

FILE NAME: National Safety Council (NSC)

DATE: 1966

DOC#: NSC194

DOCUMENT DESCRIPTION: Transactions of the NSC - Up-To-Date Industrial Hygiene

UP-TO-DATE INDUSTRIAL HYGIENE

WHAT'S NEW IN INDUSTRIAL HYGIENE

Opening Remarks

By JACK RADCLIFFE

Supervisor Industrial Safety Section, Ford Motor Co.; Past Chairman Occupational Health Hazards Committee, NSC Industrial Conference

Radcliffe:

This session is co-sponsored by two groups, the American Industrial Hygiene Association and the American Association of Industrial Nurses. There will be four key speakers and the subjects tend to inter-relate. At the conclusion of the papers we will have a question and answer period.

With the co-sponsorship of the American Industrial Hygiene Association and the American Association of Industrial Nurses, we have on the platform with us today their two presidents. First, William T. McCormick, president of the American Industrial Hygiene Association and Assistant Director in charge of Occupational Hygiene in the Medical Department of Inland Steel Company, Chicago. He is also a member of the American Society of Safety Engineers, and many other related safety and hygiene groups.

McCormick:

The American Industrial Hygiene Association is most pleased to be a co-sponsor of this program on Up to Date Industrial Hygiene. I am particularly pleased that the ladies who make up the membership of the American Association of Industrial Nurses are also co-sponsors this morning.

In our company, the groups who are concerned with the health of workers both directly and indirectly enjoy a cordial and co-operative relationship with each other. This has been a benefit to both workers and the company alike. I think it is extremely important that those of us who have interests in the well being of people have the opportunity to meet together as groups periodically to share our information and to assist those in the common goal that we have. The program this morning consists of outstanding speakers; I'm sure each has a message

for us to take back to assist us in our program. It gives me great pleasure to represent the American Industrial Hygiene Association this morning and to bring you greetings from its members.

Radcliffe:

The president of the American Association of Industrial Nurses is employed with the Guide Lamp Division of General Motors Corporation. She is a registered nurse and has done hospital work, private duty, supervision, and industrial nursing during the last 22 years, has worked on many committees and given many papers. She is a most active member of the industrial nurses in this country. Without them, our medical, hygiene, and safety programs would be lacking. It's my pleasure to introduce to you the president of the American Association of Industrial Nurses, Mrs. Edna Watson.

Mrs. Watson:

We are most happy to have been invited to co-sponsor this session in the Safety Congress and, on behalf of the Board of Directors of the American Association of Industrial Nurses, I thank you for being able to share this experience with you.

As industrial nurses, we are especially interested in all phases of safety and hygiene in our various job situations. As individuals we are vitally concerned with safety at home, school, on the highway, or wherever we find ourselves in a community setting, not only for ourselves and families but to be better informed and thus more effective as occupational health nurses.

We hear much today about the team approach to health, preventive medicine, and concern for the whole man, both on the job and away from work. We believe that it takes a combined effort of all of us to

realize the goal of a safe, healthy environment in which we work, live, and play. It takes knowledge, understanding and cooperation to have an efficient, effective safety program. That is why we are pleased to have a part in this session and you are to be congratulated in making it possible for all of those who are interested in safety to come together to share ideas and learn what part they can play in the accomplishment of an effectual program.

We as industrial nurses need to learn to be better prepared to care for the health and safety of workers on the job and to be able to answer questions about safety away from work. As an association, we're glad to be a

participant in this worthwhile project for we are desirous of doing all that we can to fulfill the purposes of our organization. This we can do by taking part in meetings such as this with other national associations who have similar goals and purposes. Since health and safety are so closely related, you cannot have a good health program without a good safety program. One complements the other, for a healthy productive worker must have a safe work environment.

By working together, to recognize safety hazards and cooperating to eliminate them, we can make the environment of the American industrial worker the most healthy, safe, and productive place in the world.

WHAT HEALTH, SAFETY AND PLANT PERSONNEL SHOULD KNOW ABOUT DUSTS, FUMES, MISTS, GASES, VAPORS, AND NOISE

By WARREN A. COOK

Professor of Industrial Health, Department of Industrial Health,
School of Public Health, The University of Michigan,
Ann Harbor, Mich.

A quick answer to what should be known by health, safety, and plant personnel about hazardous materials used in the plant is—everything! Practically, the extent of the knowledge must necessarily fall somewhat short of this Utopian goal. There are a number of categories of information which should be known. I propose to explore a number of these.

Perhaps the most critically needed information is that concerning materials which may cause serious illness or death without the worker realizing that he is being subjected to a dangerous atmosphere. An example of such material is one which has resulted in only some 20 deaths as reported in the literature over the last fifty years, and only three reported cases since 1956. Certainly, such a material should not deserve too great emphasis among the myriad of substances which compete for a place in the overall knowledge of health, safety, and plant personnel. But let us consider what the actual facts may be.

In January, 1966, a worker in California was brazing metal parts, using a silver solder. After some two hours of work, he began to feel bad and the next day experienced some tightness of the chest, was coughing, and felt that he had been exposed to too much welding fume. As the condition worsened, he called a physician and they agreed that he must have permitted himself to be exposed to excessive welding fume. He was treated symptomatically. On the fourth morning after the exposure he was found dead in bed. Within a short time after this, a second worker on the same job became affected. By this time, it was known that the silver solder contained over 20 per cent cadmium and that the condition was actually due to excessive exposure to cadmium fume. Following the report of this fatal and accompanying nonfatal case, 10 additional cases were reported to the California Bureau of Occupational Health, three of these fatal. A detailed account of the circumstances of the two initial cases is to

be published soon by Dr. Hector P. Blejer of the California Department in the *Journal of Occupational Medicine*.

Here we have an example of a material which does not immediately become excessively irritating; one concerning which we have not had too many published reports of difficulty. Very possibly, the reason for this was that cases may have occurred but, being sporadic, they have not been recognized nor published.

Since a welder or a worker engaged in brazing operations may have been using solders over the years containing no cadmium, and then such a solder is required for the next day's work, it is vital that not only the health and safety personnel but also the foreman in charge of the operation should be well informed concerning the hazards from cadmium oxide fume.

Another example of hazardous materials in this category is chlorinated naphthalene. This waxy material is melted in order to impregnate wire or cable insulation or electrical condensers. The vapor from this synthetic wax condenses in the air above the melting pot as a fume. On being inhaled in excessive amounts it may cause serious and even fatal liver damage.

Among the earlier fatal cases as result of such an exposure, one worker died with a diagnosis of yellow atrophy of the liver. At that time there had been no such experience with this material and it was thought that the fact that this worker was a rather heavy drinker may have led to his death. A second worker continued the operation. When he developed a liver condition which also terminated fatally, but with no history of alcoholic beverage complication, investigations were instituted which definitely implicated this harmless looking and non-irritating synthetic wax as the producer of these liver conditions.

As further categories of knowledge concerning hazardous materials, we should include those materials actually in use in a plant, together with those which may be contemplated for early future use. Possibly the best and earliest source of information concerning such materials is through the purchasing agent. Accordingly, it is strongly recommended that a close liaison be set up between the purchasing agent and the health and safety personnel so that early informa-

tion will be provided concerning materials in use and those which are to be ordered.

These materials may best be discussed in categories related to their physical and physiological properties.

Among the most important categories are the dusts that produce the pneumoconioses. In the major industries involving exposure to silica dust, there tends to be a good knowledge of the fact that too much of these dusts will cause a lung condition which may be disabling. Where the dust may contain crystalline free silica, such as is the case with molding sand in the foundry, or granite dust in a quarry or stone cutting shop, it is well understood that the greater the percentage of free silica in the dust the lower the dust concentration should be in order to avoid the development of silicosis. It is known that workers should be given periodic X-ray examination, and that the extent of the dust exposure should be determined by air analyses, with control measures such as will be discussed later in this session.

Less knowledgeable, as a rule, are health and safety personnel concerning such exposures in those operations where crystalline free silica may be used rather incidentally in an operation at a plant not normally considered to be a dusty industry. An example would be the use of silica flour as a filler in a paint mixture or as inert material in a variety of products.

Asbestos has been much in the daily newspapers over the last year or two, not so much because of its action in causing asbestosis, but because of the association of a cancerous condition known as mesothelioma which has been found among workers with asbestos in far greater incidence than among the general population.

Talc and soapstone powders are used in such industries as rubber goods manufacturing, and may introduce appreciable amounts of such dusts into the air. Whereas most dusts made up of silicates are essentially inert and, as such, as much as 50 million particles per cubic foot of air may be considered acceptable, these two minerals have been found to produce disabling pneumoconiosis in lesser concentrations with the result that no more than 20 million particles per cubic foot of air is considered within safe limits.

This, however, is not the whole story in connection with talc and soapstone. Not infrequently, these two materials are found to have some quartz content; this may be as much as 20 per cent. Application of a formula given in the *Threshold Limit Value* list of the American Conference of Governmental Industrial Hygienists to a talc or soapstone dust with 20 per cent quartz limits the exposure to only 10 million particles per cubic foot of air. Consequently, when such materials are being used, it is essential to have the additional bit of knowledge as to percentage of crystalline free silica.

Somewhat the same situation occurs in connection with a dusty material made up of diatomaceous earth, a form of amorphous silica. The natural material has been found to cause a disabling silicosis when the exposure exceeds 20 million particles per cubic foot. However, where the diatomaceous earth is subjected to a calcining operation, some of this amorphous free silica changes over to the crystalline form known as cristobalite. Depending upon whether the diatomaceous earth is calcined with or without a flux, the percentage of the cristobalite may be in the order of 20 per cent or 30 per cent, the latter with the flux calcining. Applying the ACGIH formula, these calcined diatomaceous earths should be kept either to 10 million particles per cubic foot or to seven million, in order to avoid lung injury.

In the category of metals, we would expect that all health and safety personnel are familiar with lead as an occupational hazard and that proper precautions are taken to prevent excessive exposure. In spite of this general knowledge, lead poisoning cases continue to occur in industry, not only in the industries that have produced the greatest number of cases over past years. After a report in the literature that lead poisoning cases were occurring in plastic manufacturing in Italy and a subsequent report of such cases in this industry in France, a group of lead poisoning cases occurred in a plastic manufacturing operation in this country. Possibly if a close relationship had been maintained between the purchasing department and the health and safety personnel, the exposure might have been brought under control without occurrence of cases.

Beryllium is well known as a producer of serious and fatal occupational disease

cases, and it is felt that much of the hazard was removed when manufacturers or fluorescent lights agreed to omit beryllium in their phosphors in June 1949. This metal has many desirable properties and is finding increasing use in a diversity of operations. In all plants where high temperature resistance metals or ceramics may be used, the health and safety personnel should be alert to the introduction of this material. As an indication of relative hazards, the exposure to beryllium should be kept to about a hundredth of that considered permissible for lead.

It would seem that everybody is well informed concerning carbon monoxide, the gas which is responsible for more exposures than any other, and also the gas responsible for the greatest number of cases of fatal asphyxiation. In areas where there is an active possibility of escape of gases containing carbon monoxide, there tends to be an increasing use of multipoint carbon monoxide alarms. Such installations have been placed in a number of blast furnace plants where carbon monoxide concentrations of the gas are in the order of 26 or 27 per cent.

Fortunately, for most fuel gas purposes natural gas is coming into increasing use and this, of course, contains no carbon monoxide. Furthermore, where in earlier years supplementary gas supplies have been provided through water-gas or producer-gas installations, these are today being replaced by liquified petroleum gas with no carbon monoxide content. It is, of course, important always to keep in mind that imperfect combustion of natural gas or LPG will produce a sufficient amount of carbon monoxide to cause asphyxiation. Cases of carbon monoxide asphyxiation have occurred over the years on Monday mornings where cold systems are being heated with natural gas. Here, the impingement of the burning gas on cold surfaces interferes with complete combustion with markedly greater amounts of carbon monoxide in the products of combustion.

Among the gases which might well be listed with those which may cause sudden death is hydrogen sulfide. The worst case of liberation of hydrogen sulfide in an occupied area occurred in Poza Rica, Mexico, where liberation of hydrogen sulfide at a gas and oil field caused 22 deaths and several hundred cases of sufficient severity to require hospitalization. Wherever hydrogen sulfide is being recovered from petroleum