

A Guide to the
DIAGNOSIS
of
OCCUPATIONAL
DISEASES

**A REFERENCE MANUAL
FOR PHYSICIANS**

Compiled Jointly by the Staffs of

**THE INDUSTRIAL HEALTH DIVISION
DEPARTMENT OF NATIONAL HEALTH AND WELFARE**

and

**THE DIVISION OF INDUSTRIAL HYGIENE
DEPARTMENT OF HEALTH FOR ONTARIO**

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PREFACE

This reference manual is intended to be of assistance to physicians in the diagnosis and prevention of occupational diseases. It has been prepared in response to the growing interest in industrial health problems on the part of the medical profession, labour and management.

The growth of Canadian industry in recent years has been extremely rapid. During the course of World War II, Canada became one of the foremost industrial nations of the world. Between 1939 and 1946, the value of our manufactured goods and foreign trade increased threefold while the number of employees in manufacturing alone rose from 658,000 to 1,119,000. Today, in Canada, the number of persons gainfully employed in all occupations is about 5,000,000.

Not only has there been an increase in the number of employees in our industries, but industry itself has become more complex and diversified. Many new materials and processes, introduced during the war, have now become standard features in Canadian industry and some of these constitute further sources of potential or actual health hazards for the worker. The control of the working environment and the supervision of workers' health call for a wider knowledge of the potential health hazards in all industries and for enhanced skill in recognizing occupational diseases.

A comprehensive program of industrial hygiene requires the combined services of professional and technical people from various scientific fields. In addition to the plant physician and nurse, the modern industrial hygiene team includes chemists, engineers, physicists, as well as factory inspectors, safety supervisors, plant managers, personnel directors, and first-aid men. All these people must have some knowledge of the broad field of industrial health in order to understand their special function in a preventive program.

The general practitioner and the specialist in various branches of medicine are also important members of this team when their patients are industrial workers. They, as well as the plant physician, therefore, should have a practical working knowledge of occupational factors in the causation of disease and the information assembled in this book is intended to be helpful in determining that relationship. For this purpose, in Chapter 2, a reference key is presented

giving an alphabetical list of "Occupations" with their associated potential health hazards; and in Chapter 3 there follows a description of occupational diseases which may result from those hazards. Harmful chemicals are described under the following headings: Properties, Uses and Occurrence, Mode of Entry into the Body, Physiological Action and Toxicity, Signs and Symptoms.

The remaining chapters are of more general interest, Chapter I providing a brief discussion of occupational diseases, Chapter IV a review of occupational dermatoses and Chapter V a summary of the various provincial workmen's compensation acts.

This publication is intended to present only a brief summary of current knowledge of the diagnostic features relevant to occupational diseases. The selection and arranging of the material, together with the writing of accompanying text, have been performed largely by Dr. R. B. Sutherland of the Ontario Division of Industrial Hygiene and Dr. E. A. Watkinson and H. N. Acker, B.A., of the Federal Division of Industrial Health. Much of the material has been selected from works listed in the bibliography. Acknowledgment is also made to the United States Department of Labor, whose bulletin No. 41, "Occupation Hazards and Diagnostic Signs", has served as the basis for Chapter II. The values given for maximum allowable concentrations are those generally accepted today, but of course, are subject to change when further scientific knowledge warrants revision.

It is hoped that this book will fill, at least in part, a long felt need for a ready reference manual on the diagnosis of occupational diseases.

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CHAPTER I

THE OCCUPATIONAL DISEASES

I. General Considerations

Since occupational diseases have their origin in the working environment, their prevention, diagnosis and treatment depend upon a knowledge of the health hazards associated with any particular environment. In respect to patients who are industrial workers, physicians will want to know the materials and the processes with which their patients have been dealing and whether these have involved an exposure to any potential or actual health hazard. While it is often impractical for the general practitioner to know the whole industrial field, he can, however, become familiar with the working environment associated with the industries in his own community.

Early diagnosis of an occupational disease is especially important, for until the cause is determined, other workers may continue to be exposed to the same hazard. A knowledge of the potential hazards and the early signs and symptoms of abnormal exposure will assist in establishing an early diagnosis. Through close observation too, the industrial physician may notice significant minor changes among a working group. For example, pallor, loss of appetite and general weakness occurring among several workers in a storage battery plant should suggest group exposure to dangerous concentrations of lead.

STEPS IN DIAGNOSIS:

In the diagnosis of occupational disease it is important to prove exposure to the toxic substance, absorption of the substance into the body and to demonstrate actual signs of ill health caused by absorption. Most industrial diseases are insidious in their onset. Although they usually develop while the workman is still exposed to the causative agent, some diseases such as silicosis, radium poisoning and benzol poisoning, may not become evident for months or even years after the workman has left the hazardous environment. In no other branch of medicine is the work history of the patient more important. Not only is a complete medical and personal history essential, but a detailed history of all occupations held by the workman since the time he left school is imperative.

Investigation of industrial materials must be thorough. It should be remembered that mixtures, rather than simple substances are often used, particularly in the case of solvents. Such materials may contain harmful impurities or, without the trade name being changed, their composition may be altered in such a way as to become hazardous. Consequently, it is often necessary to contact or visit the plant to identify materials used by the workman and to consult the manufacturer of trade products to ascertain their chemical composition. In certain provinces manufacturers may be required to inform departments of labour or health concerning the composition of their products.

The physician must then determine whether any of these materials are known to be harmful. If the patient's exposure to a specific toxic substance is responsible for his illness, the clinical picture should be consistent with those of other known cases of occupational disease produced by similar agents. However, it should be borne in mind that the workman is often exposed to a mixture of toxic substances, a fact which may produce a complex and confused clinical picture.

It must be established whether the exposure, in terms of concentration and duration, has been sufficient to produce toxic effects in the workman. Exposure may be continuous or intermittent and there may be great variations in concentration during the working day. These factors influence the degree of danger associated with industrial poisons. For example, daily exposures to low concentrations of benzol over a considerable period of time, are likely to result in severe changes in the haemopoietic system; on the other hand, brief exposures to high concentrations, short of narcosis, usually have no serious effect on the body provided they are not repeated. In contrast, a single exposure to a high concentration of nitrous fumes may produce pulmonary oedema within eight to twenty-four hours. Thus the conditions under which a toxic material is used may have a direct bearing on the degree of hazard involved.

Recurrence of an illness, coinciding with the workman's return to a similar previous exposure, is further evidence supporting a diagnosis of occupational disease. This applies particularly to occupational dermatoses which usually show improvement when the man is removed from the causative exposure, and which recur upon his return to former work.

GENERAL CONSIDERATIONS

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The finding of similar cases of illness among several persons subject to the same working conditions may be an important point suggesting an occupational origin of the disease. However, not all similarly exposed personnel need be affected. As in non-industrial diseases, there is marked variation in individual susceptibility. In addition, there appears to be a relationship between the age, sex and race of the individual and his susceptibility to poisoning by certain chemicals. Alcoholism and previous liver damage from any cause in a worker are believed to increase his susceptibility to the effects of T.N.T. and the chlorinated hydrocarbons.

The diagnosis of an occupational disease is often difficult to establish. It may necessitate an environmental survey including the collection and examination of dusts, fumes, vapours and gases, for the purpose of determining whether the worker has been exposed to toxic substances or hazardous conditions. The medical examination may involve the determination of the poison or its excretion products in body fluids or tissues. For example, urinalysis may reveal the presence of arsenic, fluorides, lead, manganese, mercury or selenium, or the excretory products of aniline, benzol, nitriles, phenol, toluene, T.N.T. or xylidine. Blood examination may show abnormal amounts of arsenic, carbon monoxide, fluorides, lead or manganese. Analysis of hair and finger nail clippings may reveal the presence of arsenic and the analysis of exhaled air may indicate the absorption of radioactive substances.

Usually, the general practitioner does not maintain facilities for making all these investigations. *When he requires assistance either in investigating an exposure or in making diagnostic tests, he may obtain such essential help from his provincial department of health. Special divisions of industrial hygiene exist in Manitoba, Ontario, Quebec and Nova Scotia under the provincial departments of health. These agencies can also frequently supply library facilities and information concerning the materials contained in trade products. The assistance of these divisions is available to all members of the medical profession and to industrial plants.*

CLASSIFICATION OF OCCUPATIONAL HEALTH HAZARDS

The harmful conditions and substances encountered in industry may be divided into the following main groups:

- A. Abnormalities of Air Pressure.
- B. Abnormalities of Temperature and Humidity.
- C. Dampness.
- D. Defective Illumination.
- E. Excessive Noise.
- F. Radiant Energy.
- G. Electrical Burns; Electrical Shock.
- H. Repeated Motion and Pressure; Vibration.
- I. Infections.
- J. Dust and fumes.
- K. Harmful Chemicals.

Many of the above groups are further subdivided into specific individual hazards which are listed in the index.

In Chapter III the health hazards related to occupation are discussed in order of the above classification. An attempt has been made, in the description of each hazard, to stress those points which will assist the physician in arriving at a diagnosis. Thus, certain physical properties of each hazard have been given, *e.g.*, Boiling Point, Vapour Density and where possible, Volatility. It is hoped that the information given under these headings will assist the physician in assessing the workman's degree of exposure. Under "Physiological Action and Toxicity", the body systems usually affected are indicated and where known, the action of various concentrations of each harmful chemical is given. The paragraph on "Signs and Symptoms" gives a brief description of the common clinical findings. "Maximum Allowable Concentrations", as presently accepted by most authorities, are stated. Mention is made of the fire hazard associated with most of the chemicals, since it is felt that many physicians, especially those connected with industry, can be of assistance to management in pointing out instances where a fire hazard and its consequent health hazard may exist.

2. Definitions

Certain terms frequently used in this book may be defined as follows:

DUSTS: Solid particles generated by handling, crushing, grinding, rapid impact, detonation and decrepitation of organic or inorganic materials such as rock, ore, metal, coal, wood, grain, etc. Dusts do

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not tend to flocculate except under electrostatic forces; they do not diffuse in air but settle under the influence of gravity. (American Standards Association)

FUMES: Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, etc., and often accompanied by a chemical reaction such as oxidation. Fumes flocculate and sometimes coalesce. (ASA)

MISTS: Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, and atomizing. (ASA)

VAPOURS: The gaseous form of substances which are normally in the solid or liquid state and which can be changed to these states either by increasing the pressure or decreasing the temperature alone. Vapours diffuse. (ASA)

GASES: Normally formless fluids which occupy the space of enclosure and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Gases diffuse. (ASA)

SPECIFIC GRAVITY: This is the density or weight of a liquid or solid in relation to that of water. When the liquid or solid is heavier than water, the specific gravity is greater than 1; when the substance is lighter than water, the specific gravity is less than 1.

BOILING POINT: This is the temperature at which the vapour pressure of a liquid is equal to the atmospheric pressure. In general, the lower the boiling point of a liquid, the greater its vapour pressure at room temperature.

VOLATILITY: This term is used to express the rate of evaporation of a liquid. Usually, the lower the boiling point of a liquid the more rapidly will it evaporate at room temperature.

VAPOUR DENSITY: This is the density or weight of a gas or vapour in relation to that of air. When the gas or vapour is heavier than air, the vapour density is greater than 1; when the substance is lighter than air the vapour density is less than 1. In still air, heavier gases and vapours tend to settle to lower levels, as for example, in pits and wells but a portion is diffused in the air at all levels.

MAXIMUM ALLOWABLE CONCENTRATION (M.A.C.): This is the highest concentration of an atmospheric contaminant which is regarded as having no harmful effect upon the health of an individual exposed continuously during the working day (8 hour daily exposure) and for prolonged periods of employment. These concentrations are usually expressed in one of three ways:

(1) In the case of gases and vapours, the M.A.C. is usually given in parts per million (ppm), that is, as parts of the gas or vapour per million parts of air. It must be remembered that the "parts of gas or vapour" refer to the gas-volume of the substance (*i.e.*, the volume of the substance in its gaseous state) and must not be confused by estimating the liquid volume of the substance in a million parts of air. To illustrate, the volume occupied by a gram-molecular weight of a substance at 0° Centigrade and 760 mm. of mercury pressure (Normal Temperature and Pressure) is 22.4 litres when in the gaseous state. The molecular weight of carbon tetrachloride (CCl_4) is 154, (carbon 12, chlorine 35.5) and 154 grams of CCl_4 , at N.T.P., occupies 22.4 litres when completely volatilized. The liquid volume, on the other hand, is only 96 cc., or 0.096 litres. In this example, the gas volume is $22.4 \div 0.096$, or 233 times the liquid volume, and if the concentration of carbon tetrachloride in air in a given exposure were wrongly calculated using the liquid volume, the result would be 233 times lower than the true concentration.

(2) In the case of fumes, dusts and mists, the M.A.C. is usually expressed as milligrammes of contaminant per cubic metre of air (or Mgm. cu. metre, or Mgm/ M^3). For the most part, these concentrations are expressed as milligrammes per 10 cubic metres of air, since the volume of air breathed by the average man in 8 hours while doing moderately hard work is about 10 cubic metres. The M.A.C., given as milligrammes per 10 cubic metres of air, therefore, indicates that concentration of contaminant in air which is regarded as safe and relates it to the average amount of air breathed by the workman during a working day.

(3) In the case of mineral dusts, such as asbestos and dusts containing free silica, the M.A.C. is expressed in millions of particles per cubic foot of air (M.P.P.C.F.), the dust count being performed by the standard light field technique.

In the case of gamma rays from X-rays or radium, the recommended limits of exposure are expressed as roentgen units per 8 hour

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day. Where the radioactive material is gaseous, such as radon, the M.A.C. is given as curies per cubic metre of air.

It should be noted that some recommended M.A.Cs. have been determined by actual study of exposures associated with the development of clinical cases in industry. In other instances, where hazardous materials have been recently introduced into industry, the M.A.Cs. have been determined largely through animal experiments and it should be realized that results thus obtained may not be directly referable to man. Therefore, as more industrial experience and clinical evidence become available, it may be considered advisable to lower some limits which are now regarded as safe, or to raise others which are found to be lower than necessary.

FLASH POINT: This is the temperature at which a liquid or solid gives off sufficient vapour to support combustion. The term applies chiefly to liquids, but there are certain solids, such as camphor and naphthalene, which evaporate at ordinary room temperatures and have flash points while in the solid state.

A substance having a flash point above room temperature does not, of course, constitute as great a fire hazard as a substance having a flash point at or below room temperature. The lower the flash point, the more readily will a material give off sufficient vapour to support combustion. For purposes of classification, flammable liquids may be divided into four groups:

Class 1: Liquids having a flash point below 25°F.; *e.g.* ethyl (or anaesthetic) ether, gasoline, benzol.

Class 2: Liquids having a flash point above 25°F. and below 70°F.; *e.g.*, ethyl alcohol, methyl alcohol, toluol.

Class 3: Liquids having a flash point above 70°F. and below 200° F.; *e.g.*, kerosene, turpentine, xylol.

Class 4: Liquids having a flash point above 200°F.; *e.g.*, dichlorobenzene, ethylene glycol, paraffin wax.

EXPLOSIVE LIMITS (OR FLAMMABLE LIMITS): The minimum explosive limit is that concentration of a vapour in air which is required to support combustion. Vapour concentrations lower than the minimum explosive concentration will not burn. The maximum explosive limit is that concentration of vapour which still supports combustion, but beyond which there is insufficient oxygen to support the burning

of the vapour. The difference between the minimum and the maximum limits, representing concentrations in which combustion is supported, is known as the explosive range. Explosive limits are usually expressed as percentages by volume, of the gas or vapour in air. The minimum explosive limit is nearly always a higher concentration than that regarded as the maximum which is non-injurious to health (M.A.C.).

CHAPTER II

LIST OF OCCUPATIONS AND THEIR POTENTIAL
HAZARDS**Abrasives Workers**

Heat
Inorganic dusts (free silica)
Inorganic dusts (no free silica)
Organic dusts

Acetaldehyde Workers

Acetaldehyde
Mercury and its compounds

Acetanilide Workers

Amino compounds of benzol, toluol
and xylol
Aniline

Acetic Acid Makers

Hydrochloric acid
Mercury and its compounds

Acetone Workers

Acetone
Mercury and its compounds

Acetylene Workers (see also carbide
makers and welders)

Acetone
Ammonia
Arsine
Carbon disulphide
Carbon monoxide
Chloride of lime
Chromium and its compounds
Inorganic dust
Phosphine

Acid Dippers

Arsine
Cyanides
Dampness
Hydrochloric acid
Nitric acid
Nitrous fumes
Sulphuric acid

Acid Finishers (glass)

Hydrochloric acid
Lead and its compounds
Sulphuric acid

Actors

Lead and its compounds

Agricultural Workers (see farmers)**Air Hammer Operators**

Excessive noise
Repeated motion, pressure and
vibration

Aeroplane-Dope Workers

Acetone
Amyl acetate
Benzol and its homologues (toluol
and xylol)
Butyl acetate
Butyl alcohol
Ethyl acetate
Ethylene glycol monomethyl ether
Formic acid
Ketones
Petroleum hydrocarbons

Aeroplane-Hangar Employees

Alkalis
Benzol and its homologues (toluol
and xylol)
Carbon tetrachloride
Chlorinated hydrocarbons
Petroleum hydrocarbons

Aeroplane Pilots—Crop Dusting

Altitude (rarefied air, decreased
atmospheric pressure)
Arsenic and its compounds
Carbon monoxide
Lead and its compounds

Alcohol Distillery Workers

Amyl acetate
 Amyl alcohol
 Benzol and its homologues (toluol
 and xylol)
 Ethyl alcohol
 Formic acid
 Mercury and its compounds
 Methyl alcohol
 Propyl alcohol

Aldehyde Pumpmen

Acetaldehyde
 Methyl alcohol

Alkali Salt Makers

Carbon dioxide
 Chlorine
 Dampness
 Hydrochloric acid
 Hydrogen sulphide
 Sulphur dioxide

Alloy Makers

Antimony
 Arsenic
 Beryllium
 Cadmium
 Carbon monoxide
 Chromium
 Cobalt
 Copper
 Heat
 Inorganic dust (free silica)
 Lead
 Magnesium
 Manganese
 Metal fume fever
 Nickel
 Selenium
 Tellurium
 Tin
 Vanadium
 Zinc

Aluminum Extractors

Alkalis
 Fluorine and its compounds

Alum Workers

Sulphuric acid

Amalgam Workers

Mercury and its compounds

Ammonia Workers

Ammonia
 Calcium cyanamide
 Carbon monoxide

Ammonium Salt Makers

Ammonia
 Carbon disulphide
 Cyanides
 Heat
 Hydrochloric acid
 Nitric acid
 Sulphuric acid

Amyl Acetate Workers

Amyl acetate
 Amyl alcohol

Amyl Alcohol Workers

Amyl alcohol

Aniline Dye Makers

(see dye makers)

Aniline Workers

Amino compounds of benzol, toluol
 and xylol
 Aniline
 Arsine
 Benzol and its homologues (toluol
 and xylol)
 Chromium and its compounds
 Hydrochloric acid
 Nitric acid
 Nitrobenzol
 Nitro compounds of benzol, toluol
 and xylol
 Nitrous fumes

Animal By-Products Workers

Acrolein
 Anthrax
 Dampness
 Erysipeloid
 Fungus infections
 Septic infections
 Undulant fever
 Weil's disease

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Animal Hair Dressers
(see hair workers)**Animal Handlers**
Anthrax
Fungus infections
Glanders
Rabies
Septic infections
Undulant fever**Annealers**
Ammonia
Heat**Antifreeze Makers**
Glycols
Methyl alcohol**Antimony Extractors (refiners)**
Antimony and its compounds
Heat**Antimony Fluoride Extractors**
Hydrofluoric acid**Arsenic Roasters**
Arsenic and its compounds
Heat**Art-Glass Workers**
Amyl acetate
Arsenic and its compounds
Cobalt and its compounds
Hydrofluoric acid
Lead and compounds
Manganese and its compounds
Methyl alcohol
Petroleum hydrocarbons
Turpentine**Artificial Flower Makers**
Arsenic and compounds
Chromium and compounds
Lead and compounds
Mercury and compounds
Methyl alcohol
Repeated motion, pressure and vibration

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Artificial Gem Makers
Thallium and its compounds**Artificial Ice Makers**
Ammonia
Carbon dioxide
Dampness
Sudden variations of temperature
Sulphur dioxide**Artificial Leather Makers**
Acetone
Amino compounds of benzol, toluol and xylol
Amyl acetate
Aniline
Arsenic and compounds
Benzol and its homologues (toluol and xylol)
Butanone
Butyl alcohol
Heat
Methyl alcohol
Nitric acid
Nitrous fumes
Sulphuric acid**Artificial Pearl Makers**
Acetone
Amyl acetate
Lead
Nitric acid
Nitrous fumes
Tetrachloroethane**Artificial Rubber Makers**
(see rubber makers, synthetic)**Artificial Silk Makers**
(see rayon)**Artificial Stone Makers**
Inorganic dust (free silica)
Inorganic dust (no free silica)
Tar and pitch**Asbestos Miners**
(see also miners)
Asbestos dust

Asbestos Products Workers

Asbestos dust
Benzol and its homologues (toluol
and xylol)
Formaldehyde
Heat
Tar and pitch

Ashmen

Inorganic dust (no free silica)
Organic dust

Asphalt Workers

Heat
Tar and pitch

Automobile Mechanics (see garage workers)**Automobile Painters (see also painters)**

Amyl acetate
Benzol and its homologues (toluol
and xylol)
Chlorinated hydrocarbons
Dampness
Ethyl acetate
Ketones
Methyl alcohol
Petroleum hydrocarbons

Babbitt Metal Workers

Antimony and its compounds
Lead and its compounds

Babbitters

Antimony and its compounds
Lead and its compounds

Bakers

Carbon dioxide
Carbon monoxide
Organic dust
Sudden variations of temperature
Ultraviolet and infrared rays

Baking Powder Makers

Carbon dioxide
Inorganic dust (no free silica)
Organic dust

Barbers

Fungus infections
Repeated motion, pressure and
vibration

Barium Carbonate Makers

Barium and its compounds
Hydrogen sulphide

Bar-Mill Workers (iron and steel)

Heat

Barometer Makers

Mercury and its compounds

Basic Slag (artificial manure)**Handlers**

Inorganic dust (no free silica)

**Batch Makers (glass works)
(see glass mixers)****Batch Makers (rubber works)
(see compounders, rubber)****Batters (tannery)**

Anthrax

Battery (dry) Makers

Amyl acetate
Benzol and its homologues (toluol
and xylol)
Chromium and its compounds
Hydrochloric acid
Inorganic dust (no free silica)
Lead and its compounds
Manganese and its compounds
Mercury and its compounds
Organic dust
Tar and pitch
Zinc and its compounds

Battery (storage) Makers

(see storage battery makers)

Beamers (textiles)

Organic dust

Beam-House Workers (tannery)

Anthrax
Dampness

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Beatermen (paper and pulp)

Chlorine
Dampness

Beauty Parlour Operators

Ammonium thioglycollate
Benzol and its homologues (toluol
and xylol)
Fungus infections
Hydrogen sulphide

Bed Rubbers (stone)

Inorganic dust (free silica)
Inorganic dust (no free silica)

Benzene Workers (see benzol workers)**Benzine** (petroleum) **Workers**

Aliphatic hydrocarbons
Petroleum hydrocarbons

Benzol Purifiers

Benzol and its homologues (toluol
and xylol)
Sulphuric acid

Benzol-Stillmen

Benzol
Heat

Benzol Workers

Benzol

Bessemer-Converter Workers

(iron and steel)
Carbon monoxide
Heat
Ultraviolet and infrared rays

Bevelers

Inorganic dust (no free silica)

Billet Mill Workers (iron and steel)

Heat

Bisque-Kiln Workers

Carbon monoxide
Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)

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Blacksmiths

Carbon dioxide
Carbon monoxide
Cyanides
Heat
Lead and its compounds
Repeated motion, pressure and
vibration
Ultraviolet and infrared rays

Blanket Makers

Anthrax

Blasters

Carbon monoxide
Hydrogen sulphide
Inorganic dust (free silica)
Inorganic dust (no free silica)
Nitrous fumes

Blast Furnace Workers

Carbon dioxide
Carbon monoxide
Heat
Hydrocyanic acid
Hydrogen sulphide
Phosphine
Sulphur dioxide
Ultraviolet and infrared rays

Bleachers

Alkalis
Chloride of lime
Chlorine
Chromium compounds
Heat
Hydrochloric acid
Hydrofluoric acid
Nitric acid
Nitrous fumes
Oxalic acid
Ozone
Phosgene
Sulphur dioxide
Sudden variations of temperature

Bleaching Powder Makers

Arsine
Chloride of lime
Chlorine
Manganese compounds

- Blenders** (motor fuel)
(see gasoline blenders)
- Blockers** (felt hats)
Carbon monoxide
Heat
- Blooders** (tannery)
Lead and its compounds
- Blooming-Mill Workers** (iron and steel)
Heat
- Blowers** (glass manufacturing) (see glass blowers)
- Blowers-Out** (zinc smelting)
Heat
Metal fume fever
Zinc and its compounds
- Blue Print Makers**
Chromium compounds
- Blue Print Paper Makers**
Amino compounds of benzol, toluol and xylol
Aniline
Oxalic acid
- Bluers** (revolvers)
Heat
- Boiler Cleaners and Washers**
Carbon monoxide
Dampness
- Boiler-Room Workers**
Carbon dioxide
Carbon monoxide
Heat
- Boneblack Makers**
Ammonia
Phosphorus and its compounds
- Bone Renderers, Extractors, etc.**
Acrolein
Anthrax
Heat
Hydrocyanic acid
Organic dust
Sulphur dioxide
- Bookbinders**
Acrolein
Amyl acetate
Arsenic and its compounds
Lead and its compounds
Methyl alcohol
Oxalic acid
- Bottle-Cap Makers**
Lead and its compounds
- Bottlers** (mineral water)
Carbon dioxide
Hydrogen sulphide
- Brake-Lining Makers**
Asbestos dust
Benzol and its homologues (toluol and xylol)
- Brass Founders**
Antimony and its compounds
Arsenic and its compounds
Carbon dioxide
Carbon monoxide
Copper and its compounds
Heat
Inorganic dust (free silica)
Lead and its compounds
Metal fume fever
Phosphorus and its compounds
Sulphur dioxide
Ultraviolet and infrared rays
Zinc and its compounds
- Brass Polishers** (see also polishers and cleaners, metal)
Lead and its compounds
- Braziers**
Heat
Lead and its compounds
Ultraviolet and infrared rays
Zinc and its compounds
- Brewers**
Amyl alcohol
Carbon dioxide
Carbon monoxide

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Dampness
Fungus infections
Formaldehyde
Heat
Hydrofluoric acid
Phenol
Sudden variations of temperature
Sulphuric acid

Brick Burners

Carbon dioxide
Carbon monoxide
Heat
Lead and its compounds

Brick Layers

Inorganic dust (no free silica)

Brick Makers

Dampness
Heat
Hydrofluoric acid
Inorganic dust (free silica)
Inorganic dust (no free silica)
Lead and its compounds
Magnesium and its compounds
Manganese and its compounds
Sulphur dioxide

Briquette Makers

Arsenic and its compounds
Tar and pitch

Bronze Powder Makers

Acetone
Lead and its compounds
Zinc and its compounds

Bronzers

Ammonia
Amyl acetate
Arsenic and its compounds
Arsine
Benzol
Cyanides
Hydrochloric acid
Hydrocyanic acid
Hydrogen sulphide

Inorganic dust (no free silica)
Lead and its compounds
Manganese and its compounds
Mercury and its compounds
Methyl alcohol
Petroleum hydrocarbons
Zinc and its compounds

Broom Makers

Anthrax
Chlorine
Formaldehyde
Organic dust
Sulphur dioxide

Browniers (gun barrels)

Phosphoric acid

Brush Makers

Anthrax
Formaldehyde
Lead and its compounds
Methyl alcohol
Organic dust
Tar and pitch

Buffers

Defective illumination
Inorganic dust (free silica)
Inorganic dust (no free silica)
Organic dust

Buffers (rubber)

Amyl acetate
Ethyl acetate
Lead and its compounds
Petroleum hydrocarbons

Bulb (mercury) Makers

Mercury and its compounds

Buoy Makers

Phosphine

Burners (enameling)

Heat
Lead and its compounds

Burnishers (metals)

Antimony and its compounds
Carbon tetrachloride
Chlorinated hydrocarbons
Defective illumination
Petroleum hydrocarbons
Sulphuric acid
Trichloroethylene

Burrers (needles)

Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)

Burr Filers

Inorganic dust (free silica)
Inorganic dust (no free silica)

Butchers

Anthrax
Dampness
Erysipeloid
Glanders
Septic infections
Sudden variations of temperature
Tularaemia
Undulant fever
Weil's disease

Button Makers

Acetaldehyde
Acetone
Acids
Chloride of lime
Formaldehyde
Fungus infections
Inorganic dust (no free silica)
Lead and its compounds
Organic dust

Butyl Acetate Makers

Butyl alcohol

Butyl Alcohol Makers

Butyl alcohol

Cable Makers

Lead and its compounds

Cable Splicers

Acrolein
Aliphatic hydrocarbons (methane, etc.)
Carbon monoxide
Cresol
Dampness
Electrical burns; electrical shock
Hydrogen sulphide
Lead and its compounds
Petroleum hydrocarbons
Phenol
Poison ivy
Turpentine

Cadmium Alloy Makers

Cadmium and its compounds

Cadmium and Cadmium-Compound Makers

Arsine
Cadmium and its compounds

Cadmium Platers (see also electroplaters)

Cadmium and its compounds

Caisson Workers

Carbon dioxide
Carbon monoxide
Compressed air
Dampness
Defective illumination
Hydrogen sulphide
Sudden variations of temperature

Calcium Carbide Makers (see carbide makers)**Calcium Cyanamide Makers**

Calcium cyanamide
Heat
Inorganic dust (no free silica)

Calenderers (rubber)

Inorganic dust (no free silica)
Sudden variations of temperature

Calico Printers (see textile printers)

Carpet Cleaners

Anthrax
Chlorinated hydrocarbons
Organic dust
Petroleum hydrocarbons

Carpet Makers

Anthrax
Arsenic and its compounds
Organic dust

Cartridge Cup Washers

Dampness

Cartridge Dippers

Hydrochloric acid
Nitric acid
Nitrous fumes
Sulphuric acid

Cartridge Felt and Wad Makers

Dampness

Cartridge Cap Operators

Lead and its compounds
Mercury and its compounds

Cartridge Shot Shell Paraffin**Dippers**

Dampness
Sudden variations of temperature

Case Hardeners

Cyanides
Heat
Hydrocyanic acid
Ultra high frequency radiations

Casters (metal) (see foundry and also particular metal)**Casting Cleaners (foundry) (see also acid dippers)**

Inorganic dust (free silica)
Inorganic dust (no free silica)

Cast Scrubbers (electroplaters)

Benzol and its homologues (toluol and xylol)
Petroleum hydrocarbons

Cattlemen

Anthrax
Undulant fever

Cellulose Makers

Alkalis
Dampness
Hydrogen sulphide
Sulphur dioxide
Sulphuric acid

Cellulose Products Makers (see rayon, pyroxylin plastics, lacquers)**Cementers (rubber)**

Benzol and its homologues (toluol and xylol)
Butyl alcohol
Carbon disulphide
Carbon tetrachloride
Ethyl acetate
Chlorinated hydrocarbons
Methyl alcohol
Petroleum hydrocarbons
Tetrachloroethane
Trichloroethylene
Turpentine

Cement (Portland) Workers

Carbon monoxide
Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)

Cement (rubber, plastic, etc.)**Mixers**

Acetone
Ammonia
Amyl acetate
Benzol and its homologues (toluol and xylol)
Carbon disulphide
Carbon tetrachloride
Chlorinated hydrocarbons
Diethylene dioxide
Ethyl acetate
Lead and its compounds
Petroleum hydrocarbons

Candle Makers

Acrolein
 Amino compounds of benzol, toluol
 and xylol
 Aniline
 Arsenic and its compounds
 Chromium and its compounds
 Sulphuric acid

Candy Makers

Dermatitis
 Heat
 Sudden variations of temperature

Canners

Arsenic and its compounds
 Carbon dioxide
 Dampness
 Heat
 Lead and its compounds
 Sudden variations of temperature
 Septic infections

Can Sealers

Benzol and its homologues (toluol
 and xylol)

Cap Loaders

Mercury and its compounds

Cappers (window glass)

Heat

Carbide Makers

Acetylene
 Ammonia
 Carbon monoxide
 Heat
 Inorganic dust (no free silica)
 Organic dust
 Ultraviolet and infrared rays

Carbolic Acid Makers

Benzol and its homologues (toluol
 and xylol)
 Phenol
 Sulphur dioxide
 Sulphuric acid

Carbonated-Water Makers

Carbon dioxide

Carbon Black Workers

Heat
 Organic dust

Carbon Brush Makers

Inorganic dust (no free silica)
 Organic dust

Carbon Dioxide Makers

Carbon dioxide

Carbon Disulphide Makers

Carbon disulphide
 Hydrogen sulphide

Carbonizers (shoddy)

Arsine
 Hydrochloric acid
 Organic dust
 Sulphuric acid

Carbon Paper Makers

Organic dust

Carbon Printers (photography)

Chromium compounds

Carbon Tetrachloride Workers

Carbon disulphide
 Carbon tetrachloride
 Phosgene
 Sulphur chloride

Carders (asbestos)

Asbestos dust

Carders (textiles)

Organic dust

Card Grinders (textile)

Inorganic dust (no free silica)
 Organic dust

Carpenters

Organic dust
 Repeated motion, pressure and
 vibration

Pyridine
 Sulphur chloride
 Tar and pitch
 Tetrachloroethane

Ceramic Workers (see pottery workers)

Chambermen (sulphuric acid)
 Sulphur dioxide
 Sulphuric acid

Charcoal Burners
 Carbon dioxide
 Carbon monoxide
 Organic dust

Charcoal Workers
 Carbon monoxide
 Organic dust

Charcoal Workers (sugar refining)
 Heat
 Sudden variations of temperature

Chargers (furnace) (see also particular metal)
 Carbon monoxide
 Heat
 Inorganic dust (no free silica)

Chargers (smelting and refining) (see also particular metal)
 Carbon monoxide
 Heat
 Inorganic dust (no free silica)

Chasers (steel)
 Inorganic dust (free silica)
 Inorganic dust (no free silica)

Chauffeurs
 Carbon monoxide
 Dampness
 Petroleum hydrocarbons
 Repeated pressure, motion and vibration
 Sudden variations of temperature

Chemists (analytical)
 Acetaldehyde
 Acetone
 Alkalis
 Antimony and compounds
 Arsenic and compounds
 Benzol and its homologues (toluol and xylol)
 Cadmium and its compounds
 Carbon disulphide
 Carbon monoxide
 Carbon tetrachloride
 Chlorinated hydrocarbons
 Chlorine
 Chromium and its compounds
 Cyanides
 Cyanogen and compounds
 Formaldehyde
 Hydrochloric acid
 Hydrogen sulphide
 Lead and its compounds
 Mercury and its compounds
 Methyl alcohol
 Nitric acid
 Nitrous fumes
 Petroleum hydrocarbons
 Phosphorus and its compounds
 Sulphuric acid
 Zinc and its compounds

Chemists (radium research)
 X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.).

Chimney Masons
 Carbon monoxide

Chimney Sweepers
 Arsenic and its compounds
 Carbon monoxide
 Inorganic dust (no free silica)
 Tar and pitch

Chippers
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Lead and its compounds

Chloride of Lime Makers

Chloride of lime
Chlorine

Chlorinated Diphenyl Workers

Chlorinated diphenyls

Chlorinated Naphthalene Workers

Chlorinated naphthalenes

Chlorine Makers

Chlorine
Hydrochloric acid
Manganese and its compounds
Mercury and its compounds

Chlorodiphenyl Users

Chlorinated diphenyls

Chloroform Makers

Acetone
Carbon tetrachloride
Chloride of lime
Methyl chloride

Chrome Workers

Chromium and its compounds

Chromium Platers (see also electroplaters)

Chromium and its compounds

Cigar Makers

Fungus infections
Lead and its compounds
Nicotine and tobacco
Organic dust

Clay and Bisque Makers (pottery)

Dampness
Inorganic dust (free silica)
Inorganic dust (no free silica)
Sudden variations of temperature

Clay-Plug Makers (pottery)

Dampness
Inorganic dust (no free silica)

Clay-Products Workers (see pottery workers)**Cleaners (metal) (see polishers and cleaners, metal)****Clerks**

Defective illumination
Repeated motion, pressure and vibration

Clothes Pressers

Carbon monoxide
Heat

Cloth Singers

Carbon monoxide

Coal Carbonizers

Carbon monoxide
Hydrogen sulphide
Sulphur dioxide

Coal Miners

(see miners)

Coal Passers

Inorganic dust (no free silica)
Organic dust

Coal Tar Workers (see also coke oven workers)

Amino compounds of benzol, toluol and xylol
Aniline
Benzol and its homologues (toluol and xylol)
Carbon monoxide
Cresol
Cyanides
Cyanogen compounds
Heat
Phenol
Tar and pitch

Cobbers (asbestos)

Asbestos

Cobblers

Anthrax
Benzol and its homologues (toluol and xylol)
Carbon tetrachloride
Organic dust
Repeated motion, pressure and vibration

Coin Makers

Nickel
Silver

Coke-Oven Workers (see also coal tar workers)

Ammonia
Benzol and its homologues (toluol and xylol)
Carbon monoxide
Heat
Hydrogen sulphide
Sulphur dioxide
Tar and pitch

Cold Storage Plant Workers (see refrigerating plant workers)**Collar (fused) Makers**

Acetone
Ethylene glycol monomethyl ether
Methyl alcohol

Collodion Makers

Nitric acid
Nitrous fumes

Coloured Paper Workers

Arsenic and its compounds

Colourers (marble)

Chromium compounds

Colourers (white) of Shoes

Lead and its compounds

Colour Makers

Amino compounds of benzol, toluol and xylol
Ammonia
Aniline
Antimony and its compounds
Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Brominated hydrocarbons (methyl bromide)
Bromine
Cadmium and its compounds
Chlorinated hydrocarbons

Chlorine

Chromium and its compounds

Cobalt and its compounds

Dimethyl sulphate

Ethylene chlorohydrin

Heat

Iodine

Inorganic dust (no free silica)

Lead and its compounds

Manganese and its compounds

Mercury and its compounds

Methyl chloride

Naphthols

Petroleum hydrocarbons

Selenium compounds

Sulphuric acid

Tetrachloroethane

Thallium and its compounds

Comb Makers

Acetone
Ketones
Organic dust

Compositors

Alkalis
Amino compounds of benzol, toluol and xylol
Aniline
Antimony and compounds
Benzol and its homologues (toluol and xylol)
Defective illumination
Inorganic dust (no free silica)
Lead and its compounds
Petroleum hydrocarbons
Repeated motion, pressure and vibration
Turpentine

Compounders (rubber)

Amino compounds of benzol, toluol and xylol
Aniline
Antimony and its compounds
Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Chromium compounds

- Hexamethylene tetramine
- Inorganic dust (no free silica)
- Lead and its compounds
- Organic dust
- Petroleum hydrocarbons
- Compressed Air (caisson) Workers**
(see caisson workers)
- Compressed Air (pneumatic tool) Workers**
(see pneumatic tool workers)
- Concentrating Mill Workers** (see also oil flotation plant workers)
 - Dampness
 - Inorganic dust (free silica)
 - Inorganic dust (no free silica)
 - Lead and its compounds
 - Manganese and its compounds
 - Selenium and its compounds
- Confectioners** (see candy makers)
- Construction Workers**
 - Dampness
 - Inorganic dust (free silica)
 - Inorganic dust (no free silica)
- Cooks**
 - Carbon monoxide
 - Erysipeloid
 - Septic infections
 - Sudden variations of temperature
 - Ultraviolet and infrared rays
- Copper Founders**
 - Arsenic and compounds
 - Copper and its compounds
- Copper Miners** (see miners)
- Copper Refiners and Smelter Workers**
 - Antimony and its compounds
 - Arsenic and its compounds
 - Carbon monoxide
 - Copper and its compounds
 - Heat
 - Hydrofluoric acid
- Lead and its compounds
- Manganese and its compounds
- Selenium compounds
- Sulphur dioxide
- Tellurium and compounds
- Coppersmiths**
 - Arsenic and its compounds
 - Copper and its compounds
- Copper (strip) Roller-Mill Workers**
 - Acrolein
- Cordage Factory Workers**
 - Anthrax
 - Tar and pitch
- Core Makers**
 - Acrolein
 - Carbon monoxide
 - Carbon tetrachloride
 - Heat
 - Inorganic dust (free silica)
 - Inorganic dust (no free silica)
 - Zinc and its compounds
- Cork Workers**
 - Organic dust
- Corn-Products Workers**
 - Dampness
 - Heat
 - Sudden variations of temperature
- Cosmetic Workers**
 - Arsenic and its compounds
 - Ethylene glycol monomethyl ether
 - Mercury and its compounds
 - Nitrobenzol
 - Nitro compounds of benzol, toluol and xylol
- Cotton Mill Workers**
 - Byssinosis
 - Dampness
 - Heat
 - Inorganic dust (no free silica)
 - Organic dust
- Cottonseed-Oil Workers**
 - Heat

Cotton Twisters

Organic dust

Repeated motion, pressure and vibration

Cranemen (glass industry)

Heat

Cranemen (iron and steel)

Acrolein

Carbon monoxide

Heat

Inorganic dust (free silica)

Cranemen (non-ferrous)

Arsenic and compounds

Heat

Inorganic dust (free silica)

Lead and compounds

Metal fume fever

Selenium and compounds

Sulphur dioxide

Zinc and compounds

Crayon (coloured) Makers

Chromium and its compounds

Lead and its compounds

Creosoting-Plant Workers

Cresol

Dampness

Phenol

Tar and pitch

Cresol-Soap Makers

Cresol

Cresylic Acid Makers

Cresol

Crucible Mixers

Inorganic dust (no free silica)

Organic dust

Crucible-Steel-Department

Employees

Heat

Crushermen (clay and stone)

Inorganic dust (free silica)

Inorganic dust (no free silica)

Crushers (asbestos)

Asbestos dust

Cupola Men (foundries)

Carbon dioxide

Carbon monoxide

Heat

Curers, Vapour (rubber) (see vulcanizers)**Curriers (tannery)**

Anthrax

Arsenic and compounds

Organic dust

Petroleum hydrocarbons

Cut-Glass Workers

Arsenic and its compounds

Inorganic dust (no free silica)

Lead and its compounds

Cutlery Makers

Amyl acetate

Inorganic dust (free silica)

Inorganic dust (no free silica)

Lead and its compounds

Cutters (oxyacetylene and other gases) (see welders)**Cyanamide Makers**

Calcium cyanamide

Heat

Inorganic dust (no free silica)

Cyanide Workers

Ammonia

Cyanides

Hydrocyanic acid

Cyanogen Makers

Cyanogen

Hydrogen sulphide

Mercury and its compounds

Dairy Workers

Anthrax

Undulant fever

Damascening Workers

Nitric acid
Nitrous fumes

Dancers

Repeated motion, pressure and
vibration

De-Brassers

Nitric acid
Nitrous fumes

Decorators (pottery)

Arsenic and its compounds
Benzol and its homologues (toluol
and xylol)
Lead and its compounds
Mercury and its compounds
Petroleum hydrocarbons
Turpentine

Degreasers

Benzol and its homologues (toluol
and xylol)
Carbon disulphide
Carbon tetrachloride
Chlorinated hydrocarbons
Chlorinated naphthalenes
Cycloparaffins
Dichloroethyl ether
Diethylene dioxide
Ethylene dichloride
Methylene chloride
Petroleum hydrocarbons
Tetrachloroethane
Tetrachloroethylene
Trichloroethylene

**Denatured-Alcohol Workers (see
particular denaturant)****Dental Workers**

Lead and its compounds
Mercury and its compounds

Dentists

Mercury and its compounds
X-rays, radium and other radio-
active substances

Depilatory Makers

Barium and its compounds
Thallium and its compounds

Detinning Workers

Chlorine

Detonator Cleaners

Mercury and its compounds

Detonator Fillers

Mercury and its compounds

Detonator Packers

Mercury and its compounds

Diamond Cutters

Inorganic dust (no free silica)
Organic dust
Repeated motion, pressure and
vibration

Diamond Polishers

Lead and its compounds

Diatomaceous Earth Workers

Inorganic dust (free silica)

**Digester-House Workers (paper and
pulp)**

Heat
Hydrogen sulphide
Sudden variations of temperature
Sulphur dioxide

Dimethyl Sulphate Makers

Arsine
Dimethyl sulphate
Methyl alcohol
Nitric acid
Nitrous fumes
Sulphuric acid

Dinitrobenzol Workers

Benzol
Nitric acid
Nitrobenzol
Nitro compounds of benzol, toluol
and xylol
Nitrous fumes

Dinitrophenol Workers

Dinitrophenol
Nitric acid
Nitrous fumes
Phenol

Thallium and its compounds

Trichloroethylene
Trinitrophenol
Ultraviolet rays

Dioxan Users

Diethylene dioxide

Divers

Carbon dioxide
Carbon monoxide
Compressed air (increased atmospheric pressure)

Dippers (gun cotton)

Nitric acid
Nitrous fumes

Doffers (textile)

Dampness
Heat
Organic dust

Dippers (rubber)

Benzol and its homologues (toluol and xylol)
Carbon tetrachloride
Petroleum hydrocarbons

Dope Workers (see aeroplane dope workers)**Dippers (see also acid dippers)****Dressers (glass)**

Heat

Dish-Washers

Fungus infections

Dresser Tenders (textile)

Dampness
Heat
Sudden variations of temperature

Disinfectant Makers (see also insecticide makers)

Acetaldehyde
Amino compounds of benzol, toluol and xylol
Aniline
Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Brominated hydrocarbons
Bromine
Carbon dioxide
Chloride of lime
Chlorine
Chlorobenzols
Cresol
Cyanides
Cyanogen
Formaldehyde
Glycols
Hydrocyanic acid
Mercury and its compounds
Ozone
Phenol
Sulphur dioxide

Driers (lacquer)

Amyl acetate
Ethyl acetate
Ketones
Methyl alcohol
Petroleum hydrocarbons
Infrared rays

Driers (rubber)

Benzol and its homologues (toluol and xylol)
Carbon disulphide
Petroleum hydrocarbons

Drier Workers (foundry)

Carbon monoxide

Drillers (rock)

Inorganic dust (free silica)
Inorganic dust (no free silica)

Drivers (see chauffeurs)

Drop Forgers

Heat

Dry Cleaners

Amyl acetate

Benzol and its homologues (toluol
and xylol)

Carbon disulphide

Carbon tetrachloride

Chlorinated hydrocarbons

Ethylene dichloride

Methyl alcohol

Oxalic acid

Petroleum hydrocarbons

Sudden variations of temperature

Tetrachloroethane

Tetrachloroethylene

Trichloroethylene

Turpentine

Drying Room Workers

(miscellaneous)

Carbon dioxide

Carbon monoxide

Sudden variations of temperature

Dye Makers

Acetaldehyde

Acetone

Acridine

Alkalis

Amino compounds of benzol, toluol
and xylol

Ammonia

Aniline

Antimony and its compounds

Aromatic hydrocarbons

Arsenic and its compounds

Arsine

Barium and its compounds

Benzol

Brominated hydrocarbons (ethyl
bromide, methyl bromide)

Bromine

Butyl alcohol

Carbon dioxide

Carbon tetrachloride

Chloride of lime

Chlorinated hydrocarbons

Chlorine

Chlorobenzols

Chromium compounds

Cresol

Cyanides

Diethylene dioxide

Dimethyl sulphate

Dinitrophenol

Ethylene chlorohydrin

Ethylene glycol monomethyl ether

Formaldehyde

Formic acid

Furfural

Heat

Hydrochloric acid

Hydrogen sulphide

Lead and its compounds

Manganese and its compounds

Mercury and its compounds

Methyl alcohol

Methyl chloride

Methylene chloride

Naphthols

Nitric acid

Nitrobenzol

Nitro compounds of benzol, toluol
and xylol

Nitrous fumes

Oxalic acid

Phenol

Phenyl hydrazine

Phosgene

Pyridine

Sudden variations of temperature

Sulphur dioxide

Sulphuric acid

Thallium and its compounds

Toluol

Trichloroethylene

Trinitrophenol

Turpentine

Uranium and its compounds

Vanadium and its compounds

Xylol

Dyers (see also mordanters and other preparatory process workers)

Acetone
 Amino compounds of benzol, toluol and xylol
 Ammonia
 Amyl acetate
 Aniline
 Antimony and its compounds
 Aromatic hydrocarbons
 Arsenic and its compounds
 Chlorinated hydrocarbons
 Chromium and its compounds
 Ethylene dichloride
 Formaldehyde
 Hydrochloric acid
 Hydrofluoric acid
 Lead and its compounds
 Manganese and its compounds
 Methyl alcohol
 Nitric acid
 Nitrous fumes
 Oxalic acid
 Petroleum hydrocarbons
 Phenol
 Pyridine
 Sudden variations of temperature
 Sulphur chloride
 Titanium oxide
 Trinitrophenol
 Uranium and its compounds
 Vanadium and its compounds

Electrical Condenser Makers

Chlorinated diphenyls
 Chlorinated naphthalenes

Electrical Transformer Makers

Chlorinated diphenyls
 Chlorinated naphthalenes

Electricians

Electrical burns; electrical shock
 Ozone
 Ultraviolet and infrared rays

Electric Induction Furnace Workers

Mercury and its compounds

Electric Linemen (see also cable splicers)

Dampness
 Electrical burns; electrical shock
 Ultraviolet and infrared rays

Electrode Makers

Organic dust
 Tar and pitch

Electrolytic Process (copper) Workers

Arsine

Electroplaters

Alkalis
 Antimony and its compounds
 Arsenic and its compounds
 Arsine
 Benzol and its homologues (toluol and xylol)
 Cadmium and its compounds
 Carbon disulphide
 Carbon tetrachloride
 Chlorinated hydrocarbons
 Chlorinated naphthalenes
 Chromium compounds
 Cyanides
 Dampness
 Formic acid
 Hydrochloric acid
 Hydrocyanic acid
 Hydrofluoric acid
 Lead and its compounds
 Mercury and its compounds
 Nickel and its compounds
 Nitric acid
 Nitrous fumes
 Petroleum hydrocarbons
 Sulphuric acid
 Tetrachloroethane
 Trichloroethylene

Electrotypers (see also electroplaters)

Ammonia
 Antimony and its compounds
 Inorganic dust (no free silica)
 Lead and its compounds
 Organic dust
 Sudden variations of temperature

Elevator Operators

Repeated motion, pressure and vibration

Embalmers

Formaldehyde
Mercury and its compounds

Embalming Fluid Makers

Mercury and its compounds

Embossers

Mercury and its compounds

Embroidery Workers

Defective illumination
Lead and its compounds

Emery Wheel Makers

Inorganic dust (no free silica)
Lead and its compounds

Enamelers

Amyl acetate
Antimony and its compounds
Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Carbon disulphide
Carbon monoxide
Chlorinated hydrocarbons
Chromium and its compounds
Dampness
Ethyl acetate
Heat
Inorganic dust (free silica)
Lead and its compounds
Manganese and its compounds
Nickel and its compounds
Petroleum hydrocarbons
Repeated motion, pressure and vibration
Tetrachloroethane
Turpentine

Enamel Makers

Amyl acetate
Antimony and its compounds
Arsenic and its compounds
Barium and its compounds

Benzol and its homologues (toluol and xylol)

Carbon disulphide

Carbon monoxide

Chlorinated hydrocarbons

Chromium compounds

Ethyl acetate

Ethylene glycol monomethyl ether

Hydrochloric acid

Hydrofluoric acid

Lead and its compounds

Manganese and its compounds

Nitric acid

Nitrous fumes

Petroleum hydrocarbons

Tetrachloroethane

Turpentine

Engineers (stationary)

Carbon monoxide
Heat
Inorganic dust (no free silica)
Sudden variations of temperature

Engravers

Alkalis
Benzol and its homologues (toluol and xylol)
Copper and its compounds
Defective illumination
Hydrochloric acid
Inorganic dust (no free silica)
Lead and its compounds
Mercury and its compounds
Nitric acid
Nitrous fumes
Oxalic acid
Repeated motion, pressure and vibration
Sulphuric acid

Etchers

Arsine
Hydrochloric acid
Hydrofluoric acid
Nitric acid
Nitrous fumes
Phenol
Sulphuric acid

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

35.

Ethyl Benzene Makers

Ethyl benzene

Ethyl Bromide Users

Brominated hydrocarbons (ethyl bromide)

Ethyl Chloride Users

Chlorinated hydrocarbons (ethyl chloride)

Ethylene Dibromide Users

Brominated hydrocarbons (ethylene dibromide)

Ethylene Dichloride Users

Ethylene dichloride

Ethylene Oxide Users

Ethylene oxide

Examiners Using Fluoroscope or X-Ray

X-rays

Excavation Workers

Inorganic dust (free silica)

Explosives Workers (see also particular occupation)

Acetaldehyde

Acetone

Amino compounds of benzol, toluol and xylol

Ammonia

Amyl acetate

Amyl alcohol

Aniline

Antimony and its compounds

Benzol and its homologues (toluol and xylol)

Bromine

Carbon dioxide

Carbon disulphide

Chromium and its compounds

Cresol

Dampness

Dinitrophenol

Formaldehyde

10893-3½

Lead and its compounds

Mercury and its compounds

Methyl alcohol

Nitric acid

Nitrobenzene

Nitro compounds of benzol, toluol and xylol

Nitroglycerine

Nitrous fumes

Phenol

Phosphorus and its compounds

Pyridine

Sulphuric acid

Tetryl

Trinitrophenol

Exterminators and Fumigators
(see insecticide makers)**Extractor Operators (soap)**

Dampness

Sudden variations of temperature

Extractors (gold and silver) (see gold and silver refiners and extractors)**Extractors (oils and fats)**

Acetone

Alcohols

Benzol and its homologues (toluol and xylol)

Carbon disulphide

Chlorinated hydrocarbons

Cycloparaffins

Ethylene dichloride

Petroleum hydrocarbons

Tetrachloroethane

Trichloroethylene

Farmers

Anthrax

Arsenic and its compounds

Calcium cyanamide

Cyanides

D.D.T.

2, 4-D

Fungus infections

Glanders

Lead and its compounds

Mercury compounds
 Nicotine
 Phosphorus and its compounds
 Septic infections
 Tetanus
 Tularaemia
 Undulant fever

Fat Renderers

Acrolein
 Anthrax
 Heat
 Hydrogen sulphide
 Magnesium and its compounds
 Ozone
 Sudden variations of temperature
 Sulphuric acid

Feather Curers

Arsenic and its compounds
 Organic dust

Feather Workers

Amino compounds of benzol, toluol
 and xylol
 Aniline
 Arsenic and its compounds
 Benzol and its homologues (toluol
 and xylol)
 Methyl alcohol
 Organic dust
 Petroleum hydrocarbons
 Septic infections
 Sulphur dioxide
 Turpentine

Felt Hat Makers

Carbon monoxide
 Heat
 Mercury and its compounds
 Methyl alcohol
 Nitric acid
 Nitrous fumes
 Organic dust
 Sudden variations of temperature
 Sulphuric acid

Felt Makers

Anthrax
 Heat
 Hydrogen sulphide

Ferrosilicon Workers

Arsenic and its compounds
 Arsine
 Inorganic dust (free silica)
 Phosphine

Fertilizer Makers (see also phosphate mill workers)

Acrolein
 Ammonia
 Anthrax
 Arsenic and its compounds
 Arsine
 Benzol and its homologues (toluol
 and xylol)
 Calcium cyanamide
 Carbon dioxide
 Cyanides
 Dampness
 Hydrochloric acid
 Hydrofluoric acid
 Hydrogen sulphide
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Magnesium and its compounds
 Manganese and its compounds
 Nicotine
 Nitric acid
 Nitrous fumes
 Organic dust
 Phosphorus and its compounds
 Septic infections
 Sulphur dioxide
 Sulphuric acid

Fiberizers (asbestos)

Asbestos dust

Fiber Workers

Organic dust

Filament Makers and Finishers

(incandescent lamps)

Amyl acetate
Carbon monoxide
Methyl alcohol
Thallium and its compounds

File Makers

Inorganic dust (free silica)
Inorganic dust (no free silica)

Fillers

Antimony and its compounds
Inorganic dust (no free silica)
Lead and its compounds

Filling Station Workers

Carbon monoxide
Lead and its compounds
Petroleum hydrocarbons
Tetraethyl lead

Film Makers (see photographic film makers)**Filter Press Workers**

Dampness

Finishers (leather)

Organic dust

Fire Extinguisher Makers

Brominated hydrocarbons (ethyl bromide, ethylene dibromide, methyl bromide)
Carbon dioxide
Carbon tetrachloride
Chlorinated hydrocarbons (ethyl chloride)

Firemen (city)

Acrolein
Carbon monoxide
Dampness
Heat
Phosgene
Sudden variations of temperature
Sulphur dioxide

Firemen (stationary)

Carbon monoxide
Heat
Inorganic dust (no free silica)
Sudden variations of temperature
Ultraviolet and infrared rays

Fireworks Makers (see also explosive workers)

Antimony and its compounds
Arsenic and its compounds
Barium and its compounds
Manganese and its compounds
Mercury and its compounds
Phosphorus and its compounds
Thallium and its compounds
Trinitrophenol

Fishermen

Dampness
Septic infections
Sudden variations of temperature
Tar and pitch

Flatteners (glass)

Heat

Flavouring Extract Makers

Amyl acetate
Amyl alcohol
Benzol and its homologues (toluol and xylol)
Butyl alcohol
Nitrobenzol
Nitro compounds of benzol, toluol and xylol

Flax-Rettery Workers

Hydrogen sulphide

Flax Spinners

Heat
Organic dust

Flint Workers

Inorganic dust (free silica)
Inorganic dust (no free silica)

Floor Polish Makers (see polish makers)

Flour Mill Workers

Fungus infections
Organic dust

Flue Cleaners

Carbon monoxide
Inorganic dust (no free silica)
Sulphur dioxide
Tar and pitch

Flue Dust Recoverers (sulphuric

acid manufacturing)
Thallium and its compounds

Fluorescent Lamp Makers

Beryllium and its compounds

Flush Tenders (aluminum)

Dampness

Fly Paper Makers

Arsenic and its compounds

Food Irradiators

Ultraviolet and infrared rays

Forgemen

Heat

Formaldehyde Workers

Formaldehyde

Formic Acid Workers

Formic acid
Oxalic acid

Foundry Workers (see also particular metal)

Carbon dioxide
Carbon monoxide
Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)
Ultraviolet and infrared rays

Freight Handlers

Anthrax

Frosters (glass and pottery)

Chromium compounds

Fruit Essence Makers (see flavouring extract makers)**Fruit Preservers**

Sulphur dioxide

Fullers (textiles)

Benzol and its homologues (toluol and xylol)
Carbon tetrachloride
Chlorinated hydrocarbons
Dichloroethyl ether
Tetrachloroethane

Fulminate Mixers

Hydrocyanic acid
Mercury and its compounds
Nitric acid
Nitrous fumes

Fumigant Makers (see insecticide makers)**Fumigators and Exterminators** (see insecticide makers)**Fur Carders**

Anthrax
Organic dust

Fur Clippers

Anthrax
Organic dust

Fur Cutters

Anthrax
Organic dust

Fur Handlers

Amino compounds of benzol, toluol and xylol
Anthrax
Hydrogen sulphide
Mercury and its compounds
Organic dust

Furnace Workers (see also particular metal)

Carbon dioxide

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Carbon monoxide
Heat
Inorganic dust (no free silica)
Ultraviolet and infrared rays

Furnace Workers (bauxite)
Inorganic dust and fume (Group IV)
Ultraviolet and infrared rays

Furniture Polishers
Amyl acetate
Chromium compounds
Methyl alcohol
Organic dust
Petroleum hydrocarbons
Repeated motion, pressure and vibration
Turpentine

Fur Preparers
Anthrax
Formaldehyde
Mercury and its compounds
Nitric acid
Nitrous fumes
Organic dust

Fur Pullers
Anthrax
Organic dust

Fusel Oil Workers
Amyl alcohol

Fused Quartz Workers
Inorganic dust (free silica)

Galvanizers
Acrolein
Ammonia
Arsenic and its compounds
Arsine
Dampness
Heat
Hydrochloric acid
Lead and its compounds
Metal fume fever
Nitric acid
Nitrous fumes

Petroleum hydrocarbons
Sulphur dioxide
Sulphuric acid
Trichloroethylene
Zinc and its compounds

Garage Workers
Acrolein
Carbon monoxide
Lead and its compounds
Oxalic acid
Petroleum hydrocarbons
Tetraethyl lead

Gardeners
Arsenic and its compounds
Calcium cyanamide
Cyanides
D.D.T.
2, 4-D.
Lead and its compounds
Nicotine
Phosphorus compounds
Tetanus
Undulant fever

Gas (illuminating) Workers
Ammonia
Arsine
Benzol and its homologues (toluol and xylol)
Carbon monoxide
Heat
Hydrocyanic acid
Hydrofluoric acid
Hydrogen sulphide
Phenol
Sudden variations of temperature
Tar and pitch
Trichloroethylene

Gasoline Blenders
Aliphatic hydrocarbons
Amino compounds of benzol, toluol and xylol
Aniline
Benzol and its homologues (toluol and xylol)

Brominated hydrocarbons (ethylene dibromide)

Ethyl benzene

Lead and its compounds

Nitrobenzol

Nitro compounds of benzol, toluol and xylol

Petroleum hydrocarbons

Tetraethyl lead

Gasoline Engine Workers

Acrolein

Carbon monoxide

Petroleum hydrocarbons

Gas Purifiers

Ammonia

Hydrocyanic acid

Hydrogen sulphide

Phenol

Gassers (textile)

Carbon monoxide

Gatherers (glass)

Heat

Gelatine Makers

Acrolein

Anthrax

Sulphur dioxide

Germicide Makers (see disinfectant makers)

Gilders

Amyl acetate

Benzol and its homologues (toluol and xylol)

Cyanides

Ethyl acetate

Mercury and its compounds

Methyl alcohol

Nitric acid

Nitrous fumes

Petroleum hydrocarbons

Pyridine

Glass Blowers

Heat

Inorganic dust (no free silica)

Ultraviolet and infrared rays

Glass Colourers

Cadmium compounds

Chromium compounds

Cobalt compounds

Selenium compounds

Tellurium compounds

Thallium compounds

Glass Cutters

Dampness

Inorganic dust (no free silica)

Glass Etchers

Formaldehyde

Hydrofluoric acid

Glass Finishers

Dampness

Hydrochloric acid

Hydrofluoric acid

Inorganic dust (no free silica)

Lead and its compounds

Sulphuric acid

Glass Furnace Workers (see also glass mixers)

Carbon monoxide

Heat

Inorganic dust (free silica)

Inorganic dust (no free silica)

Ultraviolet and infrared rays

Glass Mixers

Alkalis

Antimony and its compounds

Arsenic and its compounds

Barium and its compounds

Hydrochloric acid

Inorganic dust (free silica)

Inorganic dust (no free silica)

Lead and its compounds

Magnesium and its compounds

Manganese and its compounds

Selenium and its compounds

Thallium and its compounds

Uranium and its compounds

Vanadium and its compounds

Glass Polishers

Lead and its compounds

Glass (safety) Makers

Butyl alcohol
Chlorinated hydrocarbons
Methyl alcohol
Tetrachloroethane

Glaze Dippers (pottery)

Antimony and its compounds
Arsenic and its compounds
Chromium compounds
Dampness
Hydrochloric acid
Lead and its compounds
Manganese and its compounds

Glaze Mixers (pottery)

Antimony and its compounds
Arsenic and its compounds
Chromium and its compounds
Hydrochloric acid
Inorganic dust (free silica)
Inorganic dust (no free silica)
Lead and its compounds
Manganese and its compounds

Glost-Kiln Workers

Carbon monoxide
Lead and its compounds
Sudden variations of temperature

Glove Makers (leather preparers)

(see also tannery workers)
Dampness
Organic dust

Glue Workers

Acrolein
Ammonia
Anthrax
Benzol and its homologues (toluol
and xylol)
Carbon dioxide
Carbon disulphide
Carbon tetrachloride
Chlorinated hydrocarbons
Cresol
Dampness
Hydrochloric acid
Hydrogen sulphide

Nitrobenzol

Nitro compounds of benzol, toluol
and xylol
Organic dust
Petroleum hydrocarbons
Septic infections
Sudden variations of temperature
Sulphur dioxide
Sulphuric acid
Trichloroethylene

Glycerine Refiners

Oxalic acid

Gold Beaters

Inorganic dust (no free silica)
Repeated motion, pressure and
vibration

**Gold and Silver Refiners and
Extractors**

Arsenic and its compounds
Arsine
Bromine
Chlorine
Cyanides
Formaldehyd
Hydrocyanic acid
Hydrofluoric acid
Inorganic dust (no free silica)
Lead and its compounds
Mercury and its compounds
Sulphur chloride

Grain Elevator Workers

Carbon dioxide
Fungus infections
Organic dust

Granite Workers (see stone-cutters)**Graphite Workers**

Heat
Inorganic dust (no free silica)
Organic dust

**Grinders (colours) (see colour
makers)**

Grinders (metals)

Antimony and its compounds
 Dampness
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Lead and its compounds
 Repeated motion, pressure and vibration

Grinders (rubber)

Antimony and its compounds
 Lead and its compounds
 Organic dust

Grinding Wheel Makers

Inorganic dust (free silica)
 Inorganic dust (no free silica)

Grooms

Fungus infections
 Glanders
 Septic infections
 Tetanus

Guncotton Dippers

Nitric acid
 Nitrous fumes
 Sulphuric acid

Guncotton Pickers

Organic dust

Guncotton Washers

Dampness

Gypsum Workers

Hydrogen sulphide
 Inorganic dust (no free silica)
 Sudden variations of temperature

Hair Workers

Anthrax
 Dampness
 Mercury and its compounds
 Organic dust
 Septic infections

Hammermen

Repeated motion, pressure and vibration

Hardeners (see temperers)**Harness Makers**

Organic dust

Hat Makers (felt) (see felt hat makers)**Heel Makers (shoe)**

Organic dust

Hemp Workers

Organic dust

Hide Workers

Alkalis
 Anthrax
 Chromium compounds
 Fungus infections
 Septic infections

Horn Workers

Organic dust

Hothouse Workers (see also gardeners)

Arsenic compounds
 Cyanides
 D.D.T.
 2, 4-D.
 Lead compounds
 Nicotine
 Phosphorus compounds
 Sudden variations of temperature

Hot Rod Rollers (iron and steel)

Heat

Housemaids

Alkalis
 Chlorinated hydrocarbons
 Repeated motion, pressure and vibration

House Wreckers

Inorganic dust (free silica)
 Inorganic dust (no free silica)

Hydraulic Construction Workers

Dampness

Hydraulic Miners

Dampness

Hydrochloric Acid Makers

Arsine

Hydrochloric acid

Hydrogen sulphide

Sulphuric acid

Hydrocyanic Acid Makers

Cyanides

Hydrocyanic acid

Sulphuric acid

Hydrofluoric Acid Makers

Hydrofluoric acid

Ice (artificial) Makers (see artificial ice makers)**Ice Cream Makers**

Ammonia

Carbon dioxide

Dampness

Sudden variations of temperature

Incandescent Lamp Makers (see also particular occupation)

Amyl acetate

Carbon monoxide

Lead and its compounds

Mercury and its compounds

Methyl alcohol

Thallium and its compounds

Incandescent Mantle Hardeners

Hydrofluoric acid

Pyridine

Thorium and its compounds

Ink Makers

Alkalis

Ammonia

Arsenic and its compounds

Barium compounds

Benzol and its homologues (toluol and xylol)

Brominated hydrocarbons (methyl bromide)

Bromine

Carbon monoxide

Carbon tetrachloride

Chlorinated hydrocarbons

Chlorine

Chromium compounds

Cresol

Ethylene glycol monomethyl ether

Formaldehyde

Glycols

Hydrochloric acid

Lead and its compounds

Mercury and its compounds

Methyl alcohol

Nitrobenzol

Nitro compounds of benzol, toluol and xylol

Oxalic acid

Petroleum hydrocarbons

Silver compounds

Turpentine

Vanadium compounds

Insecticide Makers (see also disinfectant makers)

Arsenic compounds

Barium compounds

Bromine

Carbon dioxide

Carbon disulphide

Carbon monoxide

Carbon tetrachloride

Chlorinated hydrocarbons

Chlorobenzols

Cresol

Cyanides

D.D.T.

Diethylene dioxide

Ethylene dichloride

Ethylene oxide

Formaldehyde

Hydrocyanic acid

Lead and its compounds

Mercury and its compounds

Methyl formate

Nicotine

Nitric acid

Nitrous fumes

Petroleum hydrocarbons
 Phosphorus compounds
 Sulphur chloride
 Sulphur dioxide
 Tetrachloroethane
 Thallium compounds
 Trichloroethylene
 Turpentine

Inspectors Using Fluoroscope or X-Ray

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Instrument Dial (luminous)

Painters

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Insulation (sound, heat) Workers

Asbestos dust
 Inorganic dust (free silica)
 Inorganic dust (no free silica)

Insulators (wire)

Antimony and its compounds
 Arsenic and its compounds
 Benzol and its homologues (toluol and xylol)
 Carbon tetrachloride
 Chlorinated diphenyls
 Chlorinated hydrocarbons
 Chlorinated naphthalenes
 Ethylene dichloride
 Tar and pitch

Iodine Makers

Chlorine

Iron and Steel Workers (all departments) (see also particular occupation and alloy makers)

Arsenic and its compounds
 Carbon monoxide
 Heat
 Inorganic dust (no free silica)
 Titanium dioxide
 Ultraviolet and infrared rays

Ironers

Carbon monoxide
 Repeated motion, pressure and vibration
 Sudden variations of temperature

Irradiators (food)

Ultraviolet rays

Japan Makers

Arsenic and its compounds
 Lead and its compounds
 Methyl alcohol
 Petroleum hydrocarbons
 Sudden variations of temperature
 Turpentine

Japanners

Arsenic and its compounds
 Lead and its compounds
 Methyl alcohol
 Petroleum hydrocarbons
 Turpentine

Jewelers

Amyl acetate
 Arsine
 Cyanides
 Defective illumination
 Hydrochloric acid
 Inorganic dust (no free silica)
 Lead and its compounds
 Mercury and its compounds
 Nitric acid
 Nitrous fumes
 Repeated motion, pressure and vibration
 Sulphuric acid

Junk (metal) Refiners

Heat
 Inorganic dust (no free silica)
 Lead and its compounds
 Metal fume fever
 Zinc and its compounds

Jute Workers

Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Organic dust

Kiln Tenders

Carbon monoxide
Heat

Knitters

Repeated motion, pressure and
vibration

Knitting Mill Workers

Organic dust

Labelers (paint cans)

Lead and its compounds

**Laboratory Workers (see also
chemists)**

Carbon monoxide
Mercury and its compounds

**Laboratory Workers (radium
research)**

X-rays, radium and other radio-
active substances (radiothorium,
mesothorium, etc.)

Lace Makers

Organic dust

Lacquerers

Acetone
Amyl acetate
Amyl alcohol
Arsenic and its compounds
Benzol and its homologues (toluol
and xylol)
Chlorobenzols
Ethyl acetate
Ethyl benzene
Formic acid
Ketones
Lead and its compounds
Methyl alcohol
Petroleum hydrocarbons
Pyridine
Triorthocresyl phosphate
Turpentine

Lacquer Makers

Acetaldehyde
Acetone

Ammonia

Amyl acetate
Amyl alcohol
Arsenic and its compounds
Barium compounds
Benzol and its homologues (toluol
and xylol)
Butanone
Butyl alcohol
Chlorinated diphenyls
Chlorinated naphthalenes
Chlorobenzols
Diethylene dioxide
Ethylene chlorohydrin
Ethylene glycol monoethyl ether
Ethylene glycol monomethyl ether
Formaldehyde
Formic acid
Ketones (hexone, hexanone)
Lead and its compounds
Methyl alcohol
Nitric acid
Nitrous fumes
Pentanone
Petroleum hydrocarbons
Propyl alcohol
Pyridine
Triorthocresyl phosphate
Turpentine

Lampblack Makers

Organic dust
Petroleum oils
Phenol

**Lamps (electric) (see incandescent
lampmakers)****Lapidaries**

Inorganic dust (no free silica)

Lard Makers

Acrolein

Lasters (shoes)

Dampness
Methyl alcohol
Organic dust
Sudden variations of temperature

Lathe Turners

Repeated motion, pressure and vibration

Laundry Workers

Carbon monoxide
Chloride of lime
Chlorine
Dampness
Formaldehyde
Heat
Ozone
Sudden variations of temperature

Lead Arsenate Makers

Arsenic and its compounds
Lead and its compounds

Lead Burners

Arsine
Lead and its compounds

Leadfoil Makers

Heat
Lead and its compounds

Lead Miners (see also miners)

Lead and its compounds

Lead Pipe Makers

Lead and its compounds

Lead Platers (on iron)

Mercury and its compounds

Lead Salts Makers

Lead and its compounds

Lead Smelter Workers

Antimony and its compounds
Arsenic and its compounds
Cadmium and its compounds
Carbon monoxide
Heat
Lead and its compounds
Selenium and its compounds
Sulphur dioxide
Tellurium and its compounds

Leather Workers (see also tannery workers)

Amino compounds of benzol, toluol and xylol
Amyl acetate
Anthrax
Barium compounds
Carbon tetrachloride
Chlorinated hydrocarbons
Chromium and its compounds
Hydrochloric acid
Methyl alcohol
Organic dust
Trichloroethylene

Lehr Tenders (glass)

Heat

Letter Sorters

Defective illumination
Repeated motion, pressure and vibration

Levermen (iron and steel)

Heat

Lime Burners

Arsine
Carbon dioxide
Carbon monoxide
Heat
Inorganic dust (no free silica)
Selenium compounds

Lime Kiln Chargers

Carbon dioxide
Carbon monoxide
Inorganic dust (no free silica)

Lime Pullers (tannery)

Anthrax
Dampness

Lime Workers

Inorganic dust (no free silica)

Linen Workers

Organic dust

Linoleum Makers

Acrolein
 Amyl acetate
 Arsenic and its compounds
 Barium compounds
 Benzol and its homologues (toluol and xylol)
 Carbon tetrachloride
 Chlorinated hydrocarbons
 Chromium compounds
 Dampness
 Ethylene chlorohydrin
 Heat
 Inorganic dust (no free silica)
 Lead and its compounds
 Manganese compounds
 Methyl alcohol
 Organic dust
 Petroleum hydrocarbons
 Sudden variations of temperature
 Sulphuric acid
 Turpentine

Linotypers

Antimony and its compounds
 Carbon monoxide
 Lead and its compounds

Linseed Oil Boilers

Acrolein
 Carbon dioxide
 Lead and its compounds

Litharge Workers

Lead and its compounds

Lithographers

Amino compounds of benzol, toluol and xylol
 Aniline
 Arsenic and its compounds
 Benzol and its homologues (toluol and xylol)
 Chromium compounds
 Glycols
 Hydrochloric acid
 Inorganic dust (no free silica)
 Lead and its compounds
 Mercury and its compounds

Methyl alcohol

Nitric acid
 Nitrous fumes
 Oxalic acid
 Petroleum hydrocarbons
 Repeated motion, pressure and vibration
 Sulphuric acid
 Tetrachloroethane
 Turpentine

Lithopone Makers

Barium and its compounds
 Cadmium and its compounds

Lithotransfer Workers

Lead and its compounds

Locksmiths

Repeated motion, pressure and vibration

Longshoremen

Anthrax
 Manganese compounds
 Weil's disease

Luminous Dial Factory Workers

X-rays, radium, and other radio-active substances (radiothorium, mesothorium, etc.)

Luters (zinc smelting)

Heat
 Metal fume fever
 Zinc and its compounds

Lye Makers

Alkalis

Machinists

Petroleum oils
 Repeated motion, pressure and vibration

Magnesium Alloy Makers

Magnesium and its compounds

Mail Sorters

Defective illumination
 Repeated motion, pressure and vibration

Manganese Dioxide Workers
Manganese and its compounds

Manganese Grinders
Manganese and its compounds

Manganese Ore Separators
Manganese and its compounds

Manganese Steel Makers
Manganese and its compounds

Manometer Makers
Mercury and its compounds

Manure Handlers
Septic infections
Tetanus
Undulant fever

Marble Cutters
Inorganic dust (no free silica)

Masons
Dampness
Inorganic dust (free silica)
Inorganic dust (no free silica)
Repeated motion, pressure and vibration

Masseurs
Fungus infections
Septic infections

Match Factory Workers
Alkalis
Antimony and its compounds
Carbon disulphide
Chromium compounds
Dampness
Hydrogen sulphide
Inorganic dust (no free silica)
Lead and its compounds
Manganese compounds
Organic dust
Phosphorus and its compounds

Mattress Makers
Anthrax
Organic dust

Meat Inspectors
Anthrax
Erysipeloid
Fungus infections
Septic infections
Undulant fever

Meat Packing Employees (see
packing house employees and
slaughterhouse workers)

Mechanics (gas engines)
Carbon monoxide
Petroleum hydrocarbons
Petroleum oils

Melters (foundry, glass)
Heat

Mercerizers
Alkalis
Hydrochloric acid
Sulphuric acid

Mercury Alloy Makers
Mercury and its compounds

Mercury Boiler Workers
Mercury and its compounds

Mercury Bronzers
Mercury and its compounds

Mercury Pump Workers
Mercury and its compounds

Mercury Salt Workers
Mercury and its compounds

Mercury Solder Workers
Mercury and its compounds

Mercury Still Cleaners
Mercury and its compounds

Mercury Switch Makers
Mercury and its compounds

Mercury Vapour Lamp Makers
Mercury and its compounds

Metallizers

Cadmium and its compounds
 Copper and its compounds
 Lead and its compounds
 Metal fume fever
 Selenium and its compounds
 Zinc and its compounds

Metal Polishers and Cleaners (see polishers and cleaners, metal)**Metal Polish Makers (see polish makers)****Metal Turners**

Inorganic dust (no free silica)

Metal Workers (see particular occupation)**Metal Washers**

Chlorinated hydrocarbons
 Petroleum hydrocarbons

Methyl Alcohol Workers

Acetone
 Carbon monoxide
 Methyl alcohol

Mica Strippers or Splitters

Inorganic dust (no free silica)

Mica Workers

Inorganic dust (no free silica)

Microscopists

Repeated motion, pressure and vibration

Milkers

Fungus infections
 Repeated motion, pressure and vibration
 Undulant fever

Milk Inspectors

Undulant fever

Millers

Fungus infections
 Mercury and its compounds

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Millinery Workers

Acetone
 Amino compounds of benzol, toluol and xylol
 Amyl acetate
 Aniline
 Benzol and its homologues (toluol and xylol)
 Defective illumination
 Methyl alcohol
 Petroleum hydrocarbons
 Turpentine

Mineral Earth Workers

Inorganic dust (no free silica)

Miners

Asbestos dust
 Carbon dioxide
 Carbon monoxide
 Dampness
 Defective illumination
 Heat
 Hydrogen sulphide
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Manganese and its compounds
 Nitrous fumes
 Repeated motion, pressure and vibration
 Silver and its compounds
 Sudden variations of temperature

Minkery Workers

Anthrax
 Glanders
 Septic infections

Mirror Silverers

Acetaldehyde
 Ammonia
 Benzol and its homologues (toluol and xylol)
 Cyanides
 Dampness
 Formaldehyde
 Formic acid
 Lead and its compounds
 Mercury and its compounds
 Silver and its compounds
 Sudden variations of temperature

Mixers (rubber)

Amino compounds of benzol, toluol and xylol
 Aniline
 Antimony and its compounds
 Arsenic and its compounds
 Benzol and its homologues (toluol and xylol)
 Carbon tetrachloride
 Chromium compounds
 Hexamethylene tetramine
 Inorganic dust (no free silica)
 Lead and its compounds
 Paraldehyde
 Petroleum hydrocarbons
 Sudden variations of temperature
 Synthethic rubber

Mixing Room Workers (miscellaneous)

Inorganic dust (no free silica)
 Organic dust

Mould Breakers (foundry)

Heat
 Inorganic dust (free silica)
 Inorganic dust (no free silica)

Mould Breakers (pottery)

Carbon monoxide

Moulders (asbestos)

Asbestos dust

Moulders (foundry)

Heat
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Lead and its compounds
 Metal fume fever
 Zinc and its compounds

Monotypers

Antimony and its compounds
 Carbon monoxide
 Lead and its compounds

Mordanters

Amyl alcohol
 Antimony and its compounds

Arsenic and its compounds

Benzol and its homologues (toluol and xylol)
 Chloride of lime
 Chromium compounds
 Cyanides
 Formic acid
 Nitric acid
 Nitrous fumes
 Petroleum hydrocarbons
 Vanadium compounds

Motion Picture Film Workers (see also pyroxylin plastics workers)

Amyl acetate
 Butyl alcohol
 Carbon monoxide
 Chlorinated hydrocarbons
 Tetrachloroethane

Motion Picture Machine Operators

Mercury and its compounds
 Nitrous fumes
 Ultraviolet and infrared rays

Motion Picture Studio Workers and Actors

Ultraviolet and infrared rays

Mottlers (leather)

Amyl acetate
 Methyl alcohol

Muffle Tenders

Heat

Mule Handlers

Anthrax
 Glanders

Muriatic Acid Makers (see hydrochloric acid makers)**Musical Instrument Makers**

Lead and its compounds

Musicians

Repeated motion, pressure and vibration

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Naphthylamine Workers

Amino compounds of benzol, toluol
and xylol
Aniline
Naphthylamines

Neon Lights Lettermakers

Carbon monoxide

Nickel Extractors

Nickel and its compounds

Nickel Platers (see also electroplaters)

Cyanides
Dampness

Nickel Purification Workers

(mond process)

Carbon monoxide
Nickel and its compounds
Nickel carbonyl

Nitraniline Workers

Amino compounds of benzol, toluol
and xylol
Aniline

Nitrators

Nitric acid
Nitrobenzol
Nitro compounds of benzol, toluol
and xylol
Nitroglycerine
Nitrous fumes
Sulphuric acid

Nitric Acid Workers

Ammonia
Lead and its compounds
Nitric acid
Nitrous fumes
Sulphuric acid

Nitrobenzene Workers (see nitrobenzol workers)**Nitrobenzol Workers**

Benzol and its homologues (toluol
and xylol)
10893-4j

Nitric acid

Nitrobenzol

Nitro compounds of benzol, toluol
and xylol

Nitrous fumes

Sulphuric acid

Nitrocellulose Workers (see also pyroxylin plastics workers)

Acetone
Amyl acetate
Amyl alcohol
Arsine
Benzol and its homologues (toluol
and xylol)
Ethyl acetate
Ethylene glycol monomethyl ether
Nitric acid
Nitrous fumes
Sulphuric acid

Nitroglycerine Makers

Arsine
Lead and its compounds
Nitric acid
Nitroglycerine
Nitrous fumes
Sulphuric acid

Nitrous Oxide Workers

Nitrous fumes

Oilcloth Makers (see linoleum makers)**Oilers**

Petroleum oils

Oil Extractors (see extractors) (oils and fats)**Oil Flotation Plant Workers (see also concentrating mill workers)**

Hydrogen sulphide
Petroleum oils
Sulphur dioxide

Oil Purifiers

Sulphuric acid

Oil Refiners (see petroleum refiners)**Oil Well Workers**

Hydrogen sulphide

Petroleum oils

Open Hearth Department Workers

(iron and steel)

Carbon monoxide

Heat

Ore Concentrating Mill Workers

(see concentrating mill workers)

Oxyacetylene Cutters (see welders)**Ozonators**

Ozone

Packing House Employees (see also slaughterhouse workers)

Alkalis

Dampness

Erysipeloid

Heat

Hydrogen sulphide

Septic infections

Sudden variations of temperature

Undulant fever

Weil's disease

Painters

Acetone

Amino compounds of benzol, toluol and xylol

Amyl acetate

Amyl alcohol

Aniline

Antimony and its compounds

Arsenic and its compounds

Benzol and its homologues (toluol and xylol)

Carbon disulphide

Chromium compounds

Ethyl acetate

Ketones

Lead and its compounds

Manganese compounds

Mercury and its compounds

Methyl alcohol

Nitric acid

Nitrous fumes

Petroleum hydrocarbons

Repeated motion, pressure and vibration

Titanium dioxide

Turpentine

Painters (luminous watch and instrument dials)

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Painters (tar)

Tar and pitch

Paint Makers

Acetone

Alkalis

Amino compounds of benzol, toluol and xylol

Amyl acetate

Amyl alcohol

Aniline

Antimony and its compounds

Arsenic compounds

Barium compounds

Benzol and its homologues (toluol and xylol)

Cadmium compounds

Carbon disulphide

Chlorinated diphenyls

Chlorinated naphthalenes

Chromium compounds

Dampness

Ethyl acetate

Hydrochloric acid

Lead and its compounds

Magnesium compounds

Manganese compounds

Mercury and its compounds

Methyl alcohol

Petroleum hydrocarbons

Phenol

Pyridine

Selenium compounds

Sulphuric acid

Tar and pitch

Titanium dioxide

Turpentine	Ammonia
Uranium compounds	Amyl acetate
Paint Remover Makers	Arsine
Ammonia	Chlorine
Benzol and its homologues (toluol and xylol)	Chromium compounds
Butanone	Dampness
Cresol	Excessive noise
Dichloroethyl ether	Formaldehyde
Diethylene dioxide	Fungus infections
Furfural	Heat
Ketones	Hydrochloric acid
Methyl alcohol	Hydrofluoric acid
Methylene chloride	Hydrogen sulphide
Petroleum hydrocarbons	Lead compounds
Phenol	Magnesium compounds
Paint Removers	Sulphur dioxide
Ammonia	Sulphuric acid
Acetone	Sudden variations of temperature
Amyl acetate	Titanium dioxide
Benzol and its homologues (toluol and xylol)	Paper Money Makers
Dichloroethyl ether	Chromium compounds
Inorganic dust (no free silica)	Paraffin Workers
Ketones	Acetone
Lead and its compounds	Benzol and its homologues (toluol and xylol)
Methylene chloride	Carbon disulphide
Petroleum hydrocarbons	Carbon tetrachloride
Phenol	Ethylene dichloride
Pair Heaters (tin plate)	Petroleum oils
Heat	Parakeet Handlers
Paper Box Makers	Psittacosis
Repeated motion, pressure and vibration	Paris Green Workers
Paper Glazers	Arsenic and its compounds
Arsenic and its compounds	Parrot Handlers
Paperhangers	Psittacosis
Arsenic and its compounds	Patent Leather Makers
Chromium compounds	Amyl acetate
Inorganic dust (no free silica)	Carbon monoxide
Lead and its compounds	Lead and its compounds
Paper Makers (see also particular occupation)	Methyl alcohol
Alkalis	Oxalic acid
	Ozone
	Sudden variations of temperature
	Sulphuric acid
	Turpentine

Pavers

Heat
Repeated motion, pressure and vibration
Tar and pitch

Pencil Makers

Acetone
Alkalis
Amino compounds of benzol, toluol and xylol
Aniline
Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Chromium compounds
Pyridine

Perfume Makers

Acetone
Amino compounds of benzol, toluol and xylol
Ammonia
Amyl acetate
Aniline
Benzol and its homologues (toluol and xylol)
Brominated hydrocarbons (ethyl bromide)
Butyl alcohol
Carbon tetrachloride
Chlorinated hydrocarbons
Cresol
Dimethyl sulphate
Ethyl acetate
Formic acid
Hydrochloric acid
Methyl alcohol
Methyl chloride
Methylene chloride
Naphthols
Nitrobenzol
Nitro compounds of benzol, toluol and xylol
Petroleum hydrocarbons
Phenol
Sulphuric acid
Trichloroethylene

Petroleum Refiners

Acetone
Acrolein
Alkalis
Amino compounds of benzol, toluol and xylol
Ammonia
Aniline
Benzol and its homologues (toluol and xylol)
Carbon monoxide
Chlorinated hydrocarbons
Dampness
Dichloroethyl ether
Heat
Hydrochloric acid
Hydrogen sulphide
Lead and its compounds
Methylene chloride
Nitrobenzol
Nitro compounds of benzol, toluol and xylol
Petroleum hydrocarbons
Petroleum oils
Sulphur dioxide
Sulphuric acid
Trichloroethylene
Turpentine

Pewter Makers

Antimony and its compounds
Lead and its compounds

Pharmaceutical Workers

Acetone
Acrolein
Alkalis
Amino compounds of benzol, toluol and xylol
Aniline
Antimony and its compounds
Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Brominated hydrocarbons (ethyl bromide, ethylene dibromide, methyl bromide)
Bromine
Calcium cyanamide

Carbon dioxide
 Carbon tetrachloride
 Chloride of lime
 Chlorinated hydrocarbons
 Diethylene dioxide
 Dinitrophenol
 Ethylene dichloride
 Formic acid
 Magnesium compounds
 Manganese compounds
 Mercury and its compounds
 Methyl chloride
 Methylene chloride
 Naphthols
 Nitric acid
 Nitroglycerine
 Nitrous fumes
 Organic dust
 Petroleum hydrocarbons
 Phenol
 Phenyl hydrazine
 Phosgene
 Phosphorus and its compounds
 Sulphuric acid
 Tellurium compounds
 Tetrachloroethane
 Tetrachloroethylene
 Trichloroethylene
 Trinitrophenol
 Turpentine
 Uranium

Phenol Makers

Benzol and its homologues (toluol
 and xylol)
 Phenol
 Sulphuric acid

Phenyl Hydrazine Workers

Phenyl hydrazine

Phosphate Extractors

Hydrochloric acid

**Phosphate Mill Workers (see also
 fertilizer makers)**

Dampness
 Hydrofluoric acid

Inorganic dust (no free silica)
 Phosphorus and its compounds
 Sudden variations of temperature

Phosphide Makers

Carbon monoxide
 Phosphine

Phosphor-Bronze Workers

Phosphorus and its compounds

Phosphoric Acid Makers

Cyanides
 Nitric acid
 Nitrous fumes
 Sulphuric acid

Phosphorus Compound Makers

Hydrogen sulphide
 Phosphorus and its compounds

Phosphorus Extracters

Hydrofluoric acid
 Phosphine
 Phosphorus and its compounds

Phosphorus (red) Makers

Phosphine
 Phosphorus and its compounds

Phosphorus Refiners

Phosphine
 Phosphorus and its compounds

Photoengravers

Alkalis
 Ammonia
 Amyl acetate
 Benzol and its homologues (toluol
 and xylol)
 Chromium compounds
 Methyl alcohol
 Nitric acid
 Nitrous fumes

**Photographers (see also photogra-
 phic material workers)**

Defective illumination
 Methyl alcohol
 Ultraviolet and infrared rays

Photographic Film Makers (see also pyroxylin plastics workers)

Amyl acetate
 Bromine
 Butyl alcohol
 Defective illumination
 Ethyl acetate
 Nitric acid
 Nitrous fumes
 Silver and its compounds

Photographic Material Workers (see also photographic film makers)

Acetaldehyde
 Acetone
 Amino compounds of benzol, toluol and xylol
 Ammonia
 Aniline
 Barium compounds
 Benzol and its homologues (toluol and xylol)
 Chlorine
 Chromium compounds
 Cresol
 Cyanides
 Formaldehyde
 Hydrochloric acid
 Mercury and its compounds
 Metol
 Phenol
 Sulphuric acid
 Tellurium compounds
 Trichloroethylene
 Trinitrophenol
 Turpentine
 Uranium compounds
 Vanadium compounds

Photograph Retouchers

Lead and its compounds

Photogravure Workers

Chromium compounds
 Nitric acid
 Nitrous fumes

Picklers

Arsine
 Cyanides
 Dampness
 Heat
 Hydrochloric acid
 Hydrofluoric acid
 Nitric acid
 Nitrous fumes
 Sulphuric acid

Picric Acid Makers

Benzol and its homologues (toluol and xylol)
 Nitric acid
 Nitrous fumes
 Phenol
 Sulphuric acid
 Trinitrophenol

Pigment Makers (see colour makers)**Pile Drivers**

Repeated motion, pressure and vibration

Pipe Fitters (see also particular liquid piped)

Lead and its compounds

Pitch Workers

Arsenic and its compounds
 Cresol
 Heat
 Tar and pitch

Planer Men (stone)

Inorganic dust (free silica)
 Inorganic dust (no free silica)

Plasterers

Anthrax
 Dampness
 Inorganic dust (no free silica)

Plaster of Paris Workers

Inorganic dust (no free silica)

Plastics Makers (see pyroxylin plastics workers, also resin (synthetic) makers)

Platers (see electroplaters and metallizers)

Platinum Extractors

Bromine

Plumbers (see also particular substance piped)

Arsine

Carbon monoxide

Lead and its compounds

Pneumatic Tool Workers

Inorganic dust (free silica)

Inorganic dust (no free silica)

Repeated motion, pressure and vibration

Policemen

Carbon monoxide

Dampness

Polishers and Cleaners (metal) (see also degreasers)

Benzol and its homologues (toluol and xylol)

Cyanides

Hydrochloric acid

Inorganic dust (free silica)

Inorganic dust (no free silica)

Lead and its compounds

Methyl alcohol

Organic dust

Oxalic acid

Petroleum hydrocarbons

Pyridine

Repeated motion, pressure and vibration

Silver and its compounds

Trichloroethylene

Turpentine

Polish Makers

Amino compounds of benzol, toluol and xylol

Amyl acetate

Aniline

Benzol and its homologues (toluol and xylol)

Carbon tetrachloride

Chlorinated hydrocarbons

Chlorobenzols

Cyanides

Diethylene dioxide

Inorganic dust (no free silica)

Methyl alcohol

Nitrobenzol

Nitro compounds of benzol, toluol and xylol

Oxalic acid

Petroleum hydrocarbons

Trichloroethylene

Turpentine

Porcelain Makers (see pottery workers)

Porters

Repeated motion, pressure and vibration

Potassium Hydroxide Makers

Alkalis

Pot Fillers (glass)

Heat

Potlifters (iron and steel)

Heat

Pot Pullers (foundry)

Heat

Pot Room Workers (aluminum foundry; carbide plant)

Heat

Pot Setters

Heat

Pottery Workers (see also particular occupation)

Arsenic and its compounds

Carbon dioxide

Carbon monoxide

Chromium compounds

Cobalt compounds

Dampness

Heat

Hydrochloric acid

Hydrofluoric acid

- Inorganic dust (free silica)
- Inorganic dust (no free silica)
- Lead and its compounds
- Manganese compounds
- Mercury and its compounds
- Selenium compounds
- Sulphur dioxide
- Pourers (foundry)**
 - Heat
 - Ultraviolet and infrared rays
- Powder Makers (see smokeless powder makers)**
- Preparers (tannery)**
 - Anthrax
 - Dampness
 - Septic infections
- Preservative Makers and Handlers**
 - Formaldehyde
- Pressers**
 - Carbon monoxide
 - Repeated motion, pressure and vibration
- Pressmen (oil refining)**
 - Dampness
 - Petroleum oils
- Pressmen (printers) (see printers)**
- Pressroom Workers (rubber)**
 - Amino compounds of benzol, toluol and xylol
 - Aniline
 - Antimony and its compounds
 - Arsenic and its compounds
 - Benzol and its homologues (toluol and xylol)
 - Petroleum hydrocarbons
 - Sudden variations of temperature
- Primers (explosives)**
 - Mercury and its compounds
- Printers**
 - Amino compounds of benzol, toluol and xylol
 - Aniline
- Antimony and its compounds
- Arsenic and its compounds
- Benzol and its homologues (toluol and xylol)
- Carbon monoxide
- Carbon tetrachloride
- Chlorinated hydrocarbons
- Chlorobenzols
- Cyanides
- Defective illumination
- Glycols
- Inorganic dust (no free silica)
- Lead and its compounds
- Mercury and its compounds
- Methyl alcohol
- Petroleum hydrocarbons
- Tetrachloroethylene
- Turpentine
- Printers Textile (see textile printers)**
- Puddlers (iron and steel)**
 - Carbon monoxide
 - Heat
 - Manganese and its compounds
- Pulp Mill Workers (see also paper makers)**
 - Dampness
 - Excessive noise
 - Heat
- Putty Makers**
 - Carbon disulphide
 - Inorganic dust (no free silica)
 - Lead and its compounds
 - Petroleum hydrocarbons
- Putty Polishers (glass)**
 - Inorganic dust (no free silica)
 - Lead and its compounds
- Pyrites Burners**
 - Arsenic and its compounds
 - Heat
 - Hydrogen sulphide
 - Inorganic dust (no free silica)
 - Selenium compounds
 - Sulphur dioxide

Pyroxylin Plastics Workers

Acetaldehyde
 Acetone
 Acrolein
 Amino compounds of benzol, toluol and xylol
 Amyl acetate
 Amyl alcohol
 Aniline
 Arsine
 Benzol and its homologues (toluol and xylol)
 Brominated hydrocarbons (ethylene dibromide)
 Butyl alcohol
 Carbon monoxide
 Carbon tetrachloride
 Chlorinated hydrocarbons
 Cyanides
 Diethylene dioxide
 Ethyl acetate
 Ethylene glycol monomethyl ether
 Hydrogen sulphide
 Ketones
 Lead and its compounds
 Methyl alcohol
 Nitric acid
 Nitrous fumes
 Organic dust
 Petroleum hydrocarbons
 Propyl alcohol
 Sulphuric acid
 Tetrachloroethane
 Triorthocresyl phosphate

Quarrymen

Excessive noise
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Repeated motion, pressure and vibration

Quartz Workers

Inorganic dust (free silica)

Radioactive Paint Makers

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Radiologists

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Radio Tube Makers

Mercury and its compounds

Radium Miners

X-rays, radium and other radioactive substances, (radiothorium, mesothorium, etc.)

Radium Ore Reduction Workers

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Radium Specialists

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Rag Workers

Anthrax
 Organic dust
 Septic infections

Rayon Makers

Alkalis
 Ammonia
 Amyl acetate
 Arsine
 Butyl alcohol
 Carbon disulphide
 Chlorinated diphenyls
 Chlorinated hydrocarbons
 Chlorine
 Cyanides
 Dampness
 Diethylene dioxide
 Formaldehyde
 Heat
 Hydrochloric acid
 Hydrogen sulphide
 Methyl alcohol
 Methylene chloride
 Nitric acid
 Nitrous fumes
 Oxalic acid
 Sulphuric acid
 Tetrachloroethane

Reclaimers (rubber)

Amino compounds of benzol, toluol
and xylol
Aniline
Benzol and its homologues (toluol
and xylol)
Carbon disulphide
Hydrochloric acid
Lead and its compounds
Phenol
Sulphuric acid

Red Lead Workers

Lead and its compounds

Refiners (metals) (see also particular occupation)

Arsenic and its compounds
Arsine
Carbon monoxide
Heat
Hydrochloric acid
Lead and its compounds
Mercury and its compounds
Nitric acid
Nitrous fumes
Selenium compounds
Sulphur dioxide
Sulphuric acid

Refiners (sugar) (see sugar refiners)**Refrigerating Plant Workers**

Ammonia
Brominated hydrocarbons
Carbon dioxide
Chlorinated hydrocarbons
Dampness
Freon
Methyl chloride
Ozone
Sudden variations of temperature

Refrigerator (mechanical)**Makers and Repair Men**

Acrolein
Brominated hydrocarbons (ethyl
bromide, methyl bromide)
Chlorinated hydrocarbons

Freon

Methyl chloride
Methyl formate
Sulphur dioxide

Resins (synthetic) Makers

Acetaldehyde
Acetone
Alkalis
Amino compounds of benzol, toluol
and xylol.
Aromatic hydrocarbons (naphtha-
lene, anthracene)
Benzol and its homologues (toluol
and xylol)
Chlorinated diphenyls
Chlorinated hydrocarbons
Chlorinated naphthalenes
Cresol
Dichloroethyl ether
Diphenyl
Ethyl acetate
Ethylene glycol monomethyl ether
Formaldehyde
Furfural
Heat
Hexamethylene tetramine
Methyl alcohol
Nitrobenzols
Organic dust
Oxalic acid
Phenol
Selenium compounds
Styrene
Trichloroethylene
Triorthocresyl phosphate
Vinyl chloride

Riveters

Excessive noise
Lead and its compounds
Repeated motion, pressure and
vibration

Road Repairers

Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)
Tar and pitch

Roentgenologists

X-rays, radium and other radioactive substances, (radiothorium, mesothorium, etc.)

Roller Coverers (cotton mill)

Heat
Organic dust

Rollers (metals)

Heat

Roll Setters (iron and steel)

Heat

Roll Wrenchers (iron and steel)

Heat

Roofers

Lead and its compounds
Sudden variations of temperature
Tar and pitch

Roofing Material Workers

Asbestos dust
Heat
Inorganic dust (no free silica)
Tar and pitch

Rope Makers

Organic dust
Tar and pitch

Rotogravure Workers

Acetone
Amino compounds of benzol, toluol and xylol
Benzol and its homologues (toluol and xylol)

Roughers (iron and steel)

Heat

Rubber Cement Makers (see cement mixers, rubber)**Rubber Glove Makers**

Petroleum hydrocarbons

Rubberized Asbestos Board Makers

Petroleum hydrocarbons

Rubber (synthetic) Makers

Acetaldehyde
Acrylonitrile
Amino compounds of benzol, toluol and xylol
Amyl alcohol
Aniline
Butadiene
Chlorine
Chlorobutadiene
Cresol
Isoprene
Naphthols
Naphthylamines
Nitrous fumes
Styrene
Sulphur chloride

Rubber Tire Builders

Benzol and its homologues (toluol and xylol)
Heat
Petroleum hydrocarbons
Repeated motion, pressure and vibration

Rubber Workers (see also particular occupation)

Acetaldehyde
Acetone
Alkalis
Amino compounds of benzol, toluol and xylol
Aniline
Antimony and its compounds
Arsenic and its compounds
Barium compounds
Benzol and its homologues (toluol and xylol)
Carbon disulphide
Carbon tetrachloride
Chlorinated hydrocarbons
Chromium compounds
Ethylene dichloride
Formaldehyde
Formic acid
Heat

- Inorganic dust (free silica)
 - Inorganic dust (no free silica)
 - Lead and its compounds
 - Magnesium compounds
 - Methyl alcohol
 - Naphthols
 - Naphthylamines
 - Nitrous fumes
 - Organic dust
 - Petroleum hydrocarbons
 - Phenol
 - Pyridine
 - Repeated motion, pressure and vibration
 - Sudden variations of temperature
 - Synthetic rubber
 - Tellurium compounds
 - Tetrachloroethane
 - Trichloroethylene
 - Triorthocresyl phosphate
 - Turpentine
- Sagger Makers**
- Dampness
 - Inorganic dust (no free silica)
 - Lead and its compounds
- Sailors**
- Carbon monoxide
 - Sudden variations of temperature
 - Repeated motion, pressure and vibration
- Salt Extractors (coke oven by-products)**
- Ammonia
 - Sulphuric acid
- Salt Preparers**
- Heat
 - Inorganic dust (no free silica)
 - Sudden variations of temperature
- Sand Blasters**
- Inorganic dust (free silica)
 - Inorganic dust (no free silica)
- Sand Cutters**
- Inorganic dust (free silica)
- Sanders**
- Inorganic dust (free silica)
 - Inorganic dust (no free silica)
- Sanding Machine Operators**
- Inorganic dust (free silica)
 - Inorganic dust (no free silica)
- Sandpaperers (enameling and painting auto bodies, etc.)**
- Inorganic dust (no free silica)
 - Lead and its compounds
- Sandpaper Makers**
- Inorganic dust (free silica)
 - Inorganic dust (no free silica)
- Sand Pulverizers**
- Inorganic dust (free silica)
- Saw Filers**
- Defective illumination
 - Inorganic dust (no free silica)
- Sawmill Workers**
- Organic dust
- Sawyers**
- Repeated motion, pressure and vibration
- Sawyers (stone)**
- Inorganic dust (free silica)
 - Inorganic dust (no free silica)
- Scissors Sharpeners**
- Inorganic dust (no free silica)
 - Repeated motion, pressure and vibration
- Scourers (belts)**
- Benzol and its homologues (toluol and xylol)
- Scourers (metals)**
- Carbon tetrachloride
 - Chlorinated hydrocarbons
 - Nitric acid
 - Nitrous fumes
 - Petroleum hydrocarbons
 - Sulphuric acid
 - Trichloroethylene

Scourers (wood lasts) (shoes)
Organic dust

Scouring Powder Makers
Alkalis
Inorganic dust (free silica)
Inorganic dust (no free silica)

Scrapers (foundry)
Inorganic dust (free silica)
Inorganic dust (no free silica)

Screen Tenders (pulp mill)
Dampness

Screen Workers (lead and zinc smelting)
Inorganic dust (no free silica)
Lead and its compounds

Sealers (incandescent lamps)
Carbon monoxide

Sealing Wax Makers
Arsenic and its compounds
Turpentine

Seamstresses
Defective illumination
Repeated motion, pressure and vibration

Seed Treating Workers
Fungus infections
Mercury salts
Organic mercury compounds
Phosphorus compounds

Selenium Refiners
Selenium and its compounds

Sewage Purification Workers
Chlorine

Sewer Workers
Aliphatic hydrocarbons (methane, etc.)
Ammonia

Carbon dioxide
Carbon monoxide
Dampness
Hydrogen sulphide
Petroleum hydrocarbons

Sewing Machine Operators
Defective illumination
Repeated motion, pressure and vibration

Shade Cloth Makers
Benzol and its homologues (toluol and xylol)
Petroleum hydrocarbons

Shale Oil Workers (see petroleum refiners)

Shavers (felt hats; fur; tannery)
Anthrax
Dampness
Organic dust
Septic infections

Shearers
Anthrax
Fungus infections
Undulant fever

Sheep Dip Makers
Arsenic and its compounds

Sheet Metal Workers
Lead and its compounds
Metal fume fever
Zinc and its compounds

Shellackers
Amyl acetate
Benzol and its homologues (toluol and xylol)
Butyl alcohol
Lead and its compounds
Methyl alcohol
Petroleum hydrocarbons
Turpentine

Shellac Makers

Ammonia
Amyl acetate
Benzol and its homologues (toluol and xylol)
Butyl alcohol
Lead and its compounds
Methyl alcohol
Petroleum hydrocarbons
Turpentine

Shell Fillers

Dinitrophenol
Nitrobenzols
Nitro compounds of benzol, toluol and xylol
Nitroglycerine
Tetryl
Trinitrophenol
Trinitrotoluol

Shepherds

Anthrax
Fungus infections

Sherardizers

Metal fume fever
Zinc and its compounds

Shingle Stainers

Petroleum hydrocarbons

Shipyards Workers

Lead and its compounds
Repeated motion, pressure and vibration
Tar and pitch
Ultraviolet and infrared rays

Shoddy Workers

Anthrax
Arsine
Chlorine
Hydrochloric acid
Organic dust
Septic infections
Sulphuric acid

Shoe Dyers

Amino compounds of benzol, toluol and xylol
Lead and its compounds
Nitrobenzols
Nitro compounds of benzol, toluol and xylol

Shoe Factory Operatives (see also particular occupation)

Acetone
Amyl acetate
Anthrax
Benzol and its homologues (toluol and xylol)
Carbon tetrachloride
Chlorinated hydrocarbons
Organic dust
Petroleum hydrocarbons
Tetrachloroethane
Trichloroethylene
Turpentine

Shoe Finishers

Ammonia
Amyl acetate
Amyl alcohol
Benzol and its homologues (toluol and xylol)
Ethyl acetate
Methyl alcohol
Petroleum hydrocarbons
Sudden variations of temperature

Shoe Heel (wood) Coverers

Acetone
Amyl acetate
Benzol and its homologues (toluol and xylol)
Ethyl acetate
Methyl alcohol
Petroleum hydrocarbons

Shoemakers (see cobblers)**Shooting Gallery Workers**

Lead and its compounds
Mercury and its compounds
Nitrous fumes

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Shot Makers

Antimony and its compounds
 Arsenic and its compounds
 Lead and its compounds

Silicon Alloy Makers

Inorganic dust (free silica)

Silk Weighters

Lead and its compounds
 Tin compounds

Silk Workers

Organic dust
 Septic infections

Silo Workers

Carbon dioxide

Silverers (mirror) (see mirror silverers)**Silver Foil Makers**

Silver and its compounds.

Silver Melters

Carbon monoxide
 Cyanides
 Silver and its compounds
 Sudden variations of temperature

Silver Miners (see also miners)

Arsenic and its compounds

Silver Nitrate Makers

Silver and its compounds
 Nitric acid
 Nitrous fumes

Silver Platers (see also electroplaters)

Silver and its compounds

Silversmiths

Silver

Singers (cloth)

Carbon monoxide

Sintering Plant Workers

Inorganic dust (no free silica)
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Skimmers (glass)

Heat
 Ultraviolet and infrared rays

Slag Workers

Heat
 Inorganic dust (no free silica)

Slate Workers

Inorganic dust (free silica)
 Inorganic dust (no free silica)

Slaughter House Workers

Anthrax
 Dampness
 Erysipeloid
 Fungus infections
 Glanders
 Septic infections
 Undulant fever
 Weil's disease

Slip Makers (pottery)

Dampness
 Inorganic dust (no free silica)
 Lead and its compounds

Slushers (porcelain enameling)

Lead and compounds

Smelters (see also particular metal)

Heat
 Inorganic dust (free silica)
 Inorganic dust (no free silica)
 Sulphur dioxide

Smokeless Powder Makers

Acetone
 Amyl acetate
 Amyl alcohol
 Benzol and its homologues (toluol
 and xylol)
 Carbon disulphide
 Nitric acid
 Nitrobenzol
 Nitro compounds of benzol, toluol
 and xylol
 Nitrous fumes
 Nitroglycerine
 Phenol
 Trinitrophenol

Smoothers (glass)

Dampness

Inorganic dust (no free silica)

Soap (abrasive) Workers

Inorganic dust (no free silica)

Inorganic dust (free silica)

Soap Makers

Acrolein

Alkalis

Amyl acetate

Arsenic and its compounds

Benzol and its homologues (toluol and xylol)

Carbon tetrachloride

Chlorinated hydrocarbons

Dampness

Dichloroethyl ether

Ethyl acetate

Ethylene dichloride

Formaldehyde

Formic acid

Hydrochloric acid

Hydrogen sulphide

Manganese compounds

Methyl alcohol

Nitrobenzol

Nitro compounds of benzol, toluol and xylol

Organic dust

Petroleum hydrocarbons

Septic infections

Sudden variations of temperature

Sulphuric acid

Tar and pitch

Tetrachloroethane

Tetrachloroethylene

Trichloroethylene

Soda Makers

Ammonia

Arsine

Carbon dioxide

Chlorine

Dampness

Hydrogen sulphide

Nitric acid

Nitrous fumes

Sulphuric acid

Sodium Hydroxide Makers

Alkalis

Chlorine

Dampness

Sodium Silicate Makers

Inorganic dust (free silica)

Sodium Sulphide Makers

Hydrogen sulphide

Softeners (tannery)

Organic dust

Solderers

Arsine

Cadmium and its compounds

Carbon monoxide

Cyanides

Hydrochloric acid

Lead and its compounds

Solder

Ultraviolet and infrared rays

Zinc and its compounds

Solder Makers

Antimony and its compounds

Cadmium and its compounds

Lead and its compounds

Solder

Zinc and its compounds

Spice Makers

Organic dust

Spinners (asbestos)

Asbestos dust

Spinners (textile)

Organic dust

Repeated motion, pressure and vibration

Spongers

Dampness

Heat

Sprayers (metals) (see metallizers)**Sprayers (paint) (see painters)**

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Sprayers (tree) (see also insecticide makers)

Arsenic and its compounds
Cyanides
D.D.T.
Lead and its compounds
Phosphorus compounds

Spreaders (rubber works)

Carbon tetrachloride
Sudden variations of temperature

Stablemen

Anthrax
Ammonia
Fungus infections
Glanders
Septic infections
Tetanus
Undulant fever

Stamp Mill Workers

Dampness
Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)

Starch Makers

Carbon dioxide
Hydrogen sulphide
Organic dust

Statuary Workers

Inorganic dust (free silica)
Inorganic dust (no free silica)

Steam Fitters (see pipe fitters)**Stearic Acid Makers**

Acrolein
Sudden variations of temperature

Steel Alloy Makers (see alloy makers)**Steel (chrome) Makers**

Chromium compounds

Steel Engravers (see engravers)

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Steeple Jacks

Carbon monoxide
Sulphur dioxide

Stereotypers

Antimony and its compounds
Lead and its compounds
Sudden variations of temperature

Still (coal tar) Cleaners

Benzol and its homologues (toluol and xylol)
Heat
Tar and pitch

Stillmen (carbolic acid)

Heat
Phenol

Stillmen, Operating (see also particular chemical)

Heat

Stitchers (shoes)

Methyl alcohol

Stockmen

Anthrax
Glanders
Septic infections
Tetanus
Undulant fever

Stockyard Workers (see slaughter house workers)**Stokers**

Carbon monoxide
Heat
Inorganic dust (no free silica)
Sudden variations of temperature
Ultraviolet and infrared rays

Stone (artificial) Makers

Inorganic dust (free silica)
Inorganic dust (no free silica)
Tar and pitch

Stone Cleaners

Hydrofluoric acid
Oxalic acid

Stone Cutters

Dampness
Inorganic dust (free silica)
Inorganic dust (no free silica)
Repeated motion, pressure and vibration

Stone Masons

Inorganic dust (free silica)
Inorganic dust (no free silica)

Stone Workers

Inorganic dust (free silica)
Inorganic dust (no free silica)

Storage Battery Makers

Amyl acetate
Antimony and its compounds
Arsine
Cadmium and its compounds
Carbon monoxide
Lead and its compounds
Mercury and its compounds
Nickel and its compounds
Sulphur dioxide
Sulphuric acid

Straw Cutters

Fungus infections

Straw Hat Makers

Acrolein
Amyl acetate
Chloride of lime
Chlorinated hydrocarbons
Ethyl acetate
Formaldehyde
Methyl alcohol
Organic dust
Petroleum hydrocarbons
Sudden variations of temperature
Tetrachloroethane

Street Cleaners

Inorganic dust (no free silica)
Organic dust
Septic infections

Street Repairers

Excessive noise
Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)
Repeated motion, pressure and vibration
Tar and pitch

Subway Construction Workers

Inorganic dust (free silica)

Sugar Refiners

Ammonia
Barium compounds
Carbon dioxide
Chlorine
Dampness
Heat
Hydrochloric acid
Hydrogen sulphide
Inorganic dust (no free silica)
Organic dust
Septic infections
Sudden variations of temperature
Sulphur dioxide
Sulphuric acid

Sulphates Makers

Sulphuric acid

Sulphides Makers

Hydrogen sulphide

Sulphite Cooks (pulp mill)

Heat
Sudden variations of temperature
Sulphur dioxide

Sulphur Dioxide Makers

Carbon monoxide
Sulphur dioxide

Sulphuric Acid Workers

Ammonia
Arsenic and its compounds
Arsine
Hydrogen sulphide

Lead and its compounds

Nitric acid

Nitrous fumes

Selenium and its compounds

Sulphur dioxide

Sulphuric acid

Vanadium and its compounds

Sumackers (tannery)

Anthrax

Dampness

Septic infections

Surgical Dressing Makers

Phenol

Tablehands (tannery)

Anthrax

Dampness

Table Operatives (iron and steel)

Heat

Table Turners (enamelling)

Inorganic dust (no free silica)

Lead and its compounds

Sudden variations of temperature

Tailors

Repeated motion, pressure and vibration

Talc Workers

Inorganic dust (no free silica)

Tallow Refiners

Acrolein

Carbon disulphide

Chlorinated hydrocarbons

Septic infections

Sulphuric acid

Tank Cleaners (see also particular chemical)

Arsine

Benzol and its homologues (toluol and xylol)

Hydrofluoric acid

Petroleum hydrocarbons

Tar and pitch

Tetraethyl lead

Tank Men

Dampness

Heat

Tannery Workers

Alkalis

Amino compounds of benzol, toluol and xylol

Ammonia

Amyl acetate

Aniline

Anthrax

Arsenic and its compounds

Chloride of lime

Chromium and its compounds

Cyanides

Dampness

Formaldehyde

Formic acid

Hydrochloric acid

Hydrogen sulphide

Lead and its compounds

Mercury and its compounds

Oxalic acid

Petroleum hydrocarbons

Septic infections

Sulphur dioxide

Sulphuric acid

Trinitrophenol

Tapers (aeroplanes)

Chlorinated hydrocarbons

Tetrachloroethane

Tappers (smelting) (see also particular metal)

Heat

Ultraviolet and infrared rays

Tar (distillery) Workers (see also coal tar workers)

Arsenic and its compounds

Cresol

Heat

Tar and pitch

Taxidermists

Anthrax
 Arsenic and its compounds
 Mercury and its compounds
 Organic dust
 Psittacosis
 Septic infections

Teasers (glass)

Carbon monoxide
 Heat

Telegraphers

Repeated motion, pressure and vibration

Telephone Linemen (trench work)

(see also cable splicers)

Carbon monoxide
 Cresol
 Dampness
 Electrical burns; electrical shock
 Lead and its compounds
 Petroleum hydrocarbons
 Phenol
 Poison ivy

Temperers

Calcium cyanamide
 Carbon monoxide
 Cyanides
 Heat
 Lead and its compounds
 Mercury and its compounds
 Petroleum oils
 Sulphuric acid

Tetraethyl Lead Makers

Bromine
 Lead and its compounds
 Tetraethyl lead

Textile (asbestos) Workers

Asbestos dust

Textile Comb Makers

Inorganic dust (no free silica)

Textile Finishers (see particular occupation)**Textile Printers**

Amino compounds of benzol, toluol and xylol
 Amyl acetate
 Aniline
 Antimony and its compounds
 Aromatic hydrocarbons
 Arsenic and its compounds
 Cadmium compounds
 Carbon monoxide
 Chlorinated hydrocarbons
 Chlorine
 Chlorobenzols
 Chromium and its compounds
 Cyanides
 Ethyl acetate
 Formaldehyde
 Glycols
 Heat
 Hydrochloric acid
 Lead and its compounds
 Manganese compounds
 Mercury and its compounds
 Methyl alcohol
 Nitric acid
 Nitrous fumes
 Petroleum hydrocarbons
 Phenol
 Sudden variations of temperature
 Sulphuric acid
 Turpentine
 Vanadium compounds

Textile Workers (see particular occupation)

Dampness
 Heat
 Organic dust
 Sudden variations of temperature

Thallium Workers

Thallium and its compounds

Thermometer Makers

Mercury and its compounds
 Methyl chloride
 Thallium and its compounds

OCCUPATIONS AND THEIR POTENTIAL HAZARDS

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Thread Glazers

Heat
Sudden variations of temperature

Tile Makers (see also pottery workers)

Dampness
Heat
Inorganic dust (free silica)
Lead and its compounds
Sudden variations of temperature
Uranium compounds

Tin Foli Makers

Heat
Lead and its compounds

Tinners

Acrolein
Ammonia
Arsenic and its compounds
Arsine
Dampness
Heat
Hydrochloric acid
Lead and its compounds

Tin Plate Mill Workers (see iron and steel workers)**Tin Recovery Workers**

Chlorine

Tire Builders (see rubber tire builders)**Tobacco Denicotinizers**

Ethylene dichloride
Nicotine and tobacco
Trichloroethylene

Tobacco Moisteners

Carbon dioxide
Dampness

Tobacco Seedling Treaters

Benzol and its homologues (toluol and xylol)

Tobacco Workers

Nicotine and tobacco
Organic dust

Tongamen (iron and steel)

Heat

Tool Makers

Inorganic dust (no free silica)

Top Fillers (foundry)

Carbon monoxide
Heat
Inorganic dust (no free silica)

Towermen (sulphuric acid) (see also sulphuric acid workers)

Arsine
Nitric acid
Nitrous fumes
Sulphur dioxide
Sulphuric acid

Toy Makers

Acetone
Amyl acetate
Arsenic and its compounds
Lead and its compounds

Train Despatchers

Defective illumination
Repeated motion, pressure and vibration

Transfer Workers (pottery)

Lead and its compounds
Turpentine

Transparent Wrapping Materials Workers

Acetone
Alkalis
Carbon disulphide
Chlorinated hydrocarbons
Hydrochloric acid
Hydrogen sulphide
Sudden variations of temperature
Sulphuric acid

Treaders (rubber)

Benzol and its homologues (toluol and xylol)
Petroleum hydrocarbons
Repeated motion, pressure and vibration

Tree Sprayers (see sprayers, tree)**Trichloroethylene Workers**

Trichloroethylene

Trinitrotoluol Makers

Benzol and its homologues (toluol and xylol)

Nitric acid

Nitro compounds of benzol, toluol and xylol

Nitrous fumes

Trinitrotoluol

Tube Makers (glass)

Heat

Tubulators (incandescent lamps)

Carbon monoxide

Tumbling Barrel Workers

Inorganic dust (free silica)

Inorganic dust (no free silica)

Tunnel Workers

Aliphatic hydrocarbons (methane, etc.)

Carbon dioxide

Compressed air (increased atmospheric pressure)

Dampness

Defective illumination

Hydrogen sulphide

Inorganic dust (free silica)

Inorganic dust (no free silica)

Nitrous fumes

Turners-Out (glass)

Heat

Turpentine Extractors

Heat

Turpentine

Type Cleaners

Benzol and its homologues (toluol and xylol)

Methyl alcohol

Petroleum hydrocarbons

Type Founders

Antimony and its compounds

Lead and its compounds

Type Melters

Acrolein

Lead and its compounds

Type Setters (see compositors)**Typists**

Repeated motion, pressure and vibration

Upholsterers

Anthrax

Methyl alcohol

Organic dust

Uranium Miners

Uranium and its compounds

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Uranium Workers

Uranium and its compounds

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Vanadium Steel Workers

Heat

Vanadium and its compounds

Vapour Curers (see vulcanizers)**Varnishers**

Acetaldehyde

Acetone

Amino compounds of benzol, toluol and xylol

Amyl acetate

Amyl alcohol

Aniline

Benzol and its homologues (toluol and xylol)

Butyl alcohol

Ethyl acetate

Ethylene chlorohydrin
Formic acid
Ketones
Lead and its compounds
Manganese compounds
Methyl alcohol
Paraldehyde
Petroleum hydrocarbons
Turpentine

Varnish Makers

Acetaldehyde
Acetone
Acrolein
Alkalis
Amino compounds of benzol, toluol
and xylol
Ammonia
Amyl acetate
Amyl alcohol
Aniline
Barium compounds
Benzol and its homologues (toluol
and xylol)
Butyl alcohol
Carbon disulphide
Chlorinated diphenyls
Chlorinated naphthalenes
Diethylene dioxide
Ethyl acetate
Ethylene chlorohydrin
Ethylene glycol monomethyl ether
Formic acid
Furfural
Ketones
Lead and its compounds
Manganese compounds
Methyl alcohol
Ozone
Petroleum hydrocarbons
Phenol
Sulphur chloride
Sulphur dioxide
Sudden variations of temperature
Turpentine

Varnish Remover Makers

Benzol and its homologues (toluol
and xylol)

Dichloroethyl ether
Ketones
Methylene chloride
Petroleum hydrocarbons

Varnish Removers

Benzol and its homologues (toluol
and xylol)
Dichloroethyl ether
Ketones
Methylene chloride
Petroleum hydrocarbons

Vatmen

Carbon dioxide
Dampness
Heat

Vat Varnishers (see varnishers)**Vault Workers**

Carbon dioxide

Velvet Makers

Arsenic and its compounds
Heat

Veterinarians

Anthrax
Glanders
Septic infections
Undulant fever

Vignettters

Hydrochloric acid

Vinegar Workers

Carbon dioxide
Heat

Vintners

Carbon dioxide

Vinyl Chloride Makers

Vinyl chloride

Vulcanizers

Amino compounds of benzol, toluol
and xylol
Ammonia
Aniline
Antimony and its compounds

Benzol and its homologues (toluol and xylol)

Carbon dioxide
Carbon disulphide
Carbon tetrachloride
Chlorinated hydrocarbons
Chromium compounds
Dampness
Heat
Hydrogen sulphide
Methyl alcohol
Petroleum hydrocarbons
Selenium compounds
Sudden variations of temperature
Sulphur chloride
Sulphur dioxide

Vulcanizers (steam)

Heat
Dampness

Wallpaper Printers

Amino compounds of benzol, toluol and xylol
Arsenic and its compounds
Chromium compounds
Formaldehyde
Heat
Lead and its compounds
Phenol
Sudden variations of temperature

Warehouse Workers

Anthrax

Washers

Dampness

Washers (metal) (see also degreasers)

Chlorinated hydrocarbons
Petroleum hydrocarbons

Washwomen

Dampness
Repeated motion, pressure and vibration

Watch Dial (luminous) Painters

X-rays, radium and other radio-active substances (radiothorium, mesothorium, etc.)

Watchmakers

Defective illumination
Repeated motion, pressure and vibration

Waterproofers (paper and textile)

Benzol and its homologues (toluol and xylol)
Carbon tetrachloride
Chromium compounds
Formaldehyde
Petroleum hydrocarbons
Tar and pitch

Water Purifiers

Barium compounds
Chloride of lime
Chlorine

Wax Makers (see also petroleum)

Benzol and its homologues (toluol and xylol)
Chlorinated diphenyls
Chlorinated hydrocarbons
Chlorinated naphthalenes
Ozone
Sulphuric acid
Tetrachloroethane
Turpentine

Wax Ornament Makers

Acrolein
Arsenic and its compounds
Chromium compounds

Weavers

Organic dust
Repeated motion, pressure and vibration

Weavers (asbestos)

Asbestos dust

Welghers

Inorganic dust (free silica)
Organic dust

Welders

Arsenic and its compounds
Benzol and its homologues (toluol and xylol)
Cadmium and its compounds
Carbon monoxide
Chromium and its compounds
Copper
Electrical burns; electrical shock
Heat
Hydrofluoric acid
Lead and its compounds
Manganese and its compounds
Mercury and its compounds
Metal fume fever
Nitric acid
Nitrous fumes
Ozone
Phosphine
Phosphorus and its compounds
Selenium and its compounds
Ultraviolet and infrared rays
Zinc and its compounds

Well Workers

Aliphatic hydrocarbons (methane, etc.)
Carbon dioxide
Hydrogen sulphide

White Lead Workers

Carbon dioxide
Lead and its compounds

Window Shade Makers

Benzol and its homologues (toluol and xylol)
Petroleum hydrocarbons

Wire Drawers

Arsenic and its compounds
Hydrochloric acid
Sulphuric acid

Writers (incandescent lamps)

Amyl acetate

Wood Alcohol Distillers

Acetone
Carbon monoxide
Methyl alcohol

Wooden Heel Workers

Anthrax

Wood Last Scourers (shoes)

Organic dust

Wood Polishers (see furniture polishers)**Wood Preservers**

Arsenic and its compounds
Cresol
Dinitrophenol
Mercury and its compounds
Phenol
Sulphuric acid
Tar and pitch

Wood Stainers

Chromium compounds
Lead and its compounds

Woodworkers

Methyl alcohol
Organic dust
Petroleum hydrocarbons

Wool Carders

Anthrax
Organic dust

Wool Scourers

Acetone
Ammonia
Anthrax
Dampness
Sudden variations of temperature

Wool Spinners

Anthrax
Organic dust

Wool Workers (see also particular occupation)

Anthrax
Organic dust

X-Ray Machine Makers

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

X-Ray Photographers

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

X-Ray Technicians

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

X-Ray Tube Makers

X-rays, radium and other radioactive substances (radiothorium, mesothorium, etc.)

Yeast Makers

Acetaldehyde
Carbon dioxide
Hydrofluoric acid
Sulphuric acid

Zinc Chloride Makers

Arsine
Chlorine
Hydrochloric acid
Zinc compounds

Zinc Electrode Makers

Mercury and its compounds

Zincers

Cyanides

Zinc Miners (see also miners)

Arsenic and its compounds
Lead and its compounds
Manganese and its compounds

Zinc Smelters and Refiners

Antimony and its compounds
Arsenic and its compounds
Cadmium and its compounds
Carbon monoxide
Heat
Inorganic dust (free silica)
Inorganic dust (no free silica)
Lead and its compounds
Manganese and its compounds
Metal fume fever
Selenium and its compounds
Sulphur dioxide
Tellurium and its compounds
Zinc and its compounds

Zoological Technicians

Anthrax
Glanders
Psittacosis
Septic infections
Tetanus
Undulant fever.

In some industries, it may be a comparatively simple matter to provide good illumination while in others one may require the advice of illuminating engineers. For those who have need for technical knowledge on this subject, a useful reference work is "Recommended Practice of Industrial Lighting," prepared by the Illuminating Engineering Society and available from the Department of Labour, Ottawa. It should be borne in mind that, in fine work, magnification with good illumination may be more effective than high intensity alone.

Nystagmus has been reported in British coal miners and in train despatchers in America. In the case of coal miners, the condition is attributed to the low illumination of the coal face combined with the necessity of working in cramped positions. In train despatchers, the condition is thought to be due to the constant shifting of the eyes associated with the recording of data on the train sheet.

Ultraviolet light is an occupational hazard which frequently causes acute conjunctivitis and photophobia. This hazard is discussed in Section F, under "Radiant Energy."

Section E. Excessive Noise

The effects produced by excessive noise include fatigue, impaired hearing, decreased efficiency and emotional disturbances.

Noise can be measured by the sound level meter, which determines the intensity of a sound in the immediate environment in terms of decibels. The noise level produced by a riveting machine is about 100 decibels; in a large stenographic room it is about 70 decibels; the intensity of sound in ordinary conversation varies from 35 to 65 decibels. The normal threshold of audibility is 0 decibels. Intensities above 80 decibels are annoying and uncomfortable, and noise levels of 100 to 130 decibels have been found to cause temporary and permanent deafness. Levels above 130 decibels are painful to the ear.

Intensity is not the only factor in the evaluation of a noise problem. Industrial noise is usually a combination of sounds of different frequencies. By measuring the intensity of sound produced at each frequency and determining the frequency of vibration of various parts of a machine, it is often possible to establish the main sources of a noise and take steps to eliminate or reduce it.

By means of an audiometer, the hearing loss in decibels may be determined at each frequency. Investigations of deafness due to noise have shown that the initial loss in acuity occurs for sounds of

Section J. Dusts and Fumes

Certain industrial processes are associated with the production of considerable quantities of dusts and fumes. The effect of such dusty environments upon the health of the worker is frequently very difficult to assess. At one time, most dusts were thought to be at least potentially harmful to the body. With the discovery of the effect of silica on the lungs, the view was finally adopted that only silica (and possibly asbestos) was dangerous, and dusts were classified as harmful or inert, depending upon their silica content. In recent years, with the discovery of lung conditions associated with non-siliceous dusts and fumes, and with the realization that the reaction of the lung to silica is probably modified by the inhalation of concomitant materials, it has become necessary to reconsider the effects on the body of exposure to dusty environments. Though silica still remains the chief cause of pulmonary disease resulting from occupational exposure, some other dusts and fumes are now known to produce disability or even death. It is doubtful whether any dust can be regarded as entirely harmless, under conditions of extreme exposure.

From the hygienist's point of view, the question is whether a particular dust or fume exposure may be harmful to the health of workers. The practicing physician must decide whether a worker's disability or impairment of function is the result of exposure to dust or fumes associated with his work, and whether an affected worker should be allowed to return to his job. To answer these questions requires not only a broad knowledge of the effects on the body of dusts and fumes generally, but also detailed information regarding the particular exposure and its relation to the worker. Thus, in assessing the exposure, information is required concerning such factors as: (1) chemical composition of the dust or fume; (2) the size of the dust or fume particles; (3) the concentration or quantity of the respirable dust or fume in the worker's breathing zone; (4) intermittency of exposure and total length of exposure; (5) severity of the work (as it affects depth of respiration); and (6) efficiency of protective devices and measures aimed at dust control.

1. *Chemical Composition of the Dust or Fume.*

This information is frequently difficult to secure from the patient. Dusts, which are produced by mechanical action, such as grinding, crushing, drilling and cutting, are, for the most part, similar in

composition to the substance from which they are derived. The same chemical constituents are present in the dust though sometimes in different proportions than in the parent substance. Fumes, on the other hand, being the result of condensation from the gaseous state, as after volatilization of metals, are frequently oxidized during the condensation process and therefore differ chemically from the substance from which they originate. In order to determine accurately the composition of the dust or fume, it may be necessary to secure samples for analysis.

2. *Size of Dust or Fume Particle.*

It has been conclusively established that the vast majority (over 90 per cent) of the particles which reach the alveoli are less than 3 microns ($3/1,000$ ths of a millimetre) in diameter. Most particles larger than 3 microns either settle out of the air before it is breathed, or are trapped in the secretions of the nose and throat and eliminated or swallowed. As a rule, dust particles vary greatly in size, depending to some extent upon the mechanical processes involved in their production. The dust produced by the wet drilling of hard rock contains a higher *percentage* of respirable dust than that produced by dry drilling, since most of the larger particles are trapped in the wet process while many of the finer particles escape. The *number* of particles of respirable size produced by dry drilling is, of course, very much greater than that produced by wet drilling. In the case of fumes, the particles are usually more uniform in size and their diameter such that the greater proportion of the fume is respirable. However, fume particles tend to flocculate, producing larger particle masses.

3. *Concentration of Respirable Dust or Fume in Air.*

A healthy respiratory system is capable of handling a certain amount of dust or fume without impairment of function or systemic poisoning resulting. However, the inhalation of amounts beyond this threshold is harmful. The concentration of dust or fume which can safely be inhaled varies widely according to the composition of the material inhaled and the duration of the exposure. There is also a wide variation in individual susceptibility. Of two men, working at the same job and in the same exposure over a period of years, one may develop occupational dust disease while the other remains apparently unaffected. This individual susceptibility is often observed by the industrial physician dealing with groups of workers in similar exposures. For most of the mineral dusts and fumes,

values have been set for the concentrations of the material in air which are regarded as permissible for repeated 8-hour exposures.

4. *Intermittency of Exposure and Length of Exposure.*

In the case of certain acutely irritant dusts and fumes, (e.g., cadmium), harmful effects may result from single, massive exposures. With the majority of dusts however, months or years may be required before the worker is affected. Frequently the man concerned has changed his job before symptoms develop. For this reason, a careful occupational history should start from the time the patient left school, and account for his employment during the subsequent years up to the time of his present illness.

The securing of adequate information concerning the above four factors in the worker's exposure, and the assessment of other factors such as the efficiency of the measures taken to control dust within the plant, frequently require laboratory and other facilities not readily available to the general practitioner. In such cases, assistance should be requested from the Provincial Department of Health or its Division of Industrial Hygiene.

1. ORGANIC DUSTS

Organic dusts contain carbon and are largely derived from substances of animal or plant origin. Common examples are dusts and fibres arising from the handling or manufacture of: wood, bone and shell; fur, skins, hides and leather; feathers; brooms and straw; flour and grain; tobacco; jute, flax (linen), hemp, cotton, wool (worsted, etc.); felts and carpets; rags and paper; sweepings.

Though most organic dusts do not cause pneumoconiosis or pulmonary fibrosis of a specific disabling nature, many are irritant to the upper respiratory passages and to the conjunctivae and skin, causing bronchitis, conjunctivitis and dermatitis. Many organic dusts may elicit allergic reactions in sensitized persons, with production of asthma, urticaria, etc. Such irritative and allergic effects are usually relieved by termination of the exposure, and tend to recur when the patient returns to the job. A few dusts of the organic type have been reported to cause rather specific illnesses, outlined below. In some cases, it is doubtful whether the dust itself is responsible, bacteria and fungi present in the dust having been incriminated by certain investigators.

COTTON DUST

The term "byssinosis" has been applied to a respiratory affection occurring in certain workers exposed to cotton dust. The condition has been recognized in England for some years. The persons affected were employed in carding rooms and were mainly the operators of carding engines. As yet, no definite cases have been reported in Canada.

The clinical picture usually takes the following course: After working for some time in the dusty atmosphere, the worker develops a feeling of irritation in the throat and chest, sneezing, and a dry, short cough. At first, complaints are noticed only on Monday mornings or after a short absence from work and subside after only a few hours or a day or two, even though the worker remains in exposure. Symptoms return each Monday morning and a low-grade fever may be present in a few of the affected workers. The condition may gradually wear off and not recur, or it may never entirely clear, the symptoms recurring upon each return to work after a short absence. In the early stages there is no disability. However, after 10 or more years' exposure, the symptoms of fever, cough and tightness in the chest return, in greater severity than in the early stage. The worker tires easily, loses weight, and suffers from asthma and bronchitis. Removal from work may produce some improvement in his condition, but return to work results in further recurrence of symptoms. As the condition progresses, dyspnoea becomes marked, the cough is more productive, with expectoration of mucoid or mucopurulent sputum, and there is marked emphysema. In the later stages, the condition is disabling and incurable. Physical findings in the early stages are not remarkable. In the later stages the usual clinical findings are those of chronic bronchitis and emphysema. The radiographic appearances are consistent with chronic bronchitis and emphysema though the hilar shadows are somewhat more prominent than is usually found in these conditions. Autopsies have revealed only a non-specific chronic bronchitis and emphysema. The condition is regarded by most authorities as the result of allergy occurring in sensitized persons.

In addition to the fairly distinct entity described above, there have been several reports of an acute febrile illness, with cough, dyspnoea, tightness in the chest, and general systemic symptoms, occurring in cotton weavers in England and in mattress makers, cotton seed treaters and cotton millworkers in the United States.

These illnesses were regarded as being a form of acute bronchitis. Residual symptoms lasted for one or two months. The American investigators believed the illness to be caused by a gram-negative, rod-shaped bacillus; the English workers attributed their cases to mycotic agents in the cotton dust.

"THRESHER'S LUNG" AND "FARMER'S LUNG"

Men exposed to dust from hay, straw and grain have been reported to suffer from a group of diseases which are often called "asthma", "bronchitis" or "pneumonia". Investigators in England, Switzerland and Scandinavia consider the condition to be a fairly discrete entity, probably due to mycotic infection of the lungs. Exposure occurs when grain has stood out in wet weather before threshing. Under these conditions the grain is frequently heavily contaminated with fungi, and when dried, the dust contains the spores. The condition is characterized by gradually increasing dyspnoea, slight fever, unproductive cough and an increased sedimentation rate. Clinical findings include areas of dullness to percussion and moist crepitations in the lungs. In more severe cases the shortness of breath is marked, the fever is higher, and there may be muco-purulent sputum or haemoptysis. Radiologically there is a fine reticulation in the early stages, later followed by a soft mottling through both lungs. As the disease progresses, the mottling becomes more dense, the hilar shadows enlarge, and eventually the lungs show large, dense patches due to coalescent areas of fibrosis, and there are considerable areas of emphysema. In the early stages, the condition responds to potassium iodide therapy. In the later stages response to therapy is poor, and the fibrosis advances. One case coming to autopsy showed emphysema of the lung, with bands of fibrosis traversing the lung substance.

WHEAT DUST

Large amounts of grain dust, when inhaled, may produce asthma and bronchitis in sensitive individuals. The fine hairs of the wheat grain have been reported to cause asthma in workers exposed to the dust arising from the first cleaning of the wheat. Injection of minute amounts of the wheat hair extract gave rise to severe local reactions and to asthma in sensitive millers.

BAGASSE

The term "bagassosis" is applied to a lung condition occurring in workers handling bagasse—a fibrous material which remains after the

sugar has been extracted from sugar cane. The condition has been reported in England, United States and Mexico, and consists of an acute bronchiolitis and pneumonia, with symptoms beginning usually about 8 weeks after first commencing work with the bagasse. There is usually fever, extreme dyspnoea, cough with scanty, black stringy sputum, and signs scattered throughout both lungs. Radiography shows the presence of miliary shadows throughout both lung fields. Symptoms gradually lessen over a period of 6 weeks, with the lung fields clearing completely. Occasionally the pneumonia fails to resolve and fibrosis of the lung may develop. The exact cause of the condition has not been definitely established, the vegetable dust and fungi both being suspect. No cases have been noted in Canada, as yet.

2. INORGANIC DUSTS AND FUMES

These materials are metallic or mineral in origin. Included in the mineral dusts are coal and graphite, though strictly speaking the latter are organic materials. The inorganic dusts and fumes may be divided into five main groups, according to their action upon the body.

Group I. Inert Dusts and Fumes:

These substances produce no systemic symptoms when inhaled, and prolonged exposure does not result in the development of any disability. Though the lungs may show radiographic changes after some years of exposure, such changes are not accompanied by symptoms or measurable impairment of function, and there is no predisposition to pulmonary tuberculosis. The radiographic shadowing is caused, for the most part, by the deposition of radio-opaque materials in relation to the lymphatic system of the lung, where they remain, causing no injury. The lung changes produced by the inert dusts are of importance chiefly because of the difficulty they present in differential diagnosis, since their radiographic appearances sometimes closely resemble those due to silica. Included in the group of inert dusts and fumes are:

CARBON DUSTS

Graphite is a crystalline form of carbon; ash-free anthracite coal is an amorphous form of the same element. In the pure state, these dusts cause no fibrosis of the lung; as they occur in nature, however, graphite and anthracite frequently contain considerable amounts of

free silica, and workers exposed may develop a modified form of silicosis, or anthracosilicosis. Like true silicosis, anthracosilicosis may produce a disabling fibrosis of the lung. The incidence of the disease has been shown to be related to the concentration of silica dust in the air and to the length of the exposure.

IRON DUSTS AND FUMES

Exposure to these materials occurs in haematite miners, welders, polishers (who use the red oxide of iron, or rouge), tool makers, cutlery makers, and many other occupations. The deposition of these dusts or fumes in the lungs produces a non-disabling condition known as siderosis, which is characterized radiologically by a fine, generalized mottling of the lung fields. There are usually no symptoms or impairment of health. Certain exposures to iron dusts and fumes are associated with exposure to silica. Thus silicosis is a recognized hazard in iron and steel foundries, and the mining of iron ores in certain regions, particularly in England, is associated with the production of a modified form of silicosis which may be disabling if infected.

DUSTS OF CALCIUM AND MAGNESIUM COMPOUNDS

Calcium carbonate occurs naturally as limestone, marble and chalk. Gypsum is calcium sulphate. Calcined magnesium carbonate is used in making bricks for furnace linings and other types of insulating material. Inhalation of the dusts of these materials may produce radiographic changes, but there is no evidence that any disabling lung fibrosis results, even after prolonged exposures. Talc, a hydrated magnesium silicate, is discussed below (see Group V).

CEMENT DUST

Cement is essentially a mixture of calcium silicate and calcium aluminate, with an excess of lime. Though there may be up to 23 per cent of silica in cement, this silica is present as silicate, combined with the calcium. There is no definite evidence that prolonged exposure to cement dust causes any disability. Characteristic radiographic changes do not occur.

SILICATE DUSTS

Most of the silicate dusts including clay and kaolin (aluminum silicate), sodium silicate (or "water glass", an adhesive used in sealing cardboard cartons), and the dusts of fibrous glass insulating materials (composed of silicates of sodium, potassium, calcium and

other metals) produce no fibrosis of the lungs even after long exposure. The only silicate which at present is definitely known to cause disabling lung fibrosis is asbestos, a fibrous silicate of magnesium and other metals (see Group IV). In the case of two other silicates, mica and talc, their role in producing pulmonary disease is still under investigation (see Group V).

Recommended M.A.C.: For inert dusts, such as cement, limestone, chalk, iron, etc., containing no free silica, the recommended maximum allowable concentration is regarded by most authorities as being 50 M.P.P.C.F. (million particles per cubic foot of air).

Group II. Dusts and Fumes Producing Systemic Effects:

Some metallic dusts and fumes are absorbed through the lungs, causing systemic effects in other parts of the body while the lungs escape damage. Inhalation of lead dust and fumes plays an important part in the causation of lead poisoning, and mercury poisoning may follow the inhalation of mercury vapour. The chronic form of manganese poisoning usually follows inhalation. While the lungs are generally not affected in such cases, mice exposed to manganese dust have developed a pneumonitis, and British and European reports have indicated a higher incidence of pneumonia and other respiratory infections in persons exposed to manganese dusts and fumes than in the general population. The inhalation of fumes of certain other metals causes a general systemic effect known as "metal fume fever". While zinc oxide is regarded as the commonest cause, the oxides of magnesium, copper, lead, antimony, arsenic, nickel, silver and cobalt have been reported as capable of producing the condition. Some investigators think that the fever is a reaction to proteids liberated following the destruction of epithelial cells of the respiratory tract by the action of the metallic oxide. The only respiratory symptoms reported are a dry cough and tightness of the chest. In any case, the effects on the respiratory system cause little discomfort, and no permanent disability is produced. See Section K, for further details regarding systemic poisons and metal fume fever.

Group III. Dusts and Fumes Producing Inflammatory Lung Changes:

Inhalation of dusts or fumes of cadmium, vanadium, osmium and beryllium may produce acute inflammatory changes in the lungs. Exposure to certain compounds of beryllium may result in the development of an acute pneumonitis, or the worker may apparently escape injury and have no symptoms while in exposure, only to develop a

disabling and sometimes fatal lung condition after leaving exposure. The latent period may be as long as five years. Cadmium, beryllium and vanadium are discussed in Section K, since their effect upon the body is not restricted to the respiratory system.

Group IV. Dusts and Fumes Producing Disabling Lung Fibrosis:

Two dusts and one fume are known to produce disabling pulmonary fibrosis—silica, asbestos, and the fume produced during the fusion of bauxite in the manufacture of artificial alumina abrasives.

SILICA

From the point of view of numbers of men exposed and cases of disability produced, silica is still the chief cause of pulmonary dust disease. The distinction between "free" silica (silicon dioxide, SiO_2) and "combined" silica (or silicate, having the radicle $-\text{SiO}_4$) is most important, since the silicates, with the exception of asbestos, are probably inert. The prolonged inhalation of dusts containing free silica, on the other hand, may result in the development of a disabling pulmonary fibrosis known as silicosis. The Committee on Pneumoconiosis of the American Public Health Association defines silicosis as "a disease due to the breathing of air containing silica (SiO_2), characterized by generalized fibrotic changes and the development of miliary nodules in both lungs, and clinically by shortness of breath, decreased chest expansion, lessened capacity for work, absence of fever, increased susceptibility to tuberculosis (some or all of which symptoms may be present), and characteristic X-ray findings."

Silica occurs in the pure state in nature as quartz. It is the main constituent of sand, sandstone, tripoli and diatomaceous earth, and is present in high amounts (up to 35%) in granite. Several ores, especially iron and coal, may contain a variable amount of silica. Exposure to silica occurs in hard rock mining, in foundries, in the manufacture of porcelain and pottery, in the spraying of vitreous enamels, in sandblasting, in granite-cutting and tombstone-making, in the manufacture of silica firebrick and other refractories, in grinding and polishing operations where natural abrasive wheels are used, and other occupations.

The duration of exposure which is associated with the development of silicosis varies widely for different occupations. Thus, the average duration of exposure required for the development of silicosis in sand-blasters is 2 to 10 years, in moulders and granite cutters

about 30 years, and in hard rock miners 10 to 15 years. There is, also, much variation in individual susceptibility, certain workers showing radiological evidence of the disease years before their fellow workmen who are similarly exposed. Such susceptible individuals are fortunately rather rare.

In the absence of pulmonary tuberculosis, silicosis does not commonly cause symptoms or disability. The action of silica on the lungs results in the production of a diffuse, nodular fibrosis in which the parenchyma and the lymphatic system are involved. This fibrosis is, to a certain extent, progressive, and may continue to increase for several years after exposure is terminated. It would appear that the fibrosis is commonly self-limiting, a point of equilibrium being reached where the reparative processes of the lungs effectively counteract the irritant action of the retained and dissolved silica. The exact point of equilibrium is determined chiefly by the amount of silica retained in the lungs, and by the effectiveness of the response elicited in the individual's lung tissue. In most instances, the pulmonary reserve greatly exceeds the amount of lung tissue which is replaced by the fibrotic process, and no symptoms or disability result. Where the pulmonary reserve is sufficiently reduced, the worker complains of shortness of breath on exertion. This is the first and most common symptom in cases of uncomplicated silicosis. If severe, it may incapacitate the worker for heavy, or even light, physical exertion, and in extreme cases there may be shortness of breath even while at rest. The most common physical sign of silicosis is a limitation of expansion of the chest. There may be a dry cough, sometimes very troublesome. The characteristic radiographic appearance is one of diffuse, discrete nodulation, scattered throughout both lung fields. Where the disease advances, the shortness of breath becomes worse, and the cough more productive and troublesome. There is no fever or other evidence of systemic reaction. Further progress of the disease results in marked fatigue, extreme dysnopea and cyanosis, loss of appetite, pleuritic pain and total incapacity to work. If tuberculosis does not supervene, the condition may eventually cause death either from cardiac failure or from destruction of lung tissue, with resultant anoxaemia. In the later stages, the X-ray may show large, conglomerate shadows, due to the coalescence of the silicotic nodules, with areas of emphysema between them. Such advanced cases are rare, and are usually the

result of prolonged massive exposures occurring in individuals who are unduly susceptible.

The most serious feature of silicosis lies in the fact that its presence predisposes to tuberculous infection, and that tuberculosis in persons with silicosis tends to progress regardless of any therapeutic measures taken, although rest may delay the process. In some silicotics the tuberculosis runs an acute course; more commonly, the combination of tubercle bacilli and inhaled quartz produces chronic fibrosis of the lungs, which slowly spreads over a period of many years. Contraction of the masses of fibrosis results in the formation of areas of compensatory emphysema. Such disease causes shortness of breath, and if severe, may produce total disability. The usual symptoms of tuberculosis, such as fever, night sweats, loss of weight and productive cough may make their appearance only a year or so before death. The dyspnoea and disability which were formerly believed to be characteristic of silicosis were in most instances due to the massive fibrosis and emphysema which followed the combined action of tubercle bacilli and silica. Silicosis, alone, rarely causes significant emphysema, with its resultant shortness of breath and disability.

In making a diagnosis of silicosis, it is essential to ascertain whether the man worked in a silica exposure, and if he has, whether he had sufficient exposure to cause the disease. Though this seems elementary, cases have been labelled silicosis where there was never any exposure to silica, or where there had been exposure for only several months. The tendency to rely solely upon a single chest film, with no enquiry made as to past exposure, frequently results in such mistakes in diagnosis. Much harm can be done a man in telling him that his disability is due to silicosis, if it should be shown subsequently that he does not have the disease.

Recommended M.A.C.: For dusts containing over 50% free silica, the recommended maximum allowable concentration for prolonged exposure is 5 million particles per cubic foot (M.P.P.C.F.)

For dusts containing 5 to 50% free silica, the recommended M.A.C. is 20 M.P.P.C.F.

For dusts containing less than 5% free silica, the recommended M.A.C. is 50 M.P.P.C.F.

ASBESTOS

Canada is one of the principal countries producing asbestos. This material is chiefly hydrated magnesium silicate, occurring as a white

fibrous ore. The fibres, when separated, may be spun into yarn and woven in much the same manner as ordinary textiles or they may be ground and mixed with other materials to form insulating boards or sheets. Exposure to the dust occurs in the crushing, carding, spinning and weaving of the material, and in the manufacture of brake linings and asbestos insulating products.

The essential lesion produced is a diffuse fibrosis which probably begins as a "collar" about the terminal bronchioles. Usually, at least 4 to 7 years of exposure are required before the production of a serious degree of fibrosis. There is apparently less predisposition to tuberculosis than is the case with silicosis.

Clinically, the most striking sign is shortness of breath of gradually increasing intensity, often associated with a dry cough. In the early stages physical signs are absent or slight; in the later stages râles may be heard, the diastolic blood pressure is raised, the second pulmonary sound is accentuated, and in long-standing cases there is frequently clubbing of the fingers. In the early stages of the disease the chest X-ray reveals a ground-glass or granular change, chiefly in the lower lung fields; as the condition progresses the heart outline becomes "shaggy" and irregular patches of mottled shadowing may be seen.

At autopsy, the pleurae are thickened and adherent and thick subpleural fibrous plaques are often present. Where the disease is far advanced there are usually large areas of fibrosis, with emphysematous changes in the apices and bases. The alveolar walls are thickened, and the characteristic "asbestos bodies" are found.

Recommended M.A.C.: 5 to 10 M.P.P.C.F.

FUME PRODUCED DURING THE FUSION OF BAUXITE

In 1942 an occupational lung disease caused by the fumes produced during the fusion of bauxite in the manufacture of artificial alumina abrasives was discovered by Dr. C. G. Shaver, Superintendent of the Niagara Peninsula Sanatorium. Bauxite is a natural hydrated alumina or aluminum oxide (Al_2O_3) containing small amounts of silica. When fused, a crystalline alumina or artificial corundum is formed. In the manufacture of corundum the bauxite is heated in open metal pots by means of an electric arc. During the fusion, dense white fumes are given off. The fumes consist chiefly of alumina (40 to 60%) and amorphous silica (30 to 45%). The greatest exposure occurs among men operating overhead cranes and among those who shovel mix into the furnaces.

The lesion produced is essentially a diffuse interstitial fibrosis. The nodule formation, which characterizes silicosis, is absent. In the early stages there are no symptoms or clinical signs. The radiographic changes consist of an indefinite granular or lace-like appearance in the apices and sub-apical regions. As the condition progresses, the lace-like shadowing extends into the lower lung fields. In the later stages the whole lung field may present a granular, or irregular, nodular appearance. The diaphragm is distorted and the mediastinum widened. Up to this point, the patient has usually had no complaints, and the only physical sign is a decreasing vital capacity. In such cases, spontaneous pneumothorax, frequently bilateral, may occur, with complaint of sudden extreme dyspnoea and/or severe chest pain. With the occurrence of the pneumothorax the man is nearly always totally incapacitated. The heart is retracted to the uncollapsed side, and the periphery of the collapsed lung may show large emphysematous blebs or bullae. The lungs of cases coming to autopsy have shown massive strands of interstitial hyaline fibrosis, with areas of compensatory emphysema. The pleurae are thickened or adherent, and sub-pleural bullae are usually present. There is no nodule formation. Extensive lung fibrosis may follow as little as 2 or 3 years of exposure, though usually the period of exposure is longer. The exact factor in the fumes which is responsible for causing the condition has not yet been isolated. The possibility that the fibrosis may be due to silica, modified in its action by the presence of alumina or of other materials present in the fumes, has to be considered. On the other hand, exposure of workmen in Germany during the past war to aluminum powder resulted in the development of a lung condition which, from the reports published, appears to be essentially the same as that discovered by Shaver. There is some suggestion that similar cases have also occurred in Sweden following exposure to aluminum powder. These exposures are being investigated.

Recommended M.A.C.: No values have been set, as yet. Periodic chest X-ray is essential to the early detection of cases.

Group V. Dusts and Fumes of Undetermined Pathogenicity to the Lung:

The effect of certain dusts and fumes on the body and the role they play in causing lung disease has not yet been clearly determined.

TALC

Talc or soapstone, a hydrated magnesium silicate, is used as a filler in rubber, plastics, paints, insulating materials, cosmetics and dusting powders. Exposure may occur in the mixing, crushing and milling of the material, and in its use as a filler. Reports published indicate that exposure to talc dust may be associated with the development of a diffuse fibrosis, with symptoms of dyspnoea, cough and fatigue, and with the production of disability. Radiologically there may be a diffuse, fine granular shadowing throughout both lung fields, or the shadowing may be of a nodular type, resembling silicosis. Autopsy reports describe irregular areas and bands of cellular fibrosis surrounding the vessels and bronchi, producing thickening of the alveolar walls. No silicotic nodules were found. Though some investigators believe that talc, per se, is responsible, the possibility that the condition is produced by a modified action of free silica present in the talc has to be borne in mind. Further investigation is needed to decide the question.

Recommended M.A.C.: It is felt by some authorities that the concentration of talc dust in air should not exceed 20 M.P.P.C.F. where men are exposed repeatedly for 8 or more hours each day.

MICA

A potassium-aluminum or magnesium-aluminum silicate. There is no definite evidence that exposure to mica dust causes pulmonary fibrosis. The possibility of free silica being present in the earth from which mica is obtained must be remembered.

Recommended M.A.C.: 50 M.P.P.C.F., where the mica contains less than 5% silica.

DIATOMACEOUS EARTH

Natural diatomaceous earth is an amorphous form of silica. In the amorphous state, the material does not cause disabling lung fibrosis. When calcined with certain fluxes, a portion of the amorphous silica is converted into crystalline silica, and men exposed to this form of the earth have been reported to develop a lung fibrosis which does not exhibit the nodule formation characteristic of silicosis. Pneumothorax has been reported to occur frequently in the men affected.

Recommended M.A.C.: No limit has been set.

ARSENIC, CHROMIUM AND RADIOACTIVE DUSTS

There is some evidence that exposure to dusts of arsenic, chromium and radioactive materials has been associated with a higher incidence

of pulmonary cancer than occurs in the general population. In the case of arsenic and the radioactive dusts, the evidence that these materials may cause carcinoma of the lung is fairly strong. However, in the case of an individual with lung cancer, it is as yet impossible to say that the carcinoma is the result of his exposure, even where there has been prolonged exposure to one or more of these materials. The role played by exposure to dusts and fumes in the development of pulmonary carcinoma is extremely difficult to assess and it may be many years before the relationship is clear.

Section K. Harmful Chemicals

Acetaldehyde (Acetic Aldehyde; Acetyl Hydride; Aldehyde; Ethanal; Ethyl Aldehyde).

Formula: CH_3CHO .

Properties: A colourless liquid, having a strong, pungent, fruity odour. Inflammable.

Specific Gravity: 0.78 times as heavy as water.

Boiling Point: 69.4°F .

Vapour Density: 1.5 times heavier than air.

Volatility: Is quite volatile at ordinary room temperatures.

Acetaldehyde is miscible with water, alcohol, benzol, ether, acetone and gasoline.

Uses and Occurrence: Used in the manufacture of chemicals and dyes, plastics, synthetic rubber, disinfectants and preservatives, drugs and perfumes. Is employed in photography and in the silvering of mirrors.

Mode of Entry into Body: As a vapour, through inhalation.

Physiological Action and Toxicity: Acetaldehyde is eliminated in the bile by the liver. The vapour is irritant to the mucous membranes of the eyes, mouth and respiratory tract. The majority of subjects find 50 ppm irritating to the eyes, and a concentration of less than 200 ppm is definitely irritating to the nose and throat. Acetaldehyde possesses anaesthetic properties, but this action is masked by the more intense irritant action on the upper respiratory tract. Continued exposure to very high concentrations may result in death from respiratory paralysis. Acetaldehyde is less toxic than

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