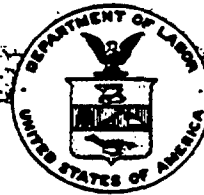


OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

A Revision of Bureau of Labor Statistics Bulletin No. 582



BULLETIN NO. 41

Revised 1942

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450

no.41

28 JUL 1963
JAN 5 1964

OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

Bulletin Number 41 is a Revision of Bureau of Labor
Statistics Bulletin No. 582, by LOUIS I. DUBLIN, Third
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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 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. Savers, 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.

MARCH 1, 1942.

OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

A Guide To Impairments To Be Looked For In 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 may 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 occupations in which hazards may be found, 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 shows 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 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 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. 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.

All of the foregoing comments receive a special emphasis at this time due to the general defense program. One result of the enormously increased manufacture of munitions of all kinds is the use of many chemicals about which little or nothing is known, and many of which are entirely new. Furthermore, the lengthening of the hours of work and of the number of work days in the week and the added stress of production carry with them a likelihood of aggravation of occupational hazards so that hazards which are ordinarily of minor importance may become serious under the stress of war-time conditions.



Section I.—Alphabetical List of Occupations

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 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, 89, 108.
 Acid finishers (glass), J 62, 68, 108.
 Acid makers. *See* particular acid.
 Acridine workers, J 4.
 Acrolein workers, J 5.
 Actors, J 68.
 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, 68.
 Airplane wing varnishers. *See* Varnishers.
 Alcohol-distillery workers, J 8, 9, 16, 37, 70, 72.
 Aldehyde pumpmen, J 1, 72.
 Alkali salt makers, C, J 25, 34, 62, 106, 107.
 Alloy makers, B 1, J 12, 17, 27, 39, 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 9, 15, 64, 68, 72, 123.
 Artificial-amber makers, J 56.
 Artificial-dower makers, H, J 12, 38, 66, 70, 72.
 Artificial-gem makers, J 114.
 Artificial-ice makers, B 2, C, J 1, 108.
 Artificial-leather workers, B 1, J 3, 8, 10, 12, 16, 20, 22, 72, 88, 108.
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 Artificial-pearl makers, J 3, 9, 68, 89, 111.
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 Artificial-stone makers, E 3, J 109.
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 Asbestos products workers, B 1, E 4, J 16, 56, 109.
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 Babbitt metal workers, J 11, 66.
 Babbitters, J 11, 66.
 Bacteriologists, F, F 1.
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 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.
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 Battery (storage) makers. *See* Storage battery makers.
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- Beauty parlor operatives, F. J 16.
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 Bevelers, E 3.
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 Bleaching powder makers, J 13, 30, 34, 69.
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 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.
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 Bottle-cap makers, J 66.
 Bottlers (mineral waters), J 25, 107.
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 Brick makers, B 1, C, E 2, 3, J 64, 66, 68, 69, 106.
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 Bromine makers, J 10, 19, 34.
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 Carbonated-water makers, J 25.
 Carbon-black workers, B 1, E 1.
 Carbon-brush makers, E 1, E 3.
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 Carbon-dioxide makers, J 25.
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 Carbon printers (photography), J 38.
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 Carders (asbestos), E 4.
 Carders (textiles), E 1.
 Card grinders (textiles), E 1, 3.
 Carpenters, H.
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 Carpet makers, E 1, F 1, J 12.
 Carroters (felt hats), J 12, 70, 88.
 Cartridge cup washers, C.
 Cartridge dippers, J 62, 88, 106.

- 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 37.
 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 3, J 27, 102.
 Cement (rubber, plastic, etc.) mixers. J 3, 7, 8, 15, 16, 26, 28, 43, 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 38.
 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, 8.
 Clay-ping 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.
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 Coal carbonizers. J 107.
 Coal miners. *See* Miners.
 Coal passers. E 1, 3.
 Coal-tar workers. B 1, J 10, 16, 27, 41, 42, 83, 109. *See also* Coke-oven workers.
 Cobblers. E 1, F 1, H, J 16, 28.
 Coin makers. J 91, 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 39.
 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 3.
 Cooks. B 2, F, G 2, J 27.
 Copper foundries. J 12, 40.
 Copper miners. *See* Miners.
 Copper refiners and smelters. B 1, J 11, 12, 27, 40, 64, 66, 69, 102, 106, 110.
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 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.
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 Creosoting-plant workers. C, J 109.
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 Cupola men (foundries). B 1, J 25, 27.
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 Curriers (tannery). E 1, F 1, J 12, 15.

- Cut-glass workers, E 3, J 12, 68.
 Cutlery makers, E 2, 3, J 9, 66.
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 Cynamide makers, B 1, E 3, J 24.
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 Dairy workers, F 1, 4.
 Damuscening workers, J 88.
 Dancers, H.
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 Decorators (pottery), J 12, 15, 16, 66, 70, 123.
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 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.
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 Devil operators (felt hats), E 1, J 70.
 Diamond cutters, E 1, 3, H.
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 Dichlorethylene workers, J 43.
 Digester-house workers (paper and pulp), B 1, 2, J 106, 107.
 Dimethyl-sulphate makers, J 13, 45, 72, 88, 106.
 Dinitrobenzol workers, J 85.
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 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, 28.
 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, 18, 19, 22, 25, 28, 30, 34, 38, 41, 42, 45, 47, 48, 50, 54, 57, 58, 62, 66, 69, 70, 72, 73, 74, 75, 76, 79, 83, 88, 89, 93, 94, 95, 99, 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, 83, 89, 93, 98, 100, 105, 117, 124, 125. *See also* Mordanters, and other preparatory process workers.

 Electrical condenser makers, J 31, 33.
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 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, 90, 106, 111, 119.
 Electrotypers, B 2, E 1, 3, J 7, 11, 66.
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 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, 108.
 Ether makers, J 106.
 Ethyl-benzene makers, J 49.
 Ethyl-bromide makers, J 50.
 Ethyl-chloride makers, J 50.
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 Ethylene-dichloride makers, J 52.
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 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, 106. *See also* particular occupation.
- Felt makers. B 1. F 1. J 107.
- Ferrosilicon makers. E 2.
- Ferrosilicon workers. J 12, 13, 97.
- Fertilizer makers. C. E 1, 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.
- Fillers. E 3. J 11, 66.
- Filling station workers. J 15, 27, 66.
- 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, 96, 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.
- Flatteners (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 58, 70, 88.
- Fur pullers. E 1. F 1.
- Fusel-oil workers. J 9.
- Galvanizers. B 1. C. J 5, 7, 12, 13, 15, 62, 66, 88, 106, 108, 119, 128.
- Garage workers. J 5, 15, 27, 66.
- Garbage workers. F 3.
- Gardeners. F 4. J 12, 24, 66, 83.
- Gas (illuminating) workers. B 1, 2. J 7, 13, 18, 27, 42, 64, 83, 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, 106.
- Glass-furnace workers. B 1. E 3. G 2. J 27. *See also* Glass mixers.
- Glass mixers. E 2, 3. J 11, 12, 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, 39, 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, 106.
- 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 miners, J 107.
 Gypsum workers, B 2, E 3.
- 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 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, 106, 123, 125.
 Insecticide makers, F, J 12, 14, 15, 19, 25, 28, 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 3.
 Insulators (wire), J 11, 12, 16, 23, 31, 33, 52, 109.
 Iodine makers, J 34.
 Iron and steel workers (all departments), B 1, E 3, G 2, J 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.
 Jupanners, J 12, 15, 66, 72, 123.
 Jewelers, D, E 3, H, J 8, 13, 42, 62, 66, 70, 88, 106.
 Junk (metal) refiners, B 1, E 3, J 66, 123.
 Jute workers, E 1, 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 lamp makers.
 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, 56, 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, 23, 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.

- Lumbersmen, B 2.
 Luminous dial factory workers, G 1.
 Lutens (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.
 Milkmen, 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, 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, 18, 29, 38, 66.
 Mixing-room workers (miscellaneous), E 1, 3.
 Mold breakers (foundry), E 2, 3.
 Mold breakers (pottery), J 27.
 Molders (asbestos), E 4.
 Molders (foundry) B 1, E 2, 3, J 66, 128.
 Monotypers, J 11, 27, 68.
 Mordanters, J 9, 11, 12, 15, 16, 30, 38, 42, 57, 88, 125.
 Motion-picture film workers, J 9, 22, 27, 111. *See also* Pyroxylin plastic workers.
 Motion-picture-machine operators, G 2, J 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.
 Nitratators, 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, 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 106.
 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.
 Ore crushermen (siliceous rock), E 2.
 Oxalic-acid makers, J 42, 88, 99, 108.

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 3, 8, 9, 10, 11, 12, 15, 18, 28, 29, 38, 68, 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, 18, 23, 28, 31, 33, 38, 62, 68, 69, 70, 72, 93, 100, 102, 104, 108, 109, 117, 119, 123, 124.

Paint-remover makers, J 15, 18, 20, 28, 41, 44, 48, 53, 72, 76, 93, 111, 119.

Paint removers, E 3, J 3, 8, 15, 18, 28, 44, 68, 76, 93, 111, 119.

Pail heaters (tin plate), B 1.

Paper-box makers, H.

Paper glazers, J 12.

Paperhangers, E 3, J 12, 38, 68.

Paper makers, B 1, 2, C, F 2, J 7, 8, 13, 34, 38, 58, 62, 64, 68, 69, 99, 104, 106, 107, 108, 117. *See also* particular occupation.

Paper-money makers, J 38.

Paraffin workers, J 3, 16, 28, 29, 52, 92.

Parakeet handlers, F.

Paris-green workers, J 12.

Parrot handlers, F.

Patent leather makers, B 2, J 8, 27, 68, 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, 18, 22, 28, 41, 43, 45, 50, 57, 62, 72, 73, 76, 79, 83, 93, 99, 108, 119.

Petroleum refiners, B 1, C, J 3, 5, 7, 10, 15, 18, 27, 44, 62, 66, 76, 85, 92, 104, 108, 107, 108, 119, 123.

Pewter makers, J 11.

Pharmaceutical workers, E 1, J 3, 5, 10, 11, 12, 18, 19, 24, 25, 28, 30, 47, 48, 50, 51, 52, 57, 68, 69, 70, 73, 75, 76, 79, 86, 88, 93, 94, 95, 98, 99, 104, 108, 110, 111, 112, 119, 123, 124.

Phenol makers, J 16, 98, 108.

Phenyl-hydrazine workers, J 94.

Phosgene makers, J 27, 34, 86.

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, 19, 22, 88, 103. *See also* Pyroxylin-plastics workers.

Photographic-material workers, J 1, 3, 7, 10, 14, 16, 34, 38, 41, 42, 54, 62, 70, 93, 98, 108, 110, 119, 123, 124, 125. *See also* Photographic-film makers.

Photograph retouchers, J 68.

Photoengraving workers, J 38, 88.

Physicians, G 1, J 25, 70.

Picklers, B 1, C, J 13, 42, 62, 64, 98, 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 68. *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 Metal-lizers.

Platinum extractors, J 19.

Plumbers, J 13, 27, 68. *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, 108, 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, 68, 69, 70, 102, 108. *See also* particular occupation.

Pouncers (felt hats), E 1, 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, 68, 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, 28, 68.

Putty polishers (glass), E 3, J 68.

- 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, 66, 82, 72, 76, 88, 89, 104, 107, 108, 111.
 Reclaimers (rubber), J 10, 16, 26, 62, 66, 93, 106.
 Red lead workers, J 66.
 Refiners (metals), B 1, J 12, 13, 27, 62, 66, 70, 88, 102, 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 1, 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 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, 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, 106.
 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 (enamelling and painting auto bodies, etc.), E 3, J 66.
 Sandpaper makers, E 2, 3.
 Sand pulverizers, E 2.
 Sandstone quarriers, crushers, dressers, 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, 106, 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, 35, 86, 98.
 Shepherds, F, F 1.
 Sherardizers, J 123.
 Shingle stainers, J 15.
 Shipyard workers, J 109.
 Shoddy workers, E 1, F 1, 3, J 13, 34, 62, 106.
 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* Electro-platers.
 Silversmiths, J 103.
 Singers (cloth), J 27.
 Sintering plant workers, E 3.
 Sizars (felt hats), B 1, J 70.
 Skimmers (glass), B 1, G 2.
 Slag workers, B 1, E 3.
 Slate grinders, E 2, 3.
 Slaughter-house workers, C, F, F 1, 3, 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, 96.
 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, 58, 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 23, 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 (corrosion resistant) makers, J 12.
 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 3, J 109.
 Stone cleaners, J 64, 89.
 Stonecutters, C, E 2, 3, H.
 Stone masons. *See* Masons.
 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 3, J 106.
 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, 62, 106, 107, 108.
 Sulphates makers, J 106.
 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, 106, 107.
 Sulphur dioxide makers, J 27, 106.
 Sulphurizers (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, 96, 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, 106, 123, 125.
 Textile workers, B 1, 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.
 Tanners. B 1, C, J 5, 7, 12, 13, 62, 68.
 Tin plate mill workers. *See* Iron and steel workers.
 Tin recovery workers. J 34.
 Tire builders. *See* Rubber tire builders.
 Tobacco denicotinizers. J 52, 119.
 Tobacco moisteners. C, J 25.
 Tobacco seedling treaters. J 16.
 Tobacco workers. E 1, J 93.
 Tongsman (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, 65.
 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 foundries. 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, 106, 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.
 Vignettors. 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 25, 66.
 Window-shade makers. J 15, 16.
 Wire drawers. J 12, 62, 106.
 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	Catchers (iron and steel)	Glass-furnace workers
Alloy makers	Cement (Portland) workers	Graphite workers
Ammonium-salts makers	Charcoal workers (sugar refinery)	Hot-rod rollers (iron and steel)
Annealers	Cloth preparers	Iron and steel workers (all departments)
Antimony extractors (refiners)	Coal-tar workers	Junk (metal) refiners
Arsenic roasters	Coke-oven workers	Kiln tenders
Artificial-leather workers	Color makers	Laundry workers
Asbestos-roofing makers	Copper smelters	Lead-foil makers
Asphalt workers	Core makers	Lead smelters
Bar-mill workers (iron and steel)	Corn-products workers	Lehr tenders (glass)
Benzol-still men	Cotton-mill workers	Levermen (iron and steel)
Bessemer converter workers (iron and steel)	Cottonseed-oil workers	Lifters-over (glass)
Beta-still operators (iron and steel)	Cranemen (glass industry)	Lime burners
Billet-mill workers (iron and steel)	Cranemen (iron and steel)	Linoleum makers
Bisque-kiln workers	Crucible-steel-department employees	Luters (zinc smelting)
Blacksmiths	Cupola men (foundries)	Marblers (glass)
Blast-furnace workers	Cyanamid makers	Melters (foundry; glass)
Bleachers	Digester house workers (paper and pulp)	Mercury smelters
Bleachery driers	Doffers (textile)	Miners
Blockers (felt hats)	Dressers (glass)	Molders (foundry)
Blooming-mill workers (iron and steel)	Dresser tenders (textile)	Muffle tenders
Blowers-out (zinc smelting)	Drop forgers	Open-hearth-department workers (iron and steel)
Bluers (revolvers)	Dye makers	Packing-house employees
Boiler-room workers	Enamelers	Pair heaters (tin plate)
Brass foundries	Engineers (stationary)	Paper makers
Braziers	Felt-hat makers	Pavers
Brewers	Felt makers	Petroleum refiners
Brick burners	Firemen (city)	Picklers
Brick makers	Firemen (stationary)	Pitch workers
Burners (enameling)	Flatteners (glass)	Pot fillers (glass)
Candy makers	Flax spinners	Pot lifters (iron and steel)
Canners	Forgemen	Pot pullers (foundry)
Cappers (window glass)	Foundry workers	Pot-room workers (aluminum foundry; carbide plant)
Carbide makers	Furnace workers	Pot setters
Carbon-black workers	Galvanizers	Pottery workers
Case hardeners	Gas (illuminating) workers	Pourers (foundry)
Casters (iron and steel)	Gatherers (glass)	Puddlers (iron and steel)
	Glass blowers	Pullers-out (felt hats)
		Pulp-mill workers

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

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

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

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

2. Inorganic Dust Containing Free Silica

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Abrasives makers	Flint workers	Sandpaper makers (quartz varieties)
Abrasives workers	Foundry workers	Sand pulverizers
Bedrubbers (siliceous stone)	Glass mixers	Sandstone quarriers, crushers, dressers
Bisque-kiln workers	Glaze mixers (pottery)	Sawyers (siliceous stone)
Blasters—underground (siliceous rock)	Grinders, metal (sandstone wheels)	Scouring powder makers
Brickmakers (refractories)	Grinding wheel (sandstone) dressers	Scrapers (foundry)
Burrers—needles (sandstone wheels)	Granite cutters	Silicon alloys makers
Casting cleaners (foundry)	Masons (refractory materials)	Slut grinders
Chippers (foundry)	Miners in siliceous rock	Smelter workers
Clay and bisque makers (pottery)	Molders (foundry)	Soap (abrasive) makers and packers
Concentrating mill—ore crushermen (siliceous rock)	Ore crushermen (siliceous rock)	Sodium silicate makers
Coremakers	Planer men (siliceous rock)	Stampmill workers
Crusher men (siliceous rock)	Polishers (metal)	Statuary (granite or sandstone) makers
Cutlery grinders (sandstone wheels)	Pottery workers	Stonecutters (granite or sandstone)
Drillers (siliceous rock)	Quarrymen (siliceous rock)	Stone workers (granite or sandstone)
Enamelers (free silica frits)	Quartz workers	Subway construction workers (in siliceous rock)
Ferrosilicon makers	Rubber workers (filling)	Tile makers
	Sandblasters	Tumbling barrel workers
	Sand cutters	Tunnel construction workers (in siliceous rock)
	Sanders (quartz paper)	
	Sanding machine operators (quartz paper)	

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

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

4. Asbestos

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Asbestos-products workers	Crushers (asbestos)	Textile (asbestos) workers
Brake-lining workers	Fiberizers (asbestos)	Weavers (asbestos)
Carders (asbestos)	Molders (asbestos)	
	Spinners (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.
Well'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	Fertilizer makers	Shavers (felt hats, fur, tannery)
Bacteriologists	Freight handlers	Shepherds
Bathers (tannery)	Fur carders	Shoddy workers
Beamhouse workers (tannery)	Fur clippers	Shoe-factory workers
Blanket makers	Fur cutters	Slaughterhouse workers
Bonemeal workers	Fur handlers	Stablemen
Broom makers	Fur preparers	Sumackers (tannery)
Brush makers	Fur pullers	Table hands (tannery)
Butchers	Gelatine makers	Tannery workers
Carpet cleaners	Glue makers	Taxidermists
Carpet makers	Hair workers	Upholsterers
Cattle salesmen	Leather workers	Veterinarians
Cobblers	Lime pullers (tannery)	Warehouse workers
Cordage-factory workers	Longshoremen	Wooden-beel workers
Curriers	Mattress makers	Wool carders
Dairy workers	Meat inspectors	Wool scourers
Farmers	Minkery workers	Wool spinners
Fat renderers	Plasterers	Wool workers
Felt makers	Preparers (tannery)	
	Rag 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	Grocers	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)	ers of instrument dials, and other workers in plants manufacturing luminous dials.	Radium ore reduction workers
Dentists	Physicians, nurses, and hospital attendants	Radium specialists
Incandescent mantle makers	Radioactive-paint makers	Roentgenologists
Inspectors and examiners using fluoroscope or X-ray	Radioactive-water makers	Uranium miners
Painters of luminous watch dials and paint-	Radiologists	Uranium workers
	Radium miners	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, retinitis, cataract, dermatitis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

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

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 Legislation¹ 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	Mirror silverers	Rubber (synthetic) makers
Aldehyde pumpmen	Photographic workers	ers
Disinfectant makers	Pyroxylin-plastics workers	Varnishers
Dye makers	ers	Varnish makers
Explosives workers	Resin (synthetic) makers	Vinegar workers
Lacquer 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	Artificial-pearl makers	Cement (rubber, plastic etc.) mixers
Acetylene workers	Artificial-silk workers	Chloroform makers
Airplane-dope makers	Bronze-powder makers	Collar (fused) makers
Artificial-leather makers	Button makers	

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

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	Gasoline engine workers	Refrigerator (mechanical) makers and repairmen
Bone renderers	Gelatine makers	Soap makers
Bookbinders	Glue makers	Stearic-acid makers
Candle makers	Lard makers	Straw-hat makers
Copper (strip) roller mill workers	Linoleum makers	Tallow refiners
Fat renderers	Linseed-oil boilers	Tinners
Fertilizer makers	Petroleum refiners	Type melters
Galvanizers	Pharmaceutical workers	Varnish makers
Garage workers	Pyroxylin-plastics workers	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	Calcium carbide makers	Dyers
Ammonia workers	Cement (rubber plastic, etc.) mixers	Electrotypers
Ammonium-salts makers	Coke-oven workers	Explosives workers
Annealers	Color makers	Fertilizer makers
Artificial-ice makers	Cyanide makers	Galvanizers
Boneblack makers	Dye makers	Gas (illuminating) workers
Bronzers		

Gas purifiers	Photoengravers	Shoe finishers
Glue makers	Photographic materials workers	Soda (Solvay) makers
Ice-cream makers	Rayon makers	Staple men
Ink makers	Refrigerating-plant workers	Sulfur refiners
Lacquer makers	Salt extractors (coke-oven byproducts)	Sulphuric-acid workers
Mirror silverers	Sewer workers	Tannery workers
Nitric-acid makers	Shellac makers	Tinners
Paper makers		Varnish makers
Perfume makers		Vulcanizers
Petroleum refiners		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	Furniture polishers	Polish makers
Alcohol-distillery workers	Gilders	Pyroxylin-plastics workers
Amyl acetate workers	Incandescent lamp makers	Rayon makers
Art-glass workers	Jewelers	Shellackers
Artificial-leather workers	Lacquerers	Shellac makers
Artificial-pearl makers	Lacquer makers	Shoe-factory workers
Battery (dry) makers	Leather workers	Shoe finishers
Bookbinders	Linoleum makers	Shoe-heel (wood) coverers
Bronzers	Motion-picture film workers	Smokeless-powder makers
Buffers (rubber)	Mottlers (leather)	Soap makers
Camphor makers	Nitrocellulose workers	Storage-battery makers
Cement (rubber, plastic, etc.) mixers	Painters	Straw hat makers
Cutlery makers	Paint makers	Tannery workers
Dry cleaners	Paint removers	Textile printers
Dyers	Paper (coated) makers	Toy makers
Enamelers	Patent-leather makers	Varnishers
Enamel makers	Perfume makers	Varnish makers
Explosives workers	Photoengravers	Writers (incandescent lamps)
Fruit-essence makers	Photographic-film makers	

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

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

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

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

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

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	Ferrosilicon workers	Pyroxylin-plastics workers
Acid dippers	Fertilizer makers	Rayon makers
Aniline workers	Galvanizers	Refiners (metals)
Balloon (hydrogen) workers	Gas (illuminating) workers	Shoddy workers
Bleaching-powder makers	Hydrochloric acid workers	Soda makers
Bronzers	Jewelers	Solderers
Cadmium workers	Lead burners	Storage-battery makers
Carbonizers (shoddy)	Lime burners	Submarine workers
Dimethyl-sulphate makers	Nitrocellulose makers	Sulphuric-acid workers
Dye makers	Nitroglycerine makers	Tank cleaners
Electrolytic-process (copper) workers	Paper makers	Tinners
Electroplaters	Picklers	Tower men (sulphuric acid)
Etchers	Plumbers	War-gas makers
Extractors (gold)		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-plastic 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	Enamel makers	Pteric-acid makers
Airplane hangar employees	Engravers	Polish makers
Alcohol (denatured) workers	Explosives workers	Polishers
Aniline workers	Extractors (oils and fats)	Pressroom workers (rubber)
Artificial-leather makers	Feather workers	Printers
Asbestos-products impregnators	Fertilizer makers	Pyroxylin-plastics workers
Auto painters	Flavoring-extract makers	Reclaimers (rubber)
Battery (dry) makers	Fullers (textiles)	Rotogravure workers
Beauty-parlor operatives	Gas (illuminating) workers	Rubber-tire builders
Benzol purifiers	Gasoline blenders	Rubber workers
Benzol-stillmen	Gilders	Sourers (belts)
Benzol workers	Glue workers	Shade-cloth makers
Brake-lining makers	Ink makers	Shellackers
Bronzers	Insulators (wire)	Shellac makers
Can sealers	Lacquers	Shoe-factory workers
Carbolic-acid makers	Lacquer makers	Shoe finishers
Cast scrubbers (electroplaters)	Linoleum workers	Shoe-heel (wood) coverers
Cementers (rubber)	Lithographers	Smokeless powder makers
Cement mixers (rubber)	Millinery workers	Soap makers
Chlorodiphenyl makers	Mirror silverers	Still (coal tar) cleaners
Clutch-disk impregnators	Mixers (rubber)	Tank cleaners
Coal-tar workers	Mordanters	Tobacco seedling trenters
Cobblers	Nitrobenzol makers	Treaders (rubber)
Coke-oven workers	Nitrocellulose workers	Trinitrotoluol makers
Color makers	Painters	Varnishers
Compounders (rubber)	Paint makers	Varnish makers
Decorators (pottery)	Paint-remover makers	Varnish-remover makers
Degreasers	Paint removers	Varnish removers
Dippers (rubber)	Paraffin makers	Vulcanizers
Disinfectant makers	Pencil makers	War gas makers
Driers (rubber)	Perfume makers	Waterproof-fabric makers
Dry cleaners	Petroleum refiners	Wax makers
Dye makers	Pharmaceutical workers	Welders
Electroplaters	Phenol makers	Window-shade makers
Enamelers	Photoengravers	
	Photographic materials workers	

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	Explosives workers	Pharmaceutical workers
Bromine-salts makers	Extractors (gold)	Photographic-film makers
Color makers	Ink makers	Platinum extractors
Disinfectant makers	Insecticide makers	Tetraethyl-lead makers
Dye makers	Methyl bromide makers	War-gas makers
Ethylene dibromide 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	Ruyon 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	Cyanamide makers	Gardeners
Calcium cyanamide makers	Farmers	Pharmaceutical workers
	Fertilizer makers	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	Disinfectant makers	Refrigerating - plant workers
Bakers	Divers	Sewer workers
Baking-powder makers	Drying-room workers	Silo workers
Blacksmiths	Dye makers	Soda makers
Blast-furnace workers	Explosives (safety) makers	Starch makers
Boiler-room workers	Fertilizer workers	Submarine workers
Bottlers (mineral waters)	Fire-extinguisher makers	Sugar refiners
Brass founders	Foundry workers	Tannery pit men
Brewers	Furnace workers	Tobacco moisteners (storehouse)
Brick burners	Glue makers	Tunnel workers
Calsson workers	Grain-elevator workers	Vatmen
Canners	Ice-cream makers	Vault workers
Carbonated - water makers	Insecticide makers	Vinegar makers
Carbon-dioxide-ice workers	Lime burners	Vintners
Carbon-dioxide makers	Lime-kiln workers	Vulcanizers
Carbonic-acid makers	Linseed-oil boilers	Well workers
Charcoal burners	Miners	White-lead makers
Clothes pressers	Pharmaceutical workers	Yeast makers
Cupola men (foundries)	Physicians	
	Pottery workers	

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

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

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, necrosis.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

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

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

31. Chlorinated Diphenyls

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

Acneiform skin eruptions, jaundice, and atrophy of liver.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

32. Chlorinated Hydrocarbons

See the following: Carbon tetrachloride, chlorinated diphenyl, chlorinated naphthalenes, chloroprene, dichloroethylene, 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	Electrical-transformer makers	Paint makers
Degreasers (metals)	Electroplaters	Resin (synthetic) workers
Electrical-condenser makers	Insulators (wire)	Varnish makers
	Lacquer 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	Extractors (gold and silver)	Soda makers
Beatermen (paper and pulp)	Ink makers	Sodium-hydroxide makers
Bleachers	Iodine makers	Submarine workers
Bleaching-powder makers	Laundry workers	Sugar refiners
Bromine makers	Paper makers	Sulphur-chloride makers
Broom makers	Phosgene makers	Textile printers
Chloride of lime makers	Photographic workers	Tin-recovery workers
Chlorine makers	Rayon makers	War-gas makers
Color makers	Rubber-substitute makers	Water purifiers
Detinning workers	Sewage-purification workers	Zinc-chloride makers
Disinfectant makers		
Dye makers	Shoddy 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	Enamel makers	Pencil (colored) makers
Aniline workers	Explosives (ammonal and pyroxylin) workers	Photoengravers
Artificial-flower makers	Frosters (glass and pottery)	Photographic workers
Battery (dry) makers	Furniture polishers	Photogravure workers
Bleachers	Glass colorers	Pottery workers
Blueprint makers	Glass workers (pottery)	Rubber workers
Candle (colored) makers	Ink makers	Steel (chrome) makers
Carbon printers (photography)	Linoleum workers	Tannery (chrome) workers
Chrome workers	Lithographers	Textile printers
Chromium platers	Match-factory workers	Vulcanizers
Colorers (marble)	Mixers (rubber)	Wallpaper printers
Color makers	Mordanters	Waterproofers (paper and textile)
Compounders (rubber)	Painters	Wax-ornament workers
Crayon (colored) makers	Paint makers	Welders
Dye makers	Paperhangers	Wood stainers
Dyers	Paper makers	
Electroplaters	Paper-money makers	
Enamelers		

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	Glass colorers	Steel-alloy makers
Color makers	Pottery workers	

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 foundry	Copper refiners and smelters	Engravers
Copper foundry	Coppersmiths	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	Glue workers	Photographic workers
Cresol-soap makers	Ink makers	Pitch workers
Cresylic-acid makers	Insecticide makers	Resin (synthetic) makers
Disinfectant makers	Paint-remover makers	Rubber (artificial) workers
Dye makers	Perfume (synthetic) makers	
Explosives 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	Fertilizer makers	Photographic workers
Ammonium-salts makers	Fulminate mixers	Picklers
Art-printing workers	Fumigators	Polishers (metals)
Blacksmiths	Gas (illuminating) workers	Polish makers
Blast-furnace workers		Pyroxylin-plastics workers
Bone distillers	Gas purifiers	
Bronzers	Gilders	Rayon makers
Browners (gun barrels)	Gold refiners	Silver refiners
Case hardeners	Hydrocyanic-acid makers	Solderers
Coal-tar-distillery workers	Insecticide makers	Sprayers (trees)
Cyanide workers	Jewelers	Tannery workers
Cyanogen makers	Mirror silverers	Temperers
Disinfectant makers	Mordanters	Textile printers
Dye makers	Oxalic-acid makers	War-gas makers
Electroplaters	Phosphoric-acid makers	Zincers
Extractors (gold and silver)		

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

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 0.028 to 0.10 percent vapor in air by volume. All except lacrimation were attained with 0.01 percent, while an exposure of 310 minutes to 0.0085 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 0.065 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 0.3 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
	Lacquer makers	Varnishers
Exterminators	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

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

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

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	Resin makers	Varnish makers
Paint-remover makers		

59. Gasoline. See Benzine

60. Hexanone (Methyl Butyl Ketone)

Hexanone is an organic solvent. It is reported to be a good solvent for nitro-cellulose 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, 0.63, 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	Chlorine makers	Hydrochloric-acid makers
Acid dippers	Dye makers	Ink makers
Acid finishers (glass)	Dyers	Jewelers
Alkali-salt makers	Electroplaters	Leather workers
Ammonium-salts makers	Enamel makers	Lithographers
Aniline workers	Engravers	Mercerizers
Battery (dry) makers	Etchers	Methyl chloride makers
Bleachers	Fertilizer makers	Paint makers
Bronzers	Galvanizers	Paper-mill workers
Camphor makers	Glass finishers	Perfume (synthetic) makers
Carbonizers (shoddy)	Glass mixers	Petroleum refiners
Cartridge dippers	Glaze mixers (pottery)	Phosphate extractors
Chlorine-compound makers	Glazers (pottery)	Photographic workers
	Glue makers	

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

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	Electroplaters	Incandescent-mantle hardeners
Antimony-fluoride extractors	Enamel makers	Paper (filter) makers
Art-glass workers	Etchers	Phosphate-mill workers
Beryllium extractors	Fertilizer makers	Phosphorus extractors
Bleachers	Gas (illuminating) workers	Picklers (metals)
Brewers	Glass etchers	Pottery workers
Brick makers	Glass finishers	Stone cleaners
Copper refiners and smelters	Gold refiners	Tank cleaners (brewery)
Dyers	Hydrofluoric-acid makers	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)	Brass polishers	Colorers (white) of shoes
Actors	Braziers	Color makers
Airplane pilots—crop dusting	Brick burners	Compositors
Amber workers	Brickmakers	Compounders (rubber)
Art-glass workers	Bronzers	Concentrating-mill workers (lead and zinc)
Artificial-flower makers	Browniers (gun barrels)	Copper refiners
Artificial-pearl makers	Brush makers	Crayon (colored) makers
Babbitt-metal workers	Buffers (rubber)	Cut-glass workers
Babbitters	Burners (enameling)	Cutlery makers
Battery (dry) makers	Cable makers	Decorators (pottery)
Blacksmiths	Cable splicers	Dental workers
Blooders (tannery)	Canners	Diamond polishers
Bookbinders	Cartridge makers	Dye makers
Bottle-cap makers	Cement workers (ceramic)	Dyers
Brass foundries	Chippers	Electroplaters
	Cigar makers	

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

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

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 rhythmical movements of arms, legs, trunk, and head, cramps and stiffness of

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Alloy makers	Fertilizer makers	Open-hearth-department workers
Aluminum extractors	Fireworks makers	Painters
Battery (dry) makers	Glass mixers	Paint makers
Bleaching-powder makers	Glaze dippers (pottery)	Pharmaceutical workers
Brick makers	Glaze mixers (pottery)	Pottery workers
Bronzers	Linoleum makers	Puddlers (iron and steel)
Chlorine makers	Longshoremen	Soap makers
Color makers	Manganese-dioxide workers	Steel-alloy makers
Concentrating-mill workers	Manganese grinders	Textile printers
Copper smelters	Manganese-ore separators	Varnishers
Dye makers	Manganese-steel makers	Varnish makers
Dyers	Match-factory workers	Welders
Enamelers	Miners (manganese)	Zinc miners
Enamel makers		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	Electroplaters	Mercury-solder workers
Acetic-acid (synthetic) makers	Embalmers	Mercury-still cleaners
Acetone (synthetic) makers	Embalming fluid makers	Mercury-switch makers
Alcohol (synthetic) makers	Embossers	Mercury-vapor lamp makers
Amalgam makers	Engravers (steel)	Mirror silverers
Artificial-flower makers	Explosives workers	Mixers (felt hats)
Barometer makers	Extractors (gold and silver)	Painters
Battery (dry) makers	Felt-hat makers	Paint (antifouling) makers
Blowers (felt hats)	Fireworks makers	Pharmaceutical workers
Bronzers	Formers (felt hats)	Photographic workers
Browners (gun barrels)	Fulminate mixers	Physicians
Brushers (felt hats)	Fur (hatters) handlers	Pottery decorators
Bulb (mercury) makers	Fur handlers	Primers (explosives)
Cap loaders	Fur preparers	Printers
Carroters (felt hats)	Gilders	Radio-tube makers
Cartridge makers	Gold refiners	Refiners (metals)
Chlorine makers	Hair workers	Shooting-gallery workers
Color makers	Hardeners (felt hats)	Sizers (felt hats)
Coners (felt hats)	Incandescent-lamp makers	Sole stitchers (Blake machine)
Cosmetic workers	Ink (vermillion) makers	Starters (felt hats)
Cyanogen gas makers	Insecticide makers	Stiffeners (felt hats)
Decorators (pottery)	Jewelers	Storage-battery makers
Dental workers	Laboratory workers	Tannery workers
Dentists	Lead platers (on iron)	Taxidermists
Detonator cleaners	Lithographers	Temperers
Detonator fillers	Manometer makers	Textile printers
Detonator packers	Mercury boiler workers	Thermometer makers
Devil operators (felt hats)	Mercury-alloy makers	Water gilders
Disinfectant makers	Mercury bronzers	Welders
Dye makers	Mercury miners	Wood preservers
Electric-induction furnace workers	Mercury-pump workers	Zinc-electrode makers
	Mercury-salt workers	
	Mercury smelters	

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

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

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

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	Methyl-chloride makers	Refrigerator (mechanical) makers and repair men
Chloroform makers	Perfume makers	
Color makers	Pharmaceutical workers	
Dye makers		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	Methylene-chloride workers	Perfume makers
Dye makers		Petroleum refiners
Lacquerers	Perfume makers	Pharmaceutical workers
Lacquer makers	Paint removers	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	Storage-battery makers
Electroplaters	(Mond process)	
Enamellers		

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

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	Pharmaceutical workers	Smokeless-powder makers
Nitroglycerin workers	Shell fillers	

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

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

90. Ozone**SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR**

Irritation of eyes and respiratory tract.

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

91. Pentanone (Methyl Propyl Ketone)

Pentanone is an organic solvent. It is reported to be a good solvent for nitro-cellulose 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 1.8 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)	Oilers	Paraffin workers
Furniture polishers	Oil-floatation-plant workers	Petroleum refiners
Lampblack makers		Pressmen (oil refinery)
Machinists	Oil-well workers	Temperers
Mechanics		

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

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

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 foundries	Pharmaceutical workers	Phosphorus-compound makers
Explosives workers	Phosphate-mill workers	Phosphorus extractors
Exterminators	(phosphorous manufacture)	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, garlicy 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	Glass mixers	Resin (synthetic) makers
Cement (Portland) makers (certain areas)	Lead smelters and refiners	Selenium refiners
Color makers	Lime burners (certain areas)	Steel-alloy makers
Concentrating-mill workers	Metallizers	Sulphuric-acid workers
Copper smelters and refiners	Paint makers	Vulcanizers
Glass colorers	Pottery workers	Welders
	Pyrites burners	Zinc smelters and refiners

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

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

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

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

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	Fertilizer makers	Pyrites burners
Barium-carbonate makers	Flax-rettery workers	Pyroxylin-plastics workers
Blasters	Fur handlers	Rayon makers
Blast-furnace workers	Gas (illuminating) workers	Sewer workers
Bottlers (mineral water)	Gas purifiers	Soap makers
Bronzers	Glue workers	Soda (Leblanc) makers
Cable splicers	Gypsum miners	Sodium-sulphide makers
Caisson workers	Hydrochloric-acid makers	Starch makers
Carbon-disulphide makers	Match-factory workers	Sugar refiners
Cellulose makers	Miners	Sulphides makers
Coal carbonizers	Oil-floatation-plant workers	Sulphur-chloride makers
Coke-oven workers	Oil-well workers	Sulphuric-acid makers
Cyanogen makers	Packing-house workers	Sulphur miners
Digester-house workers (paper and pulp)	Paper makers	Tannery workers
Dye makers	Petroleum refiners	Transparent - wrapping - material workers
Fat renderers	Phosphorus-compound makers	Tunnel workers
Felt makers		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	Felt-hat makers	Pickers (metals)
Acid finishers (glass)	Fertilizer makers	Picric-acid makers
Alum workers	Galvanizers	Pyroxylin-plastics work- ers
Ammonium-salts makers	Glass finishers	Rayon makers
Ammonium-sulphate mak- ers	Glue makers	Reclaimers (rubber)
Artificial-leather makers	Guncotton dippers	Refiners (metals)
Benzol purifiers	Hydrochloric-acid makers	Salt extractors (Coke- oven byproducts)
Beta-still operators (beta naphthol)	Hydrocyanic-acid makers	Scourers (metals)
Brewery workers	Jewelers	Shoddy workers
Burnishers (iron and steel)	Linoleum makers	Soap makers
Candle makers	Lithographers	Soda (Leblanc) makers
Carbolic-acid makers	Mercerizers	Storage-battery workers
Carbonizers (shoddy)	Nitrators	Sugar refiners
Cartridge dippers	Nitric-acid makers	Sulphates makers
Cellulose makers	Nitroglycerin makers	Sulphuric-acid makers
Chambermen (sulphuric acid)	Nitrocellulose makers	Tallow refiners
Color makers	Nitroglycerin makers	Tannery workers
Dimethyl-sulphate makers	Oil purifiers	Temperers
Dye makers	Paint makers	Textile printers
Electroplaters	Paper makers	Towermen (sulphuric acid)
Engravers	Patent-leather makers	Transparent-wrapping- material workers
Etchers	Perfume makers	Wax refiners
Ether makers	Petroleum refiners	Wire drawers
Explosives workers	Pharmaceutical workers	Wood preservers
Fat purifiers	Phenol makers	Yeast makers
	Phosphoric-acid makers	
	Phosphorus-evaporating- machine workers	
	Photographic workers	

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	Creosoting-plant workers	Roofers
Asbestos goods workers	Electrode makers	Roofing-paper workers
Asphalt workers	Fishermen	Rope makers
Battery (dry) makers	Flue cleaners	Shipyards workers
Briquet makers	Gas (illuminating) workers	Soap makers
Brush makers	Insulators	Still (coal tar) cleaners
Cement workers (plastic)	Painters (tar)	Street repairers
Chimney sweepers	Paint makers	Tank cleaners
Coal-tar workers	Pavers	Tar workers
Coke-oven workers	Pitch workers	Waterproofers
Cordage-factory workers	Road repairers	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	Pharmaceutical workers	Rubber makers
Glass colorers	Photographic workers	Zinc refiners
Lead 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	Glass (safety) workers	Rubber workers
Artificial-pearl makers	Insecticide makers	Shoe-factory operatives
Cementers (rubber)	Lacquerers	Soap makers
Cement mixers (rubber)	Lacquer makers	Straw-hat makers
Color makers	Lithographers	Tapers (airplanes)
Degreasers (metals, textiles)	Motion-picture-film workers	Varnishers
Dry cleaners	Paint-remover makers	Varnish makers
Electroplaters	Paint removers	Varnish-remover makers
Enamelers	Pharmaceutical workers	Varnish removers
Enamel makers	Pyroxylin-plastics workers	Wax makers
Extractors (oils and fats)	Rayon makers	
Fullers (textiles)		

112. Tetrachlorethylene (Perchloroethylene)**SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR**

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

Degreasers (metals)	Pharmaceutical workers	Soap makers
Dry cleaners	Printers	

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

Gasoline blenders	Tank cleaners	Tetraethyl-lead makers
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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	Filament makers (incandescent lamps)	Insecticide makers
Color makers	Fireworks makers	Thallium workers
Depilatory makers	Flue-dust recoverers (sulphuric acid mfr.)	Thermometer makers
Disinfectant makers	Glass mixers	
Dye makers		
Exterminators		

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

Paint makers

Paper makers

Iron and steel workers

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	Japanners	Printers
Cable splicers	Lacquerers	Rubber workers
Campbor makers	Lacquer makers	Sealing-wax makers
Cementers (rubber)	Linoleum makers	Shellackers
Compositors	Lithographers	Shellac makers
Decorators (pottery)	Millinery workers	Shoe factory operatives
Dry cleaners	Painters	Textile printers
Dye makers	Paint makers	Transfer workers (pottery)
Enamelers	Patent-leather makers	Turpentine extractors
Enamel makers	Petroleum-refinery workers	Varnishers
Feather workers	Pharmaceutical workers	Varnish makers
Furniture polishers	Photographic workers	Wax makers
Ink (printing) makers	Polishers	
Insecticide makers	Polish makers	
Japan 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	Paint makers	Tile makers
Dyers	Pharmaceutical workers	Uranium miners
Glass mixers	Photographic workers	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	Ink (blue) makers	Sulphuric-acid workers
Dye makers	Mordanters	Textile printers
Dyers	Photographic workers	Vanadium-steel workers
Glass mixers		

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 a burning sensation in the soles of the feet. They immediately recovered on leaving 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, shivering 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)	Core makers	Molders (foundry)
Brass founders	Galvanizers	Pourers (brass foundry)
Brasiers	Junk-metal refiners	Sherardizers
Bronze-powder makers	Luters (zinc smelting)	Welders
Bronzers	Metallizers	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 Dermatogoses; 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

<i>Occupation exposed</i>	<i>Skin irritants</i>
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).....	Benzene, 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, benzene.
Degreasers.....	Solvents.
Dentists.....	Procan, 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, benzene, carbon tetrachloride.
Dye makers.....	Acids, benzene, 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, benzene, 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.....	Benzene, caustic alkali, naphtha, 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.
Lindane makers.....	Dyes.

Occupations Exposed to Specified Skin Irritants—Continued

<i>Occupation exposed</i>	<i>Skin irritants</i>
Machinists.....	Cutting compounds, lubricants, oils.
Masons.....	Lime.
Match-factory workers.....	Dyes, dextrins, gums, chrome salts.
Mercurizers.....	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, pyrogallol acid, turpentine, amldol, 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 hydro-sulphide, 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

BOOKS

- Browning, Ethel. Toxicity of industrial organic solvents; summaries of published work. Great Britain Medical Research Council, Industrial Health Research Board. Report No. 80. His Majesty's Stationery Office. London. 1937. 396 pp.
- Chenoweth, Lawrence B., and Willard Machie. Industrial hygiene; a handbook of hygiene and toxicology for engineers and plant managers. F. S. Crofts & Co. New York, 1939. 235 pp.
- Clark, W. Irving, and Philip Drinker. Industrial medicine. National Medical Book Co., Inc. New York. 1935. 262 pp.
- Drinker, Philip, and Theodore Hatch. Industrial dust; hygienic significance, measurement, and control. McGraw-Hill Book Co., Inc. New York, 1936. 316 pp.
- Hamilton, Alice. Industrial poisons in the United States. Harper & Bros. New York, 1925. 590 pp.
- Industrial toxicology. Harper & Bros. New York, 1934. 352 pp.
- Henderson, Yandell, and Howard W. Haggard. Noxious gases and the principles of respiration influencing their action. Chemical Catalog Co. Inc. New York, 1927. 220 pp.
- Kessler, Henry H. Accidental injuries; the medico-legal aspects of workmen's compensation and public liability. Lea & Febiger. Philadelphia, 1931. 718 pp.
- Kober, George M., and Emery R. Hayhurst. Industrial health. P. Blakiston's Son & Co. Philadelphia, 1924. 1184 pp.
- Lanza, A. J. Silicosis and asbestosis, by various authors. Oxford University Press. New York, 1938. 439 pp.
- Lanza, A. J., and Jacob A. Goldberg. Industrial hygiene. Oxford University Press. New York, 1939. 661 pp.
- Legge, Sir Thomas. Industrial maladies. Oxford University Press. London, 1934. 225 pp.
- Leschke, Erich. Clinical toxicology; modern methods in the diagnosis and treatment of poisoning translated by C. P. Stewart and O. Dorrer. William Wood & Co. Baltimore, 1934. 346 pp.
- McCord, Carey P. Industrial hygiene for engineers and managers. Harper & Bros. New York, 1931. 336 pp.
- McNally, William D. Toxicology. Industrial medicine. Chicago, 1937. 1,022 pp.
- Sappington, C. O. Medico-legal phases of occupational diseases; an outline of theory and practice. Industrial Health Book Co. Chicago, 1939. 405 pp.
- Schwartz, Louis, and Louis Tulipan. A text-book of occupational diseases of the skin. Lea & Febiger. Philadelphia, 1939. 755 pp.
- White, R. Prosser. The Dermatergoses; or occupational affections of the skin. H. K. Lewis & Co., Ltd. London, 1934. 716 pp.

REPORTS AND MISCELLANEOUS PERIODICALS

- Industrial Medicine; the journal of occupational diseases and traumatic surgery. Industrial Medicine Publishing Co. Beloit, Wisc. Published monthly.
- International Labor Office. Occupation and Health; Encyclopedia of Hygiene, Pathology, and Social Welfare, studied from the point of view of labor, industry, and trades. Brochure edition. Brochures Nos. 1-353. Geneva, 1925-1934.
- Occupation and Health; Encyclopedia of Hygiene, Pathology, and Social Welfare, studied from the point of view of labor, industry, and trades. Supplement. Geneva, 1938-1939.
- The Journal of Industrial Hygiene and Toxicology. Williams & Wilkins Co. Baltimore, Md. Published monthly.

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.

United States
Government Printing Office
Washington : 1942

For sale by the Superintendent of Documents, U. S. Government Printing Office
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