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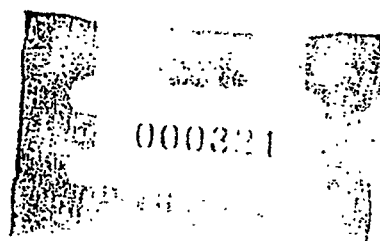
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NATIONAL SAFETY COUNCIL

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Industrial Hygiene

Industrial Dusts—What Every Supervisor Should Know

By L. E. HAMLIN, M.D.

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Most manufacturing procedures are capable of generating varying amounts of dust which may be visible, invisible, dangerous or inert. It is therefore important that these substances be properly classified in order to protect the health of employees and provide safe environments in which they may carry on their daily occupations.

Obviously the supervisor should have some knowledge of industrial dusts since the responsibility for enforcing measures instituted for their control usually falls upon his shoulders. Unless he has a good idea of the actual risks confronting him, he will be at a disadvantage in securing cooperation from those under his direction. Ability to answer questions concerning plant hazards in a convincing manner is a very important factor in any dust control program, and if the supervisor cannot explain the necessity of avoiding exposure to toxic materials the worker under his charge is very unlikely to pay attention to it.

On the other hand, a brief explanation that carries the ring of sincerity and truth can frequently correct unnecessary misunderstanding. For example, a capable young employee was worried about contracting silicosis because he worked in a plant where at times there appeared to be considerable dust in the atmosphere. He did not know that this dust was free from silica or other harmful ingredient, but his foreman did.

Knowledge of his own department enabled the supervisor to convince the workman that not only was the dust inert but also plans were under way for the installation of new ventilating equipment which would remove the particles that were already present. The man was satisfied and the company was able to retain the services of a good employee.

What then are some of the fundamental things a supervisor should know about in-

dustrial dusts? Dust is formed by reducing earthy materials to small size. Processes like grinding, crushing, blasting, and drilling produce dust particles of sizes from the sub-microscopic to the visible.

Fumes are formed from combustion, sublimation and condensation. Those from burning or melting lead or zinc are typical examples. The size of the particles is generally below one micron. (A micron is 1/25,000th of an inch.)

Smoke is usually of organic origin from such things as burning tobacco, wood, oil or coal. The particle size is usually below a half micron.

Mists or fogs are formed by condensation of water vapor and the particle or droplet size varies widely.

The most important item to the supervisor is the realization that he may be dealing with a dust which can produce badly harm. His first consideration should be "How is the man himself affected? Is the dust present in sufficient amounts in the air to be a source of danger? Does it exist in the pure state or is it mixed with other dusts? What is the actual count of particles per cubic foot of air, and what percentage of these is of respirable size (below 10 microns and especially those below three microns? How long does it take to develop occupational disease of the lungs from exposure to dust?"

All this may appear to be outside the scope of the supervisor's activities since after all his job is concerned primarily with production. However, most industries place the responsibility for carrying out safety measures on the foreman and it is apparent that his department will suffer if these are not properly enforced. Safety therefore includes precautions against occupational disease as well as accidents so that some knowledge of methods for reducing exposure from dangerous dusts, to fumes or other

harmful materials is a proper part of the supervisor's armament.

It is not advocated that his duties be so expanded as to encroach upon the field of the industrial hygienist but it is reasonable and logical to suggest that he equip himself with the essential details concerning occupational risks in the department he manages. This information can be readily obtained from his company medical department or through other agencies such as the Division of Public Health of state and federal governments. These bureaus welcome inquiry of this type and their services are usually available without charge.

Much confusion and misunderstanding exists about the capacity of various dusts arising from occupational procedures to cause physical disability. Exaggerated reports and misrepresentation by individuals unfamiliar with their specific properties have incriminated certain materials known to be quite inactive and absolved others proven to possess harmful qualities. Experience accumulated through years of intensive study and research indicates that the great majority of industrial dusts have little effect on health other than their nuisance value and contribution toward poor housekeeping.

However, the fact that they are unlikely to cause occupational disease should not be used as an excuse to do nothing about them. A good working environment demands that they be removed in spite of their innocuous characteristics and the smart supervisor will do all he can to accomplish their elimination.

The wide assortment of dusts met with in industry makes their classification into "harmful" and "inert" categories difficult. Those arising from organic sources such as animal and vegetable products as a rule do not cause serious harm but are capable of producing local irritation like dermatitis or skin rashes, dental conditions, and inflammation of the eyes and the mucous membrane lining of the upper air passages.

The majority of harmful dusts encountered in manufacturing processes are inorganic in character. The specific effect on health varies. Chromium, cadmium, arsenic, and their compounds produce local irritation as do the organic dusts if they can also cause general intoxication present in sufficient amounts. The dusts or fumes derived from

the heavy metals like lead, mercury, and manganese can be highly toxic and poisoning from these substances has been recognized for many years.

Recently serious and even fatal illness has been found to occur from exposure to beryllium and some of its compounds while another occupational condition known as "Shaver's Disease" has produced severe damage to the lungs of workers exposed to fumes arising from the fusing of bauxite, the chief ore of aluminum, in the manufacture of artificial abrasives.

Generally speaking, the particle size which is most dangerous is in the range of one-half to three microns in diameter. Particles larger than these seldom reach the alveoli or terminal air sacs of the lungs since they are filtered out by the "cilia" or natural protective mechanism of the nose, throat, and large bronchi. There is also good evidence that particles below one-half micron in size may be retained in the lungs in sufficient quantities to result in disease. This means that the visible dust in a working place may not be as dangerous as the particles which are not seen by the naked eye.

Industrial hygienists emphasize this and also point out that although the amount of visible dust in the atmosphere in the vicinity of a certain job appears great, it does not necessarily mean that the workman is inhaling significant quantities of harmful particles. The exposure may be intermittent and of brief duration, or the air at the breathing level of the employee may be sufficiently clear that no undue risk is involved.

With the exception of beryllium and bauxite few of the aforementioned dusts cause damage to lung tissue and, as explained previously, not every person so exposed does develop occupational disease.

At the present time it is generally agreed that the most important sources of industrial disease of the lungs are free or uncombined silica and asbestos. Silica or silicon dioxide which makes up approximately 60 per cent of the rocks and minerals of the earth's crust, is the specific cause of the ailment affecting the lungs of workers in dusty trades, known as silicosis.

It is very important to recognize the fact that this widely known condition cannot be acquired from any material other than

free silica and also that it happens only when particles smaller than ten microns in size of this mineral have been inhaled over long periods of time, such as from two to 25 years with an average of ten years. The term "free silica" usually means quartz of which there are many varieties. There are also other forms of free silica.

The scarring or fibrosis of the lungs which results from the action of uncombined silica casts characteristic nodular shadows in the chest roentgenograms of those affected. Frequently this is the only way the disease can be detected as it causes no symptoms in the early, uncomplicated stage.

Other dusts may produce x-ray patterns which are difficult to differentiate from silicosis and some unrelated illnesses may resemble it closely. The x-ray picture observed after the inhalation of iron oxide particles among some welders and grinders shows densities which are all too often mistaken for those seen in silicosis. Since this condition (siderosis) is harmless, the implications of such misdiagnosis are obvious.

Unfamiliarity with industrial diseases of the lungs by those charged with evaluating them properly has resulted in employees becoming needlessly alarmed, forsaking their jobs and forfeiting seniority while industry has lost good workmen and production. It

has also paid unjust claims for disability in compensation of this sort the supervisor suffers along with the rest since his department is bound to be affected by these conditions.

To attempt to tell the supervisor all he should know about the extensive subject of industrial dusts is an impossible assignment. Suffice it to say that the more he learns about them through his own volition, the better his qualifications for his job will be. Through such enterprise he will enter a new field of endeavor and discover a fascinating experience which will pay dividends both to himself and his company.

The complexity of problems which confront the director of any department in today's exacting requirements presents a formidable challenge to his resources, and this, along with the working man's reasonable insistence on a better place to work demonstrates that a knowledge of industrial hygiene may well be a most important factor in the efficient discharge of his duties.

The best treatment of any disease associated with industry is not to let it happen in the first place. The problem is for engineers rather than physicians, but, regardless of the one on whom the burden falls, its final outcome depends upon the interest and efficiency of the man who manages a department.

Occupational Dermatitis; Teamwork in Engineering and Medical Control

By WALTER F. SCHOLTZ

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We have accepted the challenge that occupational dermatitis presents to industrial medicine, and accordingly it can be stated that with proper care and intensive educational programs, occupational dermatitis can be checked and great savings effected.

Through the institution and maintenance of control measures workmen can be protected against dermatitis producing oils, chemicals, etc. The ideal control measures will protect workmen all along the line from the manufacturing of the basic materials to the completed fabricated part.

Modern industry today is becoming so

cognizant of the benefits of good preventive measures that they are not only relying on the worker alone, but are seeking the teamwork of everyone concerned.

Since the proof of the pudding is in the eating, I would like to state what has been done through a concentrated program on occupational dermatitis control and prevention which started in 1943 at the West Allis works of our company. This concentrated program has resulted in a 71 per cent decrease and a reduction from 10.3 to 2.7 the number of cases per million man-hours of exposure.