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

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OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

A Guide to Impairments To Be Looked for in Hazardous Occupations

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

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



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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 info-

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

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

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

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

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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.

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

ORGANIC DUST

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

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

INORGANIC DUST

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

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

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

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

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

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

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

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

1. Organic Dust

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

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2. Inorganic Dust Containing Free Silica

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

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

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

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

4. Asbestos

SYMPTOM, CONDITION, OR DISEASE TO LOOK FOR

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

OCCUPATIONS WHICH OFFER SUCH EXPOSURE

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

F. Infections

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

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