FILE NAME: Westinghouse (WH)

DATE: 1942

DOC#: WH507

DOCUMENT DESCRIPTION: Published Conference Presentation from IHF Conference

Westinghouse

DQLDB
Q39DB
Q49DB

INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, Inc.

SEVENTH ANNUAL MEETING OF MEMBERS

PITTSBURGH, PENNSYLVANIA
NOVEMBER 10-11, 1942

the various working locations and in the air as finally discharged from the room.

3. Under conditions of complete mixing the concentrations thus obtained would be alike. If, at any sampling point, the concentration is higher than at the final outlet, one knows that the rate of effective ventilation in this area is less than for the room as a whole and in reverse proportions to the concentration found.

4. From such a survey it will be possible to improve the system so as to effect more uniform ventilation and, perhaps, without any actual increase in the total ventilation.

5. If, in addition to the equilibrium concentrations, the rates of build up of the test gas concentrations and the rate of decay after the gas feed is shut off are obtained, one can predict the cycle of concentrations of the contaminant which will obtain at the various points of exposure for a given cyclical release of the contaminant. The mathematical relationships will be considered in another report.

Acknowledgments

Grateful acknowledgment is made to the Industrial Hygiene Foundation and to the American Air Filter Company for their financial assistance which made this study possible. It is regretted that, because of the war, the work had to stop while still in the preliminary stage. A full report will be made of the work and especially of the application of the proposed technique in the design of a large exhaust system. It is to be hoped that the method will receive further field tests and that a simpler and more flexible test procedure will be developed.

KEEPING SCORE ON TOXIC MATERIALS AND PROCESSES IN THE PLANT

EDGAR C. BARNES*

To give you briefly the background for our methods controlling the use of toxic materials, we are a relatively large manufacturing industry using hundreds—yes, thousands of different materials, many of them toxic materials. It is not a case of controlling one or two or three types of hazards, but hundreds of hazards, and thousands of people exposed to these hazards. We have in our headquarters medical department an industrial hygiene laboratory, which has functioned over a period of 19 years, and a number of systems have been developed there which are probably of interest to you.

We soon found that we had to disseminate the factual information, such as you have been hearing today, to the proper personnel in our plants in order that it could be properly applied, worked into the design of equipment, and processes developed utilizing that information. It was necessary to get that information in the hands of persons who deal with the different materials and processes involved.

The industrial hygiene laboratory is also interested in obtaining advance notice from engineers, plant personnel, superintendents, etc., so that we may have a knowledge of what materials they are thinking about using or planning to use, so that we may at least try to keep ahead of them.

Our headquarters engineering department utilizes a card system for keeping track of these different materials in use in the plant. On these cards, four by six, they record the name and assign a number to the material, record the suppliers' names, the engineering department using it, and other pertinent data which would be useful to the various engineers and shop personnel who use it. That suggested like a logical place to provide some information on the toxicity or possible effect on the health of the workers from the use of the material.

We have added, at the top of each of these cards, under the name of the product, a very brief statement regarding the toxicity of the material or precautions that should be taken in using it. As an example, if we have a card on benzol, it will definitely state at the top of each of these cards that this material is toxic; its vapors should not be breathed and excessive contact with the skin should be avoided.

These cards serve the useful purpose, first, of keeping the laboratory informed, and second, of transmitting information from the industrial hygiene group to the shop supervisors, the engineers, and other persons in the organization who work with these materials.

As stated, only generalized information is placed on these cards. It is impossible to determine beforehand all the applications that may be made. It may go into a hundred different processes, and you can't anticipate all of those uses, so that it is impossible to provide specific information. We do give a general indication of the toxicity of each mixture or substance.

It has been our feeling that if we can satisfactorily control the use of materials in the plant, and then prove that the control is satisfactory by periodic physical examination of the employees, we will not have cases of

---

* Westinghouse Electric & Manufacturing Company.

occupational disease develop. It has proved to be such over the years.

Now these materials are used, as I indicated, in many different types of processes, so that we must give these people very definite and concrete information on each of these different processes. Our headquarters engineering department provides our shop supervisors with a written process specification. It describes what materials to use, how much is needed, what temperature to use, what kind of a tank is required, etc. They are very specific written instructions on how to carry out each process.

That again seems to be a very logical place to transfer information. Therefore arrangements were made for all of those process specifications to come through the industrial hygiene laboratory for their observation and the adding of information about the toxicity of the materials involved.

For a good many years we used general statements; however, they applied specifically to the particular process involved. Later there were requests from the supervisors for more specific and concrete information. When we have occasion to make studies in their individual departments, we provide data to compare against the information which we gave them. Therefore a tabular arrangement was made, which does give them a rather concrete information about the safe limits of different materials.

In Figure I is shown the first type of caution clause which we used on our process specifications. The rest of the specification is not particularly useful in this discussion. The caution clause on this one, for example, reads: "Varnish No. — and Solvent No. — are inflammable. Keep all sparks and flame away. Do not breathe the fumes from these materials. Adequate ventilation shall be provided. Avoid contact of Varnish No. — with the skin."

This was very helpful, and again we had a transfer of information back and forth from the different development engineers, research engineers and shop personnel, in that all of these specifications come through our laboratories, thus advising us of what is being done in the plant, and we in turn provide information about the toxic materials that are involved.

Later, at the request of our shop supervisors, more specific data were included, as shown in Figure II.

This is the tabular heading, which is placed on the first page of each of the process specifications. In the first column is the name of the material and its material number. Then the sheet is divided into two general headings: Fire and Explosion Hazards, and Potential Health Hazards. Under Fire and Explosion Hazards we give them some information about the flash point, which is very helpful in controlling the possibility of explosion or fire hazards wherever the material is used. For our purposes we have divided them into three groups, designated (a), (b) and (c), (a) being the standard NFPA classification of an inflammable liquid with a flash point of less than 80° F. For practical control purposes that isn't quite high enough to be considered a dividing line between the relatively safe solvent and the relatively unsafe solvent at room temperatures, because your room temperatures may frequently go above 80° F. We therefore made our dividing line at 110°, adding the second classification (b), 80° to 110°, and (c) over 110°. Thus each potentially hazardous material which is called for in a specification is labeled (a), (b) or (c), depending on its flash point.

In ovens and work places the fire and explosion hazard is limited by controlling the percentage concentration of the vapor in the air, either in a

WESTINGHOUSE
Electric & Manufacturing Company

Process Specification No._____ September 15, 1938
Changed: September 28, 1938

VARNISH TREATMENT OF COILS FOR_____

1. GENERAL:
This specification covers the process to be followed in applying a varnish treatment to the coils of_____.

*CAUTION:
VARNISH #_____ AND SOLVENT #_____ ARE INFLAMMABLE. KEEP ALL SPARKS AND FLAMES AWAY. DO NOT BREATHE THE FUMES FROM THESE MATERIALS. ADEQUATE VENTILATION SHALL BE PROVIDED. AVOID CONTACT OF VARNISH #_____ WITH THE SKIN.
OPERATIONS

Figure I.

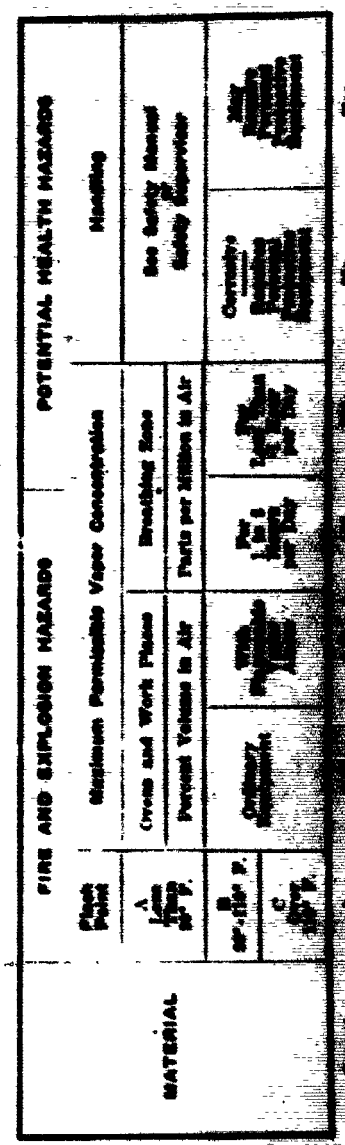
closed container or in an open space. Vapor concentrations are restricted to 25 per cent of the lower explosive limit, as we feel that a four to one factor of safety is necessary for most of the operations involving the use of these inflammable vapors.

Under the heading "Potential Health Hazards—Breathing Zone" we specify the maximum permissible vapor concentration, using two different columns. In some instances we have a relatively short exposure each day and in other instances continuous exposures. For most practical purposes these two figures do not need to be the same. As indicated in the table, the maximum permissible concentration of benzol is 100 parts in 1,000,000 for exposure of 1 to 8 hours per day, and for an exposure of less than one hour per day, 200 parts per 1,000,000. In the case of toluol, 200 parts per 1,000,000 was set as the top limit, even for the short time exposure.

Under the section entitled "Handling," it is impossible to give a specific statement. We have, by utilizing our safety manuals and our safety supervisors in the plants, informed the shop supervisors of the different types of protection which can be applied to the use of these materials, such as rubber gloves, protective hand cream or protective clothing. In one column it is indicated whether the material is corrosive, such as an acid or alkali, and in the other column the need for personal protective clothing is indicated. If the chart indicates yes, in either of these columns, they have information which can be applied to the specific need.

This scheme of providing information has proved exceptionally useful in times such as we are going through today, when many substitute materials are necessary. The plan has given us an opportunity to discuss the use of the materials with the shop supervisors and the engineers, and to make certain that proper protective measures are taken.

SAFETY REQUIREMENTS: (For explanation, refer to Process Specification No._____).



PROF. DRINKER: I would like to ask Mr. Barnes if he has ever attempted to get the firms who sell these chemicals to do this labeling for him. Do you think it would be practicable?

MR. BARNES: I think it might be ideal, but I am not so sure that it can be done.

PROF. DRINKER: The reason I asked that question is that I am working nearly all my time now for the Maritime Commission, which is a very large employer of labor. One of the most serious problems we face from a health standpoint is the use of paint vehicles, thinners and the like, of unknown composition. Usually they have only a trade name, and the paint foreman hasn't the slightest idea what they are. Only occasionally is there an indication given as to their chemical nature. We need to have some kind of adequate labeling of those items. I was hoping that if somebody like Westinghouse started it first it would be a little easier for us.

MR. BARNES: It has been our experience that we have to find the answer to those problems ourselves, and in the case of solvents, such as Professor Drinker mentioned, not only the trade names but the actual materials sometimes don't seem to be known. It is necessary to make fractional distillations of the solvents and find their true chemical composition. In some instances we just haven't been able to find out any other way. We make a practice of determining the composition of the solvents.

MR. PAUL HARDESTY (U. S. Chamber of Commerce): Do I understand you, Mr. Barnes, to imply that you have some form of periodic physical examination?

MR. BARNES: Yes. It would require too long a time to describe the details now. I will just say that each job in the plant is classified for the type and frequency of the periodic physical examination. I don't mean to imply that all employees received a periodic physical examination. However, all employees working with hazardous materials, or where the safety of themselves or others is involved, receive periodic examinations on a definite schedule which is determined by the job. That classification determines who receives an examination and, in cases of disease or reaction to toxic materials, they become the patients of the doctor and are followed under those conditions.

DR. S. C. LONG (Atlantic Refining Company): May I ask how often you make these physical examinations on the men who handle benzol?

MR. BARNES: The frequency of examination depends on each individual process or job. We have tied it down to each job in the plant. If we have an operation where there is a normal exposure which has been proved, through year of experience, to be relatively safe, the examinations will be made every six months, or once a year. If we are going into a new situation, where we don't know what the hazards are going to be, we may make the examinations once a month. Through experience, from determinations over a period of time, we reclassify the job to every six months or a year or whatever is necessary.

MR. FUNKE: In case you find a definite hazard in a certain department, are any of those men trained in first aid, promptly to take care of any serious conditions that may arise at any time?

MR. BARNES: Yes, I would say that something like 10 percent of our total employees are trained in first aid.

MR. FUNKE: With specific instructions on typical or possible conditions?

MR. BARNES: That is right. That is a problem for the safety department, basically, because it is a short time, accident type of exposure. The people in those departments understand what the hazards are and what first aid measures to apply. Frequently written instructions are provided for them.

MR. FUNKE: I was referring particularly to chemical accidents.

MR. BARNES: That is right.

PROF. DRINKER: To many of us it is a pleasure to welcome the next speaker here as a comparative newcomer to the staff of the Industrial Hygiene Foundation, who has for some years been a colleague to many of us: Dr. Francis R. Holden.