J 27, 88, 107.
Blast-furnace workers, B 1, J 25, 27, 42, 97, 106, 107.
Bleachers, B 1, 2, J 30, 34, 38, 62, 64, 88, 89, 90, 95, 99, 104, 106.
Bleachery driers, B 1.
Bleaching powder makers, J 13, 30, 34, 69.
Blenders (motor fuel). *See* Gasoline blenders.
Blockers (felt hats), B 1, J 27.
Blooders (tannery), J 66.
Blooming-mill workers (iron and steel), B 1.
Blowers (felt hats), E 1, J 70.
Blowers (glass manufacturing). *See* Glass blowers.
Blowers-out (zinc smelting), B 1, J 128.
Blue print makers, J. 38.
Blue print paper makers, J 10, 89.
Bluers (revolvers), B 1.
Boiler cleaners and washers, C, J 27.
Boiler-room workers, B 1, J 25, 27.
Boneblack makers, J 7, 96.
Bone renderers, extractors, etc., E 1, F 1, J 5, 42, 106.
Bookbinders, J 5, 8, 12, 66, 72, 89.
Bottle-cap makers, J 66.
Bottlers (mineral waters), J 25, 107.
Brake-lining makers, E 4, J 16.
Brass founders, B 1, J 11, 12, 25, 27, 40, 66, 96, 106, 128.
Brass polishers, J 66. *See also* Polishers and cleaners (metal).
Braziers, B 1, G 2, J 66, 128.
Brewers, B 1, 2, C, F 2, J 9, 25, 27, 56, 64, 93, 108.
Brick burners, B 1, J 25, 27, 66.
Bricklayers, E 3.
Brick makers, B 1, C, E 2, 3, J 64, 66, 68, 69, 106.
Briquet makers, J 12, 109.
Bromine makers, J 10, 19, 34.
Bronze powder makers, J 3, 128.
Bronzers, E 3, J 7, 8, 12, 13, 15, 16, 42, 62, 66, 69, 70, 72, 107, 128.
Broom makers, E 1, F 1, J 34, 56, 106.
Browners (gun barrels), J 42, 66, 70, 92.
Brushers (felt hats), E 1, J 70.
Brush makers, E 1, F 1, J 56, 66, 72, 109.
Buffers, D, E 1, 2, 3.
Buffers (rubber), J 8, 15, 66.
Bulb (mercury) makers, J 70.
Buoy makers, J 97.
Burners (enameling), B 1, J 66.
Burnishers (metals), D, J 11, 15, 28, 108, 119.
Burrers (needles), E 2, 3.
Burr filers, E 2, 3.
Butchers, B 2, F, F 1, 3, 4.
Button makers, E 1, 3, F, J 3, 30, 56.
Butyl acetate makers, J 22.
Butyl alcohol makers, J 22.
Butyl cellosolve makers, J 53.

Cable makers, J 66.
Cable splicers, C, J 27, 66, 107, 123.
Cadmium alloy makers, J 23.
Cadmium and cadmium-compound makers, J 13, 23.
Cadmium platers, J 23. *See also* Electroplaters.
Cadmium vapor lamp makers, J 23.
Caisson workers, A 1, B 2, C, D, J 25, 27, 107.
Calcium carbide makers. *See* Carbide makers.
Calcium cyanamide makers, B 1, E 3, J 24.
Calenderers (rubber), B 2, E 3.
Calico printers. *See* Textile printers.
Camphor makers, J 8, 10, 62, 123.
Candle makers, J 5, 10, 12, 38, 108.
Candy makers, B 1, 2.
Canners, B 1, 2, C, F 3, J 12, 25, 66.
Can sealers, J 16.
Cap loaders, J 70.
Cappers (window glass), B 1.
Carbanilide makers, J 26.
Carbide makers, B 1, E 1, 3, J 7, 27.
Carbolic-acid makers, J 16, 93, 106, 108.
Carbonated-water makers, J 25.
Carbon-black workers, B 1, E 1.
Carbon-brush makers, E 1, E 3.
Carbon-dioxide ice workers, J 25.
Carbon-dioxide makers, J 25.
Carbon-disulphide makers, J 26, 107.
Carbonic-acid makers, J 25.
Carbonizers (shoddy), E 1, J 13, 62, 108.
Carbon-paper makers, E 1.
Carbon printers (photography), J 38.
Carbon-tetrachloride workers, J 26, 28, 95, 105.
Carders (asbestos), E 4.
Carders (textiles), E 1.
Card grinders (textiles), E 1, 3.
Carpenters, H.
Carpet cleaners, E 1, F 1.
Carpet makers, E 1, F 1, J 12.
Carroters (felt hats), J 12, 70, 88.
Cartridge cup washers, C.
Cartridge dippers, J 62, 88, 108.

Cartridge felt and wad makers, C.
Cartridge makers, J 66, 70.
Cartridge shot shell paraffin dippers, B 2, C.
Case hardeners, B 1, J 42.
Casters (metal). *See* Foundry and also particular metal.
Casting cleaners (foundry), E 2, 3. *See also* Acid dippers.
Cast scrubbers (electroplaters), J 15, 16.
Catchers (iron and steel), B 1.
Cattle salesmen, F 1, 4.
Cellulose formate makers, J 57.
Cellulose makers, C, J 104, 106, 107, 108.
Cellulose-products makers. *See* rayon, pyroxylin-plastics, lacquers.
Cementers (rubber), J 15, 16, 22, 26, 28, 43, 72, 111, 119, 123.
Cement (Portland) workers, B 1, E 2, 3, J 12, 27, 102.
Cement (rubber, plastic, etc.) mixers, J 3, 7, 8, 15, 16, 26, 28, 48, 66, 100, 105, 109, 111.
Ceramic workers. *See* Pottery workers.
Chambermaids, F.
Chambermen (sulphuric acid), J 106, 108.
Charcoal burners, J 25, 27.
Charcoal workers, E 1, J 27.
Charcoal workers (sugar refining), B 1, 2.
Chargers (furnace), B 1, E 3, J 27. *See also* particular metal.
Chargers (smelting and refining), B 1, E 3, J 27. *See also* particular metal.
Chasers (steel), E 3.
Chauffeurs, B 2, C, H, J 15, 27.
Chemists (radium research), G 1.
Chimney masons, J 27.
Chimney sweepers, E 3, J 12, 27, 109.
Chippers, E 2, 3, J 66.
Chloride-of-lime makers, J 30, 34.
Chlorinated diphenyl makers, J 31.
Chlorinated naphthalene workers, J 33.
Chlorinated rubber makers, J 28.
Chlorine compound makers, J 62.
Chlorine makers, J 34, 62, 69, 70.
Chlorodiphenyl makers, J 16.
Chloroform makers, J 3, 28, 30, 75.
Chrome workers, J 38.
Chromium platers, J 38. *See also* Electroplaters.
Cigar makers, E 1, F 2, J 66, 83.
Clay and bisque makers (pottery), B 2, C, E 2, 3.
Clay-plug makers (pottery), C, E 3.
Clay-products workers. *See* Pottery workers.
Cleaners (metal). *See* Polishers and cleaners (metal).
Clerks, D, H.
Clothes pressers, J 25.
Cloth preparers, B 1, C. *See also* Bleachers.
Cloth singers, J 27.
Clutch disk impregnators, J 16.
Coal carbonizers, J 107.
Coal miners. *See* Miners.
Coal passers, E 1, 3.
Coal-tar workers, B 1, J 10, 16, 27, 41, 42, 93, 109. *See also* Coke-oven workers.
Cobbers (asbestos), E 4.
Cobblers, E 1, F 1, H, J 16, 28.
Coin makers, J 81, 103.
Coke-oven workers, B 1, J 7, 16, 27, 106, 107, 109. *See also* Coal-tar workers.
Cold-storage-plant workers. *See* Refrigerating-plant workers.
Collar (fused) makers, J 3, 72, 74.
Collodion makers, J 88.
Colored paper workers, J 12.
Colorers (marble), J, 38.
Colorers (white) of shoes, J 66.
Color makers, B 1, E 3, J 7, 10, 11, 12, 15, 16, 19, 23, 34, 38, 39, 45, 66, 69, 70, 73, 75, 79, 102, 108, 111, 114.
Comb makers, E 1, J 3.
Compositors, D, E 3, H, J 10, 11, 15, 66, 123.
Compounders (rubber), E 3, J 10, 11, 12, 15, 16, 38, 66.
Compressed air (caisson) workers. *See* Caisson workers.
Compressed air (pneumatic tool) workers. *See* Pneumatic-tool workers.
Concentrating mill workers, C, E 2, 3, J 66, 69, 102. *See also* Oil flotation plant workers.
Coners (felt hats), E 1, J 70.
Confectioners. *See* Candy makers.
Construction workers, C, E 2, 3.
Cooks, B 2, F, G 2, J 27.
Copper founders, J 12, 40.
Copper miners. *See* Miners.
Copper refiners and smelters, B 1, J 11, 12, 27, 40, 64, 66, 69, 102, 106, 110.
Coppersmiths, J 12, 40.
Copper (strip) roller-mill workers, J 5.
Cordage factory workers, F 1, J 109.
Core makers, B 1, E 2, 3, J 27, 28, 128.
Cork workers, E 1.
Corn-products workers, B 1, 2, C.
Cosmetic workers, J 12, 70, 74, 85.
Cotton-mill workers, B 1, C, E 1, 3.
Cottonseed-oil workers, B 1.
Cotton twisters, E 1, H.
Cranemen (glass industry), B 1.
Cranemen (iron and steel), B 1.
Crayon (colored) makers, J 38, 66.
Creosoting-plant workers, C, J 109.
Cresol-soap makers, J 41.
Cresylic-acid makers, J 41.
Crucible mixers, E 1, 3.
Crucible-steel-department employees, B 1.
Crushermen (clay and stone), E 2, 3.
Crushers (asbestos), E 4.
Cupola men (foundries), B 1, J 25, 27.
Curers, vapor (rubber). *See* Vulcanizers.
Currriers (tannery), E 1, F 1, J 12, 15.

Cut-glass workers, E 3, J 12, 66.
Cutlery makers, E 2, 3, J 8, J 66.
Cutters (oxyacetylene and other gases). *See* Welders.
Cyanamide makers, B 1, E 3, J 24.
Cyanide workers, J 7, 42.
Cyanogen makers, J 42, 70, 107.

Dairy workers, F 1, 4.
Damascening workers, J 88.
Dancers, H.
Dead animal handlers, F.
De-brassers, J 88.
Decorators (pottery), J 12, 15, 16, 66, 70, 123.
Degreasers, J 15, 16, 26, 28, 33, 44, 48, 52, 76, 111, 112, 119.
Denatured-alcohol workers. *See* particular denaturant.
Dental workers, J 66, 70.
Dentists, G 1, J 70.
Depilatory makers, J 14, 114.
Detinning workers, J 34.
Detonator cleaners, J 70.
Detonator fillers, J 70.
Detonator packers, J 70.
Devil operators (felt hats), E 1, J 70.
Diamond cutters, E 1, 3, H.
Diamond polishers, J 66.
Diatomaceous earth workers, E 2.
Dichlorethylene workers, J 43.
Digester-house workers (paper and pulp), B 1, 2, J 106, 107.
Dimethyl-sulphate makers, J 13, 45, 72, 88, 108.
Dinitrobenzol workers, J 85.
Dinitrophenol workers, J 47.
Dioxan makers, J 48.
Dippers (gun cotton), J 88.
Dippers (rubber), J 15, 16, 28.
Dippers. *See also* Acid dippers.
Dish-washers, F 2.
Disinfectant makers, J 1, 10, 12, 16, 19, 25, 30, 34, 41, 42, 56, 70, 90, 93, 98, 106, 114, 119. *See also* Insecticide makers.
Divers, A 1, J 25, 27.
Doffers (textile), B 1, C, E 1.
Dog-pound workers, F.
Dope workers. *See Airplane* dope makers.
Dressers (glass), B 1.
Dresser tenders (textile), B 1, 2, C.
Driers, B 2, J 25, 27.
Driers (felt hats), B 2, J 72.
Driers (lacquer), G 2.
Driers (rubber), J 15, 16, 26.
Drier workers (foundries), J 27.
Drillers (rock), E 2, 3.
Drivers. *See* Chauffeurs.
Drop forgers, B 1.
Dry-battery workers. *See* Battery (dry) makers.
Dry cleaners, B 2, J 8, 15, 16, 26, 28, 43, 52, 72, 89, 111, 112, 119, 123.
Drying room workers (miscellaneous), B 2, J 25, 27.
Dye makers, B 1, 2, J 1, 3, 4, 7, 10, 11, 12, 13, 14, 16, 19, 22, 25, 28, 30, 34, 38, 41, 42, 45, 47, 48, 50, 56, 57, 58, 62, 66, 69, 70, 72, 73, 74, 75, 76, 79, 86, 88, 89, 93, 94, 95, 98, 100, 104, 106, 107, 108, 114, 119, 123, 124, 125.
Dyers, B 2, J 3, 7, 8, 10, 11, 12, 15, 38, 52, 56, 62, 64, 66, 69, 72, 88, 89, 93, 98, 100, 105, 117, 124, 125. *See also* Mordanters, and other preparatory process workers.

Electrical condenser makers, J 31, 33.
Electrical transformer makers, J 31, 33.
Electricians, G 2, J 90.
Electric induction furnace workers, J 70.
Electric linemen, C, G 2. *See also* Cable splicers.
Electrode makers, E 1, J 109.
Electrolytic process (copper) workers, J. 13.
Electroplaters, C, J 11, 12, 13, 15, 16, 23, 26, 28, 33, 38, 42, 57, 62, 64, 66, 70, 81, 88, 99, 108, 111, 119.
Electrotypers, B 2, E 1, 3, J 7, 11, 66. *See also* Electroplaters.
Elevator runners, H.
Embalmers, J 56, 70.
Embalming fluid makers, J 70.
Embossers, J 70.
Embroidery workers, D, J 66.
Emery wheel makers, E 3, J 66.
Enamelers, B 1, C, E 2, H, J 8, 11, 12, 15, 16, 26, 27, 38, 66, 69, 81, 111, 123.
Enamel makers, J 8, 11, 12, 14, 15, 16, 26, 27, 38, 62, 64, 66, 69, 74, 88, 111, 123.
Engineers (stationary), B 1, 2, E 3, J 27.
Engravers, D, E 3, H, J 16, 40, 62, 66, 70, 88, 89, 104, 108.
Etchers, J 13, 62, 64, 88, 93, 106.
Ether makers, J 108.
Ethyl-benzene makers, J 49.
Ethyl-bromide makers, J 50.
Ethyl-chloride makers, J 50.
Ethylene-dibromide makers, J 19, 51.
Ethylene dichloride makers, J 52.
Ethylene oxide makers, J 53.
Examiners using fluoroscope or X-ray, G 1.
Excavation workers, F 2.
Explosives workers, C, J 1, 3, 7, 8, 9, 10, 11, 16, 19, 25, 26, 38, 41, 47, 56, 66, 70, 72, 85, 86, 88, 93, 96, 98, 100, 108. *See also* particular occupation.
Exterminators and fumigators. *See* Insecticide makers.
Extractor operators (soap), B 2, C.
Extractors (gold and silver). *See* Gold and silver refiners and extractors.
Extractors (oils and fats), J 3, 15, 16, 26, 52, 111, 119.

Farmers, F, F 1, 2, 4, J 12, 24, 66, 83.
Fat renderers, B 2, F 1, J 5, 68, 90, 107, 108.
Feather curers, E 1, J 12.

Feather workers, E 1, F 3, J 10, 12, 15, 16, 72, 106, 123.
Felt-hat makers, B 1, 2, E 1, J 27, 70, 72, 88, 108. *See also* particular occupation.
Felt makers, B 1, F 1, J 107.
Ferrosilicon workers, J 12, 13, 97.
Fertilizer makers, C, E 1, 2, 3, F 1, 3, J 5, 7, 12, 13, 16, 24, 25, 42, 62, 64, 68, 69, 83, 88, 106, 107, 108. *See also Phosphate mill employees.*
Fiberizers (asbestos), E 4.
Fiber workers, E 1.
Filament makers and finishers (incandescent lamps), J 8, 27, 72, 114.
File cutters, E 3, J 66.
Filers, E 3, J 11, 66.
Filling station workers, J 15, 27, 66, 113.
Film makers. *See* Photographic film makers.
Filter press workers, C.
Finishers (leather), E 1.
Fire-extinguisher makers, J 25, 28, 50, 51, 73.
Firemen (city), B 1, 2, C, J 27, 95, 106.
Firemen (stationary), B 1, 2, E 3, G 2, J 27.
Fireworks makers, J 11, 12, 14, 69, 70, 96, 98, 114. *See also* Explosives workers.
Fishermen, B 2, C, F 3, J 109.
Fish market workers, F.
Flangers (felt hats), B 2, J 27.
Flateners (glass), B 1.
Flavoring extract makers, J 8, 9, 16, 22, 85.
Flax-rettery workers, J 107.
Flax spinners, B 1, E 1.
Flint workers, E 2, 3.
Floor molders. *See* Molders (foundry).
Floor polish makers. *See* Polish makers.
Flour mill workers, E 1, F 2.
Flue cleaners, E 3, J 27, 106, 109.
Flue dust recoverers (sulphuric acid mfr.), J 114.
Flush tenders (aluminum), C.
Fly paper makers, J 12.
Food irradiators, G 2.
Forestry workers, F.
Forgemen, B 1.
Formaldehyde workers, J 56.
Formers (felt hats), E 1, J 70.
Formic acid workers, J 57, 89.
Foundry workers, B 1, E 2, 3, G 2, J 25, 27. *See also* particular metal.
Freight handlers, F 1.
Frosters (glass and pottery), J 38.
Fruit-essence makers. *See* Flavoring extract makers.
Fruit preservers, J 106.
Fullers (textiles), J 16, 28, 44, 111.
Fulminate mixers, J 42, 70.
Fumigant makers. *See* Insecticide makers.
Fumigators and exterminators. *See* Insecticide makers.
Fur carders, E 1, F 1.
Fur clippers, E 1, F 1.
Fur cutters, E 1, F 1.
Fur handlers, E 1, F 1, J 70, 107.
Furnace workers, B 1, E 3, G 2, J 25, 27. *See also* particular metal.
Furniture polishers, E 1, H, J 8, 15, 38, 72, 92, 123.
Fur preparers, E 1, F 1, J 56, 70, 88.
Fur pullers, E 1, F 1.
Fusel-oil workers, J 9.
Fused-quartz workers, E 2.

Galvanizers, B 1, C, J 5, 7, 12, 13, 15, 62, 66, 88, 106, 108, 119, 128.
Garage workers, J 5, 15, 27, 66, 113.
Garbage workers, F 3.
Gardeners, F 4, J 12, 24, 66, 83.
Gas (illuminating) workers, B 1, 2, J 7, 13, 16, 27, 42, 64, 93, 107, 109, 119.
Gasoline blenders, J 10, 15, 16, 49, 51, 66, 85, 113.
Gasoline engine workers, J 5, 15, 27.
Gas purifiers, J 7, 42, 93, 107.
Gassers (textile), J 27.
Gatherers (glass), B 1.
Gelatine makers, F 1, J 5, 106.
Germicide makers. *See* Disinfectant makers.
Gilders, J 8, 15, 16, 42, 70, 72, 88, 100.
Glass blowers, B 1, E 3, G 2.
Glass colorers, J 23, 38, 39, 102, 110.
Glass cutters, C, E 3.
Glass etchers, J 56, 64.
Glass finishers, C, E 3, J 62, 64, 66, 108.
Glass-furnace workers, B 1, E 2, 3, G 2, J 27. *See also* Glass mixers.
Glass mixers, E 2, 3, J 12, 13, 14, 62, 66, 68, 69, 102, 104, 114, 124, 125.
Glass polishers, J 66.
Glass (safety) makers, J 22, 72, 111.
Glaze dippers (pottery), C, J 11, 12, 38, 62, 66, 69.
Glaze mixers (pottery), E 2, 3, J 11, 12, 62, 66, 69.
Glost-kiln workers, B 2, J 27, 66.
Glove makers (leather preparers), C, E 1. *See also* Tannery workers.
Glue workers, B 2, C, E 1, F 1, 3, J 5, 7, 15, 16, 25, 26, 28, 41, 62, 85, 106, 107, 108, 119.
Glycerine refiners, J 89.
Gold beaters, E 3, H.
Gold and silver refiners and extractors, E 3, J 12, 13, 19, 34, 42, 56, 64, 66, 70, 105.
Grain-elevator workers, E 1, F 2, J 25.
Granite workers. *See* Stonecutters.
Graphite workers, B 1, E 1, 3.
Grinders (colors). *See* Color makers.
Grinders (metals), C, E 2, 3, H, J 11, 66.
Grinders (rubber), E 1, J 11, 66.
Grinding wheel makers, E 2, 3.

Grooms, F 2.
Guncotton dippers, J 88, 108.
Guncotton pickers, E 1.
Guncotton washers, C.
Gypsum workers, B 2, E 3, J 107.

Hair workers, C, E 1, F 1, 3, J 70.
Hammermen, H.
Handlers of putrid or decomposing animal products, F 3.
Hardeners (felt hats), J 70, 72.
Hardeners. *See* Temperers.
Harness makers, E 1.
Hat makers (felt). *See* Felt-hat makers.
Heel makers (shoe), E 1.
Hemp workers, E 1.
Hide workers, F 2.
Horn workers, E 1.
Horse handlers, F.
Hospital attendants, G 1.
Hothouse workers, B 2. *See also* Gardeners.
Hot-rod rollers (iron and steel), B 1.
Housemaids, H.
House wreckers, E 2, 3.
Hunters, F.
Hydraulic construction workers, C.
Hydraulic miners, C.
Hydrochloric-acid makers, J 13, 62, 107, 108.
Hydrocyanic-acid makers, J 42, 108.
Hydrofluoric-acid makers, J 64.

Ice (artificial) makers. *See* Artificial-ice makers.
Ice-cream makers, B 2, C, J 7, 25.
Imitation. *See* Artificial.
Incandescent-lamp makers, J 8, 27, 66, 70, 72, 114. *See also* particular occupation.
Incandescent mantle hardeners, G 1, 2, J 64, 100.
Ink makers, J 7, 12, 14, 15, 16, 19, 27, 28, 34, 38, 41, 56, 62, 66, 70, 72, 74, 85, 89, 99, 103, 123, 125.
Insecticide makers, F, J 12, 14, 15, 19, 25, 26, 27, 28, 41, 42, 43, 48, 52, 53, 56, 66, 70, 73, 77, 83, 88, 96, 105, 106, 111, 114, 119, 123. *See also* Disinfectant makers.
Inspectors using fluoroscope or X-ray, G 1.
Instrument-dial (luminous) painters, G 1.
Insulation (sound, heat) workers, E 2, 3.
Insulators (wire), J 11, 12, 16, 28, 31, 33, 52, 109.
Iodine makers, J 34.
Iron and steel workers (all departments), B 1, E 3, G 2, J 12, 27, 117. *See also* particular occupation and Alloy makers.
Ironers, B 2, H, J 27.
Irradiators (food), G 2.

Japan makers, B 2, J 12, 15, 66, 72, 123.
Japanners, J 12, 15, 66, 72, 123.
Jewelers, D, E 3, H, J 8, 13, 42, 62, 66, 70, 88, 108.
Junk (metal) refiners, B 1, E 3, J 66, 128.
Jute workers, E 1, 2, 3.

Kiln tenders, B 1, J 27.
Knitters, H.
Knitting-mill workers, E 1.

Labelers (paint cans), J 66.
Laboratory workers, J 27, 70.
Laboratory workers (radium research), G 1.
Lace makers, E 1.
Lacquerers, J 3, 8, 9, 12, 15, 16, 28, 49, 52, 57, 66, 72, 76, 100, 111, 119, 122, 123.
Lacquer makers, J 1, 3, 7, 8, 9, 12, 14, 15, 16, 20, 22, 28, 29, 31, 33, 48, 52, 56, 57, 60, 61, 66, 72, 74, 76, 88, 91, 100, 111, 119, 122, 123.
Lampblack makers, E 1, J 92, 93.
Lamps (electric). *See* Incandescent lampmakers.
Lapidaries, E 3.
Lard makers, J 5.
Lasters (shoes), B 2, C, E 1, J 72.
Lathe turners, H.
Laundry workers, B 1, 2, C, J 27, 30, 34, 36, 90.
Lead arsenate makers, J 12, 66.
Lead burners, J 13, 66.
Leadfoil makers, B 1, J 66.
Lead miners, J, 66. *See also* Miners.
Lead-pipe makers, J 66.
Lead platers (on iron), J 70.
Lead-salts makers, J 66.
Lead smelters, B 1, J 11, 12, 23, 27, 66, 102, 106, 110.
Leather workers, E 1, F 1, J 8, 14, 28, 62, 72, 119. *See also* Tannery workers.
Lehr tenders (glass), B 1.
Letter sorters, D, H.
Levermen (iron and steel), B 1.
Lifters-over (glass), B 1.
Lime burners, B 1, E 3, J 13, 25, 27, 102.
Lime-kiln chargers, E 3, J 25, 27.
Lime pullers (tannery), C, F 1.
Lime workers, E 3.
Linen workers, E 1.
Linoleum makers, B 1, 2, C, E 1, 3, J 5, 8, 12, 14, 15, 16, 28, 38, 66, 69, 72, 108, 123.
Linotypers, J 11, 27, 66.
Linseed-oil boilers, J 5, 25, 66.
Litharge workers, J 66.
Lithographers, E 3, H, J 10, 12, 15, 16, 38, 62, 66, 70, 72, 88, 89, 108, 111, 123.
Lithopone makers, J 14, 23.
Lithotransfer workers, J 66.
Locksmiths, H.
Longshoremen, F 1, J 69.

Lumbermen, B 2.
Luminous dial factory workers, G 1.
Luters (zinc smelting), B 1, J 128.
Lye makers, J 99.

Machinists, H, J 92.
Magnesium alloy makers, J 68.
Mail carriers, C, F.
Mail sorters, D, H.
Manganese-dioxide workers, J 69.
Manganese grinders, J 69.
Manganese-ore separators, J 69.
Manganese-steel makers, J 69.
Manometer makers, J 70.
Manure handlers, F 4.
Marble cutters, E 3.
Marblers (glass), B 1.
Masons, C, E 2, 3, H.
Masseurs, F.
Match-factory workers, C, E 1, 3, J 11, 26, 38, 66, 69, 96, 99, 107.
Mattress makers, E 1, F 1.
Meat inspectors, F, F 1, F 4.
Meat packing employees. *See* Packing house employees and slaughterhouse.
Mechanics (gas engines), J 27, 92.
Melters (foundry, glass), B 1.
Mercerizers, J 62, 104, 108.
Mercury-alloy makers, J 70.
Mercury-boiler workers, J 70.
Mercury-bronzers, J 70.
Mercury-miners, J 70. *See also* Miners.
Mercury-pump workers, J 70.
Mercury-salt workers, J 70.
Mercury smelters, B 1, J 27, 70, 106.
Mercury-solder workers, J 70.
Mercury-still cleaners, J 70.
Mercury-switch makers, J 70.
Mercury-vapor-lamp makers, J 70.
Metallizers, J 23, 66, 102, 128.
Metal polishers and cleaners. *See* Polishers and cleaners (metal).
Metal-polish makers. *See* Polish makers.
Metal turners, E 3.
Metal workers. *See* particular occupation.
Metal washers, J 15.
Methane (synthetic) makers, J 27.
Methyl-alcohol workers, J 3, 27, 72.
Methyl-bromide makers, J 19, 72, 73.
Methyl-chloride makers, J 62, 72, 75.
Methyl-compound makers, J 72.
Methylene chloride workers, J 76.
Mica strippers or splitters, E 3.
Mica workers, E 3.
Microscopists, H.
Milkers, F 2, H.
Milk inspectors, F 4.
Millers, F 2.
Millinery workers, J 10, 15, 16, 72, 123.
Mineral earth workers, E 3.
Miners, B 1, 2, C, D, E 2, 3, 4, H, J 25, 27, 69, 88, 103, 107.
Minkery workers, F 1.
Mirror silverers, B 2, C, J 1, 7, 16, 42, 56, 57, 66, 70, 103.
Mixers (felt hats), E 1, J 70.
Mixers (rubber), B 2, E 3, J 10, 11, 12, 15, 16, 28, 38, 66.
Mixing-room workers (miscellaneous), E 1, 3.
Mold breakers (foundry), E 2, F 3.
Mold breakers (pottery), J 27.
Molders (asbestos), E 4.
Mold breakers (foundry), E 2, 3.
Monotypers, J 11, 27, 66.
Mordanters, J 9, 11, 12, 15, 16, 30, 38, 42, 57, 88, 125.
Motion-picture film workers, J 8, 22, 27, 111. *See also* Pyroxylin plastics workers.
Motion-picture-machine operators, G 2, J 70, 88.
Motion-picture-studio workers and actors, D, G 2.
Motormen, B 2.
Mottlers (leather), J 8, 72.
Muffle tenders, B 1.
Mule handlers, F.
Muriatic-acid makers. *See* Hydrochloric-acid makers.
Muriatic-acid mixers. *See* Acid mixers.
Musical-instrument makers, J 66.
Musicians, H.

Naphthylamine workers, J 10.
Neon lights lettermakers, J 27
Nickel extractors, J 81.
Nickel platers, C. *See also* Electroplaters.
Nickel-purification workers (Mond process), J 81, 82.
Nitraniline workers, J 10.
Nitrators, J 85, 88, 108.
Nitric-acid workers, J 7, 66, 88, 108.
Nitrobenzene workers. *See* Nitrobenzol workers.
Nitrobenzol workers, J 16, 85, 88, 108.
Nitrocellulose workers, J 3, 8, 9, 13, 16, 74, 88, 108. *See also* Pyroxylin plastics workers.
Nitroglycerin makers, J 13, 66, 86, 88, 108.
Nitrous-oxide workers, J 88.
Nurses, G 1.

Oilcloth makers. *See* Linoleum makers.
Oilers, J 92.
Oil extractors. *See* Extractors (oils and fats).
Oil-flotation-plant workers, J 92, 106, 107. *See also* Concentrating mill workers.
Oil purifiers, J 108.
Oil refiners. *See* Petroleum refiners.
Oil-well workers, J 92, 107.
Open-hearth-department workers (iron and steel), B 1, J 27.
Ore concentrating mill workers. *See* Concentrating mill workers.
Oxalic-acid makers, J 42, 88, 89, 99.

Oxy-acetylene cutters. *See* Welders.
Ozonators, J 90.

Packing-house employees, B 1, 2, C, F, F 3, 4, J 107. *See also* Slaughterhouse workers.
Painters, H, J 8, 8, 9, 10, 11, 12, 15, 16, 26, 28, 38, 66, 69, 70, 72, 88, 119, 123.
Painters (luminous watch and instrument dials), G 1.
Painters (tar), J 109.
Paint makers, C, J 3, 8, 9, 10, 11, 12, 14, 15, 16, 23, 26, 28, 31, 33, 38, 62 66, 68, 69, 70, 72, 93, 100, 102, 104, 108, 109, 117, 119, 123, 124.
Paint-remover makers, J 15, 16, 20, 28, 41, 44, 48 53, 72, 76, 93, 111, 119.
Paint removers, E 3, J 3, 8, 15, 16, 28, 44, 66, 76, 93, 111, 119.
Pair heaters (tin plate), B 1.
Paper-box makers, H.
Paper glazers, J 12.
Paperhangers E 3, J 12, 38, 66.
Paper makers, B 1, 2, C, F 2, J 7, 8, 13, 34, 38, 56, 62, 64, 66, 68, 99, 104, 106, 107, 108, 117. *See also* particular occupation.
Paper-money makers, J 38.
Paraffin workers, J 3, 16, 26, 28, 52, 92.
Parakeet handlers, F.
Paris-green workers, J 12.
Parrot handlers, F.
Patent leather makers, B 2, J 8, 27, 66, 72, 89, 90, 108, 123.
Pavers, B 1, H, J 109.
Pencil makers, J 3, 10, 12, 16, 38, 100
Perfume makers, J 3, 7, 8, 10, 15, 16, 22, 28, 41, 43, 45, 50, 57, 62, 72, 75, 76, 79, 85, 93, 99, 108, 119.
Petroleum refiners, B 1, C, J 3, 5, 7, 10, 15, 16, 27, 44, 62, 66, 76, 85, 92, 104, 106, 107, 108, 119, 123.
Pewter makers, J 11.
Pharmaceutical workers, E 1, J 3, 5, 10, 11, 12, 16, 19, 24, 25, 28, 30, 47, 48, 50, 51, 52, 57, 68, 69, 70, 73, 75, 76, 79, 86, 88, 93, 94, 95, 96, 98, 99, 104, 108, 110, 111, 112, 119, 123, 124.
Phenol makers, J 16, 93, 108.
Phenyl-hydrazine workers, J 94.
Phosgene makers, J 27, 34, 95.
Phosphate extractors, J 62.
Phosphate-mill workers, B 2, C, E 3, J 64, 96. *See also* Fertilizer makers.
Phosphine workers, J 27, 97.
Phosphor-bronze workers, J 96.
Phosphoretted-hydrogen workers, J 97.
Phosphoric-acid makers, J 42, 88, 108.
Phosphorus-compound makers, J 96, 107.
Phosphorus evaporating machine operators, B 2, C, J 96, 108.
Phosphorus extractors, J 64, 96, 97.
Phosphorus (red) makers, J 96, 97.
Photoengravers, J 7, 8, 16, 38, 72, 88, 99.
Photographers, D, G 2, J 72. *See also* Photographic-material workers.
Photographic-film makers, D, J 8, 10, 22, 88, 103. *See also* Pyroxylin-plastics workers.
Photographic-material workers, J 1, 3, 7, 10, 14, 16, 34, 38, 41, 42, 56, 62, 70, 93, 98, 108, 110, 119, 123, 124, 127. *See also* Photographic-film makers.
Photograph retouchers, J 66.
Photogravure workers, J 38, 88.
Physicians, G 1, J 25, 70.
Picklers, B 1, C, J 13, 42, 62, 64, 88, 108.
Picric-acid makers, J 16, 88, 93, 98, 108.
Pigeon fatteners, F 2.
Pigment makers. *See* Color makers.
Pile drivers, H.
Pilots (airplane). *See* Airplane pilots
Pipe fitters, J 66. *See also* particular liquid piped.
Pitch workers, B 1, J 12, 41, 109.
Planer men (stone), E 2, 3.
Plasterers, C, E 3, F 1.
Plaster of Paris workers, E 3.
Platers. *See* Electroplaters and Metallizers.
Platinum extractors, J 19.
Plumbers, J 13, 27, 66. *See also* particular substance piped.
Pneumatic tool workers, E 3, H.
Policemen, C, J 27.
Polishers and cleaners (metal), D, E 1, 2, 3, H, J 15, 16, 42, 62, 66, 72, 89, 100, 103, 119, 123.
Polish makers, E 3, J 8, 10, 15, 16, 28, 42, 48, 72, 85, 89, 119, 123.
Porcelain makers. *See* Pottery workers.
Porters, H.
Potassium-hydroxide makers, J 99.
Pot fillers (glass), B 1.
Potlifters (iron and steel), B 1.
Pot pullers (foundry), B 1.
Pot-room workers (aluminum foundry; carbide plant), B 1.
Pot setters, B 1.
Pottery workers, B 1, C, E 2, 3, J 12, 25, 27, 38, 39, 62, 64, 66, 69, 70, 102, 106. *See also* particular occupation.
Pouncers (felt hats), E 1, 2, 3.
Pourers (foundry), B 1.
Powder makers. *See* Smokeless powder makers.
Preparers (tannery), C, F 1, 3.
Preservative makers and handlers, J 56.
Pressers, H, J 27.
Pressmen (oil refining), C, J 92.
Pressmen (printers). *See* Printers.
Pressroom workers (rubber), B 2, J 10, 11, 12, 15, 16.
Primers (explosives), J 70.
Printers, E 3, J 10, 11, 12, 15, 16, 27, 28, 42, 66, 70, 72, 112, 123.
Printers textile. *See* Textile printers.
Puddlers (iron and steel), B 1, J 27, 69.
Pullers-out (felt hats), B 1.
Pulp mill workers, B 1, C. *See also* Paper makers.
Putty makers, E 3, J 15, 26, 66.
Putty polishers (glass), E 3, J 66.

Pyridine makers, J 100.
Pyrites burners, B 1, E 3, J 12, 102, 106, 107.
Pyroxylin plastics workers, E 1, J 1, 3, 5, 8, 9, 10, 13, 15, 16, 22, 27, 28, 42, 43, 48, 51, 66, 72, 74, 88, 107, 108, 111, 122.

Quarrymen, E 2, 3, H.
Quartz workers, E 2.

Radioactive paint makers, G 1.
Radioactive water makers, G 1.
Radiologists, G 1.
Radio tube makers, J 70.
Radium miners, G 1.
Radium ore reduction workers, G 1.
Radium specialists, G 1.
Rag workers, E 1, F 1, 3.
Rayon makers, B 1, C, J 7, 8, 13, 22, 26, 31, 34, 42, 43, 48, 56, 62, 72, 76, 88, 89, 104, 107, 108, 111.
Reclaimers (rubber), J 10, 16, 26, 62, 66, 93, 108.
Red lead workers, J 66.
Refiners (metals), B 1, J 12, 13, 27, 62, 66, 70, 88, 106, 108. *See also* particular occupation.
Refiners (sugar). *See* Sugar refiners.
Refrigerating-plant workers, B 2, C, J 7, 25, 75, 90.
Refrigerator (mechanical) makers and repair-men, J 5, 50, 73, 75, 77, 106.
Resins (synthetic) makers, E , J 1, 3, 31, 33, 41, 44, 56, 58, 72, 74, 89, 93, 102, 119, 126.
Riveters, H, J 66.
Road repairers, B 1, E 2, 3, J 109.
Roentgenologists, G 1.
Roller coverers (cotton mill), B 1, E 1.
Rollers (metals), B 1.
Roll setters (iron and steel), B 1.
Roll wrenchers (iron and steel), B 1.
Roofers, B 2, J 66, 109.
Roofing material workers, B 1, E 3, 4, J 109.
Rope makers, E 1, J 109.
Rotogravure workers, J 16.
Roughers (iron and steel), B 1.
Rubber-cement makers. *See* Cement mixers (rubber).
Rubber glove makers, J 15.
Rubberized asbestos board makers, J 15.
Rubber (synthetic) makers, J 1, 9, 10, 34, 37, 41, 88, 105.
Rubber tire builders, J 15, 16.
Rubber workers, B 2, E 1, 2, 3, J 3, 10, 11, 12, 14, 15, 16, 26, 28, 38, 52, 56, 57, 66, 68, 72, 88, 93, 100, 104, 110, 111, 119, 123. *See also* particular occupation.

Sagger makers, C, E 3, J 66.
Sailors, B 2, H, J 27.
Salt extractors (coke-oven byproducts), J 7, 108.
Salt preparers, B 1, 2, E 3.
Sand blasters, E 2, 3.
Sand cutters, E 2.
Sanders, E 2, 3.
Sanding machine operators, E 2, 3.
Sandpaperers (enameling and painting auto bodies, etc.), E 3, J 66.
Sandpaper makers, E 2, 3.
Sand pulverizers, E 2.
Saw filers, E 3.
Sawmill workers, E 1.
Sawyers, H.
Sawyers (stone), E 2, 3.
Scissors sharpeners, E 3, H.
Scourers (belts), J 16.
Scourers (metals), J 15, 28, 88, 108, 119.
Scourers, wood lasts (shoes), E 1.
Scouring powder makers, E 2, 3.
Scrapers (foundry), E 2, 3.
Screen tenders (pulp mill), C.
Screen workers (lead and zinc smelting), E 3, J 66.
Scrubwomen, H.
Sealers (incandescent lamps), J 27.
Sealing-wax makers, J 12, 123.
Seamstresses, H.
Selenium refiners, J 102.
Sewage purification workers, J 34.
Sewer workers, C, J 7, 15, 25, 27, 107.
Sewing machine operators, H.
Shade cloth makers, J 15, 16.
Shale oil workers. *See* Petroleum refiners.
Shavers (felt hats; fur; tannery), C, E 1, F 1, 3.
Shearers, F, F 4.
Sheep dip makers, J 12.
Sheet metal workers, J 66.
Shellackers, J 8, 15, 16, 22, 66, 72, 123.
Shellac makers, J 7, 8, 15, 16, 22, 66, 72, 123.
Shell fillers, J 47, 85, 86, 98.
Shepherds, F, F 1.
Sherardizers, J 128.
Shingle stainers, J 15.
Shipyard workers, J 109.
Shoddy workers, E 1, F 1, 3, J 13, 34, 62, 108.
Shoe dyers, J 66, 85.
Shoe factory operatives, E 1, F 1, J 3, 8, 15, 16, 28, 72, 111, 119, 123. *See also* particular occupation.
Shoe finishers, B 2, J 7, 8, 9, 15, 16, 72.
Shoe-heel (wood) coverers, J 3, 8, 15, 16, 72.
Shoemakers. *See* Cobblers.
Shooting gallery workers, J 70.
Shot makers, J 11, 12, 66.
Shove-in boys (glass), B 1.
Shifters, E 1, 3.
Silicon alloy makers, E 2.
Silk weighters, J 66, 116.
Silk workers, E 1, F 3.
Silo workers, J 25.
Silverers (mirror). *See* Mirror silverers.
Silver-foil makers, J 103.
Silver melters, B 2, J 27, 42, 103.
Silver miners, J 12.

Silver nitrate makers, J 103.
Silver platers, J 103. *See also* Electroplaters.
Silversmiths, J 103.
Singers (cloth), J 27.
Sintering plant workers, E 3.
Sizers (felt hats), B 1, J 70.
Skimmers (glass), B 1, G 2.
Slag workers, B 1, E 3.
Slate workers, E 2, 3.
Slaughter-house workers, C, F, F 1, F 3, F 4. *See also* Packing-house workers.
Slip makers (pottery), C, E 3, J 66.
Slushers (porcelain enameling), J 66.
Smelters, B 1, E 2, 3, J 106. *See also* particular metal.
Smokeless-powder makers, J 3, 8, 9, 16, 26, 85, 86, 88, 93, 98.
Smoothers (glass), C, E 3.
Soap (abrasive) workers, E 2, 3.
Soap makers, B 2, C, E 1, F 3, J 5, 8, 12, 15, 16, 28, 44, 52, 56, 57, 62, 69, 72, 85, 99, 104, 107, 108, 109, 111, 112, 119.
Soda makers, C, J 7, 13, 25, 27, 34, 88, 107, 108.
Sodium hydroxide makers, C, J 34, 104.
Sodium silicate makers, E 2.
Sodium sulphide makers, J 107.
Softeners (tannery), E 1.
Solderers, G 2, J 13, 23, 27, 42, 62, 66.
Solder makers, J 11, 23, 66.
Sole stitchers (Blake machine), J 70.
Soot packers, E 1, J 12.
Spice makers, E 1.
Spinners (asbestos), E 4.
Spinners (textiles), E 1, H.
Spongers, B 1, C.
Sprayers (metals). *See* Metallizers.
Sprayers (paint). *See* Painters.
Sprayers (trees), J 12, 42, 66.
Spreaders (rubber works), B 2, J 28.
Stablemen, F 1, 2, 4, J 7.
Stamp-mill workers, B 1, C, E 2, 3.
Starch makers, E 1, J 25, 107.
Starters (felt hats), B 1, J 70.
Statuary workers, E 2, 3.
Steam fitters. *See* Pipe fitters.
Stearic acid makers, B 2, J 5.
Steel alloy makers. *See* Alloy makers.
Steel (chrome) makers, J 38.
Steel engravers. *See* Engravers.
Steeple jacks, J 27.
Stereotypers, B 2, J 11, 66.
Stiffeners (felt hats), J 70, 72.
Still (coal tar) cleaners, B 1, J 16, 109.
Stillmen (carbolic acid), B 1, J 93.
Stillmen, operating, B 1. *See also* particular chemical.
Stitchers (shoes), J 72.
Stockmen, F 4.
Stockyard workers. *See* Slaughter-house workers.
Stokers, B 1, 2, E 3, G 2, J 27.
Stone (artificial) makers, E 2, 3.
Stone cleaners, J 64, 89.
Stonecutters, C, E 2, 3, H.
Stone masons, E 2, 3.
Stone workers, E 2, 3.
Storage-battery makers, J 8, 11, 13, 23, 27, 66, 70, 81, 106, 108.
Straw cutters, F 2.
Straw-hat makers, B 2, E 1, J 5, 8, 30, 56, 72, 111.
Street cleaners, E 1, 3, F 3.
Street repairers, B 1, E 2, 3, J 109.
Submarine workers, J 13, 25, 34.
Subway construction workers, E 2.
Sugar refiners, B 1, 2, C, E 1, 3, J 7, 14, 25, 34, 82, 100, 107, 108.
Sulphates makers, J 108.
Sulphides makers, J 107.
Sulphite cooks (pulp mill), B 1, 2, J 106.
Sulphur burners, B 1, E 3, J 12, 106.
Sulphur chloride makers, J 34, 62, 105, 107.
Sulphur dioxide makers, J 27, 106.
Sulphurers (malt and hops), J 106.
Sulphur extractors, J 26.
Sulphuric acid workers, J 7, 12, 13, 66, 88, 102, 106, 107, 108, 125.
Sulphur miners, J 106, 107.
Sumackers (tannery), C, F 1.
Surgical dressing makers, J 93.

Tablehands (tannery), C, F 1.
Table operatives (iron and steel), B 1.
Table turners (enameling), B 2, E 3, J 66.
Tailors, H, J 27.
Takers-down (glass), B 1.
Talc workers, E 3.
Tallow refiners, F 3, J 5, 26, 108.
Tank cleaners, J 13, 15, 16, 64, 109, 113. *See also* particular chemical.
Tank men, B 1, C.
Tannery workers, C, F 1, 3, J 7, 8, 10, 12, 15, 25, 30, 38, 42, 56, 57, 62, 66, 70, 89, 98, 104, 106, 107, 108.
Tapers (airplanes), J 111.
Tappers (smelting), B 1. *See also* particular metal.
Tar (distillery) workers, B 1, J 12, 41, 109. *See also* Coal tar workers.
Taxidermists, E 1, F 1, 3, J 12, 70.
Tear gas makers. *See* War gas makers.
Teazers (glass), B 1, J 27.
Telegraphers, H.
Telephone linemen (trench work), C, J 27. *See also* Cable splicers.
Temperers, B 1, J 24, 27, 42, 66, 70, 92, 108.
Tetraethyl lead makers, J 19, 66, 113.
Textile (asbestos) workers, E 4.
Textile comb makers, E 3.
Textile finishers. *See* particular occupation.
Textile printers, B 1, 2, J 8, 10, 11, 12, 23, 27, 34, 38, 42, 56, 62, 66, 69, 70, 72, 88, 93, 108, 123, 125.
Textile workers, B 1, B 2, C, E 1. *See also* particular occupation.
Thallium workers, J 114.
Thermometer makers, J 70, 75, 114.

Thread glazers, B 1, 2.
Tile makers, B 1, 2, C, E 2, 3, J 66, 124. *See also* Pottery workers.
Tin-foil makers, B 1, J 66.
Tinners, B 1, C, J 5, 7, 12, 13, 62, 66.
Tin plate mill workers. *See* Iron and steel workers.
Tin recovery workers, J 34.
Tire builders. *See* Rubber tire builders.
Tobacco denicotinizers, J 72, 119.
Tobacco moisteners, C, J 25.
Tobacco seedling treaters, J 16.
Tobacco workers, E 1, J 83.
Tongsmen (iron and steel), B 1.
Toolmakers, E 3.
Top fillers (foundry), B 1, E 3, J 27.
Towermen (sulphuric acid), J 13, 88, 106, 108. *See also* Sulphuric acid workers.
Toy makers, J 8, 12, 66.
Train dispatchers, D.
Transfer workers (pottery), J 66, 123.
Transparent wrapping materials workers, B 2, J 3, 26, 62, 104, 107, 108.
Trappers, F.
Treaders (rubber), J 15, 16.
Tree sprayers. *See* Sprayers (trees).
Trichlorethylene workers, J 119.
Trinitrotoluol makers, J 16, 85.
Tube makers (glass), B 1.
Tubulators (incandescent lamps), J 27.
Tumbling-barrel workers, E 2, 3.
Tunnel workers, A 1, D, E 2, 3, J 25, 88, 107.
Turners-out (glass), B 1.
Turpentine extractors, B 1, J 123.
Type cleaners, J 15, 72.
Type founders, J 11, 66.
Type melters, J 5, 66.
Typesetters. *See* Compositors.
Typists, H.

Ultramarine blue makers, J 106.
Upholsterers, E 1, F 1, J 72.
Uranium miners, G 1, J 124.
Uranium workers, G 1, J 124.

Vanadium steel workers, B 1, J 125.
Vapor curers. *See* Vulcanizers.
Varnishers, J 1, 3, 8, 9, 10, 15, 16, 22, 28, 43, 52, 57, 66, 69, 72, 111, 119, 123.
Varnish makers, B 2, J 1, 3, 5, 7, 8, 9, 10, 12, 14, 15, 16, 22, 26, 28, 31, 33, 48, 52, 57, 58, 61, 66, 69, 72, 74, 90, 93, 104, 105, 111, 119, 123.
Varnish remover makers, J 15, 16, 44, 60, 91, 111.
Varnish removers, J 15, 16, 44, 60, 91, 111.
Vatmen, B 1, C, J 25.
Vat varnishers. *See* Varnishers.
Vault workers, J 25.
Velvet makers, B 1, J 12.
Veterinarians, F, F 1, 3, 4.
Vignetters, J 62.
Vinegar workers, J 1, 25.
Vintners, J 25.
Vinyl chloride makers, J 126.
Vulcanizers, B 2, J 7, 10, 11, 15, 16, 25, 26, 28, 38, 72, 102, 105, 106, 107.
Vulcanizers (steam), B 1, C.

Wallpaper printers, B 1, 2, J 12, 38, 66.
Warehouse workers, F 1.
War gas makers, J 13, 16, 19, 34, 42, 45, 95, 98, 105.
Warming-house employees (guncotton), B 2.
Washers, C.
Washers (metal), J 15. *See also* Degreasers.
Washwomen, C, H.
Watch dial (luminous) painters, G 1.
Watchmakers, D, H.
Water gilders, J 70.
Waterproofers (paper and textile), J 15, 16, 28, 38, 56, 109.
Water purifiers, J 14, 30, 34, 90.
Wax makers, J 16, 31, 33, 90, 108, 111, 123. *See also* Petroleum.
Wax-ornament makers, J 5, 12, 38.
Weavers, E 1, H.
Weavers (asbestos), E 4.
Weighers, E 1, 3.
Welders, B 1, G 2, J 12, 16, 23, 27, 38, 40, 64, 66, 69, 70, 88, 90, 96, 97, 102, 128.
Well workers, J 25.
White lead workers, J 27, 66.
Window-shade makers, J 15, 16.
Wire drawers, J 12, 62, 108.
Wirers (incandescent lamps), J 8.
Wood-alcohol distillers, J 3, 27, 72.
Wooden heel workers, F 1.
Wood-last scourers (shoes), E 1.
Wood polishers. *See* Furniture polishers.
Wood preservers, J 12, 47, 70, 93, 108, 109.
Wood stainers, J 38, 66.
Woodworkers, E 1, J 15, 72.
Wool carders, E 1, F 1.
Wool scourers, B 2, C, F 1, J 3, 7.
Wool spinners, E 1, F 1.
Wool workers, E 1, F 1. *See also* Particular occupation.
Wringers (guncotton), J 88.

X-ray machine makers, G 1.
X-ray photographers, G 1.
X-ray technicians, G 1.
X-ray tube makers, G 1.

Yeast makers, J 1, 25, 64, 108.

Zinc chloride makers, J 13, 34, 62.
Zinc electrode makers, J 70.
Zincers, J 42.
Zinc miners, J 12, 66, 69. *See also* Miners.
Zinc smelters and refiners, B 1, E 2, 3, J 11, 12, 23, 27, 66, 69, 102, 106, 110, 128.
Zoological technicians, F 4.

Section II.—List of Hazards, Symptoms, Occupations Exposed, and Methods of Prevention

A. Abnormalities of Air Pressure

1. Compressed Air (Increased Atmospheric Pressure)

In building tunnels, laying deep foundations for large buildings, and so forth, it is often necessary for the work to be carried on under increased air pressure in order to prevent the entrance of water into the excavations. After the workers enter the compression chamber or "lock" the pressure of the air in the compartment is increased gradually and at short intervals. The first sensation of compression is felt on the eardrums, which may be relieved by the act of swallowing. If the air is too quickly compressed, hemorrhage may occur. The greater part of the danger of working in compressed air lies in hasty decompression. While under compression the blood and tissue juices dissolve an increased amount of air, the gases of which are released when the pressure is suddenly decreased. The bubbles of nitrogen thus formed cut off the blood supply from various parts of the body by blocking up the capillaries. The symptoms of compressed-air illness, the so-called "bends," are the result.

Workers in compressed air must follow strictly the rules governing gradual compression and decompression. State regulations regarding work in compressed air cover limits of pressure, hours of labor under varying pressures, time of compression and of decompression, physical requirements, and other safety measures; see, for example, Industrial Code: Rules Relating to Work in Compressed Air, Bulletin No. 22, of the New York State Department of Labor, 1922, and the amendment to these rules reported in Special Bulletin No. 135 of the New York State Department of Labor, 1925, page 24.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Pruritis and rash; excruciating pain in abdomen and extremities, joints and muscles; painful pressure in chest; aphasia and asphyxia; monoplegia and paraplegia; dyspnea; vertigo; Meniere's syndrome.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Caisson workers Divers Tunnel workers

2. Altitude; Rarefied Air (Decreased Atmospheric Pressure)

In contrast to working under compressed air, rising to an altitude of 10,000 feet as in aviation is accompanied by a reduction in the barometric pressure from 760 mm. at sea level, to 520 mm., and at 18,000 feet, the normal pressure is approximately halved. Exposure to decreased atmospheric pressure has a profound effect on health.

The physiological changes which occur are chiefly due to oxygen want (anoxia), and the term used for the resulting condition is "altitude sickness." It may be acute, due to rapid ascent or prolonged stay at high altitude, or chronic, due to the cumulative effect of repeated prolonged exposures to minor degrees of oxygen want.

Furthermore, as the external air pressure on the body decreases, the internal pressure must decrease correspondingly if the body is not to burst; so, given sufficiently extreme conditions of decreased pressure and rapid ascent, the internal gases of the body will expand and eventually, at altitudes of 30,000 feet or over, dissolved air bubbles will form in the blood vessels and tissues as in compressed air illness ("the bends"). "Aeroembolism" is the term given to this condition in aviation medicine, and normal individuals vary greatly in susceptibility, so that it may occur at lower altitudes.

Disturbances of the middle ear are common among flying personnel due to rapid changes in altitude and pressure. A rapid dive with negative pressure on the eustachian tube prohibiting its opening may cause the drum to rupture.

The lowered partial pressure of oxygen in the inhaled air at high altitudes has also a dangerous indirect effect in that it renders the individual more susceptible to carbon-monoxide gas should this be present in the pilot or passenger compartment. Low concentrations which would be considered safe at normal atmospheric pressure are capable of causing anoxemia and asphyxia at high altitudes due to the progressively decreasing oxygen saturation of the blood under these conditions.

The discussion in this section is based upon the exhaustive treatment of the subject given in the work by Capt. Harry G. Armstrong entitled "Principles and Practice of Aviation Medicine," Williams & Wilkins, 1939. Anyone interested in any phase of this increasingly important subject will find this work indispensable.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Acute altitude sickness (anoxia).—Sleepiness, headache, altered respiration, fatigue, psychological impairments, unconsciousness, and respiratory failure. Warning symptoms preceding unconsciousness are not always present. There may be even a feeling of freedom from care because of the dulling effect on the sensory nervous system.

The effects of anoxia after a flight may be more severe than the subjective symptoms noticed while flying. There may be persistent fatigue, severe headache, nausea, vomiting, dizziness, abnormal behavior, mental confusion, and muscular weakness.

Chronic altitude sickness.—Repeated exposure to anoxia (even without symptoms of acute altitude sickness) results in bodily and mental fatigue, irritability, insomnia, marked deterioration in efficiency, and disregard for danger in the air.

Aeroembolism.—The symptoms depend on the location and volume of the air bubbles, and may manifest themselves as joint pains, itching, formication, pulmonary pain and edema, neuritis, paralysis, convulsions, and coma.

Middle-ear disturbances.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane pilots
Aviation personnel (flying)
Pilots (airplane)

B. Abnormalities of Temperature and Humidity

Exposure to environmental temperature beyond the action of the body's thermostatic control primarily results in disturbances of the circulatory system. The cutaneous circulation responds to heat stimulation in the skin by increasing the blood flow through the capillaries. The capillaries, responding to a reflex action of the nerves in the skin, dilate and induce the flow of a greater volume of blood through the cutaneous circulation. Cold, on the other hand, constricts the blood vessels of the skin, causing a diminished blood supply through the cutaneous circulation and not infrequently a serious congestion of the internal organs. Abrupt changes of temperatures, from extreme heat to cooler temperatures or vice versa, are of frequent occurrence, and are a contributory cause of respiratory diseases. Extremes of temperature may produce acute symptoms in the body directly attributable to the temperature. Thus, exposure to excessively high temperatures results in heat exhaustion, heat stroke, or in heat cramps; to excessively low temperatures in frostbite or gangrene and death.

The relative humidity is an important factor to consider in connection with temperature. It is contended that a low relative humidity tends to dry up the mucous membranes of the nose and throat, thus lowering the resistance of these organs to infection. An excessively high relative humidity, on the other hand, is undesirable because of its interference with the normal evaporation of moisture from the skin. Under extreme conditions of high temperatures and high relative humidities there occurs a marked increase in the pulse rate, systolic blood pressure, and in the body temperature. Low temperatures and high relative humidities have the effect of undermining the general vitality of the organism, weakening its resistance to diseases of the respiratory passages, and to neuralgia and rheumatic affections. With the above data in mind, abnormalities of temperature have been classified under two headings, namely, "Sudden variations of temperature," and "Heat." "Extreme cold" has not been listed as a distinct hazard, because the factor of occupational exposure is readily recognized and the effects well known. It is evident that the occupations listed in the division "Heat" are exposed not only to the danger of the direct action of the high temperatures but also to the hazard, "Sudden variations of temperature."

The prevention of diseases due to exposure to extremes of temperature consists in the avoidance or mitigation of such exposure as far as practicable. In recent years, ventilation, refrigeration, and air-conditioning have received much attention, and installations of machinery to control atmospheric conditions are becoming more and more common. Protective clothing and insulating methods can mitigate hazards of abnormal temperatures. The use of salt as a preventive of heat cramps has become a standardized procedure. Those who have a need for technical data on these subjects will find much of value in the chapter on "Lighting and Atmospheric Control" by Dr. William J. McConnell, in Industrial Hygiene, Lanza and Goldberg, Oxford Medical Publications, 1939; in the article by C. P. Yaglou entitled "Abnormal Air Conditions in Industry; Their Effects on Workers and Methods of Control," in the Journal of Industrial Hygiene, January

1937, page 12, and in reports of cooperative studies conducted by the United States Public Health Service, United States Bureau of Mines and the Research Laboratory of the American Society of Heating and Ventilating Engineers.

1. Heat

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Common acute effects.

Heat stroke.—Dizziness, nausea, acute pain in the head, skin dry and hot, face red or purple, breathing difficult, high temperature, unconsciousness.

Heat exhaustion.—Pallor, cold moist skin, rapid shallow breathing, weak pulse, body temperature subnormal or slightly elevated.

Heat cramps.—Spasms of muscles of the extremities or of the abdominal wall.

Other effects of exposure.

Anemia, general debility, respiratory and rheumatic affections, skin eruptions.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Abrasives (artificial) makers
Alloy makers
Ammonium-salts makers
Annealers
Antimony extractors (refiners)
Arsenic roasters
Artificial-leather workers
Asbestos-roofing makers
Asphalt workers
Bar-mill workers (iron and steel)
Benzol-still men
Bessemer converter workers (iron and steel)
Beta-still operators (iron and steel)
Billet-mill workers (iron and steel)
Bisque-kiln workers
Blacksmiths
Blast-furnace workers
Bleachers
Bleachery driers
Blockers (felt hats)
Blooming-mill workers (iron and steel)
Blowers-out (zinc smelting)
Bluers (revolvers)
Boiler-room workers
Brass founders
Braziers
Brewers
Brick burners
Brick makers
Burners (enameling)
Candy makers
Canners
Cappers (window glass)
Carbide makers
Carbon-black workers
Case hardeners
Casters (iron and steel)
Catchers (iron and steel)
Cement (Portland) workers
Charcoal workers (sugar refinery)
Cloth preparers
Coal-tar workers
Coke-oven workers
Color makers
Copper smelters
Core makers
Corn-products workers
Cotton-mill workers
Cottonseed-oil workers
Cranemen (glass industry)
Cranemen (iron and steel)
Crucible-steel-department employees
Cupola men (foundries)
Cyanamid makers
Digester house workers (paper and pulp)
Doffers (textile)
Dressers (glass)
Dresser tenders (textile)
Drop forgers
Dye makers
Enamelers
Engineers (stationary)
Felt-hat makers
Felt makers
Firemen (city)
Firemen (stationary)
Flatteners (glass)
Flax spinners
Forgemen
Foundry workers
Furnace workers
Galvanizers
Gas (illuminating) workers
Gatherers (glass)
Glass blowers
Glass-furnace workers
Graphite workers
Hot-rod rollers (iron and steel)
Iron and steel workers (all departments)
Junk (metal) refiners
Kiln tenders
Laundry workers
Lead-foil makers
Lead smelters
Lehr tenders (glass)
Levermen (iron and steel)
Lifters-over (glass)
Lime burners
Linoleum makers
Luters (zinc smelting)
Marblers (glass)
Melters (foundry; glass)
Mercury smelters
Miners
Molders (foundry)
Muffle tenders
Open-hearth-department workers (iron and steel)
Packing-house employees
Pair heaters (tin plate)
Paper makers
Pavers
Petroleum refiners
Picklers
Pitch workers
Pot fillers (glass)
Pot lifters (iron and steel)
Pot pullers (foundry)
Pot-room workers (aluminum foundry; carbide plant)
Pot setters
Pottery workers
Pourers (foundry)
Puddlers (iron and steel)
Pullers-out (felt hats)
Pulp-mill workers

Pyrites burners
Rayon makers
Refiners (metals)
Road repairers
Roller covgrers (cotton mill)
Rollers (metals)
Roll setters (iron and steel)
Roll wrenchers (iron and steel)
Roofing-material workers
Roughers (iron and steel)
Salt preparers
Shove-in boys (glass)
Sizers (felt hats)
Skimmers (glass)
Slag-machine tenders (iron and steel)
Smelters
Spongers
Stamp-mill workers
Starters (felt hats)
Still (coal tar) cleaners
Stillmen (carbolic acid)
Stillmen (operating)
Stokers
Street repairers
Sugar refiners
Sulphite cooks (pulp mill)
Sulphur burners
Table operators (iron and steel)
Takers-down (glass)
Tank men
Tappers (smelting)
Tar-distillery workers
Teazers (glass)
Temperers
Textile printers
Textile workers
Thread glazers
Tile makers
Tin-foil makers
Tinners
Tongsmen (iron and steel)
Top fillers (foundry)
Tube makers (glass)
Turners-out (glass)
Turpentine extractors
Vanadium-steel workers
Vatmen
Velvet makers
Vulcanizers (steam)
Wall-paper printers
Welders
Zinc smelters

2. Sudden Variations of Temperature

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Respiratory infections, neuralgic and rheumatic affections.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Artificial-ice makers
Bakers
Bleachers
Brewers
Butchers
Caisson workers
Calenderers (rubber)
Candy makers
Canners
Cartridge shot shell paraffin dippers
Charcoal workers (sugar refining)
Chauffeurs
Clay and bisque makers (pottery)
Cooks
Corn-products workers
Digester-house workers (paper and pulp)
Dresser tenders (textile)
Driers (felt hats)
Dry cleaners
Drying-room workers (miscellaneous)
Dye makers
Dyers
Electrotypers
Engineers (stationary)
Extractor operators (soap)
Fat renderers
Felt-hat makers
Firemen (city)
Firemen (stationary)
Fishermen
Flangers (felt hats)
Gas (illuminating) workers
Glost-kiln workers
Glue workers
Gypsum workers
Hothouse workers
Ice-cream makers
Ironers
Japan makers
Lasters (shoes)
Laundry workers
Linoleum makers
Lumbermen
Miners
Mirror silverers
Mixers (rubber)
Motormen
Packing-house employees
Paper makers
Patent-leather makers
Phosphate-mill workers
Phosphorus evaporating machine operators
Pressroom workers (rubber)
Refrigerating-plant workers
Roofers
Rubber workers
Sailors
Salt preparers
Shoe finishers
Silver melters
Soap makers
Spreaders (rubber works)
Stearic-acid makers
Stereotypers
Stokers
Straw-hat makers
Sugar refiners
Sulphite cooks (pulp mill)
Table turners (enameling)
Textile printers
Textile workers
Thread glazers
Tile makers
Transparent-wrapping-material coaters and driers
Varnish makers
Vulcanizers
Wall-paper printers
Warming-house employees (guncotton)
Wool scourers
See also occupations exposed to heat

C. Dampness

Aside from high atmospheric humidities which have been dealt with under "Abnormalities of temperature" there remains to be considered exposure to constant wetting. Tankmen, vatmen, and washers, for example, may be required to carry on their duties constantly in wet clothes. Such exposures are brought together under the heading "Dampness." Rheumatic and neuralgic affections may result from exposure to dampness, which also may be a contributing factor to respiratory infections.

When dampness is a feature of any industrial process, work places should be supplied with drain channels to prevent the accumulation of water, or use should be made of duck boarding. Adequate waterproof clothes, such as rubber boots, rubberized aprons, and so forth, should be supplied.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Respiratory, neuralgic, and rheumatic affections.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acid dippers
Alkali-salt makers
Artificial-ice makers
Auto painters
Beamhouse workers (tannery)
Beatermen (paper and pulp)
Boiler washers
Brewers
Brickmakers
Cable splicers
Caisson workers
Canners
Cartridge-cup washers
Cartridge felt and wad makers
Cartridge shot shell paraffin dippers
Cellulose makers
Chauffeurs
Clay and bisque makers (pottery)
Clay-plug makers (pottery)
Cloth preparers
Concentrating-mill workers
Construction workers
Corn products workers
Cotton-mill workers
Creosoting-plant workers
Doffers (textile)
Dresser tenders (textile)
Electroplaters
Enamelers
Explosives workers
Extractor operators (soap)
Fertilizer makers
Filter-press workers
Firemen (city)
Fishermen
Flush tenders (aluminum)
Galvanizers
Glass cutters
Glass finishers
Glaze dippers (pottery)
Glove makers (leather preparers)
Glue workers
Grinders (metals)
Guncotton washers
Hair workers
Hydraulic construction workers
Hydraulic miners
Ice-cream makers
Lasters (shoes)
Laundry workers
Lime pullers (tannery)
Linoleum makers
Mail carriers
Masons
Match-factory workers
Miners
Mirror silverers
Nickel platers
Packing-house employees
Paint makers
Paper makers
Petroleum refiners
Phosphate-mill workers
Phosphorus evaporating machine operators
Picklers
Plasterers
Policemen
Pottery workers
Preparers (tannery)
Pressmen (oil refining)
Pulp-mill employees
Rayon makers
Refrigerating-plant workers
Sagger makers
Screen tenders (pulp mill)
Sewer workers
Shavers (felt hats; fur; tannery)
Slaughterhouse workers
Slip makers (pottery)
Smoothers (glass)
Soap makers
Soda makers
Sodium hydroxide makers
Spongers
Stamp-mill workers
Stonecutters (wet process)
Sugar refiners
Sumackers (tannery)
Tablehands (tannery)
Tank men
Tannery workers
Telephone linemen (trench work)
Textile workers
Tile makers
Tinners
Tobacco moisteners
Vatmen
Vulcanizers (steam)
Washers
Wool scourers

D. Defective Illumination

Defective illumination, characterized by insufficient quantity of light, glare (light out of place), unsuitability of color, and improper diffusion and distribution of light, is the cause of eye fatigue, headache, dizziness, and errors of refraction. Miners' nystagmus, a condition in which the eyeball acquires a peculiar involuntary oscillatory movement, is attributed to the effects of insufficient illumination. This disease is very common among British miners, but apparently is not found to any extent among American miners. The explanation for the favorable situation of the American miner probably lies in the better illumination of the American mines. Not only is defective illumination the cause of these serious impairments of vision but it is an important factor in reduced working efficiency in industry generally, and it is a very frequent cause of industrial accidents.

The hazard of defective illumination is not limited to any single industry or group of industries. It may be present in any plant. Men engaged in occupations requiring close, fine work, such as jewelers, engravers, clerks, and mail sorters, are especially likely to suffer from exposure to this hazard.

It is a comparatively simple matter to provide for all the requirements for properly illuminating workplaces in some industries, while in others the advice of illuminating engineers is required. The American Standard Code of Lighting for Factories, Mills, and Other Work Places, prepared by the Illuminating Engineering Society, New York City, is an excellent reference work for those who have need of technical knowledge on this subject.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Nystagmus, eyestrain, deficient vision due to astigmatism or hyperopia, headache, giddiness. Eyestrain contributes to neurasthenia.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Virtually all occupations. The following and similar occupations are especially subject to this hazard:

Buffers	Jewelers	Photographic film makers
Burnishers (iron and steel)	Letter sorters	Polishers (metal)
Caisson workers	Mail sorters	Steel engravers
Clerks	Miners	Train dispatchers
Compositors	Motion-picture studio workers	Tunnel workers
Embroidery workers	Photographers	Watchmakers

E. Dust

Dust arising from industrial processes is produced by mechanical action, such as grinding, crushing, cutting, drilling, and so forth. Its composition is similar to the substance or substances from which it is derived, and in this respect it differs from fume, which is the result of chemical action and which does differ from the substance of its origin. The size of dust particles is important because this influences their ability to be inhaled into the finer air passages and reach the pulmonary parenchyma.

Poisonous dusts are not considered in this section but under their appropriate headings relating to their composition. For practical purposes industrial dusts are divided into two classes, organic and inorganic.

ORGANIC DUST

Organic dusts contain carbon and are largely derived from substances of animal and plant origin. Examples of these are textile dusts, flour, sugar, wood, leather, and feathers. Organic dusts may irritate the skin, causing an occupational dermatitis or may irritate the conjunctiva. Many, if not most, organic dusts may cause an allergic reaction in some persons. When present in very large quantity, any organic dust may cause irritation of the upper air passages. Some woods may also cause skin irritation, notably Brazil wood, satinwood, teak, some mahoganies, cocobolo, California redwood.

Organic dusts do not cause pneumoconiosis or pulmonary fibrosis of a specific disabling nature. The particles of many types of organic dusts are not of the size or shape to permit them to penetrate to the lung tissue and those which do gain entrance into the body are absorbed. Coal is an organic dust, but on account of its origin is sometimes classed with the mineral dusts. Coal dust does get into the lungs, causes pigmentation, and may stimulate the production of fibrous tissue but will not produce a disabling pneumoconiosis. The "miners' asthma" of anthracite miners has been shown to be in fact a silicosis, modified by the presence of coal dust along with the silica, and is properly termed anthraco-silicosis.

INORGANIC DUST

Inorganic industrial dusts are mostly metallic and mineral. Of all the various types of such dusts, only those containing "free" or *uncombined silica* will produce the specific pneumoconiosis known as silicosis. Other inorganic dusts may cause some pulmonary fibrosis of a benign or nondisabling character. The action of silica dust upon the lungs is probably chemical, and the dust particles producing the reaction are mostly those from one-half to three microns in diameter. The reaction of silica is the production of nodules, distributed throughout both lungs, producing a characteristic appearance on the X-ray film. Another effect of silica is to stimulate tubercle infection and severe cases of silicosis frequently die with tuberculosis.

Dusts containing silica in *combined form* do not cause silicosis. However, one such dust, asbestos, a magnesium silicate, will produce a characteristic fibrosis. This is quite different in its pathology from silicosis, and has a characteristic "ground glass" appearance on X-ray film. Animal experimentation indicates that the action of asbestos is probably mechanical, since it cannot be produced in other than the pulmonary tissue. Asbestosis may cause disability, and a few fatal cases have been recorded, but in those cases showing marked disability, other organic disease is usually also present.

The control and prevention of silicosis and asbestosis depends on both medical and engineering supervision. Periodic X-ray examination of workmen exposed to these dusts is essential. Engineering methods for the control of dust comprise:

(1) The use of exhaust systems or suction devices which entrap the dust at its point of origin.

(2) The use of water, and occasionally oil, to lay the dust and keep it out of the atmosphere. Both these methods may be combined.

(3) The use of enclosed systems for dust-causing procedures, properly exhausted.

(4) Increased ventilation, thus diluting the amount of dust in the air and decreasing its concentration.

(5) The use of helmets or respirators, of a type approved by the United States Bureau of Mines, where intermittent exposures, not otherwise controllable, are involved.

1. Organic Dust

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of the skin and upper air passages, allergic effects, asthma.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Abrasives makers
Ashmen
Bakers
Battery (dry) makers
Beamers (textiles)
Blowers (felt hats)
Boneworkers
Broom makers
Brushers (felt hats)
Brush makers
Buffers
Button makers
Carbide makers
Carbon-black workers
Carbon-brush makers
Carbonizers (shoddy)
Carbon-paper makers
Carders (textiles)
Card grinders (textiles)
Carpet cleaners
Carpet makers
Charcoal workers
Cigar makers
Coal passers
Cobblers
Comb makers
Coners (felt hats)
Cork workers
Cotton-mill workers
Cotton twisters
Crucible mixers
Curriers (tannery)
Devil operators (felt hats)
Diamond cutters
Doffers (textiles)
Electrode makers
Electrotypers
Feather curers
Feather workers
Felt-hat makers
Fertilizer makers
Fiber workers
Finishers (leather)
Flax spinners
Flour-mill workers
Formers (felt hats)
Fur carders
Fur clippers
Fur cutters
Fur handlers
Fur preparers
Fur pullers
Furniture polishers
Glove makers (leather preparers)
Glue workers
Grain-elevator workers
Graphite workers
Grinders (rubber)
Guncotton pickers
Hair workers
Harnessmakers
Heel makers (shoe)
Hemp workers
Horn workers
Jute workers
Knitting-mill workers
Lace makers
Lampblack makers
Lasters (shoes)
Leather workers
Linen workers
Linoleum makers
Match-factory workers
Mattress makers
Mixers (felt hats)
Mixing-room workers (miscellaneous)
Pharmaceutical workers
Polishers (metal)
Pouncers (felt hats)
Pyroxylin-plastics workers
Rag workers
Resins (synthetic) makers
Roller coverers (cotton mills)
Rope makers
Rubber workers
Sawmill workers
Scourers, wood lasts (shoes)
Shavers (felt hats; fur; tannery)
Shoddy workers
Shoe-factory operatives
Sifters
Silk workers
Soap makers
Softeners (tannery)
Soot packers
Spice makers
Spinners (textiles)
Starch makers
Straw-hat makers
Street cleaners
Sugar refiners
Taxidermists
Textile workers
Tobacco workers
Upholsterers
Weavers
Weighers
Wood-last scourers (shoes)
Woodworkers
Wool carders
Wool spinners
Wool workers

2. Inorganic Dust Containing Free Silica

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Cough, dyspnea, pleuritic pains, deficient chest expansion, dullness, diminished resonance, colds, pleurisy, tuberculosis, hemoptysis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Abrasives makers
Abrasives workers
Bedrubbers (stone)
Bisque-kiln workers
Blasters
Brickmakers (silica brick)
Buffers
Burrers (needles)
Burr filers
Casting cleaners (foundries)
Cement (portland) workers
Chippers
Clay and bisque makers (pottery)
Concentrating-mill workers
Construction workers
Core makers
Crushermen (clay and stone)
Cutlery makers
Diatomaceous-earth workers
Drillers (rock)
Enamelers (vitreous enamels)
Fertilizer maker
Flint workers
Foundry workers
Fused-quartz workers
Glass furnace workers
Glass mixers
Glaze mixers (pottery)
Grinders (metals)
Grinding wheel makers
House wreckers
Insulation (sound, heat) workers
Jute workers
Masons
Miners
Molders (foundry)
Ore-concentrating mill workers
Planer men (stone)
Polishers (metal)
Pottery workers
Pouncers (felt hats)
Quarrymen
Quartz workers
Road repairers
Rubber workers (filling)
Sand blasters
Sand cutters
Sanders
Sanding-machine operators
Sandpaper makers
Sand pulverizers
Sawyers (stone)
Scouring-powder makers
Scrapers (foundry)
Silicon alloys makers
Slate workers
Smelter workers
Soap (abrasive) workers
Sodium silicate makers
Stamp mill workers
Statuary workers
Stone (artificial) makers
Stonecutters
Stonemasons
Stone workers
Street repairers
Subway construction workers
Tile makers
Tumbling-barrel workers
Tunnel construction workers

3. Inorganic Dust (except Asbestos) Containing no Free Silica

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Exposure to inorganic dusts containing no free silica has been found in some instances to be associated with simple linear fibrosis (nonspecific benign fibrosis-Gardner) not associated with disability. The exact relationship of various dusts to this type of fibrotic reaction is not entirely clear.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Abrasives makers
Abrasives workers
Acetylene makers
Ashmen
Basic slag (artificial manure) workers
Battery (dry) makers
Bed rubbers (stone)
Bevelers
Bisque-kiln workers
Blasters
Bricklayers
Brickmakers
Bronzers
Buffers (needles)
Burrers
Burr filers
Button makers
Calenderers (rubber)
Carbide makers
Carbon-brush makers
Card grinders (textiles)
Casting cleaners (foundry)
Cement (portland) workers
Chasers (steel)
Chimney sweepers
Chippers
Clay and bisque makers (pottery)
Clay-plug makers (pottery)
Coal passers
Color makers
Compositors
Compounders (rubber)
Concentrating-mill workers
Construction workers
Core makers
Cotton-mill openers
Crucible mixers
Crushermen (clay and stone)
Cut-glass workers
Cutlery makers
Cyanamid makers
Diamond cutters
Drillers (rock)
Electrotypers
Emery-wheel makers
Engineers (stationary)
Engravers

Fertilizer makers
File cutters
Filers
Firemen (stationary)
Flint workers
Fine cleaners
Foundry workers
Furnace workers
Glass blowers
Glass cutters
Glass finishers
Glass-furnace workers
Glass mixers
Glaze mixers (pottery)
Gold beaters
Gold refiners
Graphite workers
Grinders (metals)
Grinding wheel makers
Gypsum workers
Horn workers
Insulation (sound, heat) workers
Iron and steel mill workers
Jewelers
Junk (metal) refiners
Jute workers
Lapidaries
Lime burners
Lime-kiln chargers
Lime workers
Linoleum makers
Lithographers
Marble cutters
Masons
Match-factory workers
Metal turners
Mica strippers or splitters
Mica workers
Mineral-earth workers
Miners
Mixers (rubber)
Mixing-room workers (miscellaneous)
Mold breakers (foundry)
Molders (foundry)
Paint removers
Paper hangers
Phosphate-mill workers
Planermen (stone; metal)
Plasterers
Plaster of Paris workers
Pneumatic-tool workers
Polishers (metal)
Polish makers
Pottery workers
Pouncers (felt hats)
Printers
Putty makers
Putty polishers (glass)
Pyrites burners
Quarrymen
Road repairers
Roofing-material workers
Rubber workers
Sagger makers
Salt preparers
Sand blasters
Sanders
Sanding-machine operators
Sandpaperers (enameling and painting auto bodies, etc.)
Sandpaper makers
Saw filers
Sawyers (stone)
Scissors sharpeners
Scouring-powder makers
Scrapers (foundry)
Screen workers (lead and zinc smelting)
Sifters
Sintering-plant workers
Slag workers
Slate workers
Slip makers (pottery)
Smelter workers
Smoothers (glass)
Soap (abrasive) workers
Stamp-mill workers
Statuary workers
Stokers
Stone (artificial) makers
Stonecutters
Stonemasons
Stone workers
Street cleaners
Street repairers
Sugar refiners
Sulphur burners
Table turners (enameling)
Talc workers
Textile comb makers
Tile makers
Toolmakers
Top filers (foundry)
Tumbling-barrel workers
Tunnel workers
Weighers

4. Asbestos

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Cough, dyspnea, pallor, clubbing of fingers, diminished chest expansion.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Asbestos miners
Asbestos-products workers
Brake-lining makers
Carders (asbestos)
Cobbers (asbestos)
Crushers (asbestos)
Fiberizers (asbestos)
Miners (asbestos)
Molders (asbestos)
Roofing-material (asbestos) workers
Spinners (asbestos)
Textile (asbestos) workers
Weavers (asbestos)

F. Infections

Infections, both localized and systemic, are frequently of occupational origin. Anthrax, fungus infections, undulant fever, and "septic infections" are typical examples. A brief summary of the symptoms of these diseases and the principal occupations in which infection is likely to occur are given in this section. Other infectious diseases especially worthy of mention are listed below:

Butcher's pemphigus---------- Butchers, dead-animal handlers.
Erysipeloid---------- Butchers, button makers, cooks, fish handlers, meat inspectors.

Glanders	Horse and mule handlers.
Psittacosis	Bacteriologists, parrot, and parakeet handlers.
Rabies	Dog-pound workers, mail carriers, veterinarians.
Ringworm	Barbers, bathhouse attendants, beauty-parlor operatives, chambermaids, masseurs.
Rocky Mountain spotted fever	Foresters, hunters, sheep herders, trappers.
Tetanus	Farmers, slaughterhouse and packing-house workers.
Tularemia	Bacteriologists, butchers, cooks, farmers, forestry workers, hunters, shearers.
Weil's disease	Dog-pound workers, insecticide makers, fishmarket workers, veterinarians. Cases have also been found among British butchers, canal workers, coal miners, farmers, gardeners, street cleaners.

1. Anthrax

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Anthrax (external).—Begins as small red spot or papule in the skin, with no pain but an itching, burning sensation. This later has a blister indented in the center and is surrounded by severe swelling. Next, the center becomes black and the blister may break and discharge a bloody fluid. The black depressed area has an elevated border of small vesicles. Regional lymph nodes become enlarged and tender and often suppurate. High fever, headache, restlessness, insomnia, have also been noted.

Anthrax (internal).—Pulmonary anthrax, of which there has been almost none in America, has no external lesions and is always rapidly fatal.

Intestinal anthrax is not an industrial hazard.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Animal handlers
Bacteriologists
Baters (tannery)
Beamhouse workers (tannery)
Blanket makers
Bonemeal workers
Broom makers
Brush makers
Butchers
Carpet cleaners
Carpet makers
Cattle salesmen
Cobblers
Cordage-factory workers
Curriers
Dairy workers
Farmers
Fat renderers
Felt makers
Fertilizer makers
Freight handlers
Fur carders
Fur clippers
Fur cutters
Fur handlers
Fur preparers
Fur pullers
Gelatine makers
Glue makers
Hair workers
Leather workers
Lime pullers (tannery)
Longshoremen
Mattress makers
Meat inspectors
Minkery workers
Plasterers
Preparers (tannery)
Rag workers
Shavers (felt hats, fur, tannery)
Shepherds
Shoddy workers
Shoe-factory workers
Slaughterhouse workers
Stablemen
Sumackers (tannery)
Table hands (tannery)
Tannery workers
Taxidermists
Upholsterers
Veterinarians
Warehouse workers
Wooden-heel workers
Wool carders
Wool scourers
Wool spinners
Wool workers

2. Fungus Infections

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Fungus infections may be due to a wide variety of fungi. They may be local or systemic. Many of them are of mild clinical importance, others may produce marked disability and death

Skin diseases are caused by monilia, yeasts, dermatophytes, sporotrichum, blastomycetes, as well as a great many other fungi.

Fungus disease of the lungs may be due to blastomycetes, actinomyces, monilia, coccidioides immitis, cryptococcus, and aspergillus. The symptoms are largely those of tuberculosis, from which it is often most difficult to differentiate. The X-ray film may also closely resemble tuberculosis. The sputum usually reveals large numbers of fungi of predominantly one type.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Animal handlers	Flour- and grain-mill workers	Paper makers
Brewery workers	Grooms	Pigeon fatteners
Cigar makers	Hide workers	Stablemen
Dishwashers	Milkers	Straw cutters
Excavation workers	Millers	
Farmers		

3. Septic Infections

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Boils, carbuncles, folliculitis, cellulitis, localized lymphangitis, erysipelas.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Animal handlers	Handlers of putrid or decomposing animal products	Silk workers
Butchers	Packing-house workers	Slaughterhouse workers
Canners	Preparers (tannery)	Soap makers
Feather workers	Rag workers	Street cleaners
Fertilizer makers	Shavers (felt hats; fur; tannery)	Tallow refiners
Fishermen	Shoddy makers	Tannery workers
Garbage workers		Taxidermists
Glue makers		Veterinarians
Hair workers		

4. Undulant Fever (Brucellosis)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Weakness, profuse sweating, chills, fever, headache, usually bilateral and frontal, constipation, loss of weight, hacking nonproductive cough, general aching. Reddish, widely separated skin lesions accompanied by intense itching and burning among veterinarians have been attributed to Brucella infection.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Butchers	Manure handlers	Slaughterhouse workers
Cattle salesmen	Meat inspectors	Stablemen
Dairy workers	Milk inspectors	Stockmen
Farmers	Packing-house workers	Veterinarians
Gardeners	Shearers	Zoological technicians

G. Radiant Energy

1. X-rays, Radium, and Other Radioactive Substances (radiothorium, mesothorium, etc.)

The increasing use of X-rays and of radium in the detection and treatment of disease and the more extended use of X-rays in industry as an aid in detecting hidden defects in metals have greatly added to their importance as potential sources of occupational disease. Radioactive substances (radium, radiothorium, mesothorium) have been added to the list of occupational hazards found in various manufacturing industries. The hazard is now known to be present also in several other industries.

Exposure to X-rays and emanations from radium and other radioactive substances may produce serious burns and cancer, while the blood and blood-forming organs are profoundly affected. Anemia and leukopenia are frequently associated with exposure to radiations.

Much has been learned concerning adequate measures for the protection of workers exposed to X-rays and radioactive substances since the early days of their discovery, when many pioneers in medical treatment with these new agencies suffered severe mutilating disabilities because of their unmitigated exposure. Protective measures today have been worked out in considerable detail for the variety of conditions met with. See, for example, United States Department of Commerce, National Bureau of Standards Handbook H23, "Radium Protection and Recommendations of The British X-ray and Radium Protection Committee," fifth revised edition (January 1938).

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Severe dermatitis usually on hands and arms, loss of nails, burns, destruction of skin, injury to joints, necrosis of bones, cancer, anemia, leukemia, leukopenia, sterility.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Chemists and laboratory workers (radium research)
- Dentists
- Incandescent mantle makers
- Inspectors and examiners using fluoroscope or X-ray
- Painters of luminous watch dials and painters of instrument dials, and other workers in plants manufacturing luminous dials.
- Physicians, nurses, and hospital attendants
- Radioactive-paint makers
- Radioactive-water makers
- Radiologists
- Radium miners
- Radium ore reduction workers
- Radium specialists
- Roentgenologists
- Uranium miners
- Uranium workers
- X-ray machine makers
- X-ray technicians and photographers
- X-ray tube makers

2. Ultraviolet and Infrared Rays

Ultraviolet and infrared rays are an industrial hazard in a number of occupations where there is exposure to excessive radiance. Welders and cutters especially are exposed to ultraviolet rays: furnacemen and other workers around molten metal and glass, to infrared rays. Although we cannot see ultraviolet and infrared rays, they are very active and powerful and are usually coexistent with excessive radiance.

Ultraviolet rays are chemical in their action, and cause intense irritation of the eyes and burns of the skin, similar to sunburn. Snow blindness, desert blindness, and the "eye flashes" of welders are one and the same condition, all due to the action of ultraviolet rays upon the eye; their effects can be very painful and cause disability for several days, though usually they do not cause permanent damage.

Infrared rays act upon the eyes simply as heat, but may cause permanent damage (cataract). There is little definite evidence that welding has caused cataract, similar to glassblower's cataract, but it is probable that prolonged exposure to infrared rays may cause haziness of the cornea.

The injurious effects resulting from excessive light due to defective illumination are not considered here, but treated as a separate hazard. *See* Hazard D.

Goggles, helmets, shields, and masks, equipped with colored lenses especially designed to exclude the kinds and intensities of rays met with, afford protection to the eye. Booths should be provided for welders working indoors to protect others working nearby. Clothing which covers the body completely protects the skin from irritation caused by the rays. Protective measures are covered in detail in United States Department of Commerce, National Bureau of Standards Handbook H24, "American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs." (November 1938).

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Burns, conjunctivitis, electrical ophthalmia, photophobia, [illegible]initis, cataract, dermatitis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Bakers
Blacksmiths
Braziers
Cooks
Driers (lacquer)
Electricians
Electric linemen
Firemen (stationary)
Food irradiators
Foundry workers
Furnace workers
Glass blowers
Glass-furnace workers
Incandescent-mantle hardeners
Iron and steel mill workers
Irradiators (food)
Motion-picture-machine operators
Motion-picture-studio workers and actors
Photographers
Skimmers (glass)
Solderers
Stokers
Welders

H. Repeated Motion, Pressure, Shock, etc.

Under this heading are included those conditions which are caused by continuous repetition of movements, pressure, or blows peculiar to many occupations. This section is not concerned with the neurasthenic phenomena following accidental injuries, commonly referred to as traumatic neurosis.

Everyone is familiar with the muscular strain experienced in performing for the first time some exercise, such as rowing, long walking, and so forth. Men newly introduced into a process requiring such repeated action are affected similarly but often much more severely, so as to disable them temporarily for the particular job. When the body is subjected to constant pressure or repeated shocks such as are encountered in working with pneumatic tools or when muscles are used for a long period under conditions of severe strain, there may result tenosynovitis or bursitis. In the use of pneumatic tools, due to the repeated shocks or vibration, there may occur also marked vasomotor changes with a characteristic condition known as "dead fingers." Exposure to vibrations may also cause changes in bone structure.

After long-continued repetitive motion in which small groups of muscles are used excessively, the muscles involved may not function when called upon to perform the accustomed task, although their function is unimpaired for other activities. This condition, of which a typical example is writers' cramp, is referred to as occupational or professional neurosis.

Where continuous pressure or shock is the cause, pads or cushions are often beneficial. Workers who have to grasp tools tightly would do well frequently to change their method of holding the instrument, if this is possible. Occasional rest periods will do much toward the prevention of muscular pains and cramps.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Pain of muscle used, set up by a myositis, bursitis, synovitis, or other local changes of a chronic inflammatory nature; trembling, cramp. Among pneumatic-tool workers also vasomotor disturbances; local anemia of hand followed by hyperemia, cyanosis, and burning sensation.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Air-hammer operators
Artificial-flower makers
Barbers
Bicyclists
Blacksmiths
Carpenters
Chauffeurs
Clerks
Cobblers
Compositors
Cotton-twisters
Dancers
Diamond cutters
Elevator operators
Enamelers
Engravers
Furniture polishers
Gold-beaters
Grinders (metals)
Hammermen
Housemaids
Ironers
Jewelers
Knitters
Lathe turners
Letter sorters
Lithographers
Locksmiths
Machinists
Mail sorters
Masons
Microscopists
Milkers
Miners
Musicians
Painters
Paper-box makers
Pavers
Pile-drivers
Pneumatic-tool workers
Polishers
Porters
Pressers
Quarrymen
Riveters
Sailors
Sawyers
Scissors sharpeners
Scrubwomen
Seamstresses
Sewing-machine operators
Spinners (textiles)
Stonecutters
Tailors
Telegraphers
Typists
Washwomen
Watchmakers
Weavers

J. Poisons

Industry today produces or employs a far greater number of poisonous compounds than ever before. Extensive chemical research, particularly in the field of the volatile solvents, is adding to the number every year. The production of new synthetic materials finding industrial uses as substitutes for wood, textile, and other natural products, has also added to the list. It would be impracticable to cover all or even the greater number of these industrial poisons in a work of this kind. Only the more important ones concerning which we know something of the toxicity have been included. Some poisons, long used in industry, on the other hand, are being displaced. Since it is extremely difficult to determine whether their use has been entirely discontinued, and we cannot foretell when a new use will be found for them, their inclusion in our list has been thought desirable.

The revised List of Industrial Poisons, compiled by Sommerfeld and Fischer for the International Association of Labor Legislation [1] formed the basis for the data presented in the section on poisons in the first edition of this bulletin. The material in that list has been revised and amplified in subsequent editions, and new poisons have been added. The symptoms cited are those which are reported in the best works available. In order to avoid swelling the list of poisons to unwarranted proportions, substances whose effects are similar have been grouped. Thus all nitro compounds of benzol and its homologues have been included under one heading, and the same procedure has been followed with amino compounds. The next section is devoted to the substances occurring in industry which produce typical occupational dermatoses. Because of the very large

[1] See U. S. Bureau of Labor Statistics Bull. No. 100. Washington, 1912.

number of substances in the latter class, it has not been possible to treat them as fully as the other poisons.

The occupations and industries listed under the various poisons are those in which the hazard may be present. They are not necessarily those where actual cases of poisoning have been reported. Adequate preventive measures, vigilantly carried out, may make the chance of poisoning from even an extremely toxic compound virtually impossible. That fact has been fully established by the splendid record of many American companies which have manufactured some of the most toxic compounds for years without having a single case of poisoning develop in their plants.

To prevent industrial poisoning the following precautions should be taken:

Workers must be instructed as to the toxicity of the substance handled. Frequent medical examinations of workers must be made to detect early symptoms of disease. Before new substances are employed in industrial processes, their toxicity should be determined.

Personal cleanliness must be maintained, and proper washroom facilities, therefore, should be provided. Men should not be allowed to eat in workrooms where poisonous substances are handled. Work clothes should receive special attention and should be removed at the end of the day's work. The use of gloves and boots is often necessary.

Mechanical devices for confining the poisons are of prime importance. Reference should be made in this connection to the preventive measures discussed under "Dust." Fumes and gases should be taken care of by proper ventilation, the use of exhaust systems, fans, and blowers.

If complete removal of the poison is not possible, men who are required to work in an atmosphere polluted by poisonous fumes and gases should wear respiratory protective devices constructed for the specific poison with which they work, and approved by the United States Bureau of Mines for the conditions of exposure likely to be encountered.

1. Acetaldehyde

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of mucous membranes of eyes and respiratory tract, dyspnea and cough, acceleration of heart, profuse night sweats.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Acetaldehyde workers
- Aldehyde pumpmen
- Disinfectant makers
- Dye makers
- Explosives workers
- Lacquer workers
- Mirror silverers
- Photographic workers
- Pyroxylin-plastics workers
- Resin (synthetic) makers
- Rubber (synthetic) makers
- Varnishers
- Varnish makers
- Vinegar workers
- Yeast makers

2. Acetanilide. *See* Aniline

3. Acetone

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of skin and mucous membranes of eyes and respiratory tract.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Acetone workers
- Acetylene workers
- Airplane-dope makers
- Artificial-leather makers
- Artificial-pearl makers
- Artificial-silk workers
- Bronze-powder makers
- Button makers
- Cement (rubber, plastic etc.) mixers
- Chloroform makers
- Collar (fused) makers

Comb makers
Dye makers
Dyers
Explosives workers
Extractors (oils and fats)
Lacquerers
Lacquer makers
Methyl-alcohol makers
Nitrocellulose workers
Painters
Paint makers
Paint removers
Paraffin workers
Pencil makers
Perfume makers
Petroleum refiners
Pharmaceutical workers
Photographic workers
Pyroxylin-plastics workers
Rayon workers
Resin makers
Rubber workers
Shoe-factory operatives
Shoe-heel (wood) coverers
Smokeless-powder makers
Transparent-wrapping-material workers
Varnishers
Varnish makers
Wood-alcohol distillers
Wool scourers

4. Acridine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of skin and mucous membranes of eyes and respiratory tract, violent sneezing.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acridine workers
Dye makers

5. Acrolein

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of skin and mucous membranes of eyes and respiratory tract, dyspnea, bronchitis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acrolein is formed whenever fatty substances are heated to dryness and decomposed.

Acrolein workers
Bone renderers
Bookbinders
Candle makers
Copper (strip) roller mill workers
Fat renderers
Fertilizer makers
Galvanizers
Garage workers
Gasoline engine workers
Gelatine makers
Glue makers
Lard makers
Linoleum makers
Linseed-oil boilers
Petroleum refiners
Pharmaceutical workers
Pyroxylin-plastics workers
Refrigerator (mechanical) makers and repairmen
Soap makers
Stearic-acid makers
Straw-hat makers
Tallow refiners
Tinners
Type melters
Varnish makers
Wax ornament makers

6. Aluminum

Not generally regarded as an industrial poison.

7. Ammonia

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Intense irritation of upper respiratory passages, cough and dyspnea, pulmonary edema, bronchitis, severe irritation of eyes, caustic action on skin.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetylene workers
Ammonia workers
Ammonium-salts makers
Annealers
Artificial-ice makers
Boneblack makers
Bronzers
Calcium carbide makers
Cement (rubber plastic, etc.) mixers
Coke-oven workers
Color makers
Cyanide makers
Dye makers
Dyers
Electrotypers
Explosives workers
Fertilizer makers
Galvanizers
Gas (illuminating) workers

Gas purifiers
Glue makers
Ice-cream makers
Ink makers
Lacquer makers
Mirror silverers
Nitric-acid makers
Paper makers
Perfume makers
Petroleum refiners
Photoengravers
Photographic materials workers
Rayon makers
Refrigerating-plant workers
Salt extractors (coke-oven byproducts)
Sewer workers
Shellac makers
Shoe finishers
Soda (Solvay) makers
Stablemen
Sugar refiners
Sulphuric-acid workers
Tannery workers
Tinners
Varnish makers
Vulcanizers
Wool scourers

8. Amyl Acetate

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of mucous membranes of eyes, nose, throat; headache and vertigo, fullness of the head, drowsiness, oppression in chest, cough, nausea.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane-dope makers
Alcohol-distillery workers
Amyl acetate workers.
Art-glass workers
Artificial-leather workers.
Artificial-pearl makers
Battery (dry) makers
Bookbinders
Bronzers
Buffers (rubber)
Camphor makers
Cement (rubber, plastic, etc.) mixers
Cutlery makers
Dry cleaners
Dyers
Enamelers
Enamel makers
Explosives workers
Fruit-essence makers
Furniture polishers
Gilders
Incandescent lamp makers
Jewelers
Lacquerers
Lacquer makers
Leather workers
Linoleum makers
Motion-picture film workers
Mottlers (leather)
Nitrocellulose workers
Painters
Paint makers
Paint removers
Paper (coated) makers
Patent-leather makers
Perfume makers
Photoengravers
Photographic-film makers
Polish makers
Pyroxylin-plastics workers
Rayon makers
Shelluckers
Shellac makers
Shoe-factory workers
Shoe finishers
Shoe-heel (wood) coverers
Smokeless-powder makers
Soap makers
Storage-battery makers
Straw hat makers
Tannery workers
Textile printers
Toy makers
Varnishers
Varnish makers
Wirers (incandescent lamps)

9. Amyl Alcohol

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Irritation of eyes and respiratory tract, headache and vertigo, nausea, vomiting, diarrhea.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alcohol-distillery workers
Amyl-acetate makers
Amyl alcohol workers
Amyl-nitrite makers
Brewers
Explosives workers
Fruit-essence makers
Fusel-oil workers
Lacquerers
Lacquer makers
Mordanters
Nitrocellulose workers
Painters
Paint makers
Pyroxylin-plastics workers
Rubber (synthetic) makers
Shoe finishers
Smokeless-powder makers
Varnish makers
Varnishers

10. Aniline and Other Amino Compounds of Benzol and Its Homologues

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Pallor followed by cyanosis, especially of lips and finger tips, somnolence, irritability, mental confusion, headache and vertigo, nausea and vomiting, unsteady gait, weakness, muscular tremor and convulsions, anemia, weak pulse, visual disturbances, brownish discoloration of the blood and urine, disorders (tumors, etc.) of the bladder, eczematous eruptions.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetanilide workers
Aniline workers
Artificial-leather makers
Blueprint paper makers
Bromine makers
Camphor makers
Candle (colored) makers
Coal-tar workers
Color makers
Compositors
Compounders (rubber)
Disinfectant makers
Dye makers
Dyers
Explosives workers
Feather workers
Gasoline blenders
Lithographers
Millinery workers
Mixers (rubber)
Naphthylamine workers
Nitraniline workers
Painters
Paint makers
Pencil (colored) makers
Perfume makers
Petroleum refiners
Pharmaceutical workers
Photographic materials workers
Polish makers
Pressroom workers (rubber)
Printers
Pyroxylin-plastics workers
Reclaimers (rubber)
Rubber (synthetic) makers
Rubber workers
Tannery workers
Textile printers
Varnishers
Varnish makers
Vulcanizers

11. Antimony and Its Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation and eczematous eruptions of the skin, inflammation of mucous membranes of nose, mouth, and throat, sores in mouth, metallic taste, gastro-intestinal disorders with vomiting, diarrhea, colic.

A clear picture of symptomatology of industrial antimony poisoning is difficult to obtain. Antimony utilized in industry almost always contains arsenic and, furthermore, it is associated with lead compounds in most of its industrial uses. Both of these substances are poisons which produce many of the symptoms ascribed to antimony poisoning.

Metal fume fever. (*See* Zinc.)

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Antimony extractors (refiners)
Babbitt-metal workers
Babbitters
Brass founders
Burnishers (iron and steel)
Color makers
Compositors
Compounders (rubber)
Copper refiners
Dye makers
Dyers
Electroplaters
Electrotypers
Enamelers
Enamel makers
Explosives makers
Filers
Fireworks makers
Glass mixers
Glaze dippers (pottery)
Glaze mixers (pottery)
Grinders (metals)
Grinders (rubber)
Insulators (wire)
Lead smelters
Linotypers
Match-factory workers
Mixers (rubber)
Monotypers
Mordanters
Paint makers
Painters
Pewter makers
Pharmaceutical workers
Pressroom workers (rubber)
Printers
Rubber (red) workers
Shot makers
Solder makers
Stereotypers
Storage-battery workers
Textile printers
Typefounders
Vulcanizers
Zinc refiners

12. Arsenic and Its Compounds (Except Arseniuretted Hydrogen)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Eruptions and bronzing of skin, loss of nails and hair, keratosis, epithelioma, inflammation of eye, nose, mouth, and respiratory tract, perforation of nasal septum, headache, gastro-intestinal disturbances with nausea, vomiting, and severe diarrhea and abdominal pains, peripheral polyneuritis, muscular weakness, and paralysis. Metal fume fever (see Zinc).

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Arsenic roasters
Arsenic workers
Artificial-flower makers
Artificial-leather makers
Aviators—crop dusting
Bookbinders
Brass founders
Briquet makers
Bronzers
Candle (colored) makers
Canners
Carpet makers
Carroters (felt hats)
Cement (portland) makers
Chimney sweepers

Colored-paper workers
Color makers
Compounders (rubber)
Copper founders
Copper smelters
Coppersmiths
Cosmetic workers
Currriers (tannery)
Cut-glass workers
Decorators (pottery)
Disinfectant makers
Dye makers
Dyers
Electroplaters
Enamelers
Enamel makers
Exterminators
Farmers
Feather curers
Feather workers
Ferrosilicon workers
Fertilizer makers
Fireworks makers
Fly-paper makers
Galvanizers
Gardeners
Glass mixers
Glaze dippers (pottery)
Glaze mixers (pottery)
Gold refiners
Ink makers
Insecticide makers
Insulators (wire)
Iron and steel makers
Japan makers
Japanners
Lacquerers
Lacquer makers
Lead-arsenate makers
Lead smelters
Linoleum colorers
Lithographers
Mixers (rubber)
Mordanters
Painters
Paint makers
Paper glazers
Paperhangers
Paris-green workers
Pencil (colored) makers
Pharmaceutical workers
Pitch workers
Pottery workers
Pressroom workers (rubber)
Printers
Pyrites burners
Refiners (metals)
Rubber workers
Sealing-wax makers
Sheep-dip makers
Shot makers
Silver miners
Soap makers
Soot packers
Sprayers (trees)
Sulphur burners
Sulphuric-acid workers
Tannery workers
Tar workers
Taxidermists
Textile printers
Tinners
Toy makers
Varnish makers
Velvet makers
Wallpaper printers
Wax-ornament makers
Welders
Wire drawers
Wood preservers
Zinc miners
Zinc refiners

13. Arseniuretted Hydrogen (arsine)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Feeling of faintness and weakness, intense headache, nausea and vomiting, jaundice, abdominal pains, hemoglobinuria, anemia, suppression of urine, shivering and chills, gastric disorders.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

NOTE.—Arsine is formed when a metal and an acid react to produce nascent hydrogen which unites with arsenic present in either the acid or metal, to give the toxic gas.

Acetylene workers
Acid dippers
Aniline workers
Balloon (hydrogen) workers
Bleaching-powder makers
Bronzers
Cadmium workers
Carbonizers (shoddy)
Dimethyl-sulphate makers
Dye makers
Electrolytic-process (copper) workers
Electroplaters
Etchers
Extractors (gold)
Ferrosilicon workers
Fertilizer makers
Galvanizers
Gas (illuminating) workers
Hydrochloric acid workers
Jewelers
Lead burners
Lime burners
Nitrocellulose makers
Nitroglycerine makers
Paper makers
Picklers
Plumbers
Pyroxylin-plastics workers
Rayon makers
Refiners (metals)
Shoddy workers
Soda makers
Solderers
Storage-battery makers
Submarine workers
Sulphuric-acid workers
Tank cleaners
Tinners
Towermen (sulphuric acid)
War-gas makers
Zinc-chloride makers

14. Barium

The soluble salts of barium are poisonous when ingested. Few cases of industrial poisoning, however, have been reported. The symptoms reported in industrial poisoning include dermatitis, whitening and loss of hair, paralysis, acceleration of the heart, cyanosis of the skin, gastric pain, and vomiting.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Barium carbonate makers	Ink (printing) makers	Paint makers
Depilatory makers	Insecticide makers	Photographic workers
Dye makers	Lacquer makers	Rubber workers
Enamel makers	Leather workers	Sugar refiners
Fireworks makers	Linoleum makers	Varnish makers
Glass mixers	Lithopone makers	Water purifiers

15. Benzine (naphtha-gasoline)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Headache and vertigo, nausea and vomiting, abdominal pain, irregular respiration, pneumonia, drowsiness, irritation of skin and mucous membranes, "naphtha jag" (a condition resembling mild alcoholic intoxication), visual disturbances, twitching of the muscles.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane hangar employees	Galvanizers	Putty makers
Art-glass workers	Garage workers	Pyroxylin-plastics workers
Benzine workers	Gasoline blenders	Rubber-glove makers
Bronzers	Gasoline-engine workers	Rubberized asbestos board makers
Buffers (rubber)	Gilders	Rubber-tire builders
Burnishers (metals)	Glue workers	Rubber workers
Cast scrubbers (electroplaters)	Ink makers	Scourers (metals)
Cementers (rubber shoes)	Insecticide makers	Sewer workers
Cement mixers (rubber)	Japan makers	Shade-cloth makers
Chauffeurs	Japanners	Shellackers
Color makers	Lacquerers	Shellac makers
Compositors	Lacquer makers	Shingle stainers
Compounders (rubber)	Linoleum makers	Shoe-factory workers
Curriers (tannery)	Lithographers	Shoe finishers
Decorators (pottery)	Metal-polish makers	Shoe-heel (wood) coverers
Degreasers (fertilizer; leather; metals; textile)	Metal washers	Soap makers
Dippers (rubber)	Millinery workers	Tank cleaners
Driers (rubber)	Mixers (rubber)	Tannery workers
Dry cleaners	Mordanters	Type cleaners
Dyers	Painters	Varnishers
Electroplaters	Paint makers	Varnish makers
Enamelers	Paint-remover makers	Varnish-remover makers
Enamel makers	Paint removers	Varnish removers
Extractors (oils and fats)	Perfume makers	Vulcanizers
Feather workers	Petroleum refiners	Washers (metal)
Filling station workers	Polishers	Waterproof-cloth makers
Furniture polishers	Polish makers	Window-shade makers
	Pressroom workers (rubber)	Woodworkers
	Printers	

16. Benzol (benzene) and Its Homologues (toluol and xylol)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Headache and vertigo, gastrointestinal disturbances, hemorrhages, purpura, injury to blood-forming organs with marked but varied changes in the blood picture—slight polycythemia followed by leukopenia, erythropenia, anemia, and so forth, injury to blood vessels, heart, liver, kidneys, and nervous system, marked susceptibility to infection, local irritation (bronchitis, conjunctivitis, gingivitis, and so forth). In acute poisoning; inebriation, staggering gait, twitchings, convulsions, and loss of consciousness.

Note.—The effects of toluol and xylol differ from those of benzol particularly as regards their effects on the blood and blood-forming organs. Neither of these compounds produces the changes in the blood characteristic of benzol. It is important to note however that the toluol and xylol used in industry are frequently mixed with benzol.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane-dope workers
Airplane hangar employees
Alcohol (denatured) workers
Aniline workers
Artificial-leather makers
Asbestos-products impregnators
Auto painters
Battery (dry) makers
Beauty-parlor operatives
Benzol purifiers
Benzol-stillmen
Benzol workers
Brake-lining makers
Bronzers
Can sealers
Carbolic-acid makers
Cast scrubbers (electroplaters)
Cementers (rubber)
Cement mixers (rubber)
Chlorodiphenyl makers
Clutch-disk impregnators
Coal-tar workers
Cobblers
Coke-oven workers
Color makers
Compounders (rubber)
Decorators (pottery)
Degreasers
Dippers (rubber)
Disinfectant makers
Driers (rubber)
Dry cleaners
Dye makers
Electroplaters
Enamelers
Enamel makers
Engravers
Explosives workers
Extractors (oils and fats)
Feather workers
Fertilizer makers
Flavoring-extract makers
Fullers (textiles)
Gas (illuminating) workers
Gasoline blenders
Gilders
Glue workers
Ink makers
Insulators (wire)
Lacquerers
Lacquer makers
Linoleum workers
Lithographers
Millinery workers
Mirror silverers
Mixers (rubber)
Mordanters
Nitrobenzol makers
Nitrocellulose workers
Painters
Paint makers
Paint-remover makers
Paint removers
Paraffin makers
Pencil makers
Perfume makers
Petroleum refiners
Pharmaceutical workers
Phenol makers
Photoengravers
Photographic materials workers
Picric-acid makers
Polish makers
Polishers
Pressroom workers (rubber)
Printers
Pyroxylin-plastics workers
Reclaimers (rubber)
Rotogravure workers
Rubber-tire builders
Rubber workers
Scourers (belts)
Shade-cloth makers
Shellackers
Shellac makers
Shoe-factory workers
Shoe finishers
Shoe-heel (wood) coverers
Smokeless powder makers
Soap makers
Still (coal tar) cleaners
Tank cleaners
Tobacco seedling treaters
Treaders (rubber)
Trinitrotoluol makers
Varnishers
Varnish makers
Varnish-remover makers
Varnish removers
Vulcanizers
War gas makers
Waterproof-fabric makers
Wax makers
Welders
Window-shade makers

17. Beryllium

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Metal fume fever (*see zinc*). Severe lung injury has been reported from the extraction of beryllium, but this is thought to be due to the fluorine compounds used in the process of extraction.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Beryllium alloy workers

18. Brass. *See* Zinc

19. Bromine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Violent irritation of air passages, bronchitis, and conjunctivitis, sensation of suffocation, cough, skin eruptions, brownish stain on skin and mucous membranes.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Bromine extractors
Bromine-salts makers
Color makers
Disinfectant makers
Dye makers
Ethylene dibromide makers
Explosives workers
Extractors (gold)
Ink makers
Insecticide makers
Methyl bromide makers
Pharmaceutical workers
Photographic-film makers
Platinum extractors
Tetraethyl-lead makers
War-gas makers

20. Butanone (Methyl Ethyl Ketone)

Butanone is at present employed in the manufacture of pyroxylin solutions, chiefly in the artificial leather and lacquer industries, and is also used in paint removers. Although at present limited largely to these uses, butanone has possibilities as a solvent in other fields.

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of butanone. According to this Bureau the symptoms are principally those of eye and nose irritation, and narcosis, the latter being apparently the most significant. Animals that did not die during exposure recovered. The principal gross pathological findings immediately after exposure were congestion, edema, and hemorrhage of vital organs, death being due to a narcosis terminating in death.

Butanone, according to the same authority, has a distinct odor and is markedly irritating to the nose and eyes of man in concentrations found to be harmful to guinea pigs. It also has moderate warning properties (odor, and eye and nose irritation) in concentrations apparently harmless to guinea pigs after several hours' exposure.

21. Butyl Acetate. *See* Amyl Acetate

22. Butyl Alcohol

No case of industrial poisoning has been reported, but it has been considered a contributing cause in a number of cases of poisoning. Animal experimentation showed marked dermatitis, early liver degeneration, a definite decrease in red-blood cells, with an absolute and relative lymphocytosis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Artificial-leather workers	Lacquer makers	Rayon makers
Butyl acetate makers	Motion-picture-film workers	Shellackers
Butyl alcohol makers	Perfume makers	Shellac makers
Cementers (rubber)	Photographic-film makers	Varnishers
Dye makers	Pyroxylin-plastics workers	Varnish makers
Fruit-essence makers		
Glass (safety) makers		

23. Cadmium

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Dryness of throat, coughing, tightness, and soreness in chest, dyspnea, severe inflammation of lungs, weakness, loss of appetite, diarrhea, nausea, vomiting, headache, shivering, rapid pulse, brown urine, inflammation of kidneys, fatty degeneration of kidneys and liver.

Metal fume fever (*See* Zinc).

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Cadmium-alloy makers	Electroplaters	Solder makers
Cadmium and cadmium-compound makers	Glass colorers	Storage-battery makers
Cadmium platers	Lead smelters	Textile printers
Cadmium-vapor-lamp makers	Lithopone makers	Welders
Color makers	Metallizers	Zinc smelters and refiners
	Paint makers	
	Solderers	

24. Calcium Cyanamide (Cyanamide)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Severe irritation of nose, throat, and skin. Flushing of skin, headache, shortness of breath, rapid pulse, vasodilation with lowered blood pressure have been reported among workers who have consumed alcohol.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Ammonia workers
Calcium cyanamide makers
Cyanamide makers
Farmers
Fertilizer makers
Gardeners
Pharmaceutical workers
Temperers

25. Carbon Dioxide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Carbon dioxide is now generally regarded as a simple asphyxiant. The symptoms preceding asphyxia are: Headache and vertigo, rapid breathing, dyspnea, drowsiness, muscular weakness, flushing of face, ringing in ears.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alkali-salt makers
Bakers
Baking-powder makers
Blacksmiths
Blast-furnace workers
Boiler-room workers
Bottlers (mineral waters)
Brass founders
Brewers
Brick burners
Caisson workers
Canners
Carbonated-water makers
Carbon-dioxide-ice workers
Carbon-dioxide makers
Carbonic-acid makers
Charcoal burners
Clothes pressers
Cupola men (foundries)
Disinfectant makers
Divers
Drying-room workers
Dye makers
Explosives (safety) makers
Fertilizer workers
Fire-extinguisher makers
Foundry workers
Furnace workers
Glue makers
Grain-elevator workers
Ice-cream makers
Insecticide makers
Lime burners
Lime-kiln workers
Linseed-oil boilers
Miners
Pharmaceutical workers
Physicians
Pottery workers
Refrigerating-plant workers
Sewer workers
Silo workers
Soda makers
Starch makers
Submarine workers
Sugar refiners
Tannery pit men
Tobacco moisteners (storehouse)
Tunnel workers
Vatmen
Vault workers
Vinegar makers
Vintners
Vulcanizers
Well workers
White-lead makers
Yeast makers

26. Carbon Disulphide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Headache, vertigo, weakness, psychical effects (hilarity, agitation, irritability, hallucinations, mania), disturbances of sensation, particularly of sight, polyneuritis, digestive disturbances. Irritation of the skin.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetylene workers
Ammonium-salts makers
Carbanilide makers
Carbon-disulphide makers
Carbon tetrachloride workers
Cementers (rubber shoes)
Cement mixers (rubber)
Degreasers
Driers (rubber)
Dry cleaners
Electroplaters
Enamelers
Enamel makers
Explosives workers
Extractors (oils & fats)
Glue workers
Insecticide makers
Match-factory workers
Painters
Paint makers
Paraffin workers
Putty makers
Rayon makers
Reclaimers (rubber)
Rubber workers
Smokeless-powder makers
Sulphur extractors
Tallow refiners
Transparent-wrapping-material workers
Varnish makers
Vulcanizers

27. Carbon Monoxide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Tightness across forehead, painfulness of the eyeball, dilatation of cutaneous vessels, headache (frontal and basal), throbbing in temples, weariness, weakness,

dizziness, nausea and vomiting, loss of strength and muscular control, increased respiration and pulse, collapse, anemia, polycythemia, presence of carbon monoxide, hemoglobin.

NOTE.—Poisoning may proceed in some persons to the stage of collapse without causing any subjective symptoms.

Exposure to high concentrations of carbon monoxide for short periods, may, through the effect of oxygen deprivation, cause degenerative changes in various tissues of the body. Chronic exposure to low concentrations for long periods of time according to some investigators, may produce permanent injury.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetylene workers
Airplane pilots
Alloy makers
Ammonia makers
Bakers
Balloon inflaters
Bisque-kiln workers
Blacksmiths
Blasters
Blast-furnace workers
Blockers (felt hats)
Boiler cleaners
Boiler-room workers
Brass founders
Brewery workers
Brick burners
Cable splicers
Carbide makers
Cement (portland) makers
Charcoal burners
Chargers (furnaces)
Chauffeurs
Chimney masons
Chimney sweepers
Cloth singers
Coal-tar workers
Coke-oven workers
Compressed air (caisson) workers
Cooks
Copper smelters
Core makers
Cupola men (foundries)
Divers
Drier workers (foundries)
Drying-room workers (miscellaneous)
Enamelers
Enamel makers
Engineers (stationary)
Felt-hat makers
Filament makers and finishers (incandescent lamps)
Filling-station workers
Firemen (city)
Firemen (stationary)
Flangers (felt hats)
Flue cleaners
Foundry workers
Furnace workers
Garage workers
Gas (illuminating) workers
Gasoline-engine workers
Gassers (textiles)
Glass-furnace workers
Glost-kiln workers
Incandescent-lamp makers
Ink (printer's) makers
Insecticide makers
Iron and steel workers
Ironers
Kiln tenders
Laboratory workers
Laundry workers
Lead smelters
Lime burners
Lime-kiln chargers
Linotypers
Mechanics (gas engines)
Mercury smelters
Methane (synthetic) makers
Methyl-alcohol (synthetic) makers
Miners
Mold breakers (pottery)
Monotypers
Motion-picture-film workers
Neon-lights letter makers
Patent-leather makers
Petroleum refinery workers
Phosgene makers
Phosphine workers
Pilots (airplane)
Plumbers
Policemen
Pottery (kiln) workers
Pressers
Printers
Puddlers (foundries)
Pyroxylin-plastics workers
Refiners (metals)
Sailors
Sealers (incandescent lamps)
Sewer workers
Silver melters
Singers (cloth)
Soda makers (Leblanc)
Solderers
Steeple jacks
Stokers
Storage-battery makers
Sulphur-dioxide makers
Tailors
Tenzers (glass)
Telephone linemen (trench work)
Temperers
Textile printers
Top fillers (foundry)
Tubulators (incandescent lamps)
Welders
Wood-alcohol distillers
Zinc smelters

28. Carbon Tetrachloride

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of nose, eyes, and throat, headache, visual disturbances, vertigo, nausea and vomiting, diarrhea, loss of appetite, mental dullness, confusion and excitement, nervousness, injury to liver, jaundice, nephritis, dermatitis, narcosis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane-dope workers
Airplane-hangar employees
Burnishers (metals)
Carbon-tetrachloride workers
Cementers (rubber)
Cement mixers (rubber)
Chlorinated rubber makers
Chloroform makers
Cobblers

Core makers
Degreasers (metals)
Degreasers (textiles)
Dippers (rubber)
Dry cleaners
Dye makers
Electroplaters
Fire-extinguisher makers
Fullers (textiles)
Glue workers
Ink makers
Insecticide makers
Insulators (wire)
Lacquerers
Lacquer makers
Leather workers
Linoleum makers
Metal-polish makers
Mixers (rubber)
Painters
Paint makers
Paint-remover makers
Paint removers
Paraffin workers
Perfume makers
Pharmaceutical workers
Polish makers
Printers
Pyroxylin-plastics workers
Rubbers workers
Scourers (metals)
Shoe-factory workers
Soapmakers
Spreaders (rubber)
Varnishers
Varnish makers
Vulcanizers
Waterproof-fabric makers

29. Cellosolve (mono-ethyl ether of ethylene glycol)

This compound is used as a solvent for nitrocellulose and resins in the manufacture of lacquers.

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of cellosolve. According to this Bureau, the animals showed inactivity, weakness, dyspnea, and death following exposure for 18 to 24 hours to air saturated with cellosolve vapor (0.6 percent by volume). The principal gross pathological findings were congestion and edema of the lungs; distention of the stomach, with numerous reddish-brown petechiae scattered over the mucous membrane; and congestion of the kidney. The contents of the stomach were also discolored reddish brown. All these occurred in the animals that died during or soon after exposure. The congestion and edema were the principal findings in the animals that died 24 hours following exposure and bronchopneumonia in the animals that died 3 days following.

They also determined that men exposed to 0.6 percent for a few seconds reported the atmosphere to be irritating to the eyes and to have a very disagreeable odor. They thought that the odor and the irritation were sufficiently disagreeable to make one desire to avoid a like exposure.

Actual examinations of workers in lacquer and paint manufacture by the British Factory Department in 1934 revealed very little evidence of any injury to health from the use of cellosolve.

30. Chloride of Lime

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritating cough, inflammation of upper air passage, difficulty in breathing, asthma, bronchitis, conjunctivitis, lachrymation, hyperhidrosis, burning eruptions on the skin.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetylene workers
Bleachers
Bleaching-powder makers
Button (shell, pearl) makers
Chloride-of-lime makers
Chloroform makers
Disinfectant makers
Dye makers
Laundry workers
Mordanters
Pharmaceutical workers
Straw-hat-makers
Tannery workers
Water purifiers

31. Chlorinated Diphenyls

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Acneform skin eruptions, jaundice, and atrophy of liver.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Chlorinated-diphenyl makers
Electrical-condenser makers
Electrical-transformer makers
Insulators (wire)
Lacquer makers
Paint makers
Rayon makers
Resin (synthetic) workers
Varnish makers
Wax makers

32. Chlorinated Hydrocarbons

See the following: Carbon tetrachloride, chlorinated diphenyl, chlorinated naphthalenes, chloroprene, dichlorethylene, ethyl chloride, ethylene dichloride, methyl chloride, methylene chloride, tetrachlorethane, tetrachlorethylene, trichlorethylene, and vinyl chloride.

33. Chlorinated Naphthalenes

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Acneform skin eruptions, jaundice, and atrophy of liver.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Chlorinated naphthalene workers
Degreasers (metals)
Electrical-condenser makers
Electrical-transformer makers
Electroplaters
Insulators (wire)
Lacquer makers
Paint makers
Resin (synthetic) workers
Varnish makers
Wax makers

34. Chlorine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of mucous membranes of eyes and respiratory tract, feeling of suffocation, bronchitis, cough, pulmonary edema, dyspnea, pallid countenance and emaciation, gastric disturbances, decayed teeth, irritation of skin.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alkali-salt makers
Beatermen (paper and pulp)
Bleachers
Bleaching-powder makers
Bromine makers
Broom makers
Chloride of lime makers
Chlorine makers
Color makers
Detinning workers
Disinfectant makers
Dye makers
Extractors (gold and silver)
Ink makers
Iodine makers
Laundry workers
Paper makers
Phosgene makers
Photographic workers
Rayon makers
Rubber-substitute makers
Sewage-purification workers
Shoddy makers
Soda makers
Sodium-hydroxide makers
Submarine workers
Sugar refiners
Sulphur-chloride makers
Textile printers
Tin-recovery workers
War-gas makers
Water purifiers
Zinc-chloride makers

35. Chlorodinitrobenzol. *See* Nitrobenzol

36. Chloronitrobenzol. *See* Nitrobenzol

37. Chloroprene (2-Chloro-Butadiene)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

This compound is the starting material for the manufacture of a synthetic rubber.

According to Von Oettingen and Sayers, it has narcotic properties but is mainly characterized by its injurious effect on the liver and in addition it has also a toxic effect on the kidneys and the circulation. Von Oettingen and others have shown that vapors of chloroprene mixed with air cause a primary irritation of the respiratory tract.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Rubber (synthetic) makers

38. Chromium Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Pitlike ulcers, or so-called chrome holes, very difficult to heal, occurring on the skin, most frequently on the hands, and on the mucous membranes; inflammation and perforation of the nasal septum at the cartilaginous portion; eczematous eruptions, irritation of the conjunctiva and of the respiratory passages.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Acetylene workers
- Aniline workers
- Artificial-flower makers
- Battery (dry) makers
- Bleachers
- Blueprint makers
- Candle (colored) makers
- Carbon printers (photography)
- Chrome workers
- Chromium platers
- Colorers (marble)
- Color makers
- Compounders (rubber)
- Crayon (colored) makers
- Dye makers
- Dyers
- Electroplaters
- Enamelers
- Enamel makers
- Explosives (ammonal and pyroxylin) workers
- Frosters (glass and pottery)
- Furniture polishers
- Glass colorers
- Glaze workers (pottery)
- Ink makers
- Linoleum workers
- Lithographers
- Match-factory workers
- Mixers (rubber)
- Mordanters
- Painters
- Paint makers
- Paperhangers
- Paper makers
- Paper-money makers
- Pencil (colored) makers
- Photoengravers
- Photographic workers
- Photogravure workers
- Pottery workers
- Rubber workers
- Steel (chrome) makers
- Tannery (chrome) workers
- Textile printers
- Vulcanizers
- Wallpaper printers
- Waterproofers (paper and textile)
- Wax-ornament workers
- Welders
- Wood stainers

39. Cobalt

There is little information available on the effects of cobalt. A case of poisoning with severe damage to the liver and kidneys was reported from a French tile factory. Animal experimentation reveals polycythemia. Metal-fume fever (*see* Zinc) has been reported.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Alloy makers
- Color makers
- Glass colorers
- Pottery workers
- Steel-alloy makers

40. Copper

Metal fume fever (*see* Zinc). Chronic poisoning from inhaling or ingesting copper dust has been reported to cause hemochromatosis or bronzed diabetes. Other authorities doubt the existence of a chronic form of copper poisoning of industrial origin. Few cases have been reported upon.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Brass founders
- Copper founders
- Copper refiners and smelters
- Coppersmiths
- Engravers
- Welders

41. Cresol (cresylic acid)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Toxic effects resemble those of phenol but are less severe. The chief symptoms are irritation and erosion of skin and mucous membranes, and nephritis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Coal-tar workers
- Cresol-soap makers
- Cresylic-acid makers
- Disinfectant makers
- Dye makers
- Explosives workers
- Glue workers
- Ink makers
- Insecticide makers
- Paint-remover makers
- Perfume (synthetic) makers
- Photographic workers
- Pitch workers
- Resin (synthetic) makers
- Rubber (artificial) workers
- Tar-distillery workers

42. Cyanogen Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Acute poisoning.—Exposure to large amounts of hydrogen cyanide causes death from asphyxia almost immediately. Exposure to lesser amounts causes irritation of eyes and mucous membranes, headache, dizziness, nausea, vomiting, diarrhea, shortness of breath, palpitation of the heart, trembling, muscle cramps, shallow breathing, convulsions, unconsciousness. Hydrogen cyanide and cyanide solutions also cause skin eruptions.

Chronic poisoning.—Exposure to small amounts of cyanide compounds over a long period of time is reported to cause loss of appetite, weakness, nausea, muscle cramps, unsteady gait, paralysis of arms and legs, psychoses.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acid dippers
Ammonium-salts makers
Art-printing workers
Blacksmiths
Blast-furnace workers
Bone distillers
Bronzers
Browners (gun barrels)
Case hardeners
Coal-tar-distillery workers
Cyanide workers
Cyanogen makers
Disinfectant makers
Dye makers
Electroplaters
Extractors (gold and silver)
Fertilizer makers
Fulminate mixers
Fumigators
Gas (illuminating) workers
Gas purifiers
Gilders
Gold refiners
Hydrocyanic-acid makers
Insecticide makers
Jewelers
Mirror silverers
Mordanters
Oxalic-acid makers
Phosphoric-acid makers
Photographic workers
Picklers
Polishers (metals)
Polish makers
Pyroxylin-plastics workers
Rayon makers
Silver refiners
Solderers
Sprayers (trees)
Tannery workers
Temperers
Textile printers
War-gas makers
Zincers

43. Dichlorethylene

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

This substance has irritant and narcotic properties. Post mortem findings of men overcome by the vapors of dichlorethylene show an excess of fat in the blood suggesting death from embolism rather than asphyxiation.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Cementers (rubber)
Dichlorethylene workers
Dry cleaners
Insecticide makers
Perfume makers
Pyroxylin (plastics) workers
Rayon makers
Varnishers

44. Dichloroethyl Ether

Dichloroethyl ether is an active solvent for fats, tars, waxes, resins, and similar materials.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of dichloroethyl ether. According to this Bureau, the physiological action among these animals is primarily irritation of the respiratory passages and the lungs. In order of their appearance the symptoms produced were: nasal irritation, eye irritation, lacrimation, disturbances in respiration, dyspnea, gasping, and death. All of these appeared in concentrations of 0.026 to 0.10 percent vapor in air by volume. All except lacrimation were attained with 0.01 percent, while an exposure of 810 minutes to 0.0035 percent caused no symptoms other than signs of slight nasal irritation. The principal gross pathological findings were congestion, emphysema, edema, and hemorrhage of the lungs. These occurred in all animals that died during

or after exposure, the severity increasing with length of exposure, and also during 1 to 4 days after exposure.

The same Bureau found that concentrations of 0.055 and 0.10 percent dichloroethyl ether vapor in air on brief exposure of men, were very irritating to the eyes and nasal passages.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Degreasers	Paint removers	Soap makers
Fullers (textiles)	Petroleum refiners	Varnish-remover makers
Paint-remover makers	Resin (synthetic) makers	Varnish removers

45. Dimethyl Sulphate

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Strongly corrosive effect on the skin and mucous membranes, hoarseness, lacrimation, conjunctivitis, bronchitis, pulmonary edema with hemorrhages, photophobia.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Color makers	Dyemakers.	War gas makers
Dimethyl-sulphate makers	Perfume makers	

46. Dinitrobenzol. *See* Nitrobenzol

47. Dinitrophenol (1-2-4)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Burning thirst, sweating, panting, excitement, high fever, patchy yellow skin, and convulsions. After ingestion, evidence of liver and blood damage have been observed. Bilateral cataracts have also occurred as a sequella.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Dinitrophenol workers	Explosives workers	Shell fillers
Dye makers	Pharmaceutical workers	Wood preservers

48. Dioxan (Diethylene Dioxide)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Headache, vertigo, drowsiness, irritation of eyes, nose, throat, and lungs, gastric disturbances, injury to liver and kidneys.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Cement (rubber, plastic, etc.) mixers	Insecticide makers	Pyroxylin-plastics workers
Degreasers	Lacquer makers	Rayon makers
Dioxan makers	Paint-remover makers	Varnish makers
Dye makers	Pharmaceutical workers	
	Polish makers	

49. Ethyl Benzene

This compound is used as an "antiknock," as a lacquer diluent, general solvent, and so forth.

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of ethyl benzene. According to this Bureau these animals showed in the order of occurrence, eye and nose irritation, and apparent vertigo, static and motor ataxia, apparent unconsciousness, tremor of extremities, rapid jerky respiration, then shallow respiration, and finally slow, gasping respiration, followed by death. Exposure to 1 percent caused all these symptoms and death in from 2 to 3 hours; 0.5 percent caused all the symptoms up to and including tremor of extremities, but not respiratory disturbances and death

during or after exposure of 8 hours; 0.2 percent caused all the symptoms up to and including ataxia in 8 hours; 0.1 percent did not cause symptoms other than eye irritation during 8 hours. The gross pathological findings were congestion of the brain and congestion and edema of the lungs. These were most severe for the exposures to 1 percent concentration of vapor until death ensued.

Men exposed, according to the same authority, were of the opinion that a 0.2 percent concentration of vapor would give ample warning and would not be tolerated; and that 0.5 percent would have sufficient irritating properties to render working in this atmosphere impossible.

50. Ethyl Bromide and Ethyl Chloride

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

See note under Methyl Chloride.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Dye makers	Fire-extinguisher makers	Refrigerator (mechanical) makers and repair men
Ethyl-bromide makers	Perfume makers	
Ethyl-chloride makers	Pharmaceutical workers	

51. Ethylene Dibromide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of eyes and respiratory tract, vomiting, headache, anorexia, pallor, weakness, vertigo.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Ethylene dibromide makers	Gasoline blenders	Pyroxylin-plastics workers
Fire-extinguisher makers	Pharmaceutical workers	

52. Ethylene Dichloride (Dichlorethane)

This compound is used as a solvent, particularly in the extraction of oil and fats.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Acute poisonings in industry have been reported with the following symptoms: Dizziness, nausea, and vomiting followed by weakness, trembling and epigastric cramps. Evidence of liver damage was shown by presence of extremely low blood sugar levels. Leukocytosis and dermatitis also appeared.

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of ethylene dichloride. According to this Bureau, these animals showed irritation of eyes and nose, vertigo, static and motor ataxia, retching movements, semiconsciousness, and unconsciousness, accompanied by uncoordinated movements of the extremities, and death if exposure is continued. Exposure to 6 percent vapors caused all these symptoms, excepting death, to occur in less than 10 minutes, and death in about 30 minutes. Exposure to 1 percent caused all the symptoms to appear in 25 minutes with the possibility of death occurring a day or more following an exposure of about 15 to 20 minutes. The gross pathological findings were hyperemia, congestion, and edema of the lungs with secondary degenerative changes in the kidneys. The severity of the pathology increased with the concentration of vapor and duration of exposure. The lung lesion was the most prominent and probably the greatest causative factor in death.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Degreasers (textile)	Extractors (oils and fats)	Pharmaceutical workers
Dry cleaners	Insecticide makers	Rubber workers
Dyers	Insulators (wire)	Soap makers
Ethylene-dichloride makers	Lacquerers	Tobacco denicotinizers
Exterminators	Lacquer makers	Varnishers
	Paraffin workers	Varnish makers

53. Ethylene Oxide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Headache, vomiting, dyspnea, diarrhea, irritation of mucous membranes of nose and eyes, vertigo, nausea, lymphocytosis, dullness, disturbances of respiration and of heart action, pulmonary edema.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Butyl cellosolve makers
Ethylene oxide makers
Exterminators
Insecticide makers

54. Ethyl Silicates. Tetraethyl-ortho-silicate; Tetramethyl-ortho-silicate

Animal experimentation shows these compounds to be toxic, but no cases have been reported from industrial exposure.

55. Fluorine and Its Compounds. *See* Hydrofluoric Acid

56. Formaldehyde

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of eyes and respiratory tract, cough, bronchitis, dyspnea, severe dermatitis, destruction of finger nails.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Artificial-amber makers
Asbestos (goods) makers
Brewery workers
Broom-makers
Brush makers
Button makers
Disinfectant makers
Dye makers
Dyers
Embalmers
Explosives workers
Formaldehyde workers
Fur preparers
Glass etchers
Ink makers
Insecticide makers
Lacquer makers
Laundry workers
Mirror silverers
Paper makers
Photographic workers
Preservative makers and handlers
Rayon makers
Recoverers (gold and silver)
Resin (synthetic) makers
Rubber workers
Soap makers
Straw-hat makers
Tannery workers
Textile printers
Waterproofers (paper and textile)

57. Formic Acid. *See also* Formaldehyde

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Dermatitis (blisters, ulcerations, necrosis), irritation of mucous membranes of eyes, nose, and throat.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane-dope makers
Alcohol fermenters
Cellulose-formate makers
Dye makers
Electroplaters
Formic-acid workers
Lacquerers
Lacquer makers
Mirror silverers
Mordanters
Perfume makers
Pharmaceutical workers
Rubber workers
Soap makers
Tannery workers
Varnishers
Varnish makers

58. Furfural

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Vapors are irritating and may be dangerous to eyesight.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Dye makers
Paint-remover makers
Resin makers
Varnish makers

59. Gasoline. *See* Benzine

60. Hexanone (Methyl Butyl Ketone)

Hexanone is an organic solvent. It is reported to be a good solvent for nitrocellulose and has possibilities of use in making lacquers and also varnish and lacquer removers.

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of hexanone. According to this Bureau, hexanone produces in these animals narcosis, terminating in death in the higher concentrations. Symptoms are principally eye and nasal irritation, followed by narcosis. Animals that did not die during exposure recovered. The principal gross pathological findings were congestion and hemorrhage of the lungs, slight congestion of the brain, and moderate congestion of the liver and kidneys, as observed in the autopsies performed immediately after exposure.

Men exposed to 0.23, 0.65, and 2.0 percent vapor in air, according to this same authority, pronounced the atmosphere extremely disagreeable even for a short time (one-fourth to 1 minute) because of strong odor and irritation to eyes and nasal passages. One-tenth of 1 percent was found to have a strong odor and moderate eye and nasal irritation. Concentrations producing no marked symptoms and apparently harmless to guinea pigs after one exposure of several hours have distinct warning properties of both odor and irritation that are very disagreeable to human beings.

61. Hexone (Methyl Isobutyl Ketone)

Methyl isobutyl ketone, commercially known as hexone, has been proposed as a diluent and denaturant of ethyl alcohol for external use, and is used industrially in making varnishes and lacquers.

The United States Public Health Service studied the acute response of guinea pigs to inhalation of methyl isobutyl ketone. They found that: "Methyl isobutyl ketone vapor inhalation causes irritation of conjunctival and nasal mucosa in man at concentrations below 0.1 volume percent, although this concentration is well tolerated by guinea pigs. This indicates good warning qualities. At higher concentrations marked irritation is exhibited by guinea pigs as evidenced by lacrimation and salivation. A progressive narcosis occurs, causing lowering of body temperature, respiratory rate, and heart rate. A loss of static control, consciousness, and the deeper reflexes follows. Death finally ensues at 1.0 volume percent in about 4 hours and in progressively shorter periods at higher concentrations. Complete recovery can be effected by removal at any but the terminal stages. Gross and microscopic pathology is slight and resembles that of most acute reactions to solvent exposures."

62. Hydrochloric Acid

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation and ulceration of skin and mucous membranes, conjunctivitis, coryza, pharyngitis and bronchitis, dental caries, pulmonary hemorrhages.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Acetic-acid makers
- Acid dippers
- Acid finishers (glass)
- Alkali-salt makers
- Ammonium-salts makers
- Aniline workers
- Battery (dry) makers
- Bleachers
- Bronzers
- Camphor makers
- Carbonizers (shoddy)
- Cartridge dippers
- Chlorine-compound-makers
- Chlorine makers
- Dye makers
- Dyers
- Electroplaters
- Enamel makers
- Engravers
- Etchers
- Fertilizer makers
- Galvanizers
- Glass finishers
- Glass mixers
- Glaze mixers (pottery)
- Glazers (pottery)
- Glue makers
- Hydrochloric-acid makers
- Ink makers
- Jewelers
- Leather workers
- Lithographers
- Mercerizers
- Methyl chloride makers
- Paint makers
- Paper-mill workers
- Perfume (synthetic) makers
- Petroleum refiners
- Phosphate extractors
- Photographic workers

Picklers (metals)
Polishers and cleaners (metals)
Pottery workers
Rayon makers
Reclaimers (rubber)
Refiners (metals)
Shoddy workers
Soap makers
Solderers
Sugar refiners
Sulphur-chloride makers
Tannery workers
Textile printers
Tinners
Transparent-wrapping-material workers
Vignetters
Wire makers
Zinc-chloride makers

63. Hydrocyanic Acid. *See* Cyanogen Compounds

64. Hydrofluoric Acid

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Redness and burning of skin, intense irritation of eyelids and conjunctiva, coryza, bronchitis with spasmodic cough, ulceration of the nostrils, gums, and oral mucous membranes, painful ulcers of the cuticle, erosion, and formation of vesicles, suppuration under the finger nails.

Chronic poisoning (fluorosis) is characterized by gastro-intestinal disturbances, cachexia, stiffness of limbs, disturbances of calcium metabolism, nervous symptoms.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Aluminum extractors
Antimony-fluoride extractors
Art-glass workers
Beryllium extractors
Bleachers
Brewers
Brick makers
Copper refiners and smelters
Dyers
Electroplaters
Enamel makers
Etchers
Fertilizer makers
Gas (illuminating) workers
Glass etchers
Glass finishers
Gold refiners
Hydrofluoric-acid makers
Incandescent-mantle hardeners
Paper (filter) makers
Phosphate-mill workers
Phosphorus extractors
Picklers (metals)
Pottery workers
Stone cleaners
Tank cleaners (brewery)
Welders
Yeast makers

65. Iron Carbonyl. *See* Nickel Carbonyl

66. Lead and Its Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Ashen pallor, jaundice, metallic taste, gastrointestinal disturbances, constipation, abdominal pains, lead line on gums, asthenia, lassitude, irritability, headache, backache, pain about joints, weakness of grip, tremors of fingers and tongue, lead paralysis, especially of muscles used most, stippling of red-blood cells, anemia, ocular disturbances, mental symptoms (lead encephalopathy). Abnormal amount of lead in urine or feces. Lead in blood stream and spinal fluid. Metal-fume fever (*see* Zinc).

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acid finishers (glass)
Actors
Airplane pilots—crop dusting
Amber workers
Art-glass workers
Artificial-flower makers
Artificial-pearl makers
Babbitt-metal workers
Babbitters
Battery (dry) makers
Blacksmiths
Blooders (tannery)
Bookbinders
Bottle-cap makers
Brass founders
Brass polishers
Braziers
Brick burners
Brickmakers
Bronzers
Browners (gun barrels)
Brush makers
Buffers (rubber)
Burners (enameling)
Cable makers
Cable splicers
Canners
Cartridge makers
Cement workers (ceramic)
Chippers
Cigar makers
Colorers (white) of shoes
Color makers
Compositors
Compounders (rubber)
Concentrating-mill workers (lead and zinc)
Copper refiners
Crayon (colored) makers
Cut-glass workers
Cutlery makers
Decorators (pottery)
Dental workers
Diamond polishers
Dye makers
Dyers
Electroplaters

Electrotypers
Embroidery workers
Emery-wheel makers
Enamelers
Enamel makers
Engravers (steel)
Explosives workers
Farmers
File cutters
Fillers
Filling-station workers
Galvanizers
Garage workers
Gardeners
Gasoline blenders
Glass finishers
Glass mixers
Glass polishers
Glaze dippers (pottery)
Glaze mixers (pottery)
Glost-kiln workers
Gold refiners
Grinders (metals)
Grinders (rubber)
Incandescent-lamp makers
Ink makers
Insecticide makers
Japan makers
Japanners
Jewelers
Junk-metal refiners
Labelers (paint cans)
Lacquerers
Lacquer makers
Lead burners
Lead-foil makers
Lead miners
Lead-pipe makers
Lead-salts makers
Lead smelters
Linoleum makers
Linotypers
Linseed-oil boilers
Litharge workers
Lithographers
Lithotransfer workers
Match-factory workers
Metallizers
Mirror silverers
Mixers (rubber)
Molders (foundry)
Monotypers
Musical-instrument makers
Nitric-acid workers
Nitroglycerin makers
Painters
Paint makers
Paint removers
Paperhangers
Paper makers
Patent-leather makers
Petroleum refiners
Photograph retouchers
Pipe fitters
Plumbers
Polishers
Pottery workers
Printers
Putty makers
Putty polishers (glass)
Pyroxylin-plastics workers
Reclaimers (rubber)
Red-lead workers
Refiners (metals)
Riveters
Roofers
Rubber workers
Sagger makers
Sandpaperers (enameling and painting auto bodies, etc.)
Screen workers (lead and zinc smelting)
Sheet-metal workers
Shellackers
Shellac makers
Shot makers
Silk weighters
Slip makers (pottery)
Slushers (porcelain enameling)
Solderers
Solder makers
Sprayers (trees)
Stainers (shoes)
Stereotypers
Storage-battery makers
Sulphuric-acid workers
Table turners (enameling)
Tannery workers
Temperers
Tetraethyl lead makers
Textile printers
Tile makers
Tin-foil makers
Tinners
Toy makers
Transfer workers (pottery)
Type founders
Type melters
Varnishers
Varnish makers
Wall-paper printers
Welders
White-lead workers
Wood stainers
Zinc miners
Zinc smelters

67. Lead Arsenate. *See* Arsenic; Lead

68. Magnesium

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Metal-fume fever (*see* Zinc). Toxic effects have been suspected but have not been demonstrated as due to industrial exposure.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alloy makers
Brick makers
Fat renderers
Fertilizer workers
Glass mixers
Magnesium alloy makers
Paint makers
Paper makers
Pharmaceutical workers
Rubber workers

69. Manganese

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Languor and sleepiness, stolid mask-like facial expression, low monotonous voice, muscular twitching, varying from a fine tremor of hands to gross rythmical movements of arms, legs, trunk, and head, cramps and stiffness of

muscles in legs, increase in tendon reflexes, ankle and patellar clonus, retropulsion and propulsion, slapping gait, uncontrollable laughter and crying. Metal-fume fever (*see* Zinc).

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alloy makers
Aluminum extractors
Battery (dry) makers
Bleaching-powder makers
Brick makers
Bronzers
Chlorine makers
Color makers
Concentrating-mill workers
Copper smelters
Dye makers
Dyers
Enamelers
Enamel makers
Fertilizer makers
Fireworks makers
Glass mixers
Glaze dippers (pottery)
Glaze mixers (pottery)
Linoleum makers
Longshoremen
Manganese-dioxide workers
Manganese grinders
Manganese-ore separators
Manganese-steel makers
Match-factory workers
Miners (manganese)
Open-hearth-department workers
Painters
Paint makers
Pharmaceutical workers
Pottery workers
Puddlers (iron and steel)
Soa makers
Steel-alloy makers
Textile printers
Varnishers
Varnish makers
Welders
Zinc miners
Zinc smelters

70. Mercury and Its Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Stomatitis and gingivitis, salivation, blue line on gums, gastro-intestinal disorders, metallic or fetid breath, fine intention tremor, exaggerated knee jerk, scanning speech, mercurial erethism, loss of memory, insomnia and depression, anxiety and irritability, mercurial eczema. Metal-fume fever (*see* Zinc).

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetaldehyde makers
Acetic-acid (synthetic) makers
Acetone (synthetic) makers
Alcohol (synthetic) makers
Amalgam makers
Artificial-flower makers
Barometer makers
Battery (dry) makers
Blowers (felt hats)
Bronzers
Browners (gun barrels)
Brushers (felt hats)
Bulb (mercury) makers
Cap loaders
Carroters (felt hats)
Cartridge makers
Chlorine makers
Color makers
Coners (felt hats)
Cosmetic workers
Cyanogen gas makers
Decorators (pottery)
Dental workers
Dentists
Detonator cleaners
Detonator fillers
Detonator packers
Devil operators (felt hats)
Disinfectant makers
Dye makers
Electric-induction furnace workers
Electroplaters
Embalmers
Embalming fluid makers
Embossers
Engravers (steel)
Explosives workers
Extractors (gold and silver)
Felt-hat makers
Fireworks makers
Formers (felt hats)
Fulminate mixers
Fur (hatters) handlers
Fur handlers
Fur preparers
Gilders
Gold refiners
Hair workers
Hardeners (felt hats)
Incandescent-lamp makers
Ink (vermillion) makers
Insecticide makers
Jewelers
Laboratory workers
Lead platers (on iron)
Lithographers
Manometer makers
Mercury boiler workers
Mercury-alloy makers
Mercury bronzers
Mercury miners
Mercury-pump workers
Mercury-salt workers
Mercury smelters
Mercury-solder workers
Mercury-still cleaners
Mercury-switch makers
Mercury-vapor-lamp makers
Mirror silverers
Mixers (felt hats)
Motion-picture machine operators
Painters
Paint makers
Pharmaceutical workers
Photographic workers
Physicians
Pottery workers
Primers (explosives)
Printers
Radio-tube makers
Refiners (metals)
Shooting-gallery workers
Sizers (felt hats)
Sole stitchers (Blake machine)
Starters (felt hats)
Stiffeners (felt hats)
Storage-battery makers
Tannery workers
Taxidermists
Temperers
Textile printers
Thermometer makers
Water gilders
Welders
Wood preservers
Zinc-electrode makers

71. Metal Fume Fever. *See* Zinc

72. Methanol (Methyl Alcohol)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Burning and irritation of eyes, respiratory tract, and skin; headache, nausea and vomiting, vertigo, severe colic, convulsions, chilliness and cold sweats, cyanosis, loss of reflexes and of sensation, irregular and intermittent heart action, rapid breathing followed by retardation, rapid and marked drop in temperature. Has a specific effect on the optic nerve and may cause optic atrophy and blindness.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alcohol (denatured) workers
Aldehyde pumpmen
Antifreeze makers
Art-glass workers
Artificial-flower makers
Artificial-leather workers
Automobile painters
Bookbinders
Bronzers
Brush makers
Cementers (rubber shoes)
Collar (fused) makers
Dimethyl-sulphate makers
Driers (felt hats)
Dry cleaners
Dye makers
Dyers
Explosives workers
Featherworkers
Felt-hat makers
Filament makers (incandescent lamps)
Furniture polishers
Gilders
Glass (safety) makers
Hardeners (felt hats)
Incandescent-lamp makers
Ink makers
Japan makers
Japanners
Lacquerers
Lacquer makers
Lasters (shoes)
Leather workers
Linoleum makers
Lithographers
Methyl-alcohol workers
Methyl-bromide makers
Methyl-chloride makers
Methyl-compound makers
Millinery workers
Mottlers (leather)
Painters
Paint makers
Paint-remover makers
Patent-leather makers
Perfume makers
Photoengravers
Photographers
Polishers (metals)
Polish makers
Printers
Pyroxylin-plastics workers
Rayon makers
Resin makers
Rubber workers
Shellackers
Shellac makers
Shoe-factory operatives
Shoe finishers
Shoe-heel (wood) coverers
Soap makers
Stiffeners (felt hats)
Stitchers (shoes)
Straw-hat makers
Textile printers
Type cleaners
Upholsterers
Varnishers
Varnish makers
Vulcanizers
Wood-alcohol distillers
Woodworkers

73. Methyl Bromide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of respiratory passages, muscular twitchings, cramps, convulsions, disturbance of sight, fever, delirium, coma. Nervous symptoms—unsure gait, heightened reflexes, loss of visual acuity, loss of memory, irritable temper—may persist for a long time.

See note under Methyl chloride.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Color makers
Dye makers
Exterminators
Fire extinguisher makers
Insecticide makers
Methyl-bromide makers
Pharmaceutical workers
Refrigerator (mechanical) makers and repair men

74. Methyl Cellosolve (Ethylene Glycol Monomethyl Ether)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

While it is not positively established, recent studies suggest that methyl cellosolve may affect the blood and blood-forming organs and the nervous system.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Airplane dope makers
Collar (fused) makers
Cosmetic workers
Dye makers
Enamel makers
Ink (printing) makers
Lacquer makers
Nitrocellulose workers
Pyroxylin-plastics workers
Resin makers
Varnish makers

75. Methyl Chloride

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Progressive drowsiness, insomnia, headache, vertigo, nausea, anorexia, apathy, staggering gait, mental confusion, weakness, visual disturbances, tremors, presence of formates and acetone in urine.

NOTE.—The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of methyl chloride, methyl bromide, ethyl bromide, and ethyl chloride. According to this Bureau all four produced similar symptoms, including excitement, loss of equilibrium, inability to walk, rapid pulse, convulsive rapid respiration with rales, frothy (often blood-tinged) exudate from nostrils. The signs of lung irritation were not as pronounced for exposure to ethyl chloride as for the other compounds. The gross pathology was quite similar for all four of these alkyl halides and was characterized by congestion, hemorrhage, and edema of the lungs, and by injury to the vascular system, as shown by the tendency toward hemorrhage. Congestion was present in the organs of all groups, but parenchymal degeneration was most marked in those exposed to methyl-bromide vapors. A distinct delayed effect of exposure was noted with methyl bromide and methyl chloride, to a lesser extent with ethyl bromide, but was not observed with ethyl chloride.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Air-conditioning workers
- Chloroform makers
- Color makers
- Dye makers
- Methyl-chloride makers
- Perfume makers
- Pharmaceutical workers
- Refrigerator (mechanical) makers and repair men
- Thermometer makers

76. Methylene Chloride (Dichloromethane)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Generally considered practically harmless if free from other products and under conditions of good ventilation. But one authority reports the effects from industrial exposure to be headache, giddiness, stupor-irritability, numbness and tingling in the limbs, and possibly some degree of chronic anemia.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Degreasers
- Dye makers
- Lacquerers
- Lacquer makers
- Methylene-chloride workers
- Perfume makers
- Paint removers
- Perfume makers
- Petroleum refiners
- Pharmaceutical workers
- Rayon makers

77. Methyl Formate

Methyl formate is used in fumigants. It has also been considered for use as a high boiling refrigerant for household appliances.

The United States Bureau of Mines studied the acute responses of guinea pigs to a single exposure to vapors of methyl formate. According to this Bureau, the animals showed, in their order of occurrence, nose and eye irritation, retching movement, uncoordination, narcosis accompanied by uncoordinated movements of the extremities, and death. Methyl formate vapor was found to be irritating to the lungs. Congestion and edema were the most constant and prominent findings after exposure which resulted in death. A hyperemia of the liver and kidneys and congestion of the surface vessels of the brain and adrenals usually accompanied the lung changes. Lung irritation was frequently found immediately after exposure which did not cause death, but was absent in animals examined 4 to 10 days following exposure.

Men exposed for 1 minute to 0.15 percent vapor in air, according to the same authority, noticed the pleasant ethereal odor of methyl formate, but experienced no nasal or eye irritation or other signs or symptoms. While the odor of methyl formate is distinct and noticeable in concentrations which are relatively safe from the standpoint of producing acute poisoning, owing to its pleasant nature and the occurrence of olfactory fatigue it is doubtful whether the odor of methyl formate will serve as an effective warning of harmful conditions of exposure.

78. Naphtha. *See* Benzine

79. Naphthols

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of skin and kidneys. Injury to cornea and lens.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Color makers	Perfume makers	Pharmaceutical workers
Dye makers		

80. Naphthylamines. *See* Aniline and Other Amino Compounds of Benzol and Its Homologues

81. Nickel

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

The only lesion reported to be caused by nickel, apart from the toxic effects of nickel carbonyl, is nickel eczema. This condition is reported mostly among nickel platers who are exposed to many dermatitis-producing substances. Some authorities question whether nickel is the responsible agent.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alloy makers	Nickel extractors	Steel-alloy makers
Coin makers (nickel)	Nickel-purification workers (Mond process)	Storage-battery makers
Electroplaters		
Enamelers		

82. Nickel Carbonyl

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Giddiness, headache, nausea, constipation, dyspnea, cough, retrosternal soreness and epigastric pain, sleeplessness, cyanosis, edema of lungs, pain in the loins, hemorrhages—especially in the brain and the adrenals. Metal-fume fever (*see* Zinc)

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Nickel-purification workers (Mond process)

83. Nicotine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Industrial poisoning usually occurs through skin absorption. Acute cases may be fatal. In less severe cases there may be severe prostration, gastric upsets, cardio-vascular collapse, precordial distress, dyspnea. Toxic amblyopia has been reported by some authorities to be a chronic effect of nicotine poisoning.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Cigar makers	Fertilizer makers	Insecticide makers
Farmers	Gardeners	Tobacco workers

84. Nitraniline. *See* Aniline

85. Nitrobenzol and Other Nitro Compounds of Benzol and Its Homologues

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Cyanotic face and lips, somnolence, headache, vertigo, nausea and vomiting, odor of bitter almonds in breath, unsteady gait, tremors, muscular twitching,

and other manifestations of nerve injury, anemia, visual disturbances, methemoglobin formation, presence of hematoporphyrin, albumin, and sometimes free poison in urine, eczematous eruptions.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Aniline workers
Cosmetic workers
Dinitrobenzol workers
Dye makers
Explosives workers
Flavoring-extract makers
Floor-polish makers
Gasoline blenders
Glue workers
Ink makers
Nitrators
Nitrobenzol workers
Perfume makers
Petroleum refiners
Polish makers
Shell fillers
Shoe dyers
Smokeless-powder makers
Soap makers
Trinitrotoluol makers

86. Nitroglycerin

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Intense headache, nausea and vomiting, flushing of face, gastro-intestinal disturbances, tachycardia, skin eruptions (characterized by dryness and the formation of rhagades), marked vasodilation, and low blood pressure.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Explosives workers
Nitroglycerin workers
Pharmaceutical workers
Shell fillers
Smokeless-powder makers

87. Nitronaphthalene. *See* Nitrobenzol

88. Nitrous Fumes and Nitric Acid

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of air passages, spasmodic cough, dyspnea, pulmonary edema, bronchitis, feeling of suffocation, pain in chest, digestive disturbances, peripheral vasodilatation, methemoglobinemia and its sequelae, and depression of the central nervous system, corrosion of teeth, severe burns on the skin.

Continued exposure to diluted fumes is said to cause chronic inflammation of the respiratory tract and a general disability characterized by headache, sleeplessness, anorexia, gradual loss of strength, dyspepsia, constipation, and ulcers on the lips and mucous membranes of the mouth and pharynx.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Nitrous fumes may be present whenever nitric acid comes in contact with a metal, an organic material or with air. They are also present when nitrated materials such as photographic film are burned, when explosives are incompletely detonated and when an electric arc or an explosion causes extreme heat in the air.

Acid dippers
Aniline workers
Artificial-leather makers
Artificial-pearl makers
Blasters
Bleachers
Carroters (felt hats)
Cartridge dippers
Collodion makers
Damascening workers
De-brassers
Dimethyl-sulphate makers
Dippers (guncotton)
Dye makers
Dyers
Electroplaters
Enamel makers
Engravers
Etchers
Explosives workers
Felt-hat makers
Fertilizer makers
Fur preparers
Galvanizers
Gilders
Guncotton workers
Insecticide makers
Jewelers
Lacquer makers
Lithographers
Miners (blasting)
Mordanters
Motion-picture machine operators
Nitrators
Nitric-acid workers
Nitrobenzol workers
Nitrocellulose makers
Nitroglycerin makers
Nitrous-oxide workers
Oxalic-acid makers
Painters
Pharmaceutical workers
Phosphoric-acid makers
Photoengravers
Photographic film makers
Photogravure workers
Picklers (metals)
Picric-acid makers
Pyroxylin-plastics workers
Rayon makers
Refiners (metals)
Rubber-substitute makers
Rubber workers
Scourers (metals)
Smokeless-powder makers
Soda makers
Sulphuric-acid makers
Textile printers
Towermen (sulphuric acid)
Tunnel workers (blasting)
Welders
Wringers (guncotton)

89. Oxalic Acid

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Local caustic action on skin, bluish discoloration and brittleness of nails, irritation of mucous membranes including those of esophagus, stomach and intestines, peripheral circulatory trouble, cardiac weakness, nervousness, convulsions.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Auto-radiator cleaners
- Bleachers (straw)
- Blueprint-paper makers
- Bookbinders
- Dry cleaners
- Dye makers
- Dyers
- Engravers
- Formic-acid workers
- Glycerin refiners
- Ink makers
- Lithographers
- Metal-polish makers
- Oxalic-acid makers
- Patent-leather makers
- Polishers (metals)
- Rayon makers
- Resin makers
- Stone cleaners
- Tannery workers

90. Ozone

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of eyes and respiratory tract.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Bleachers
- Disinfectant makers
- Electrical workers
- Fat renderers
- Laundry workers
- Ozonators
- Patent-leather makers
- Refrigerating-plant workers
- Varnish makers
- Water purifiers
- Wax refiners
- Welders

91. Pentanone (Methyl Propyl Ketone)

Pentanone is an organic solvent. It is reported to be a good solvent for nitrocellulose and vinyl resin products and has possibilities of use in making lacquers and also varnish and lacquer removers.

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of pentanone. According to this Bureau, pentanone produces in these animals narcosis, terminating in death in the higher concentrations. Symptoms are principally eye and nasal irritation, followed by narcosis. Animals that did not die during exposure, recovered. The principal gross pathological findings were congestion, edema, and hemorrhage of lungs, liver, and kidneys, as observed in the autopsies performed immediately after exposure.

Men momentarily exposed to 1.3 and approximately 5.0 percent pentanone vapor, according to the same authority, pronounced the atmosphere extremely disagreeable because of irritation to the eyes and nasal passages. One-half percent was found to be very disagreeable, and 0.15 percent vapor was found to have a strong odor and to produce a moderate to marked sense of irritation to the eyes and nasal passages.

92. Petroleum. *See also* Benzine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Petroleum and its volatile products are irritating to the skin and respiratory organs, and may cause acute inflammation of the lungs and headache, sensory disturbances, and so forth. (*See* Benzine.)

Workers in petroleum refineries are subject to acne, keratosis, epithelioma, and melanosis from petroleum, paraffin, and petroleum residue. Workers exposed to petroleum oils and greases in a number of industries are subject to folliculitis, boils, and papillomas.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Browners (gun barrels)
- Furniture polishers
- Lampblack makers
- Machinists
- Mechanics
- Oilers
- Oil-flotation-plant workers
- Oil-well workers
- Paraffin workers
- Petroleum refiners
- Pressmen (oil refinery)
- Temperers

93. Phenol

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Erosion of the skin, eczema, gangrene, irritation of the respiratory organs and eyes.

Symptoms of acute poisoning following splashing with phenol or inhaling its vapors include: Headache, vertigo, nausea, tinnitus, fainting, dyspnea, excitement, convulsions, respiratory paralysis.

Symptoms of chronic exposure include: Emaciation, vomiting, diarrhea, anorexia, headache, vertigo, nephritis, degeneration of liver, circulatory disturbances.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Brewers
- Carbolic-acid makers
- Coal-tar workers
- Disinfectant makers
- Dye makers
- Dyers
- Etchers
- Explosives workers
- Gas (illuminating) workers
- Gas purifiers
- Lampblack makers
- Paint makers
- Paint-remover makers
- Paint removers
- Perfume makers
- Pharmaceutical workers
- Phenol workers
- Photographic materials workers
- Picric-acid makers
- Reclaimers (rubber)
- Resin (synthetic) makers
- Rubber workers
- Smokeless-powder makers
- Stillmen (carbolic acid)
- Surgical-dressing makers
- Textile printers
- Varnish makers
- Wood preservers

94. Phenyl Hydrazine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Vesicular eruptions of the skin with itching and burning, diarrhea, anorexia, granular degeneration of blood corpuscles, formation of methemoglobin, a sense of general malaise.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Antipyrine makers
- Dye makers
- Pharmaceutical workers
- Pheynl-hydrazine workers

95. Phosgene

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of eyes, violent lung inflammation with edema, necrosis of lung tissue, emphysema, bronchitis, bronchiectasis, dysfunction of the heart, dyspnea.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Phosgene is given off when certain chlorinated hydrocarbons come in contact with hot metals or an open flame.

- Bleachers
- Carbon-tetrachloride workers
- Dye makers
- Firemen (city)
- Pharmaceutical workers
- Phosgene makers
- War-gas makers

96. Phosphorus

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Increasingly severe toothache, digestive disturbances, swelling and ulceration of the gums and buccal membrane, loosening and falling out of the teeth, suppuration and destruction of jawbone with fistulous channels burrowing through the cheek, meningeal inflammation, emaciation. Necrosis of the bones, other than the jawbone, has also been reported.

A different type of poisoning marked by generalized systemic effects is also recognized.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Bone-black makers	Match-factory workers	Phosphor-bronze workers
Brass founders	Pharmaceutical workers	Phosphorus-compound makers
Explosives workers	Phosphate-mill workers (phosphorous manufacture)	Phosphorus extractors
Exterminators		Welders
Fireworks makers		
Insecticide makers		

97. Phosphuretted Hydrogen (Phosphine)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Oppression in chest, headache and vertigo, gastro-intestinal irritation, dyspnea, general debility, tinnitus aurium, tremors and convulsions, pain in the region of the diaphragm and feeling of chill. Symptoms similar to those of phosphorous poisoning are said to have resulted from prolonged exposure to low concentration of phosphine.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Acetylene workers	Phosphine workers	Phosphuretted hydrogen workers
Blast-furnace workers	Phosphorus extractors	Welders
Buoy makers	Phosphorus (red) makers	
Ferrosilicon workers		

98. Picric Acid (Trinitrophenol)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation and inflammation of the skin and mucous membranes, yellow coloring of skin and hair, headache, vertigo, digestive disorders, gastric pain, convulsions, nephritis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Disinfectant makers	Fireworks makers	Shell fillers
Dye makers	Pharmaceutical workers	Smokeless-powder makers
Dyers	Photographic workers	Tannery workers
Explosives workers	Picric-acid makers	War-gas makers

99. Potassium Hydroxide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Severe chemical burning of the skin, eye, and mucous membranes, formation of deep-seated and persistent ulcers, loss of nails.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Bleachers	Oxalic-acid makers	Photo-engravers
Electroplaters	Paper makers	Potassium hydroxide makers
Ink makers	Perfume makers	Soap makers
Lye makers	Pharmaceutical workers	
Match-factory workers		

100. Pyridine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of respiratory tract and of eyes, dyspnea, cough, dermatitis, headache, vertigo, gastro-intestinal and nervous disorders, trembling of extremities.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Cement mixers (rubber)	Incandescent-mantle hardeners	Pencil makers
Dye makers	Lacquerers	Polishers
Dyers	Lacquer makers	Pyridine makers
Explosives workers	Paint makers	Rubber workers
Gilders		

101. Radium. *See* Radiant energy

102. Selenium Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

The effects of industrial exposure are: Dermatitis, pallor, gastrointestinal disturbances, garlicky odor of breath and perspiration, irritation of nose and throat, coating of tongue, metallic taste in mouth, and nervousness.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Alloy makers
- Cement (Portland) makers
- Color makers
- Concentrating-mill workers
- Copper smelters
- Glass colorers
- Glass mixers
- Lead smelters
- Lime burners
- Metallizers
- Paint makers
- Pottery workers
- Pyrites burners
- Resin (synthetic) makers
- Selenium refiners
- Steel-alloy makers
- Sulphuric-acid workers
- Vulcanizers
- Welders
- Zinc smelters

103. Silver

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Argyrosis, a grayish-blue or black discoloration of the skin and mucous membranes, is the chief effect reported in industry.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Coin makers (silver)
- Ink (indelible) makers
- Miners (silver)
- Mirror silverers
- Photographic-film makers
- Polishers (silver)
- Silver-foil makers
- Silver melters and refiners
- Silver-nitrate makers
- Silver platers
- Silversmiths

104. Sodium Hydroxide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Severe chemical burning of the skin, eye, and mucous membranes. Formation of deep-seated and persistent ulcers, loss of nails.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Bleachers
- Cellulose makers
- Dye makers
- Engravers
- Glass makers
- Mercerizers
- Paint makers
- Paper makers
- Petroleum refiners
- Pharmaceutical workers
- Rayon makers
- Rubber workers
- Soap makers
- Sodium-hydroxide makers
- Tannery workers
- Transparent wrapping-material workers
- Varnish makers

105. Sulphur Chloride

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of mucous membranes of eye and respiratory tract.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Carbon-tetrachloride makers
- Cement mixers (rubber)
- Dyers
- Extractors (gold)
- Insecticide makers
- Rubber-substitute makers
- Sulphur-chloride workers
- Varnish makers
- Vulcanizers
- War-gas makers

106. Sulphur Dioxide

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation and inflammation of mucous membranes of eyes and respiratory tract, spasmodic cough, bronchitis, digestive disturbances, blood-tinged mucous, inflammation of lungs. Physical examination of a group of workers with pro-

longed exposure to sulphur dioxide and a control group from the same plant showed a higher incidence among the exposed workers of naso-pharyngitis, altered sense of smell and sense of taste, increased sensitivity to other irritants, abnormal urinary acidity, increased fatigability, shortness of breath on exertion, abnormal reflexes.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Alkali-salt makers
- Artificial-ice makers
- Blast-furnace workers
- Bleachers
- Bone extractors
- Brass founders
- Brickmakers
- Broommakers
- Carbolic-acid makers
- Cellulose makers
- Chambermen (sulphuric acid)
- Coke-oven workers
- Copper smelters
- Digester-house workers (paper and pulp)
- Disinfectant makers
- Dye makers
- Exterminators
- Feather workers
- Fertilizer makers
- Firemen (city)
- Flue cleaners
- Fruit preservers
- Galvanizers
- Gelatine makers
- Gluemakers
- Insecticide makers
- Lead smelters
- Mercury smelters
- Oil-flotation-plant workers
- Paper-mill workers
- Petroleum refiners
- Pottery workers
- Pyrites burners
- Refiners (metals)
- Refrigerator (mechanical) makers and repairmen
- Smelters
- Storage-battery chargers
- Sugar refiners
- Sulphite cooks
- Sulphur burners
- Sulphur-dioxide workers
- Sulphurers (malt and hops)
- Sulphuric-acid workers
- Sulphur miners
- Tannery workers
- Towermen (sulphuric acid)
- Ultramarine-blue makers
- Vulcanizers (rubber)
- Zinc smelters

107. Sulphuretted Hydrogen (Hydrogen Sulphide)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of mucous membranes of eyes and respiratory tract, conjunctivitis, keratitis, photophobia, bronchitis, rhinitis, pharyngitis and laryngitis, pulmonary edema, headache and vertigo, hyperpnea, gastro-intestinal disturbances, depression of the nervous system, bradycardia, psychic disorders.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Alkali-salt makers
- Barium-carbonate makers
- Blasters
- Blast-furnace workers
- Bottlers (mineral water)
- Bronzers
- Cable splicers
- Caisson workers
- Carbon-disulphide makers
- Cellulose makers
- Coal carbonizers
- Coke-oven workers
- Cyanogen makers
- Digester-house workers (paper and pulp)
- Dye makers
- Fat renderers
- Felt makers
- Fertilizer makers
- Flax-rettery workers
- Fur handlers
- Gas (illuminating) workers
- Gas purifiers
- Glue workers
- Gypsum workers
- Hydrochloric-acid makers
- Match-factory workers
- Miners
- Oil-flotation-plant workers
- Oil-well workers
- Packing-house workers
- Paper makers
- Petroleum refiners
- Phosphorus-compound makers
- Pyrites burners
- Pyroxylin-plastics workers
- Rayon makers
- Sewer workers
- Soap makers
- Soda (Leblanc) makers
- Sodium-sulphide makers
- Starch makers
- Sugar refiners
- Sulphides makers
- Sulphur-chloride makers
- Sulphuric-acid makers
- Sulphur miners
- Tannery workers
- Transparent-wrapping-material workers
- Tunnel workers
- Vulcanizers

108. Sulphuric Acid

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Corrosive action on the skin, severe inflammation of the mucous membranes of the eyes and respiratory tract, injury to the teeth through softening of the dentine, chronic catarrh.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Acid dippers
- Acid finishers (glass)
- Alum workers
- Ammonium-salts makers
- Ammonium-sulphate makers
- Artificial-leather makers
- Benzol purifiers
- Beta-still operators (beta naphthol)
- Brewery workers
- Burnishers (iron and steel)
- Candle makers
- Carbolic-acid makers
- Carbonizers (shoddy)
- Cartridge dippers
- Cellulose makers
- Chambermen (sulphuric acid)
- Color makers
- Dimethyl-sulphate makers
- Dye makers
- Electroplaters
- Engravers
- Etchers
- Ether makers
- Explosives workers
- Fat purifiers
- Felt-hat makers
- Fertilizer makers
- Galvanizers
- Glass finishers
- Glue makers
- Guncotton dippers
- Hydrochloric-acid makers
- Hydrocyanic-acid makers
- Jewelers
- Linoleum makers
- Lithographers
- Mercerizers
- Nitrators
- Nitric-acid makers
- Nitroglycerin makers
- Nitrocellulose makers
- Nitroglycerin makers
- Oil purifiers
- Paint makers
- Paper makers
- Patent-leather makers
- Perfume makers
- Petroleum refiners
- Pharmaceutical workers
- Phenol makers
- Phosphoric-acid makers
- Phorsphorus-evaporating-machine workers
- Photographic workers
- Picklers (metals)
- Picric-acid makers
- Pyroxylin-plastics workers
- Rayon makers
- Reclaimers (rubber)
- Refiners (metals)
- Salt extractors (Coke-oven byproducts)
- Scourers (metals)
- Shoddy workers
- Soap makers
- Soda (Leblanc) makers
- Storage-battery workers
- Sugar refiners
- Sulphates makers
- Sulphuric-acid makers
- Tallow refiners
- Tannery workers
- Temperers
- Textile printers
- Towermen (sulphuric acid)
- Transparent-wrapping-material workers
- Wax refiners
- Wire drawers
- Wood preservers
- Yeast makers

109. Tar and Pitch

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Melanosis, tar itch, acne, eczema, or psoriasis, ulcers of the skin and cornea, warts, epitheliomatous cancer, loss of appetite, nausea, diarrhea, headache, vertigo, irritation of the respiratory tract, conjunctivitis, albuminuria, edema, ischuria.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Artificial-stone makers
- Asbestos goods workers
- Asphalt workers
- Battery (dry) makers
- Briquet makers
- Brush makers
- Cement workers (plastic)
- Chimney sweepers
- Coal-tar workers
- Coke-oven workers
- Cordage-factory workers
- Creosoting-plant workers
- Electrode makers
- Fishermen
- Flue cleaners
- Gas (illuminating) workers
- Insulators
- Painters (tar)
- Paint makers
- Pavers
- Pitch workers
- Road repairers
- Roofers
- Roofing-paper workers
- Rope makers
- Shipyard workers
- Soap makers
- Still (coal tar) cleaners
- Street repairers
- Tank cleaners
- Tar workers
- Waterproofers
- Wood preservers

110. Tellurium Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Garlic-like odor of breath and of secretions and excretions, suppression of sweat, dryness of the mouth.

Dry, itching skin, metallic taste, anorexia, nausea, vomiting, indigestion, constipation, and somnolence.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Copper refiners
- Glass colorers
- Lead refiners
- Pharmaceutical workers
- Photographic workers
- Rubber makers
- Zinc refiners

111. Tetrachlorethane (Acetylene Tetrachloride)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Abnormal fatigue, profuse perspiration, general discontent and nervousness, headache and vertigo, vomiting, insomnia, anorexia, gastro-intestinal disorders, abdominal pains, injury to liver, jaundice, albuminuria, increase of immature large mononuclear cells in blood, elevation of white-cell count, slight anemia, slight increase in number of platelets of blood, petechiae, polyneuritis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Airplane-dope makers
- Artificial-pearl makers
- Cementers (rubber)
- Cement mixers (rubber)
- Color makers
- Degreasers (metals, textiles)
- Dry cleaners
- Electroplaters
- Enamelers
- Enamel makers
- Extractors (oils and fats)
- Fullers (textiles)
- Glass (safety) workers
- Insecticide makers
- Lacquerers
- Lacquer makers
- Lithographers
- Motion-picture-film workers
- Paint-remover makers
- Paint removers
- Pharmaceutical workers
- Pyroxylin-plastics workers
- Rayon makers
- Rubber workers
- Shoe-factory operatives
- Soap makers
- Straw-hat makers
- Tapers (airplanes)
- Varnishers
- Varnish makers
- Varnish-remover makers
- Varnish removers
- Wax makers

112. Tetrachlorethylene (Perchlorethylene)

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of eyes, tightness in frontal sinuses, increased perspiration of hands and increased secretion of mucous from nasal passages, nausea, elation, faintness, dizziness, dyspnea, retarded mental activity, headache, and visual disturbances.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Degreasers (metals)
- Dry cleaners
- Pharmaceutical workers
- Printers
- Soap makers

113. Tetraethyl Lead. *See also* Lead and Its Compounds

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Insomnia, nausea and vomiting, anorexia, vertigo and headache, muscular weakness, pallor, subnormal blood pressure, subnormal temperature, loss of weight, abdominal cramps, tremors, excessive quantities of lead in feces and urine, lead encephalopathy.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Filling-station workers
- Garage workers
- Gasoline blenders
- Tank cleaners
- Tetramethyl-lead makers

114. Thallium

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Loss of appetite, fatigue, reddish discoloration and falling out of the hair, pains in the limbs, severe eye affections, inflammation of the kidneys, albuminuria, polyneuritis, lymphocytosis, eosinophilia.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Artificial-gem makers
- Color makers
- Depilatory makers
- Disinfectant makers
- Dye makers
- Exterminators
- Filament makers (incandescent lamps)
- Fireworks makers
- Flue-dust recoverers (sulphuric acid mfr.)
- Glass mixers
- Insecticide makers
- Thallium workers
- Thermometer makers

115. Thorium. *See* Radiant Energy

116. Tin

Not generally regarded as an industrial poison.

There is a case on record which suggests that tin tetrachloride used in weighting silk may have toxic effects. The symptoms noted included feeling of chilliness in the chest, pain in the throat, and heaviness in the stomach, anemia, and traces of tin in urine and feces.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Silk weighters

117. Titanium Oxide

This compound is used as a substitute for white lead in the manufacture of paint. No ill effects have been reported as a result of its use in industry.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Dyers
Iron and steel workers
Paint makers
Paper makers

118. Toluol. *See* Benzol

119. Trichlorethylene

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

The effects of trichlorethylene are not fully established.

Symptoms of acute poisoning include excitement, drunkenness, dullness, nausea, vomiting, unconsciousness; sequelae include headache, vertigo, anorexia, disturbed heart action. Severe irritation of the respiratory passages has also been reported, but this effect is ascribed by some authorities to the action of its decomposition products, phosgene, and hydrochloric acid.

Chronic exposure is said to result in injury to the trigeminal and optic nerves. Impurities in trichlorethylene, it has been suggested, may be the cause of these injuries. Other effects are addiction and skin irritation.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Burnishers (metals)
Cementers (rubber)
Degreasers
Disinfectant makers
Dry cleaners
Dye makers
Electroplaters
Extractors (oils and fats)
Galvanizers
Gas (illuminating) workers
Glue workers
Insecticide makers
Lacquerers
Lacquer makers
Leather workers
Painters
Paint makers
Paint-remover makers
Paint removers
Perfume makers
Petroleum refiners
Pharmaceutical workers
Photographic workers
Polishers (metals)
Polish makers
Resin (synthetic) workers
Rubber workers
Scourers (metals)
Shoe-factory operatives
Soap makers
Tobacco denicotinizers
Trichlorethylene workers
Varnishers
Varnish makers

120. Trinitrophenol. *See* Picric Acid

121. Trinitrotoluol. *See* Nitrobenzol

122. Triorthocresyl Phosphate

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

No clear-cut cases have been reported from industry. It is not highly volatile, but if absorbed it may cause paralysis of extremities.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Lacquerers
Lacquer makers
Pyroxylin plastics workers

123. Turpentine

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Irritation of mucous membranes of eyes, nose, and upper air passages, bronchial inflammation, salivation, headache, vomiting, abdominal pain and vertigo, state of excitement resembling drunkenness, irritation of kidneys and bladder, strangury, odor of violets in urine, severe irritation of skin.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Art-glass workers
- Cable splicers
- Camphor makers
- Cementers (rubber)
- Compositors
- Decorators (pottery)
- Dry cleaners
- Dye makers
- Enamelers
- Enamel makers
- Feather workers
- Furniture polishers
- Ink (printing) makers
- Insecticide makers
- Japan makers
- Japanners
- Lacquerers
- Lacquer makers
- Linoleum makers
- Lithographers
- Millinery workers
- Painters
- Paint makers
- Patent-leather makers
- Petroleum-refinery workers
- Pharmaceutical workers
- Photographic workers
- Polishers
- Polish makers
- Printers
- Rubber workers
- Sealing-wax makers
- Shellackers
- Shellac makers
- Shoe factory operatives
- Textile printers
- Transfer workers (pottery)
- Turpentine extractors
- Varnishers
- Varnish makers
- Wax makers

124. Uranium

Uranium, reported to be one of the most toxic of metals, is a source of radiant energy. A high frequency of cancer of the lungs in Czechoslovakian miners of uranium is believed to be due to the radioactivity of the ore. Very little has been published on the effects on man of exposure to uranium salts. The conditions reported include purpura of the legs, reduction of leukocytes, as well as diminution of red corpuscles, a reduction in urinary elimination of nitrated salts, and an increase in the chlorides.

Experiments on animals with uranium nitrate are reported to show nephritis, glycosuria, albuminuria, gastro-intestinal disorders, degeneration of liver, affections of nervous system.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Dye makers
- Dyers
- Glass mixers
- Paint makers
- Pharmaceutical workers
- Photographic workers
- Tile makers
- Uranium miners
- Uranium workers

125. Vanadium

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Anemia, cachexia, irritation of respiratory tract, dry cough resulting in hemorrhages, diarrhea or constipation, emaciation, involvement of kidneys, hysterical manifestations, melancholia.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Alloy makers
- Dye makers
- Dyers
- Glass mixers
- Ink (blue) makers
- Mordanters
- Photographic workers
- Sulphuric-acid workers
- Textile printers
- Vanadium-steel workers

126. Vinyl Chloride

This compound is used in the synthesis of organic compounds, principally resins.

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

The United States Bureau of Mines studied the acute response of guinea pigs to a single exposure to the vapors of vinyl chloride. According to this Bureau, vinyl chloride produces in these animals unsteadiness and motor

ataxia, incomplete and finally complete narcosis. The principal gross pathological findings were congestion and edema of the lungs with hyperemia of the kidneys and liver.

This same Bureau determined that men exposed to 2.5 percent for approximately 3 minutes soon began to feel dizzy and disoriented as to space and size of surrounding objects and complained of [illegible]ning sensation in the soles of the feet. They immediately recovered on [illegible]ving the chamber, and complained only of a slight headache which lasted about 30 minutes.

127. Xylol. *See* Benzol

128. Zinc

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Metal-fume fever characterized by: Irritation of respiratory tract, dryness of throat, dry cough, malaise, headache, nausea, severe chills with fever, pains in limbs, shaking in limbs, sweating, leukocytosis.

Metal-fume fever may also be caused by fumes of lead, mercury, manganese, cadmium, arsenic, antimony, and many other metals. Metal-fume fever resulting from metals which may cause systemic poisoning should be regarded as a warning that continued exposure may have more serious effects.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

- Blowers-out (zinc smelting)
- Brass founders
- Braslers
- Bronze-powder makers
- Bronzers
- Core makers
- Galvanizers
- Junk-metal refiners
- Luters (zinc smelting)
- Metallizers
- Molders (foundry)
- Pourers (brass foundry)
- Sherardizers
- Welders
- Zinc smelters

Section III.—Dermatoses

Skin affections resulting from exposure to the hazards discussed in the foregoing section have been recorded with the symptoms, conditions, or diseases to be looked for in men employed in occupations where such hazards are present. Because the dermatoses form so large a proportion of all disabling occupational diseases the more important occupations exposed to agencies producing skin affections have been listed separately. A complete enumeration of such occupations would be impracticable. Almost any foreign substance can become a skin irritant if it is in continuous contact with the skin. Thus soap and water, which ordinarily do not irritate the skin, may cause severe dermatitis in laundresses. Under the dermatoses are included the effects on the skin of such causative agencies as poisonous and irritating chemicals, heat and cold, dust, radiant energy, friction, plants and wood, proteins, and vegetable and animal parasites.

Occupational dermatoses are frequently distinguished by their grouping, situation, mode of appearance, spread, and evolution. They are most often local and predominate on the right side of right-handed people. The onset and development are usually sudden. The association between occupational exposure and the dermatoses produced by some substances, particularly those which are primary irritants, such as caustic soda, chromic acid, and gasoline, is quite obvious. Many other substances, however, have no specific lesions or special pathology, and some are selective in the people in whom they cause injury, thus making it more difficult to associate the condition with occupational exposure.

The excellent work by Drs. Louis Schwartz and Louis Tulipan, entitled "Occupational Diseases of the Skin," fully treats of the diseases of the skin and the agencies involved in their causation. It should be consulted by anyone who has a need for an extensive work on the subject. Dr. R. Prosser White's book entitled "The Dermatergoses; or Occupational Affections of the Skin" is another very fine work. The data presented in this section are based largely on these two volumes.

The following is a list of the more common occupations exposed to agencies causing dermatoses. It is a partial list only. Reference should also be made to the specific hazards listed for the occupation under consideration in section I.

DERMATOSES

Occupations Exposed to Specified Skin Irritants

Occupation exposed	*Skin irritants*
Acetylene makers	Calcium carbide.
Acid workers	Acids.
Alkali-salt makers	Caustic alkali.
Artificial-flower makers	Caustic alkali, dyes, solvents.
Auto washers and cleaners	Solvents, potassium cyanide.
Bakers	Dough, potassium persulphate, heat, dust.
Barbers	Soap, hair tonics, dyes.
Battery (dry) makers	Acids, zinc chloride, ammonium salts, charcoal.

Occupations Exposed to Specified Skin Irritants—Continued

Occupation exposed	*Skin irritants*
Beatermen (paper and pulp)	Caustic alkali, dyes.
Bleachers (cloth)	Acids, bleaching powder, caustic alkali, hydrogen peroxide, sodium silicate.
Blooders (tannery)	Dyes.
Bricklayers	Lime.
Bronzers	Dyes.
Broom and brush makers	Dyes, vegetable dust, tar, bacteria, fungi, parasites.
Calico printers	Dyes.
Candy makers	Sugar, tartaric acid.
Canners	Fruit acids, lacquer, fungi, parasites, dyes, bacteria.
Cap loaders	Mercury compounds.
Carbide makers	Calcium carbide.
Carbolic-acid makers	Caustic alkali, phenol.
Cardboard stickers	Sodium silicate.
Carroters (felt hats)	Acids, mercury compounds.
Cartridge dippers	Acids, soap.
Cementers (rubber shoes)	Benzine, coal-tar products, naphtha, methyl alcohol
Cement workers	Lime, pitch, rosin.
Chemical workers	See specific chemical in section II J.
Chromium platers	Chromium compounds, sulphuric acid.
Cloth preparers	Acids, caustic alkali, lime, soap, potassium salts, sodium salts, sodium silicate.
Confectioners	Sugar.
Cooks	Fruit acids, glucose.
Cotton sizers	Acids, zinc chloride, arsenic salts, phenol, aluminum salts, calcium salts, magnesium salts.
Curriers (tannery)	Paraffin, benzine.
Degreasers	Solvents.
Dentists	Procain, mercury, cocaine.
Detonator cleaners	Mercury compounds.
Detonator fillers	Mercury compounds.
Detonator packers	Mercury compounds.
Dishwashers	Caustic soaps, grease, bacteria, fungi.
Disinfectant makers	Formaldehyde, cresol.
Druggists	Bleaching powder, soap, iodoform, sodium salts, sugar.
Dry cleaners	Dirt, benzine, carbon tetrachloride.
Dye makers	Acids, benzine, caustic alkali, coal-tar products, dye intermediates, dyes, turpentine, antimony compounds, barium salts, calcium salts, cresol, dextrines, ferro-cyanides, formaldehyde, gums, hydro-quinone, lead salts, phenol, potassium chlorate.
Dyers	Dyes.
Electroplaters	Acids, benzine, caustic alkali, lime, potassium cyanide, soap, nickel, sulphate, chromic acid.
Embalmers	Formaldehyde, mercury.
Enamelers	Alkalis, acids, arsenic, chromium.
Engravers	Acids, caustic alkali, ferric chloride, potassium cyanide.
Etchers	Acids, caustic alkali.
Explosives workers	Dye intermediates, explosives (TNT, etc.), ammonium salts, bromine, mercury compounds.
Farmers	Ivy and other plants, fertilizers, insecticides, bacteria, fungi parasites.
Felt-hat makers	Acids, mercuric nitrate, dyes.
Fertilizer makers	Calcium cyanamide, fluorides.
Fish dressers	Brine.
Flax spinners	Lime, brine.
Flour-mill workers	Dust, fungi, parasites.
Furnacemen	Heat.
Furniture polishers	Benzine, caustic alkali, naptha, turpentine, methyl alcohol, pyridine, rosin.
Fur workers	Dyes, lime, formaldehyde.
Galvanizers	Ammonium chloride.
Garage workers	Oils, grease, solvents.
Gardeners	Ivy and other plants, fertilizers, insecticides.
Gas-mantle impregnators	Thorium compounds.
Glass blowers	Charcoal, pitch, rosin.
Glass mixers	Caustic alkali.
Hair dressers	Cosmetics, dyes, tonics, perfumes, bacteria, fungi.
Ink makers	Dyes, turpentine, chromates.
Insecticide makers	Arsenic.
Lampblack makers	Soot.
Laundry workers	Caustic alkali, soap, bleaching powder.
Lime burners	Lime.
Lime pullers (tannery)	Lime.
Linoleum makers	Dyes.

Occupations Exposed to Specified Skin Irritants—Continued

Occupation exposed	*Skin irritants*
Machinists	Cutting compounds, lubricants, oils.
Masons	Lime.
Match-factory workers	Dyes, dextrins, gums, chrome salts.
Mercerizers	Acids, caustic alkali.
Mixers (rubber)	Accelerators (hexamethylenetetramine).
Mordanters	Acids, caustic alkali, chromates, zinc chloride, aluminum salts, antimony compounds, arsenates, copper salts, iron salts, lead salts, phosphates, silicates, tin salts.
Mottlers (leather)	Dyes.
Nickelplaters	Zinc chloride, nickel sulphate.
Nitroglycerin makers	Acids, explosives.
Painters	Acids, caustic alkali, paints, zinc chloride, benzine, chrome pigments.
Paint makers	Paints.
Paper-box makers	Glue, dyes.
Paraffin workers	Paraffin.
Parchment makers	Zinc chlorides.
Pencil (colored) makers	Dyes.
Petroleum refiners	Caustic alkali, paraffin.
Photographers	Acids, caustic alkali, chromates, metol, pyrogallic acid, turpentine, amidol, bronzing powder, hydroquinone, rodinal.
Photographic-plate cleaners	Caustic alkali.
Pitch workers	Pitch, tar.
Plasterers	Lime.
Plumbers	Caustic soaps, hydrochloric acid, zinc chloride.
Polishers	Caustic alkali, naphtha, acid, cyanogen compounds.
Polishers (silver and brass)	Potassium cyanide.
Printers	Ink, benzine, chromates, alkalis.
Pyroxylin-plastics makers	Dyes.
Radium workers	Radiant energy.
Rayon workers	Alkalis, carbon disulphide, acids, solvents, bleaches.
Rock-salt workers	Brine.
Ropemakers	Oil, tar, dyes, potassium hydroxide.
Rubber workers	Accelerators (hexamethylenetetramine), solvents.
Salt preparers	Brine.
Shell fillers	Explosives (TNT, etc.).
Shoe finishers	Benzine, coal-tar products, naphtha, methyl alcohol.
Silk workers	Alkalis, acids, dyes.
Sizers (cotton)	Zinc chloride, aluminum salts, calcium salts, magnesium salts, acids, phenol, arsenic salts.
Slaughter and packing-house workers	Bacteria, fungi, parasites, brine.
Smelters	Arsenic.
Soap makers	Caustic alkali, soap, vegetable oils, sodium silicate.
Sodium-hydroxide makers	Caustic alkali.
Solderers	Acids, zinc chloride.
Stockyard workers	Bacteria, fungi, parasites.
Sugar refiners	Sugar.
Tannery workers	Acids, lime, sodium sulphide, arsenic salts, brine, calcium hydrosulphide, chromium salts.
Tar workers	Tar, pitch.
Taxidermists	Arsenic, mercuric chloride, calcined alum, tannin.
Temperers	Oil, brine, cyanide.
Tinners	Zinc chloride.
Tobacco rollers	Vegetable dust, vegetable oils, glue.
Typists	Carbon paper, typewriter ribbons.
Upholsterers	Lacquer, glue, bacteria, fungi, parasites.
Veterinarians	Bacteria, fungi, parasites.
Vulcanizers	Accelerators (hexamethylenetetramine).
Washers	Caustic alkali, soap, bleaching powder.
Washwomen	Caustic alkali, soap, bleaching powder.
Watchmakers	Potassium cyanide, trichlorethylene.
Waterproofers (paper)	Paraffin.
Wax-ornament makers	Dye intermediates, potassium cyanide.
Wood preservers	Tar, zinc chloride, bichloride of mercury.
X-ray workers	Radiant energy.
Zinc-chloride makers	Acids, zinc chloride.

Section IV.—Selected Sources of Information on Industrial Hygiene

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UNITED STATES GOVERNMENT BUREAUS

United States Department of Labor, Bureau of Labor Statistics.
United States Department of Labor, Division of Labor Standards.
United States Bureau of Mines.
United States Public Health Service.

STATE HEALTH AND LABOR DEPARTMENTS

Connecticut State Department of Health, Bureau of Occupational Diseases.
Massachusetts Department of Labor and Industries, Division of Occupational Hygiene.
New York State Department of Labor, Division of Industrial Hygiene.
Ohio Department of Health, Division of Hygiene. Bureau of Occupational Diseases.
Pennsylvania Department of Health, Division of Industrial Hygiene.
Pennsylvania Department of Labor and Industry, Occupational Disease Prevention Division.

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