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WOOD PRO[illegible]
INDUSTRIES

[illegible] of the 42nd National Safety Council

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New Developments [illegible] ([illegible])

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NATIONAL SAFETY COUNCIL [illegible]

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effect at many operations. To disregard these conditions seems dismissal.

The effort that possibly has accomplished more for us than any other single safety project is our Annual Safety Week. This has been a week of review and extensive education. Almost a post-graduate course. It has a slightly carnival aspect, with music and loudspeakers (some of them are the tremely loud speakers), prizes and so forth to stimulate interest in safety of the employees and their families. It has proved very effective. Most of the progressive operatives look for material all year round to use during Safety Week.

The first impression a new employee receives when he starts to work for a new company is very important. He is usually briefed on company policy, hazards of his particular job, how to work safely and effectively, and the competitive spirit that prevails departmentally so that he considers himself a member of a team and wants to become accepted as a safe and accomplished worker—he wants to belong.

After a new employee is hired and before he has completed his 30 day probationary period his foreman processes an evaluation of his work with special attention to his attitude towards work, response to advice

and with special emphasis on his safety [illegible]

If he should be slow to [illegible] the [illegible] of this job, we would give him a chance in a different department. And if he should not carry the physical requirements to hold up his end of the job, we might give him an easier job. But if his attitude towards work, acceptance of advice [illegible] duty from his foreman and fellow workers is not favorable, he hasn't much chance of holding his job. If his fault is [illegible] he hasn't any chance whatsoever.

After from three to six months depending on the employee, the foreman makes another evaluation of his work. Incidentally, and of importance, these evaluations are usually made with the assistance of the plant safety inspector and/or the personnel manager, and possibly another foreman. This protects the employee from any one person's opinion. It also helps the foreman immeasurably. It is quite possible that the employee has been in to see the personnel manager over some personal matter or the plant safety inspector may have observed the man at work and drawn his own conclusions. I have refrained from giving actual statistics. You can get them all from the National Safety Council.

Health Hazards of Spray Painting

Copy on p. 6 Pa 95

By L. D. WILSON

Dr. Wilson Industrial Hygiene and Research Laboratories, Chicago, Ill.

In any discussion on health hazards in the spray painting of wood it is well to realize first of all that spray painting hazards in the wood and wood products industries are no different from those in the metal industries.

Furthermore it is important to note that in many industrial operations it is almost impossible to divorce hazards to health from hazards to safety and in devising a solution for a hazard to health the hazard to safety cannot be ignored. Finally, as far as is presently evident, hazards in both wood and metal paint spraying operations are the same with the exception of the use of electrostatic acceleration in metal spraying and perhaps the added incendiary aspects of wood and wood products.

The question of hazards to health in paint spraying operations has received attention for years from the time of the inception of the method. Thus, our own National Safety Council as early as 1922 published the results of studies involving both toxic vehicles and toxic pigments used in paint spraying. In the same manner, the National Research Council of Canada in 1930 published a comprehensive review on the subject including [illegible] and pigments and reviews the results of studies in both this country and Canada.

[illegible] ation mainly dealing with means of eliminating or alleviating hazards have been instrumental in preventing the development of serious [illegible]. Nevertheless, the problem cannot be ignored and with the [illegible] of newer synthetic materials [illegible] there that it continues, much as the author [illegible] to be [illegible].

In order to give adequate consideration to the problem let us review certain fundamental mechanisms whereby toxic materials are introduced into the human organism. Of first importance is the means of introduction by inhalation. Included here are fumes, fogs, mists, vapors, gases, dusts and smokes, including both particulate and non-particulate matter.

A second method of entry is through ingestion, either by eating or drinking. It must be admitted that entry through drinking falls in the class of an accident through mislabeling [illegible], but ingestion through eating is really real and is most frequently encountered in the case of [illegible].

The third mode of entry is through skin absorption either directly or through [illegible] and [illegible]. While these latter are of minor significance they are nevertheless [illegible].

It is evident that the most important mode of entry into the human organism is through inhalation which in the cases of gases, vapors, and fumes is unrestricted. In the case of mists, fogs, dusts and smokes, in other words, in the case of particulate matter, toxic effects result only when the particulate aggregates are in the respirable range, usually below 10 microns in size. Particles larger than 10 microns in size are normally filtered out by the nasal hairs and the mucosa of the nose and throat.

In addition to systemic poisoning there is the matter of dermatitis about which much has been said and much can be said. However, it should be [illegible] realized that the [illegible] and frequently by limited study and [illegible] ally if it is understood that [illegible] or [illegible] can be expected [illegible] the [illegible] skin will [illegible] drying and cracking of the skin and the opportunity for secondary infection. Accordingly, reasonable protection in the form of gloves or [illegible]

[illegible]

Let us now consider some of the materials which may be encountered in [illegible] operations. [illegible] the lead [illegible] arsenic, and [illegible] sulfide. The total list of [illegible] in the various [illegible] have been devised, but by and large, [illegible] toxicity, and hence [illegible] maintaining exposures at as low a level as possible. The maximum allowable concentration of mercury is [illegible] of lead, 0.15 and in the silica [illegible] order of 5 millions of particles per cubic foot depending on the free silica content.

The number of [illegible] present day [illegible] more than [illegible] include almost all of the [illegible] compounds and [illegible]. Among the more common [illegible] turpentine, [illegible] benzol, [illegible] chlorinated hydrocarbons.

It will not be possible to [illegible] alone in regard to [illegible] any [illegible] such that they [illegible] obvious fact [illegible]

[illegible] is about 200 ppm in the [illegible]

[illegible]

would be provided. [illegible] in the case of some of the newer fungicides such as sodium pentachlorophenate. [illegible]

Let us now consider some of the [illegible] materials which may be encountered in paint spraying operations. Among the more [illegible] pigments are the lead compounds, [illegible] lead in enamels, and antimony as oxide or sulfide. The total list of pigments is myriad in the various pigment mixtures which have been devised, but by and large, silica, lead and antimony are the ones of most serious toxicity, and hence require attention to [illegible] exposures [illegible] as low as possible. The maximum allowable concentration of antimony is 0.5 mg/cu meter, that of lead 0.15 and in the silica a figure of the order of 5 millions of particles per cubic foot depending on the free silica content.

The number of vehicles and thinners in present day use is so extensive as to preclude more than a general discussion. These include almost all of the classes of organic compounds and range from pure compounds alone to the most complex of mixtures. Among the more common ones are [illegible] the [illegible] of petroleum [illegible] ethyl, butyl and amyl acetate, [illegible] isopropyl and the butyl and amyl [illegible] the lower [illegible] chlorinated hydrocarbons.

It will not be possible to treat each [illegible] alone in regard to its toxic effects [illegible] may consider them briefly [illegible] common, however, all [illegible] narcotic to a degree [illegible] peculiarities of [illegible] that they gradually [illegible] the working area. [illegible]

Of the coal tar hydrocarbons, benzene, toluene and xylene, benzene is the most toxic as indicated by their maximum allowable concentrations of 35, 200 and 200 ppm respectively. Benzene is the most seriously toxic of the three, severe blood changes occurring. Toluene is a more powerful narcotic than benzene but its chronic effects are minimal and probably questionable because of frequent contamination with benzene. Xylene is possibly even more narcotic than toluene but its chronic toxicity is probably low though it has not been completely investigated.

Turpentine is well known as an irritant to the eyes and mucous tissue, but its chronic toxicity has not been established though it may be presumed to be low. Its maximum allowable concentration is now 100 ppm being recently reduced from 200 ppm.

The class of compounds known as the esters includes familiar solvents such as ethyl acetate, butyl acetate and amyl acetate. Quite generally they are of a low order of toxicity being largely irritants to the eyes and respiratory tract and having some temporary effect in the form of digestive disturbances. Most of them have maximum allowable concentrations of the order of 200 to 300 ppm.

The several alcohols present a range of toxicities. Drinking wood alcohol can result in blindness and death but exposure by inhalation is not too serious. Prime systematic manifestations are largely temporary in nature involving gastro-intestinal disturbances and narcotic symptoms with eye and mucous irritation being the most prominent. The maximum allowable concentration is 200 ppm.

Ethyl and isopropyl alcohol are mild irritants and narcotics, their maximum allowable concentrations being 1,000 and 400 ppm respectively. The butyl and amyl alcohols are quite marked in their ability to cause severe eye irritation, headache, nausea, dizziness and intestinal disturbances. The maximum allowable concentrations are of the order of 100 to 400 ppm, complete data on some of them being lacking.

The lacquer solvents [illegible] and ethyl benzene are of a low order of toxicity but are marked in their narcotic and irritant effects. This very property of [illegible] [illegible]

The chlorinated hydrocarbons such as chloroethylene, trichloroethylene, methylene chloride, propylene dichloride, etc., are all irritants and are strong narcotics. If acute exposure is severe, death may result. Chronic sub-narcotic exposures are [illegible] of not immediately recognizable permanent damage to the liver and kidneys as well as to other body organs. Maximum allowable concentrations are all of the order of 100-200 ppm except for dichloroethylether which is 15 ppm.

So much now for individual thinners and solvents. With current advances in technology, more and more complex mixtures of solvents are entering the picture and with this increasing complexity of mixtures comes there often an increasing complexity regarding their toxicity. The total toxicity of the mixture is not the sum of the toxicities of the individual components. More often than not the total toxicity exceeds the sum—an effect which is known as synergistic. It is not possible in the light of present knowledge to make a satisfactory prediction of such synergisms.

It behooves us then to require that [illegible] hazard exists with each individual [illegible] that a synergistic hazard may [illegible] mixtures, and that in both cases [illegible] and explosive hazards are [illegible] all but the chlorinated [illegible] are highly combustible.

The question arises, what can we do about these matters in practical working techniques? The [illegible] ventilation, which has for its purpose of reducing the concentration of contaminants to a level below the maximum allowable concentration [illegible] contaminants from the immediate breathing zone.

Design of ventilation facilities is a function of size of the objects being sprayed but it is not certain in any one case of what is available. [illegible] but the largest class of objects [illegible] by without a spray booth.

[illegible]

feet per minute, is ample for small booths, while large hoods can operate with face velocities of 100 f/m and in some cases as low as 50 f/m though this is not common. Multiplication of these linear velocities by the area of the hood gives the volume of air which must be furnished by the blower system. Thus 100 f/m linear velocity for a large hood of face area of 150 sq. ft. indicates that the air supply must be 15,000 cfm.

When objects are so large as to require the spray operator to move around, over, and under them in order to cover all surfaces completely, ventilation alone is not sufficient. Here it is necessary that operators wear respirators, but it is vital that they be of the type approved for organic vapors. Attempts at providing protection through the use of gauze nose and mouth pieces are fruitless since vapors are completely passed and the microscopic particles of pigment and vehicle are just poorly retained. In connection with respirator use, it is wise to establish a routine program of fitting, cleaning, sterilizing and cartridge replacement. The program developed by the Allis-Chalmers Mfg. Company in Milwaukee is a classic example of good operating practice in this regard.

There are certain instances where ordinary hoods, enclosures, and accompanying ventilation systems are too small to accommodate certain structures requiring spraying. This problem has been solved by placing the structure on a dolly and moving into a chamber called a spray equipped with a down draft floor grill. Preferred practice demands that spraying be conducted from bottom to top to reduce the amount of vehicle vapor reaching the operator. A respirator must be worn here also. Finally, there are a few instances where units need to be sprayed while mounted on a flat car. No hard rules can be set down here since size and shape dictate spraying conditions. It would be best if spraying could be conducted out-of-doors but failing that, spraying should take place under the best possible natural local ventilation, operators being required to wear respirators.

As many spraying problems lead to health, occur frequently with hazards to safety. This is especially true in the painting industry, where aerosols of solvents and thinners are highly flammable and explosive. It is necessary that definite precautions be taken against fire and explosion and all electrical equipment associated with and adjacent to paint spraying operations should adhere to explosion proof specifications. Electric lights, fixtures, switches, motors and the like and especially the fan systems used to exhaust air from spray booths should follow Group I Class D specifications. Containers of thinners and paint or lacquer should be kept in approved safety cans and when not in use should be stored in fire proof lockers.

One of the sorest spots is the fire fighting equipment especially if it is of the sprinkler type. I have seen more than one instance where a sprinkler head has been packed in paper to prevent its being plugged by paint spray, only to have the layer of deposited paint on the paper so thick as to require the pressure of Niagara Falls to break through in order to put out a fire. If paint spray is so rampant as to reach sprinkler heads, the heads should at best be covered with Kraft which is replaced each day. A weekly check of sprinkler performance is mandatory in cases of question.

No doubt there are many who recognize the possibilities of the hazards that are on hand but are in doubt as to their actual existence in their own operations. In the case of a large company with reasonably extensive laboratory facilities, manufacturers can be analyzed for their volatile content though it is admitted even in the case of laboratories and experienced users there is little difficulty in such determinations.

In the case of the small operator this type of inquiry is virtually impossible and would be costly to have performed on the sample. In this case, my experience has been that most manufacturers are still reveal approximate composition on request. If not, consult factory reps. It is remarkable how good, and yet how backward our industry is in this competitive product. This type of information has been frequently used in cases of direct requests for preferred pay rates on the basis of especially dangerous operations and I have my experience has resulted in securing the desired information without delay.

In regard to health hazards in brush painting in the realm of several segments with a bad summary and stick. To a great degree, hazards to health arise from paint and thinner vapor. These materials are

the whole range of organic compound classifications with varying degrees of toxicity. Remedial measures include use of adequate ventilation in suitable enclosures where face velocity of entering air is of the order of 300 linear f/m.

Respirators protecting against organic vapors must be worn where ventilation is not provided and in cases where the operator must be within the spray booth enclosure. A program of respirator cleaning, sterilizing and cartridge replacement is mandatory.

Finally, each user of paint and thinner should inquire into the nature of the product being handled and plan safe and healthy accommodations accordingly.

The Noise Problem in the Wood Products Industry

By C. D. YAFFE

Sr. Sanitary Eng., Occupational Health Field Headquarters (Cincinnati, Ohio), Div. of Special Health Service, U.S. Public Health Service

Does the wood products industry have a noise problem? I think so. Let me hasten to add that I think most segments of industry have noise problems, and let me say also that their severity and nature vary considerably.

What kinds of problems does industrial noise produce? First we might say that there are two types of problems. One type exerts its effects inside of the plant walls. The other attacks that part of the community in the immediate vicinity of the plant. While my remarks will be devoted primarily to in-plant problems, don't overlook the fact that public relations and good will may be adversely affected by the noise emanating from your plant. Consequently, noise control measures inside a plant may serve a double purpose by also providing benefits on the outside. Before leaving the matter of outside effects, let me stress that as evidence of growing sentiment for noise control on a community basis I recently saw a draft of a bill introduced into a state legislature which would prohibit airplanes from flying over populated areas at night if they raised the noise level at the ground above a comparatively low intensity.

Within the industrial plant, noise can create a variety of problems. One of the most important is interference with communication. Safety engineers are particularly concerned with this since inability to communicate usually results in an increased possibility of accidents. A man who can't hear a warning may be struck by a moving object.

In addition to the safety aspects, when noise makes the transmission of instructions or ideas difficult, there is generally a loss in productive capacity. More time is required to make one's self heard; and in some instances, it is necessary to shut down equipment merely to convey a message.

As a consequence, management quickly becomes receptive to recommendations for noise control when the communication problem becomes acute. While I shall comment later about standards to protect against hearing loss, I would say at this point that fortunately the control of noise that hinders communication usually also eliminates the likelihood of damage to the hearing mechanism.

Another area of interest is in the psychologic effects produced by noise. These have been studied by a number of investigators. Various reports of findings which have been published enable one, fortunately or unfortunately, to prove or disprove almost any point of view about the effects of noise. Productivity was increased when noise was controlled in one study, but after the controls were removed productivity increased still further. Noise produces fatigue, at least most of us think so; but are we sure of it? Fatigue is not a simple thing to measure.

One reason that studies of the influence of noise on efficiency present difficulties is that it is hard to evaluate the effects of motivation. Workers who are aware that their efforts are being measured may, either consciously or subconsciously, carry out a different pace than normal, usually increasing because of pride in being participants in a scientific investigation.