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Industrial Accident Prevention

A Scientific Approach

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THIRD EDITION

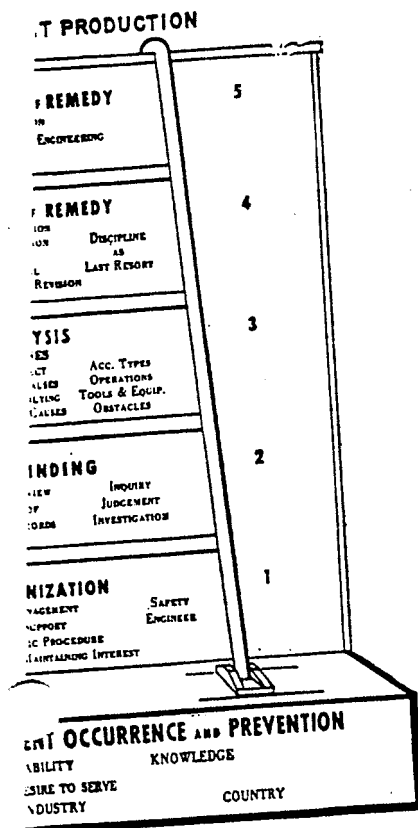
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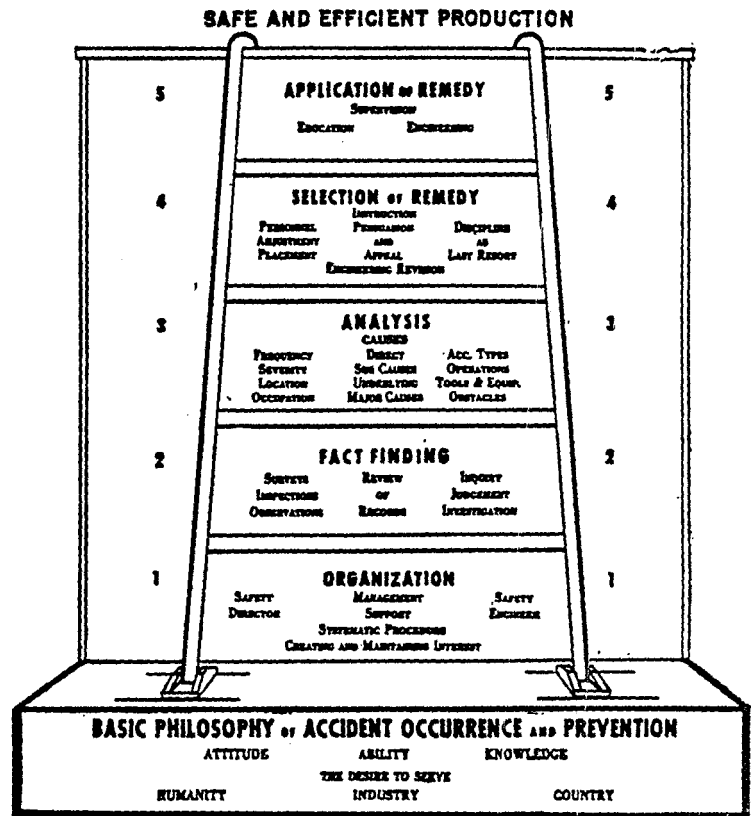
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CHAPTER 12

OCCUPATIONAL DISEASE

In the prevention of occupational diseases there is the same need for (1) a degree of interest on the part of executives and workers sufficient to initiate and maintain preventive and control methods, (2) the determination of necessary facts, and (3) corrective action based on the facts, as in the case of traumatic injury prevention. This is to say that the foundation and the five steps in the ladder of accident prevention apply without change to occupational disease. The relative importance of man failure as compared to mechanical and physical causes has not been established so definitely in the causation of occupational disease as in the occurrence of accidents that result in traumatic injury. Also there is considerable difference in types of accident and injury, unsafe agencies, and kinds of protective devices. In short, there is variation in detail and technique but none in principle or method.

Recognition of Hazards. The relation of a traumatic injury to the accident that causes it is obvious inasmuch as the interval of time between the accident and the injury is short. Occupational disease, on the other hand, does not so frequently follow immediately the exposure that is its cause. For these reasons much emphasis is placed upon the necessity for cooperation between physicians and engineers when occupational-disease problems arise. For the same reasons there is great need also for the recognition of specific materials, processes, equipment, and personal performance, one or all of which may bear materially on the incidence of occupational disease.

The problem is further complicated by such factors as the susceptibility of the individual and his physical resistance or immunity, lack of complete knowledge relating to the results of exposure to certain substances, slow development of disease in some cases, and nonstandardization of methods for determining the degree of hazard, the threshold danger limits, and often too

the methods of control and prevention. In addition, there is considerable variation, from the compensation and legal point of view, in the several states as to the definition of an occupational disease. These complications, however, emphasize rather than minimize the need for a factual and logical approach to the problem such as that here advocated.

Substance or source of occupational disease	Occupational disease associated	Typical industrial operations or uses
Acids (sulphuric, hydrochloric or hydrofluoric).	Poisoning or dermatitis	Acid manufacturing, chemical processing, etc.
Air (compressed)	Caisson disease	Tunneling
Alkaline compounds (lime, cement, caustics).	Dermatitis	Caustic manufacturing, lime burning, cement making, etc.
Arsenic	Skin irritation, ulcers, etc.	Insecticide manufacture, etc.
Asbestos	Asbestosis	Asbestos mining and milling, manufacture of asbestos products, etc.
Bacterium Mallei	Glanders	Care and handling of animals
Bacillus Anthrax	Anthrax	Handling of hides, wool, hair, or bristles
Benzene (benzol) and certain derivatives	Benzol poisoning	Manufacture and use of solvents
Carbon bisulphide	Acute and chronic poisoning	Rayon industry, rubber, insecticides
Carbon monoxide	Carbon monoxide poisoning	Garages, water-gas manufacturing, etc.
Chromium	Chrome sores, ulcers	Electroplating, paint manufacturing, tanning
Formaldehyde	Respiratory irritation	Plastic and disinfectant manufacturing
Halogenated hydrocarbons	Skin irritations, liver disorders	Metal degreasing, dry cleaning, refrigerants, flameproofing
Hydrogen sulphide	Respiratory irritation, conjunctivitis	Rayon industry, metallurgy, sewers
Lead	Lead poisoning	Handling and use of lead compounds, storage-battery and paint manufacturing, mining and smelting of lead
Light (glare)	Cataract, eye affections	Manufacture of glass, illumination
Manganese	Liver ailments, nervous disorders	Manufacture of alloy steels, in glass industry
Mercury	Mercurial poisoning	Manufacture of felt hats, thermometers, germicides, etc.
Methanol (wood alcohol) ...	Poisoning of nervous system, especially optic nerve	Antifreeze solutions, varnish making, solvents
Nickel carbonyl	Irritation and edema of lungs, dermatitis	Antiknock in motor fuel, production of metallic nickel
Nitrous fumes	Respiratory irritation and edema	Manufacture of nitrates, welding, handling nitric acid
Petroleum derivatives	Eye affections, dermatitis, respiratory disorders	Solvents, dry cleaners, paints and varnishes, fuels, lubricants
Phenols	Skin irritation	Manufacture and use of disinfectants and preservatives
Phosphorus	"Phossy jaw" or other bone deterioration	Manufacture of phosphorus and phosphoric acid
Pitch (also tar, bitumen, etc.)	Cancer or ulcer of skin, liver, or eye	Roofing, roadmaking, waterproofing
Radiations	Tumors, anemia, bone decay, sterility, cataracts	Radium-dial painting, radioisotopes, cyclotrons, betatrons, etc.
Silica	Silicosis	Granite quarrying, foundries, ore milling, sandblasting, grinding, rock drilling
Zinc	Zinc shakes	Zinc smelting, brass foundries

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Typical industrial
operations or uses

Acid manufacturing, chemical
processing, etc.
Tunneling
Caustic manufacturing, lime
burning, cement making, etc.
Insecticide manufacture, etc.
Asbestos mining and milling,
manufacture of asbestos
products, etc.
Care and handling of animals
Handling of hides, wool, hair,
or bristles
Manufacture and use of sol-
vents
Rayon industry, rubber, insecticides
Garages, water-gas manufac-
turing, etc.
Electroplating, paint manufac-
turing, tanning
Plastic and disinfectant manu-
facturing
Metal degreasing, dry clean-
ing, refrigerants, flameproof-
ing
Rayon industry, metallurgy,
sewers
Handling and use of lead com-
pounds, storage-battery and
etc. manufacturing, mining
smelting of lead
acture of glass, illumina-
tion
Manufacture of alloy steels,
in glass industry
Manufacture of felt hats,
thermometers, germicides,
etc.
Antifreeze solutions, varnish
making, solvents
Knock in motor fuel, pro-
duction of metallic nickel
Manufacture of nitrates, weld-
ing, handling nitric acid
vents, dry cleaners, paints
and varnishes, fuels, lubri-
cants
Manufacture and use of disin-
fectants and preservatives
Manufacture of phosphorus
and phosphoric acid
ing, roadmaking, water-
proofing
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Granite quarrying, foundries,
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Industry is making amazing progress in the development of new products and new methods. These create new exposures and require new methods of control. Progress is so rapid that at any given time no list of diseases caused by or incidental to industrial occupations or processes can be considered complete. For many reasons, therefore, the foregoing table can be considered only as illustrative of the general problem.

Creating and Maintaining Interest. The methods of creating and maintaining interest described in Chap. 3, Section 3, are as fully applicable to the prevention of occupational disease as to the prevention of traumatic injury resulting from accidents.

Facts and Fact Finding. Fact finding in the case of occupational-disease prevention is carried on basically in the same way as for traumatic injury. Occupational disease can occur only as the result of the exposure of a person to a mechanical or physical hazard or because of an unsafe personal act. These are the direct and proximate causes of occupational diseases.

Other important and useful facts are as follows:

The agency, meaning the particular gas, dust, liquid, solid, or other object, material, substance, radiation, etc., that embodies the hazard.

The subcause or reason for the unsafe act, meaning the motive or circumstance that prompted the person committing the unsafe act to expose himself or others to danger.

Necessary identification, meaning the particular process or operation involved, the time, place, nature and extent of injury, etc.

It is significant that the exact *degree* of hazard in addition to its identification is in a broad sense considerably more important in occupational-disease prevention than is the case with regard to other industrial hazards.

The instruments for determining the degree of contamination in the air are numerous. In the case of dust, such as silica, granite or asbestos, state and Federal codes or other enforcement legislation specify the method of the U.S. Public Health Service. The impinger used in this method is designed to draw the air sample through distilled water and impinge it at high velocity against a submerged glass deflecting plate. The movement of the dust

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