The Industrial Hygiene newsletter

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FEATURES

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Atlantic City Chosen Site for Industrial Health Conference, 1951

Next year the Industrial Health Conference will be held in Atlantic City, N. J. This decision was made at the annual meeting in Chicago during April when five organizations convened for both separate and joint meetings. The participating groups are:

American Conference of Governmental Industrial Hygienists;

American Industrial Hygiene Association;

American Association of Industrial Physicians and Surgeons;

American Association of Industrial Nurses, Inc.;

American Association of Industrial Dentists.

ACGIH Officers Selected for 1950–51

Mr. J. J. Bloomfield, assistant chief of the Division of Industrial Hygiene, Public Health Service, is the new chairman of the American Conference of Governmental Industrial Hygienists. Other officers and Executive Committee members, selected at the Chicago meeting last April, are: Chairman-Elect, Dr. J. G. Townsend, Chief, Division of Industrial Hygiene, Public Health Service; Secretary-Treasurer, J. E. Flanagan, Division of Industrial Hygiene, Public Health Service; Executive Committee members: Dr. A. S. Gray and Dr. K. E. Markuson, Bureau of Industrial Hygiene, Connecticut Department of Health, Mrs. Pearl Walden, Division of Industrial Health, Mississippi Board of Health, and Paul D. Halley, Bureau of Industrial Hygiene, West Virginia Department of Health.

COVER PICTURE—Orchard worker applies DDT to an apple tree with a broom type nozzle from a power outfit for codling moth control. Photograph by courtesy of U. S. Department of Agriculture.

INCREASED USE OF AGRICULTURAL CHEMICALS SERIOUS PROBLEM FOR INDUSTRIAL HYGIENISTS*

By H. K. Abrams, M. D.
Bureau of Adult Health
California Department of Public Health

In the past year, we have seen several significant events in the rapidly growing field of the industrial hygiene of economic poisons:

(*1*) At least seven deaths from parathion and many cases of illness from it and its sister product, TEPP.

(*2*) Introduction of two new powerful chemicals: Compounds 118 "Aldrin" and 497 "Dieldrin," both chlorinated hydrocarbons.

(*3*) New legislation and regulations on national and state levels.

(*4*) Tremendous growth of interest in prevention of further accidents on the part of chemical manufacturers, agricultural groups, medical groups, consumers, and others.

Probably of greatest interest was the past year's experience with the organic phosphate group. Of the seven deaths reported, three occurred among workers in chemical plants, three among persons applying the material in the field, and one was the case of an airplane pilot engaged in crop dusting (*1*). Fatal exposure arose from absorption through the respiratory tract or skin or both. Many cases of illness of varying severity were reported.

Case Histories

The following account of a death in California will perhaps best illustrate some of the problems involved.

"Mr. K. H. was a 31-year-old, white male entomologist employed by a University Agricultural Experimental Station. He had been working with parathion intermittently during the 4 months preceding August 1949.

"On the morning of August 23, 1949, Mr. H. arrived at the orchard shortly after 9 o'clock and took charge of the application of parathion which was already in progress. Fruit trees were being sprayed with a mixture containing 2 pounds of parathion (a 25 percent wettable powder) per 100 gallons of water at the rate of 25 gallons per tree. Mr. H. ran the sprayer while an assistant operated the nurse tank, and weighed and measured the ingredients.

"The sprayer had to be refilled about every 15 minutes, and at the refilling Mr. H. added [illegible] 10 pounds of powder containing parathion to the tank as the water was being pumped in. During the operation of the sprayer he was constantly exposed to drizzle of the spray. During the morning, he wore no protective clothing or mask other than wrist-length gloves.

"At noontime, he reported to other personnel on the job that everything had proceeded satisfactorily but that he had a headache. In answer to specific inquiries he assured his coworkers that his headache was not severe and probably of no consequence. He went home to lunch and upon returning he was wearing a pair of coveralls in addition to cap, boots, and gloves. At 3:25 the manager of the orchard made his visit to the operations and had a conversation with Mr. H., who in no way indicated that he was aware of any reaction to the material.

"The spray operation continued until approximately 4:05 p. m., at which time Mr. H. informed his assistant that he felt dizzy. The latter encouraged him to leave the orchard and go home, but Mr. H. insisted he would be all right. However, a few minutes later, while the assistant was cleaning the equipment, Mr. H. became nauseated and vomited. His coworker again asked him to leave the orchard, but Mr. H. insisted on staying and finishing the job.

"However, shortly thereafter he got into his car and started to drive home. He drove about a quarter of a mile and again became nauseated. He asked a young man to drive him home and arrived at his house about 4:45 p. m., and told his wife that he was ill from parathion. He asked her to call a doctor and ambulance, and to instruct the ambulance to bring an oxygen tent. In the meantime, he was assisted out of his clothes and proceeded to take a bath. The doctor arrived shortly after 5 p. m. and pronounced Mr. H. dead at approximately 5:05 p. m.

"The subsequent autopsy did not reveal any other contributing information as to the cause of death, and it was attributed to poisoning by parathion. A postmortem specimen of blood showed no cholinesterase activity and it contained one part of parathion per million parts of blood."

Another case history illustrates well another type of problem:

"On July 8, 1949, at 8 a. m., 3 picking crews of 30 men each went into orchards to pick fruit. Two crews were assigned to blocks in the orchard which had been sprayed on June 27, 1949, with a parathion spray powder, enough to give 2½ pounds of parathion per acre. The other crew went to a block sprayed on an earlier date.

"The day became hot and sultry, with no breeze; the temperature was between 90° and 100°. Between 12:30 p. m. and 8 p. m. 22 of the pickers working in the most recently sprayed blocks felt ill, and quit work to lie down. Most of the men began to vomit. All 22 were taken to the nearest hospital where it was noted that they all had headache, pallor, nausea, vomiting and weakness, and that two or three complained of twitching of arm and leg muscles.

"They were all treated with 1/100 of a grain of atropine sulfate intramuscularly. The response was remarkable; in 20 to 30 minutes all improved, and vomiting ceased. Ten of the men were allowed to go home that evening, and the remainder who stayed overnight for observation were released the next morning.

"Urinalyses on all patients were negative. All the men showed a slight decrease in red blood cell count and hemoglobin, while their white blood cells were increased to between 14,000 and 20,000. Because of lack of facilities, blood cholinesterase determinations were not made.

"Most of the men had brought their own lunches. Three or four ate at the mess hall provided in the orchard. Some ate the pears which were picked and others did not; some drank from

*Presented at the American Conference of Governmental Industrial Hygienists, Chicago, April 1950.

new containers and some from old containers of water. There was no evidence of any common food or any common source of water supply which was consumed by all of the men. The diagnosis in all cases was acute parathion poisoning caused by inhalation of vapors resulting from spray residue remaining from the spraying which had been done 11 days previously."

Chronic Effects

An aspect not fully evaluated as yet is the possible chronic effects of exposure. We have received reports in California from several physicians who have seen what they believe to be an excessive number of cases of hepatitis and nephritis in farming areas, among persons exposed to agricultural chemicals. Usually these people are exposed to all types including DDT, organic phosphates, and others. In the absence of good epidemiologic data, clear-cut history of exposure correlated with onset of disease, and adequate diagnostic methods, it is almost impossible as yet to conclusively assess these cases.

However, studies on the effects of related anti-ChE esters (DFP and TEPP) in man have demonstrated that the slow rate of restoration of ChE enzymes in the tissues following depression by these esters is an important factor in their production of severe cumulative effects (*2*). Some of the fatal cases can doubtless be explained on this basis.

There have been several airplane crashes in the past year or more, and there is some good evidence that the pupil-constricting effect of the organic phosphates was the precipitating factor. A good illustration is the following:

"The pilot had been up twice that day and crashed into a row of trees on his third flight. He had previously been dusting with sulfur and the hopper leaked so badly that he was completely covered from head to toe with the sulfur. No changes were made in the set-up when he started using the plane for parathion. The man who assisted the pilot in loading the plane for his last flight said the pilot had remarked about his eyesight diminishing but passed it off as a minor matter. The investigation revealed little, as the plane and pilot were destroyed by fire." (*4*)

Prevention Is Possible

Prevention of accidents from the organic phosphates is possible with the application of accepted industrial hygiene measures in the plant and the field. Special problems are:

(a) Protection of the skin because of the facility with which parathion penetrates. This is accomplished by means of suitable protective clothing, but the practicability of the elaborate protection necessary constitutes a real problem.

(b) Development of a practical, yet effective respirator for use on the farm. More work is needed here. So far, the safest types are the full-face GMC–1 consisting of canister with activated charcoal and dust filter, or better still a forced air hood type.

(c) Protection of the airplane pilot.

With regard to *contamination of food*, Lehman (*3*) states no instance of poisoning of humans has yet been reported. Apparently the amount required to penetrate the plant is far in excess of the amount used to kill insects. Birds and small animals have been killed in recently treated orchards. A rural physician recently reported a classical poisoning of a mule pulling a spray rig. The animal recovered on treatment with atropine.

Diagnosis of illness from organic phosphate exposure rests on the characteristic cholinergic manifestations and the reduced blood cholinesterase level. Cholinesterase levels in the normal person have not yet been adequately standardized and only inferences can be drawn from one determination in an individual. However, a dropping level in a person after exposure is highly significant. What is needed is a more definite laboratory diagnostic aid, such as a test for detection of the chemical or its breakdown products in the blood or urine. Possibly the near future will see one developed.

Atropine has been demonstrated to be highly effective in therapy of poisoning by the organic phosphate chemicals, but in severe cases other measures are usually necessary including oxygen, gastric lavage, cleaning of skin, parenteral fluids, and other symptomatic treatment. In severe cases, atropine should be given in doses as high as 2–3 mg. intramuscularly every hour as long as cholinergic symptoms are present, since the tolerance for atropine is greatly increased by the action of the anti-ChE compound.

A question has arisen with regard to supplying spray applicators with atropine to use in the event of symptoms. American Cyanamid Company publicly suggests to farmers that they request a prescription for 20 tablets of atropine gr. 1/100 (0.65 mg) "to be kept on hand for emergency use."

In California, the Bureau of Adult Health has already had two requests from local health departments for advice, as doctors have come to them for advice upon being requested the atropine by their patients. I question this procedure seriously:

(a) Atropine is itself a poison (fatal dose is 0.1 gm. for adults—Sollmann).

(b) The drug may be used for all types of headaches and other symptoms suspected of being parathion poisoning.

(c) It is likely to promote false security and carelessness in handling parathion.

More recently two new and potent chlorinated hydrocarbons have come into use, Compound 118, known commercially as "Aldrin" and Compound 497, known commercially as "Dieldrin." Both are being used on cotton, 497 also for residual fly control. Lehman (*3*) reports, "Both compounds penetrate the skin readily and present the rather rare property of being more toxic by dermal application than by oral ingestion, the ratio being 10 to 1." Neither of them is irritating to the skin in low concentrations; hence there is no warning sign of skin contact. Early studies indicate a chronic toxicity hazard similar to that of chlordane, with damage to the liver and other degenerative changes resulting from exposure to chlorinated hydrocarbons. Lehman believes chlordane to have "the worst all-round hazards of the chlorinated insecticides (*3*)."

Effective Legislation

Nationally, the regulations for enforcement of the Federal Insecticide, Fungicide and Rodenticide Act have been amplified by the promulgation of clarified labelling requirements, as of November 14, 1949.

The Council of State Governments has drawn up a uniform law for use

(Continued on page 16)

Hygienic Standards for the Prevention and Control of Occupational Diseases[1]

By J. J. Bloomfield,
Assistant Chief, Division of
Industrial Hygiene, USPHS

IT IS the purpose of this discussion to review the progress which has been made in this field over the past 3 years, with the hope that certain trends in the promulgation and enforcement of rules and regulations in the industrial health field will be revealed. Such a review should give us a clear picture of the direction in which we are going.

Present Status of Standards

In W. P. Yant's presentation of industrial hygiene codes and regulations during his talk here in 1948, he distinguished between codes which are considered from a "strictly legal and regulatory sense" and those which one thinks of, "in the ordinary and more voluntary sense," as being "a system of principles, rules and regulations relating to one subject or a formal statement of them."

One of the trends which has been quite evident during the past 3 years is the attempt of those concerning themselves with this subject to get away from the use of the term "code," which has a distinctly legal and regulatory connotation. This attempt to get away from the legal interpretation is not due, in any sense, to a shirking of responsibility by those who are charged with the administration of such programs.

Instead, it is primarily because our state of knowledge today is insufficient to utilize the information we have in any other way save that of a guide. For this reason, I wish to call your attention to the fact that the title of my discussion concerns itself with "hygienic standards" and not "codes" and that throughout the rest of this discussion the term "hygienic standards" will be employed.

There are, today, 56 industrial hygiene units in State and local government. This is an increase of 4 units since my last report to you. At the present time, 52 of these industrial hygiene units are administered in State and local health departments, while 4 will be found in labor departments or industrial commissions. Of the four industrial hygiene activities in the hands of labor authorities, two are located in States, namely, Illinois and Ohio, where additional activities are being carried on by the State health departments. In other words, we have a situation in Illinois and Ohio where there is definite duplication of effort in this field.

In studying the existing State laws granting authority for industrial hygiene activities, one finds that, among the 54 health agencies conducting such activities, 28 do so on the basis of implied authority found in the basic act establishing the health department proper, while 24 health departments have specific authority, or enabling legislation, for the conduct of industrial hygiene. All of the four industrial hygiene units operating in labor departments have specific authority for such work.

Rule-making Activities

Some very interesting information is revealed from the analysis of the rule-making activities in the various States. For example, 50 agencies in States have specific authority to promulgate rules and regulations for the control of industrial health hazards. Of these, 27 are in health departments and 23 in the hands of labor authorities.

When it comes to enforcement of such rules and regulations, we now find that 29 labor authorities have specific mandates for the enforcement of hygienic standards and 17 health departments have such authority. This situation reveals a very significant trend in the entry of health departments in the enforcement field, a field which has, by tradition, been considered a labor department activity.

Now let us consider the picture in States which have actually translated their authority into action. In 1946 it was shown that some 35 agencies had promulgated rules and regulations for the control and prevention of occupational diseases.[2] The present analysis shows that there are now 36 such sets of rules equally divided between health departments and labor authorities.

Once again an interesting trend is revealed in several States where the rules which have been issued have been done so jointly by the departments of public health and the labor authorities of those states. For example, such a joint activity was found in Idaho, Indiana, and New Hampshire. Also, in California, Florida, Minnesota, Rhode Island, Washington, and Wisconsin, the rules, although issued by the State labor authority, were prepared in collaboration with the State health department.

On the other hand, we find that in Ohio and Oregon rules and regulations have been issued by the health department as well as by the labor authority in those States, except that, in Oregon, the Industrial Commission, in the preparation of its rules, received assistance from the health department, but the promulgation was not a joint action.

So much for the rules themselves. Has there been any change, however, in the scope of these rules and regulations over the past 3 years? And, if so, what has been the trend in the content of such standards? In 1946, most of the rules and regulations left much to be desired, not only in the way of uniformity and adequacy, but also in their coverage, particularly in providing specific information which would assist industry in complying with the regulations which had been promulgated.

In other words, these rules tell industry "what," and not "how." For

[1] This speech was delivered at the Legal Conference of the Industrial Hygiene Foundation, November 16, 1949. It is excerpted here.

[2] Bloomfield, J. J.: Codes for the prevention and control of occupational diseases. Trans. Eleventh Annual Meeting, Industrial Hygiene Foundation, Pittsburgh, Pa., November 7, 1946.

example, 10 States have promulgated rules and regulations which are specific for an industry or a process; there are also 12 sets of rules and regulations which are of a general character, covering all industries or processes in a state or other jurisdiction; and finally, there are 20 sets of rules and regulations with somewhat limited scope, being either statements of a general character contained in one sentence, or a list of maximum allowable concentrations, or rules dealing with one definite problem, such as mercury poisoning in the hatting industry, or general sanitation, or the hazards from tetraethyl lead.

In several instances one finds the existence of rules and regulations specific for an industry or process, as well as additional rules of either a general or limited character. For example, this is the case in Ohio, where there is a general over-all set of rules as well as special rules for lead and mercury poisoning. Also, in the State of Wisconsin, one finds a general set of rules covering all industrial plants and processes, as well as rules for specific industries and processes.

Developments Cited

It is evident that not too much progress has been made at the State level, either in the number of rules and regulations issued or in an attempt to achieve uniformity as to administration and scope of standards for the protection of the health of our workers. However, there have been a few developments over the past 3 years which show definite activity and interest in this subject.

In California, the Department of Industrial Relations, in cooperation with State and local industrial hygiene units in health departments, has issued labeling orders for hazardous substances. At the same time, a revision of the general industrial safety code was drawn up by the Department of Industrial Relations in cooperation with the Bureau of Adult Health. The city of Los Angeles also drew up some rules and regulations which are far reaching and broad in character.

In Colorado, the Board of Health revised its list of maximum allowable concentrations for this year and in Oregon, as already noted, two sets of hygienic standards are in existence, one promulgated by the Board of Health and the other by the Industrial Accident Commission. The latter agency is once again revising its rules in cooperation with the State Board of Health.

In Rhode Island, the Industrial Code Commission, which is the agency charged by law with code promulgation, is working on specific rules for laundries and the rubber and textile industries. It has already adopted a code for the dry cleaning industry. These rules are being prepared jointly with the Department of Labor and the Department of Health.

The Department of Labor and Industry in Washington State, in cooperation with the Department of Health, has revised two sets of safety standards, one for the painting and decorating industry and one for metallic and nonmetallic mines. It also issued some new standards for logging operations. In Wisconsin, the Industrial Commission adopted a dry cleaning code in 1948. Several codes have been adopted in the State of New York, also.

In my 1946 presentation mention was made of the work of the standing committee of the American Conference of Governmental Industrial Hygienists, which developed a uniform set of rules and regulations for the prevention and control of occupational diseases. This work was undertaken in 1946 and was completed this year. The committee was organized because of the demand throughout the country for greater uniformity in the regulations governing health problems in industry.

The guide developed was a basic one, applicable to all places of employment. Specific operations, processes, and problems are to be the subject of future work of this committee, which will attempt to develop data which may be used as guides for those particular conditions. The committee realized that the most desirable type of standards is that which deals with the hazards of a specific process or operation.

However, the committee also recognized that insufficient data are available for many of the hazards in our industries today. It also recognized that it will take many years to develop such specific standards and that perhaps its most useful immediate task was the development of a basic set of standards applicable to all places of employment.

The development of specific standards for individual industries, processes, or operations was to be a long-range objective. The preface to the standards developed by the committee states quite clearly that the standards developed are offered "as a pattern to those interested in effecting simplification of the problem. It is offered without any intent to usurp powers or prerogatives of states and municipalities, but only with the hope that it will serve as a guide leading to increased protection for the health of our working population."

In Summary

In closing this discussion, I think we should bear in mind that more and more States are being charged with the responsibility of promulgating and enforcing rules and regulations for the prevention and control of occupational diseases; and that those States which have, as yet, not seen fit to promulgate such rules will, of necessity, have to do so in the very near future. Furthermore, the fact that we lack sufficient knowledge to say the last word with regard to hygienic standards will be no deterrent to those official agencies which are charged with responsibility in this field.

It is therefore the responsibility of all of us, be we in organized labor, industry, or Government, to assist in the development of reasonable standards while we still have the opportunity to participate in such a program. The main problem today, just at it was in 1946, will be to obtain unanimity among the various States. However, today, as then, it is felt that standards based on scientific fact and so worded that they take into consideration the various social and economic aspects of the problem, should meet with favor among all those concerned. This will be especially true if these standards are administered in a spirit of cooperation with management and labor.

What Organized Labor Wants From Industrial Hygiene*

By Frank Burke,

Director of Safety and Health,
United Steelworkers of America, CIO

IN A sense this is a pretty risky subject for me to talk to you about—"What organized Labor Wants From Industrial Hygiene." As safety and health director of the steelworkers union, I can tell you what I am pretty sure my own organization expects from industrial hygiene agencies. Or I can tell you what I think organized labor in general expects from industrial hygiene. But some of you may be pretty familiar with what other unions expect—and those ideas may differ from mine. So let's say this will be my own general opinion about what labor expects, based on close observation—and bitter experience—over the last few years.

I could tell you really what I want from industrial hygiene agencies in one word—service. But let's be more specific and consider industrial hygiene and its place in the field of labor-management relations today, as well as its place in the field of public health.

Let's begin by accepting the fact that labor unions are very much interested in the health and welfare of their members. You know as well as I that this is a fairly recent development. It wasn't many years ago when we were forced to spend all our time and energy in organizing and fighting for the right to collective bargaining and other basic objectives. Now we are able to turn to things like health and welfare. Of course, the ability to give attention to matters of health and welfare varies with individual unions and in relation to size. The smaller unions still are concerned mainly with organizing. Because, however, health and welfare are so close to the purpose of labor unions, I believe it is only a question of time until all unions will make it a primary concern.

The important thing to remember, I think, is that in this matter of concern with health and welfare, there is no place for unions to go but forward. I can't believe that there will ever be a day when we will be forced to be less concerned with these matters in order to turn to some other need. All our organized labor unions realize, at the same time we are pressing the importance of health and welfare, that labor is far behind management and government in knowledge and experience in the field of industrial health. The concept of industrial hygiene has risen through the years because of the work of management groups and governmental agencies. Management realized fairly early that it has economic interests in preventing disease and accidents. Governmental agencies took action to solve industrial health problems because such action was a proper duty of public agencies. But there is no getting around the fact that industrial hygiene is working to improve the health of the worker. You are working basically to improve the workplace and working conditions of the people in the plant—and we are the people in the plant.

That's why it seems to me such a basic fact that labor has a right to participate in industrial hygiene programs. We are the consumers, and we want a share in the determination of what we will get.

Now it is one of the fundamental ideas of our democratic way of life that privileges and rights also carry with them responsibility. So I know that with our determination to participate in industrial hygiene, we have a duty to carry out that participation in an intelligent manner. Because of the fact that we are coming into the game late, so to speak, there are a number of barriers facing our full participation with you. Probably first and foremost is tradition. For years you have been dealing primarily with management. There were some great studies made during the past years with the cooperation of unions, but by and large, you still operate chiefly and directly with management.

I understand that this is necessary to a great extent. You can't study a plant unless you can get into it, and you can't get into it unless management feels at least to some extent that you are working for them. But at the same time, I believe intelligent management will also realize that you are working for the worker and that the worker has a right to some say about what you are doing.

This is a problem that will require some work. It won't be solved overnight. In fact, it will only be solved when both sides understand all the problems involved.

A case in point in this specific problem is the matter of reports of your investigations into particular health hazards in the plants. There have been far too many instances when union people made complaints to State health departments about conditions in particular plants, and then when the industrial hygiene people proceeded to make their investigations, the reports on those investigations were given only to plant management. Despite the reasoning which may lie behind the decision of the State health departments to operate this way, I submit it is completely illogical in principle.

I have been told that union officials do not have the technical "know-how" to understand the report of the State health department. That may be true. I have also been told that the union should not be concerned about the details except to know either that the complaint was unjustified and that no hazard existed, or that, if a hazard existed, it has been eliminated. That may also be true in some cases. But again I say the workers are the people exposed to these hazards, and they have a right to know exactly the outcome of a complaint to their own government.

The larger question involved here is, of course, that you are a part of the labor-management relations picture even though industrial hygienists are government agents. You are involved in labor-management relations—willy-nilly. So it has seemed to me the shining fact in this whole picture is that the health of the workers is probably the one area of labor management relations that blends itself most to mu-

*A speech presented at the twelfth annual meeting of the American Conference of Governmental Industrial Hygienists, April 24, 1950.

tual agreement. A healthy worker is a benefit to management as well as to himself. You have been using that argument for years, in your discussions with management in attempting to persuade them to make the working place the best possible. Labor unions feel exactly the same way except, of course, that our prime interest is in keeping our members healthy, as opposed to management's interest in more profits. That is why I cannot but believe that the problems of cooperation between labor unions and industrial hygienists are all ones that we should be able to solve.

Let me go even a little bit further. In view of the logic of the situation, it seems to me that industrial hygienists would be unwise indeed to refuse to let us cooperate with them. The great need in industrial hygiene divisions, Federal, State and local alike, is for more trained personnel, more money to operate and better authority to do your work. I believe that we can help you to fill those gaps. I believe that we can help you in getting the necessary legislation and appropriations from your State legislatures to do the work you want to do. I believe that we can help you get the money to solve the old problems in industrial hygiene so that you can turn your attention to the new problems arising daily.

Speaking of the new problems brings to mind the subject of air pollution and the Donora disaster. I can't be too high in praise of the Public Health Service and the Pennsylvania Bureau of Industrial Hygiene for their work in that case. I assume that many of you know that the town of Donora is a steel town and that workers in the steel plant are members of our union. The study that was done in Donora after October 1948, will accomplish a great deal, I believe, to pave the way for a future solution of the problems of air contamination in our industrial cities.

The job that was done at Donora is a sample of what I mean when I say that organized labor expects service from industrial hygienists. Donora was an acute case, of course, and got immediate and serious attention. But to me the important point was that it was realized throughout the crisis and the study that followed that the union representing the people who worked and lived in Donora had an interest in the solution to the problem and had a basic right to know what was being done.

I would like to mention also another instance in which the Public Health Service and Pennsylvania Health Department have worked together with the steel workers union. Last year I went to Washington to confer with officials of the Labor Department and of the Public Health Service to ask that they consider organizing a series of seminars or lectures in the general principles of industrial health and safety for our union shop safety committeemen.

These shop safety committees have been set up in our collective bargaining agreements with the steel plants for several years. But they were not active because the committeemen themselves did not have the technical knowledge to do anything more than very general promotion of safety practices in the plants. The Public Health Service Division of Industrial Hygiene agreed to attempt to organize such a series of seminars in the Pittsburgh area with the Pennsylvania Bureau of Industrial Hygiene. A series of seven seminars was finally decided on for three different towns around Pittsburgh. The whole project was completed last week, and it is a pleasure to take this opportunity to thank Mr. Bloomfield, Mr. Flanagan, and Dr. Shilen and his staff for the way the courses were carried out.

The courses were not intended, you understand, to make industrial hygiene experts out of the shop committeemen, but even a general understanding of the principles of industrial hygiene is more than the shop committeemen had before. And I consider it a definite step forward. It is my hope that we may have more such courses in the future.

And right here and now I'd like to take this opportunity to request the cooperation of other state health departments in putting on these seminars in industrial hygiene in other States.

That leads me to another point in the matter of cooperation that I have heard a great deal about in the last 2 weeks. That is the discussion over who shall do industrial hygiene work—the health departments or the labor departments. Apparently jurisdictional problems plague other organizations besides the labor unions! But seriously speaking, my answer is that organized labor will go to the agency from which it will get service.

Within the next week or so you will be seeing evidence of another instance of cooperation of which I am very proud. During the time the Donora study was in progress, the Division of Industrial Hygiene people were conscious of the fact that a great deal of research needed to be done in this field. While they were in the process of doing the study they were also gathering a bibliography of everything written on the subject of biological aspects of air pollution. That bibliography will be published next week—printed as a public service by the steel worker's union.

We were pleased indeed because of our interest in air pollution to be allowed to print this work done by the Public Health Service, and it is indeed a public service on our part. Obviously it is a highly technical book and will have a specialized audience which won't be the people in the shops. It won't win any wage increases for us, but as I say, I am very proud of the fact that the officials of the steel workers union were glad to have the privilege of printing it as a public service.

But let me return to the important points to be made on this subject. We all know that despite the accomplishments of recent years there are still great areas where the picture is pretty dark.

In many instances management has developed health and safety rules and regulations without even consulting the workers. In other instances the unions have believed it necessary to use their union strength to oppose measures which would have benefited them—if they had known the truth. And there are still many companies—and even some unions, I confess—whose activities show no evidence of consideration of the health needs of the workers and the need for a healthful working environment. And I might as well say also that despite the increasing interest on the part of the more forward-looking unions, some other unions are apparently still more concerned over compensation benefits than over the prevention of conditions which caused these compensable injuries—injuries which can never be fully compensated by cash

benefits. On the other hand, attitudes of management toward industrial hygiene run all the way from paternalism to complete neglect.

What is really needed, I believe, on the part of labor and management, and government as well, is a new policy—a new attitude, an attitude that will accept the fact that all three of us must work together in industrial health. All of us are headed toward the same goal—improvement of the health of the industrial worker.

Dr. T. L. Hazlett New Member of Agency to Settle Medical Issues

Dr. T. Lyle Hazlett, Director of the Department of Industrial Medicine, University of Pittsburgh Medical School, who is also associated with the new Graduate School of Public Health, was recently appointed a member of a final non-court agency of appeal on medical issues involved in occupational disease payment disputes.

The Board is empowered to examine applicants for occupational disease benefits to determine the exact state of their health for the state workmen's compensation board. The findings of the Board are conclusive except that on court appeals a question may be entered as to whether the findings are based upon sufficient evidence.

PHS and U. of Pittsburgh Confer on Methods in Public Health Research

A conference on Methods in Public Health Research was held recently under the auspices of the Public Health Study Section, Division of Research Grants and Fellowships, National Institutes of Health, PHS, and the Graduate School of Public Health, University of Pittsburgh.

Dr. Thomas Parran, former Surgeon General of the Public Health Service, is dean of the Graduate School, which was established by a gift from the A. W. Mellon Educational and Charitable Trust. In awarding the grant, it was stipulated that the school should "emphasize occupational and industrial health and hygiene" in addition to its basic research and educational programs and its other interests in health.

Information concerning date of publication of the material presented at the Conference on Methods in Public Health Research may be obtained by writing to Dr. Lowell J. Reed, Chairman, Public Health Study Section, Division of Research Grants and Fellowships, National Institutes of Health, Bethesda 14, Md.

Columbia U. Host to Meeting on Sickness Disability Insurance

"Under disability insurance, the employer will have the same encouragement to reduce nonoccupational illnesses as he had in reducing accidents when workmen's compensation was initiated." This statement was made by Dr. Leonard J. Goldwater, Professor of Industrial Hygiene, Columbia University School of Public Health, at a recent conference on Sickness Disability Insurance. The conference was sponsored by the Graduate School of Business, the School of Engineering, the School of Law, and the School of Public Health of Columbia.

It was also brought out at the conference that since medical certification is necessary to obtain disability benefits, legislation providing them will result in more people seeing physicians and will give the physician an opportunity for practicing preventive medicine. The examination may reveal other conditions in the patient which need care. This experience is likely to encourage members of the patient's family to "see the doctor" while they are apparently well.

During the conference it was pointed out that in California more communicable diseases are reported in the certification of disability insurance than are reported regularly to the health department and that this is resulting in better reports on communicable diseases. It was also stated that under the New York State Disability Law, the insurance companies give certain discounts for medical programs existing in the plants.

The proceedings of the conference will be published and available upon request to Dr. Leonard J. Goldwater, School of Public Health, Columbia University, 600 W. 168th St., New York 32, N. Y.

DO YOU KNOW THESE PUBLICATIONS?

Public Health Engineering Abstracts.—A monthly publication issued by the Public Health Service. To be placed on the mailing list, write Mr. William Menz, Environmental Health Center, Public Health Service, 1006–1020 Broadway, Cincinnati 2, Ohio.

The Human Heart.—This pamphlet is a reprint of a series of articles which appeared in the *Washington Post*, Washington, D. C. This series presents information about the heart and the diseases affecting the heart and circulatory system in an accurate and factual manner, understandable to the general public.

A single copy may be secured without cost by writing to the Heart Information Center, National Heart Institute, Bethesda 14, Md. Additional copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 15 cents per copy, with 25 percent discount on orders of 100 or more mailed in bulk to one address.

Casanova—The Tale of a Mouse, written and illustrated by Will Anderson is an educational pamphlet on venereal diseases that has had very wide acceptance by Army, Navy, Air Force and health departments in this country and Canada.

Copies may be ordered from the American Publishing Co., 1825 K Street NW., Washington 6, D. C. The revised edition is 4⅛ x 5⅜ in size and sells for $9 per 100 copies; $40 for 500 copies; $70 for 1,000 copies; $300 for 5,000; and $500 for 10,000.

Report—National Conference on Cardiovascular Diseases.—A condensation of a 3-day meeting of 196 professional and lay leaders, held in Washington, D. C., in January 1950, to determine what is known about cardiovascular disease and how the knowledge can be applied to prevent and cure it. The summary covers the discussions on technical knowledge and research, community services, and professional education.

It is written in a very readable and interesting style and is attractively printed. Single copies of the digest report may be obtained free of charge by writing to the American Heart Association, 1775 Broadway, New York 19, N. Y.

Experts Recommend Extensive Research on Air Pollution

Industrial, research and educational organizations and State and municipal governments sent about 800 leading authorities on air pollution to the United States Technical Conference on Air Pollution, held in Washington the first week in May.

Called at the request of President Truman, the three-day conference provided the opportunity to pool the information known about air pollution and to draw up recommendations for future action. How to attain clean air for America has long been a major problem, but the problem has become more acute in recent years with increased industrialization and the development of new chemical, and radiological processes.

Discussion at the conference was organized into seven groups: agriculture, analytical methods and properties, equipment, health, instrumentation, legislation, and meteorology.

As Chairman of the Health Panel, Dr. J. G. Townsend, Chief, Division of Industrial Hygiene, Public Health Service, summarized the reports of that group at the closing session of the Conference. He said:

"In brief summarization of the information presented in this panel, the following points are outstanding:

"(*1*) The pollution of the atmosphere with allergenic material of natural, artificial, and industrial origin is associated with a frequent, and apparently increasing, occurrence of acute and chronic disease, involving especially the respiratory tract and the skin.

"(*2*) Certain acute manifestations, caused primarily by respiratory or ocular irritation, have been observed in association with industrial operations and accidents and unusual weather conditions in localized areas.

"(*3*) The effects of the more common atmospheric pollutants upon the general health of the population of our urban and industrial centers have not been demonstrated in the form of authenticated chronic disease processes.

"(*4*) The complexity of the problem is such that further evidence must be sought before the hazard to public health can be appraised adequately."

The recommendations of the Health Panel were reported by Dr. Townsend as follows:

"In order to determine the effects of exposure to air pollutants, singly and in various combinations, the investigative approaches should include the following:

"(*1*) Carefully controlled animal experimentation.

"(*2*) Study of the effects on human volunteers of controlled and specific atmospheric conditions within safe limits.

"(*3*) Comprehensive clinical investigations of exposed persons, correlated with all the essential studies of their atmospheric exposure.

"(*4*) Carefully planned and executed epidemiological studies on the effects of air pollution upon general population groups, in correlation with comprehensive determination of the composition of the community atmospheres.

"(*5*) All of these investigations should use and be correlated with findings in other related fields.

"(*6*) Without awaiting the results of long-term investigations, all possible aid and encouragement should be given to measures for the appraisal, prevention, and alleviation of currently existing human health hazards from air pollution."

Members of the Health Panel and the subjects on which they spoke were:

J. G. Townsend, M. D., Public Health Service, "Short Range Exposure to High Concentrations by Air Pollutants."

William F. Ashe, M. D., Kettering Laboratory of Applied Physiology, Cincinnati, Ohio, "Acute Effects of Air Pollution in Donora, Pa."

Marion Sulzberger, M. D., New York University, "Skin Effects of Air Pollutants."

I. R. Tabershaw, M. D., Liberty Mutual Insurance Co., New York, "Chemically Active Air Pollutants."

Robert A. Kehoe, M. D., Kettering Laboratory of Applied Physiology, Cincinnati, "Effects of Chronic Exposure to Air Pollutants."

W. C. Hueper, M. D., National Cancer Institute, National Institutes of Health, Bethesda, Md., "Cancer in Air Pollution."

Arthur J. Vorwald, M. D., Trudeau Foundation, Saranac Laboratory, Saranac Lake, N. Y., "Effect of 'Inert' Dusts in Air Pollution."

Abel Wolman, Dr. Eng., Johns Hopkins University, Baltimore, Md., "Effects of Ionizing Radiation in Air Pollution."

L. P. Herrington, Ph. D., Yale Medical School, New Haven, Conn., "Effects of Fog."

Harold F. Blum, Ph. D., Princeton University, Princeton, N. J., "Effect of Loss of Sunlight."

James M. Dunning, D. D. S., Harvard University, School of Dental Medicine, Boston, Mass., "Effects on Oral Structures from Air Pollution."

Harold F. Dorn, Ph. D., National Cancer Institute, National Institutes of Health, Bethesda, Md., "Statistical Approach."

Anna Baetjer, D. Sc., Johns Hopkins University, Baltimore, Md., "Effect of Chronic Exposure of Air Pollutants on Acute Infectious Respiratory Diseases."

F. W. Wittich, M. D., American College of Allergists, Minneapolis, Minn., "Respiratory Tract Allergic Effects from Chemical Air Pollution."

Agencies represented on the Interdepartmental Committee on Air Pollution, who sponsored the conference, were: Public Health Service, Federal Security Agency; Bureau of Mines, Department of the Interior; Weather Bureau and Bureau of Standards, Department of Commerce; Atomic Energy Commission; Agricultural Research Administration and the Bureau of Plant Industry, Soils and Agricultural Engineering, Department of Agriculture; Office of Naval Research, Bureau of Medicine and Surgery, and Office of the Deputy Chief of Naval Operations for Air, Department of the Navy; Geophysical Sciences Branch and the Air Weather Service, Department of the Air Force; Research and Development Board, Office of the Secretary of Defense; and the Office of the Surgeon General and the Chemical Corps, Department of the Army.

ABSTRACTS OF PAPERS GIVEN AT THE INDUSTRIAL HEALTH CONFERENCE[1]

ATMOSPHERIC POLLUTION CONTROL BY A LOCAL INDUSTRIAL HYGIENE UNIT

By Charles E. Couchman and Wilmer H. Schulze[2]

Health departments are expected by the public to take an active interest in the abatement of atmospheric pollution conditions whether only a few people or an appreciable segment of the population are effected. In general the usual authority invested in the health officer to abate nuisances has sufficed to correct many such situations. The beginning of an industrial hygiene service in the Baltimore City Health Department in 1931 made possible increased attention to and investigation of reports and complaints of specific instances of atmospheric pollution.

This service later resulted in an expansion of the technical and engineering studies required in the investigation of atmospheric pollutants. Offenders varied in type and degree including rendering plants, oil refineries, chemical manufacturing, domestic incinerators, and asphalt paving plants. Some of the air contaminants involved were sulfur dioxide, fluorides, hydrogen sulfide, dusts of various types, fumes and obnoxious odors.

It is interesting to note that in recent years, industry has become more conscious of its "good neighbor" responsibilities and has shown active interest and effort toward the control of atmospheric pollution. Several such examples are the expenditure or plans for the expenditure of significant amounts of money for the control of sulfur dioxide by a pigment manufacturer, fluorine compounds originating in the making of fertilizer and excessive amounts of dust created in the preparation of street paving materials. In only a relatively few instances has it been necessary to resort to court action and then only after a long period of effort to solicit the interest and cooperation of management. In such cases the defendant, on the basis of the testimony presented, was found guilty and fines were imposed.

In recent years attention has been concentrated on preventive measures. Arrangements were made for the review of all applications and plans for the construction of new industrial plants or major additions or alterations to existing ones.

The procedure affords the opportunity to discuss with management any possible sources of atmospheric pollution together with methods for their control. This type of service pays dividends in public relations both with industry and the public in general.

The relationship between industrial expansion and an increase in atmospheric pollution in an area consists of several factors having wide limits few of which can be defined at the present time. Because of the specialized training, duties and experience of the personnel in official governmental industrial hygiene units their services should be helpful to many industrial plants in evaluating the limits in an effort toward solving many atmospheric pollution problems.

VENTILATION OF OPEN TANKS

By Arthur C. Stern*

Under the joint sponsorship of the American Industrial Hygiene Association, the American Society of Heating and Ventilating Engineers and the National Association of Fan Manufacturers, the American Standards Association Sectional Committee on Safety Code for Exhaust Systems, Z9, has prepared a proposed American Standard Code for Ventilation and Safe Operation of Open Surface Tanks.

Open surface tanks include electroplating, pickling, dyeing, tanning, degreasing, and similar tanks. The proposed standard groups these tank operations into 12 classes according to the severity of the hazard associated with the substance contained in the tank because of the toxic or explosive nature of the vapor, gas or mist produced. The groupings are also listed according to the capacity of the tank to produce such vapor, gas, or mist as well as the relative energy with which it is projected or carried upwards from the tank. Tables are provided to assist in proper classification of operations.

Various hood types are illustrated and details of their design shown. For each hood type and class of operation the minimum air velocity required to control vapor, gas, or mist and the method for calculating the minimum air quantity required are both stipulated. A method for calculating the size of slot or baffle opening needed to provide uniform air flow into a manifold is described.

DENTAL ACTIVITIES IN A STATE INDUSTRIAL HYGIENE PROGRAM

By L. M. Petrie, M. D.*

We are developing a close working arrangement with the dental division of our State health department toward fostering good oral health among the industrial workers in our State.

To accomplish this, the dentist who has been assigned by the dental division will have four broad functions. First, he will work with the industrial hygiene division in conducting plant surveys to determine the effects of the environment on the oral structures of employees. Second, he will promote educational programs in an effort to teach industrial workers the value of good oral health for themselves and their families. Third, he will work with responsible groups, such as labor, management, local industrial hygiene and safety engineers, local dental societies, and the State industrial hygiene division, in assisting in the development of dental programs in industry. Finally,

[1] Chicago, April 22–29, 1950.

[2] Director, Bureau of Industrial Hygiene, and Director, Sanitary Section, respectively, Baltimore City Health Department.

*Chief, Engineering Unit, Division of Industrial Hygiene and Safety Standards, N. Y. State Department of Labor, 80 Centre Street, New York 13, N. Y.

*Dir., Division of Industrial Hygiene, Georgia Department of Public Health.

he will survey dental programs already in operation and offer consultative services for their evaluation and, when necessary, recommendations for their improvement.

It is up to the dentist to prove the value of the inclusion of oral health service into the over-all health program of a plant. Materials handled and processed by the workers often adversely affect the structures of the oral cavity as well as other parts of the body. Oral prophylaxis, regularly performed, mitigates against the ill effects of these occupational exposures.

The restoration of carious teeth protects against their loss and concomitant decrease in masticatory efficiency, with the resultant overburdening of the digestive system. The tissues of the oral cavity, at times, act as indicators of pathological changes occurring in other parts of the body. Diagnostic signs of syphilis, cancer, nutritional deficiency, and other acute and chronic diseases are manifested in the oral cavity.

The early discovery and treatment of these conditions by the industrial dentist aids in the reduction of time loss and inefficiency. Management must be convinced that, point by point, from the preplacement oral examination to dental health education, the work of the industrial dentist complements that of the plant physicians.

CHEMICAL CARCINOGENS

By J. R. Heller, M. D.*

Increased attention is being paid to the inanimate pathogenic factors that form a small but important part of our modern industrial environment. Among these are the chemical carcinogens which, though relatively small in number, come into varying degrees of contact with a large segment of the industrially employed population. Known or strongly suspected carcinogens include benzol, beta-naphthylamine, benzidine, coal tar, pitch, asphalt, soot, shale oil, crude paraffin oil, lignite oil, lignite tar, petroleum fuel and lubricating oils, arsenicals, chromates, radioactive substances, and perhaps nickel carbonyl and asbestos. Although not yet implicated in human cancer, animal cancers have been produced by other environmental substances such as estrogens, urethane, chlorinated hydrocarbons, beryllium, and selenium.

Because both the industrial and general population are exposed to a growing list of chemicals of largely undetermined biologic properties, there is an urgent need to assay these substances and to determine the extent of chemical cancer hazards. Epidemiologic studies of environmental cancer, such as those recently conducted by the chromate and petroleum industries, should be considered by other industries, including consumers as well as producers of known or suspected carcinogens.

Studies should include the entire present and former worker population that had effective contact with cancerigenic chemicals. Special attention should be paid to any unusual frequency of cancer of a specific site among employees in a restricted department or operation. Such information can be obtained from medical and employment records, supplemented by data from public health departments and insurance carriers. Where chemical carcinogens may have polluted air, water or soil, the surveys might well include the general population living in the fume or waste disposal zone.

Surveys of environmental cancer require team work among plant managements, industrial physicians, the medical profession, and Federal and State health agencies. Since industrial physicians are most aware of chemical cancer hazards, they should communicate their special knowledge to the medical profession as a whole, so that all may contribute their full share to the identification and ultimate prevention of chemical cancer.

*Dir., National Cancer Institute, Bethesda, Md.

Men on Hot Jobs Advised to Take Salt Before Work

In a paper read before the annual convention of the American Association of Industrial Physicians and Surgeons, a Chicago research worker advised men, who are employed in very hot environments, to take some ordinary table salt before they go on their jobs.

Simon Rodbard, Ph. D., assistant director of the Department of Cardiovascular Research, Medical Research Institute, Michael Reese Hospital, said that recent studies on animals suggest that the administration of salt before exposure to hot environments is of even more value than the giving of salt during or after exposure.

"These findings," he added, "promise to make it possible to protect the normal individual against heat stress and such information, naturally, is of special value to workers who must work in excessively warm environments."

The Chicago researcher, who has been engaged in a study of the regulation of the body temperature and the changes that occur with marked changes in the weather, pointed out that a man working in a hot environment throws an extra load on his heart.

"The heart," he added, "must often pump eight times as much blood as when the man is resting. The stress is still greater if there are hidden loads as in the various forms of heart disease.

"The use of adequate salt intake in the normal person helps resist the effects of heat stress. Acclimatization which occurs normally during the spring and summer weather also aids the heart and blood vessels to withstand the added burden. This is brought about by changes in the glands of internal secretion, particularly the adrenal cortex. The administration of ordinary table salt is of great value in helping to protect the circulation of healthy individuals against the effects of heat stress. In patients with heart and kidney disease, however, the problem is more complex inasmuch as too much salt intake may have its own deleterious effects when the heart is weak."

Dr. Rodbard explained that as a result of the studies of the armed forces during the war, knowledge of the effect of hot weather on the function of the body has increased enormously. These studies, he said, have been continued through the support of the Department of Defense in order to provide the greatest possible understanding of the special problems brought about by high environmental temperatures. These studies are not only of value to the armed services, but they are also being utilized by the steel and heavy industries which also require that men work in hot environments.

St. Louis Spent Many Years Fighting Air Pollution

By Raymond R. Tucker,
Washington University,
St. Louis, Mo.

(Editor's note: Mr. Tucker presented a paper on "The St. Louis Code and its Operation" at the U. S. Technical Conference on Air Pollution held in Washington in May. The paper is presented here in part.)

St. Louis, like many other cities, once believed the air could be purified by legislation alone. After each unsuccessful attempt a feeling of apathy descended upon the community. For a period of 3 to 5 years nothing would be done, then conditions would become so severe that small groups of citizens would again become aroused and a new attempt would be made. These attempts were not successful because they either failed to realize, or saw fit to ignore, the weaknesses of all previous attempts, viz., the necessity of attacking the problem at its source.

Had not the city administration in 1934 realized this fact, St. Louis would still be looking for a solution of its problem. Previous attempts had depended upon innocuous legislation without attacking the core of the problem.

The present smoke program in St. Louis had its inception in 1934. It was not a dream realized over night. It represented 7 years of planning and work. There are some who believe that the passage of the ordinance in 1940 was the solution, but many steps had been taken previous to that time and the ground work laid for the final culmination of a century of effort.

In 1934 a new thought was injected. We decided to attack this problem at its source. We believed the smoke problem to be similar to the clarification of the domestic water. We came to the conclusion that the only means of solving the smoke problem in St. Louis would have to be along similar lines. To illustrate: the water in the city of St. Louis is taken from the river, treated, clarified, and analyzed. When it is found to be potable it is then distributed to the citizens for their consumption. One can readily realize the lack of success that would attend the purification of any water if all water were distributed to individual homes and instructions issued as to the best method of clarification and purification. This latter process, however, was the system we were employing in the use of fuel.

Any fuel could be delivered to any individual, whether it was adapted to his equipment or not. It was then suggested that instructions be issued to these individuals as to the best method of firing this fuel smokelessly. True, there were many who would take these instructions seriously and endeavor to follow them. However, the vast majority would ignore them. Furthermore, the type of fuel that was being delivered made it practically impossible to do a satisfactory job unless an unreasonable amount of time was used.

It became increasingly apparent that all fuel as well as equipment had to be controlled at the source. Control over equipment was easy to obtain. Control over the fuel was more difficult. To procure control over the fuel we suggested what was known as the washing clause. At no time did we claim that the washing of fuel would eliminate smoke. It was claimed, however, that washing of coal would reduce sulfur and fly ash, produce a fuel of uniform quality with higher calorific value which would adapt itself more readily to underfeed stokers, and give a fuel with higher fusion point of ash, thus improving the fuel bed conditions and reducing clinker trouble. Hidden behind this washing clause, as I have said, was a very potent reason. This provision if enacted into a law, and if constitutional, would enable us to control the fuel at the source.

An ordinance containing this provision was passed February 11, 1937. It contained the usual provisions such as the creation of a Division of Smoke Regulation and the appointment of a commissioner. It defined dense smoke and the ash content of the fuel, created an Appeal Board and outlined the method of procedure for the issuance of the necessary permits and certificates of operation for equipment. The ordinance also required that all sales of fuel-burning equipment be reported to the commissioner and that definite requirements for the emission of fly ash be met. It also prescribed penalties for violation. The section outlining the specifications of fuel as far as ash content and sulfur content were concerned, was of course the meat of the ordinance.

The enforcement of this ordinance presented many difficulties. To assist in the enforcement a companion ordinance was proposed regulating the importation, storing, hauling, and distribution of fuel within the city of St. Louis. It empowered the commissioner to license all fuel dealers and require them to furnish a $1,000 surety bond before such licenses could be issued. This ordinance was passed and became a law in October of 1937. These two ordinances gave control over equipment and fuel. The contemplated program was weak in the sense that the domestic user of fuel was exempt from its provisions.

The activity of the new division resulted in a reduction of the density of smoke discharged from industrial, commercial and semicommercial plants, but was not sufficient to show any marked improvement. The division reiterated time and time again that the then-existing ordinance was not the solution of the problem—that a solution would not be had until there was an adequate amount of fuel available for domestic use which was smokeless and which could be sold at a price commensurate with its value.

In the fall of 1939, the city was visited with the worst smoke pall that had ever been experienced. Visibility was reduced to a matter of a few feet. One could not see across the main thoroughfares. Newspapers demanded that the Administration and the Smoke Commissioner do something, or resign.

As a result of this public demand, a citizens committee was appointed. It considered all the facts that had been suggested—central heating plants, use of natural gas, building of municipal plants to make smokeless fuel, educational programs and the use of mechanical fuel-burning equipment and smokeless fuel. After three months of deliberation, the citizens committee accepted the commissioner's recommendations.

Their report was based on two cardinal principles: first, that all those who desired to burn high volatile fuel must employ mechanical fuel-burning equipment, or they must use a smokeless fuel. A smokeless fuel was defined as any fuel containing less than 23 percent volatile matter. The committee further recommended that no one be excepted from the provisions of the ordinance—all were to be treated alike. These recommendations were incorporated in an ordinance amending the ordinance that had been passed in 1937.

The citizens committee further recommended that a provision be put in the ordinance permitting the City to declare an emergency when and if there was not an easy flow of smokeless fuel at a price commensurate with its value. They also suggested that the City be authorized to contract for the purchase of smokeless fuel for use and consumption in the city of St. Louis. They also proposed that this fuel be distributed either through normal channels of trade or by the City itself. To support this an appropriation of $300,000 was made for the purchase of such fuel.

The Smoke Ordinance contains many provisions which are common to other ordinances of similar character. The Smoke Ordinance requires that all fuel which is being used, all equipment which is installed, repaired, or remodeled, must be controlled by the Division of Smoke Regulation. It also defines what dense smoke is, for the purpose of enforcement, and contains specifications governing the emission of fly ash. Although smoke is a very definite nuisance, fly ash may become one too. St. Louis was one of the first cities to prescribe the grain loading or the amount of fly ash in each cubic foot of stack gas.

The two preceding provisions of the Smoke Ordinance are essential for enforcement. They do not, however, lead to the elimination of the source of the smoke evil. The ordinance, requiring the preparation of all high volatile fuel for use in mechanical fuel-burning equipment and the requirement that all hand-fired equipment shall use a smokeless fuel, strikes at the heart of the problem. These are the provisions that enabled St. Louis to solve its smoke problem.

The St. Louis ordinance was primarily designed for the elimination of smoke. No surveys were made because over the years of endeavor the source of the smoke was known. It came from the burning of high volatile fuel in imperfectly designed equipment. St. Louis' program is not completed. True, it has eliminated smoke to the extent where it is no longer a menace to our community, but it has not licked the fly ash and fume problem. To accomplish this result will require a survey to determine the source of these fumes and dust. When this has been done the proper legislation can be enacted to correct these nuisances at their source.

I have attempted to briefly outline the events which led up to the passage of the present ordinance in St. Louis. The time allotted to me has prevented a more detailed discussion. Although the proper legislation is absolutely essential, it alone will not solve any community problem. With the proper legislation must be an overwhelming desire on the part of the citizens to rid the city of smoke and other nuisances. In addition the administration must possess the necessary courage to transmit this desire into actuality. No matter how appropriate the legislation may be it is useless unless the provisions of the law are enforced intelligently and rigidly.

MAN'S TRADE LEAVES MARKINGS ON TEETH

A man's trade, whether he be an upholsterer or glass blower, leaves telltale markings on his teeth.

"No portion of the body is spared possible invasion by some occupational diseases," Carey P. McCord, M. D., of the Industrial Health Conservancy Laboratories, Detroit, said in a speech dealing with dental impairments in the various trades. Dr. McCord spoke before the American Association of Industrial Dentists which met in Chicago during the annual Industrial Health Conference.

"Some synthetic rubber workers," he said, "may lose the hair on their heads, while some workers in arsenic may grow enormous callouses on their feet. It then follows as prospective that some occupational diseases will involve dental and other oral structures."

Dr. McCord said: "Numerous work stigmata, the lowest grade of industrial impairment, are wholly dental affairs. These telltale markings may do little more than reveal a particular trade. The best known stigma is the tack spitter's teeth. That worker, usually in the upholstery trades, take a mouthful of tacks, works a number of heads out between the teeth, then one by one picks up these tacks with a magnetic hammer—and so through the day. In time his teeth resemble a hacksaw. Oddly enough, decay is uncommon.

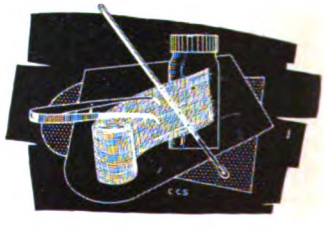
"The glass blower is a little different. Some are specialists in holding their gathering tube in a fixed position in the dental midline, thereby in time providing identification of their trade in an evenly round hole involving four front teeth. Others move their blowing tubes over all front teeth and thus wear down the entire lot.

"The brush bristle biter and the seamstress thread biter usually devote only two teeth to their work and thus introduce their trades to the dentist.

"The bugler and cornetist spare the biting surfaces but affront anterior surfaces with labial corns.

"In the so called 'gritty' trades, the shaping of pearl buttons from shell pearl is one often carried out under somewhat primitive operating conditions. These button workers are credited with having well-eroded teeth with chief involvment of the molars."

Dr. McCord discussed many occupational diseases as seen by the dentist. One touched on breath odors. "Dentists function in a world of odors, many of which are obviously unrelated to occupation," he said, adding: "On occasion, breath odor discloses exposure to harmful agents, but in themselves furnish no real proof of actual disease. Most of the gases and vapors that enter the body through the lungs are also eliminated by the lungs. Of possible significance is the garlic-like odor among workers in arsenic, selenium, cyanides, and some higher alcohols as allyl. The possibilities are legion."



Potential Hazards of Inert Gas-shielded Arc Welding*

By Harry Gilbert,
Industrial Hygienist,
New York Naval Shipyard,
Brooklyn, N. Y.

One of the important functions of the Industrial Health Division of the Medical Department and the industrial hygienist is the evaluation of the health hazards incident to the introduction of new materials and processes in naval industrial establishments. An example of this is the recent introduction of a new process for welding aluminum in the sheetmetal shop of this shipyard. Experimental work had been conducted on this process in the material laboratory prior to its use in production work. As a result of employees engaged in this process experiencing headache, eye irritation, and a "dry feeling" in the throat, an investigation was made to determine if a health hazard was involved in this welding process.

There are at present two types of welding units used for arc welding of aluminum. One, the "tungsten arc" unit, consists of an inert gas (helium or argon) shielded tungsten electrode, into the arc of which aluminum wire is hand fed. The other, using a "semiautomatic gun," is a helium-shielded unit in which aluminum wire, automatically fed at a constant rate, acts as the electrode. The arc in either case is shielded by completely enveloping it with a stream of gas, helium or argon, that will not enter into chemical combination with the molten metal, and at the same time will prevent the molten metal from coming in contact with the atmosphere. This does away with the use of flux or flux-coated rods. In this investigation, tests and comments pertain to the use of the semiautomatic welding process.

The aluminum wire, containing 5 percent silicon, liberates dense white fumes of aluminum oxide and silica in the arc. A chlorinelike odor was perceptible in the room during welding. This odor is due to the gas ozone which is produced by the action of ultraviolet radiation on oxygen in the air. The electric arc of the semiautomatic welding process results in high intensity radiation in the short ultraviolet wave length region, which is conducive to the production of ozone. Nitrogen oxide gases are also produced by the high temperature of the electric arc.

In order to obtain quantitative data on the concentrations of nitrogen oxides, ozone and metal fumes liberated during the welding process, a series of air tests was conducted in a welding bay of the sheetmetal shop. Because of cool weather, windows were closed during the time of investigation and sampling of air for fumes and gases. Aluminum joints, varying in length from 24 to 51 inches, were welded on an iron table. The operator was equipped with eye and body, but not respiratory, protective devices. A flexible exhaust duct in the welding bay, connecting to a manifold, was available for removal of fumes and gases liberated by the welding arc. In practice it was observed that the welder could locate the flexible duct fairly close to the welding arc without interfering with the helium shield.

Air samples were taken at the arc and breathing zone with and without the use of flexible exhaust ducts. Tests at the breathing zone were taken at distances of 12 to 20 inches from the welding arc. Samples taken with local exhaust in operation were with the flexible ducts located at the back center and slightly above the aluminum joints. The MSA electrostatic precipitator was used for fume sampling at a rate of 3 c. f. m. A bubbler train, containing potassium permanganate solution in the first sintered glass washing bottle and potassium iodide solution in the second bottle, was used in sampling for ozone. Sampling was accomplished with a pump and motor drawing air through the bubbler train at rates of 0.56 to 1.17 liters per minute. Evacuated separatory funnels or 100 cc. syringes, containing modified Griess-Ilosvay reacting solution, were used in sampling and testing for nitrogen oxides. Samples collected in the shop were analyzed in the industrial hygiene laboratory.

Tests for nitrogen bubbles showed the concentrations of these gases were well below the permissible limit of 25 p. p. m. The use of flexible exhaust ducts reduced these concentrations at the breathing zone of welders by 67 percent.

Tests for ozone revealed the average concentration at the breathing level was 1.4 p. p. m. for total sampling time and 2 p. p. m. for actual welding time. Because of the possible loss of some ozone in the potassium permanganate solution in the first sintered glass washing bottle of the bubbler train, either by absorption or oxidation of traces of organic matter or reduced permanganate, the concentrations of ozone obtained in the potassium iodide solution are probably on the low side. The ozone concentrations may be higher than indicated, and therefore should be considered semiquantitative. In view of the synergistic effect of nitrogen oxides and ozone, this concentration exceeds the permissible limit of 1 p. p. m.

Total fume concentrations were excessively high without the use of local exhaust ventilation. The average concentration for total sampling time was 35 mg./m.³. Local exhaust resulted in a decrease in concentration of 53.4 percent.

The combination of fumes and ozone containing nitrogen oxides liberated by the helium-shielded arc welding of aluminum was probably responsible for the irritation experienced by the welders. The irritation and toxic effects may be more pronounced if welding is performed in a confined space without adequate local exhaust ventilation. Until further information concerning the health hazards resulting from inert gas-shielded arc welding becomes available, it is advisable to offer employees engaged in this process the maximum protection possible.

In compliance with recommendations of the medical department, a movable flanged lateral exhaust hood with entrance of the same length as the aluminum joints being welded was constructed and installed in the welding bay of the sheetmetal shop. The unit was so constructed as to supply sufficient exhaust to effectively remove air

*For the complete article, see the *Medical Technicians' Bulletin*, Supplement to *U. S. Armed Forces Medical Journal*, May–June 1950.

contaminants liberated at the welding arc. Attaching a counterpoise to the exhaust hood by means of an overhead pulley should result in greater ease of manipulation of the hood to new positions when rotating units are being welded on a turntable. In addition, a baffled hood was constructed and positioned on the floor at the base of the welding zone to protect the welder from any fumes and metal sparks thrown off from the welding arc, and not removed by the hood situated at the welding zone.

Air tests were conducted to determine the effectiveness of these hoods in the removal of air contaminants liberated by the arc. A comparison of these results with those obtained in previous tests revealed a considerable reduction in the concentration of air contaminants. With the use of the local exhaust hoods, the concentration of alumina fumes and ozone fell to within permissible limits.

Los Angeles Firemen Advised on Care of Dangerous Chemicals

Members of the Los Angeles City Fire Department had heard of the detailed set of precautions developed jointly by the Los Angeles City Division of Industrial Health and the Union Oil Co., for hauling the toxic hydrogen sulfide—monoethanolamine solution—in tank trucks. The editor of their publication, *The Firemen's Grapevine*, requested an article on this subject for the information of fire fighting personnel who might be called upon to control the hazard in case of accidental spills. An article was prepared under the title, "A Smelly Gas Creates a Problem in Air Pollution, Health, and Safety," and was published, including the complete safety instructions, in the March 1950 issue of this publication.

In the meantime, the Los Angeles County Fire Department, since they too will be involved in accidental spills of this material as it is hauled through their territory, have obtained a number of copies of the safety precautions for instruction of their own personnel.

Both the Fire Department and Health Department of the City were requested to consult with the Chief Design Engineer of the Department of Water and Power concerning the public safety aspects of installing a large chlorine storage tank at the Harbor Steam Plant. A preliminary discussion at the site resulted in several basic recommendations by the Fire Department and the Division of Industrial Health to be considered in the design, location, and operation of this tank. Before final decisions are made, they will present their plans to this department for review and comment.

Agricultural Chemicals—

(Continued from page 4)

by the states to control applicators of economic poisons.

On April 7, 1949, the U. S. Department of Agriculture ordered that registrants of DDT products in interstate commerce include on the labels a warning not to use DDT on dairy animals, in dairy barns, or on food or forage to be fed to dairy animals, or other animals being finished for slaughter. This order was motivated by the finding that DDT appeared in both the milk and fatty tissues of cattle. In California, an already good state law was further strengthened by new clauses providing for:

(*1*) State examination and licensing of pest control operators.

(*2*) Examination and licensing of airplane pilots engaged in application of economic poisons.

(*3*) Empowering of State Department of Agriculture to control through permits the application of any specific chemical, after public hearings are held.

More states need to adopt adequate economic poisons control laws.

Symptomatic of the growing importance of the field has been the increasing activity of numerous groups including the establishment of the Committee on Pesticides of the A. M. A. Council on Pharmacy and Chemistry. Numerous articles have appeared on the subject in all types of scientific publications.

Conclusion

The problem of agricultural chemicals has brought together the industrial hygienist, the food and drug scientist, the agriculturalist, and the consumer because of a common interest in protecting the public health. It is an excellent combination, and it is probably because of this wide community of interest that measures for the control of health hazards from agricultural chemicals are already outstripping controls for chemicals used in the industrial plant.

The industrial revolution on the American farm has brought to the front the urgent need of industrial hygiene attention to the farmer and auxiliary occupational groups. Today workers in agriculture have a higher death rate from occupational causes than do workers in manufacturing, and it is exceeded only by the death rates in mining and construction. Farmers lose 9 percent of their gross income from accidents.

In 1949, in California, 14,202 farm hands had disabling accidents and almost 60 were killed. In 1949, we had 300 officially reported cases of occupational poisoning from agricultural chemicals. Of these, at least 118 lost more than 1 day from work, 100 had systemic disease as contrasted with skin and eye conditions, and 183 were in farming work. The remaining cases were in a wide range of industries, including chemical manufacturing and food processing, and a wide range of occupations, including airplane piloting.

It is of interest, too, to note that health on the farm in general is not what we used to think it was. A recent study showed the prevalence of disabling illness among agricultural workers was greater than among non-agricultural workers (*5*).

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