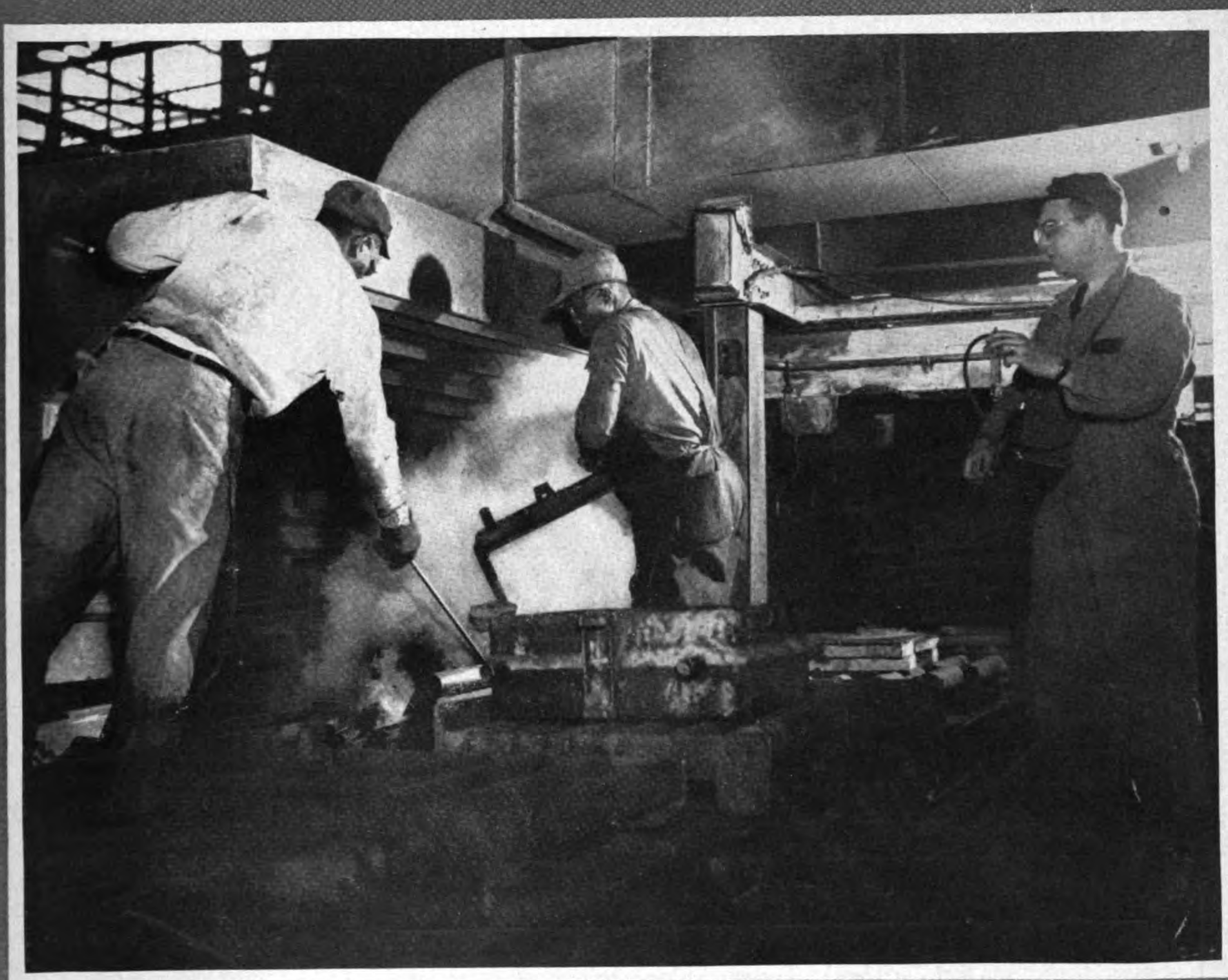
The Industrial Hygiene newsletter



WISCONSIN FEATURE

OCTOBER 1950

FEDERAL SECURITY AGENCY Public Health Service

INDUSTRIAL HYGIENE NEWSLETTER

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FEATURES

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Public Health Service Studies Chromate and Uranium Industries

THE Division of Industrial Hygiene, PHS, has been engaged for several months in intensive studies of two important industries, chromate manufacturing and uranium mining and milling.

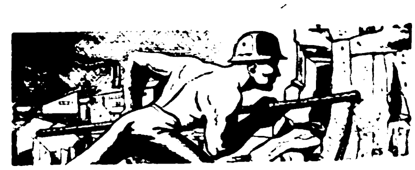
The chromate study was started at the request of the representatives of the entire chromate manufacturing industry in the United States and with the cooperation of the States concerned.

At the present time six of the seven chromate manufacturing plants have been studied from the environmental point of view. Physical examination programs have been completed in the first of the plants. Over 1,000 workers will be examined during the study and, in addition, studies will be made of the medical records of former employees of the concerns.

The uranium study is being made on the Colorado Plateau and involves the States of Utah, Arizona, and New Mexico as well as the State of Colorado. The work is being done in cooperation with the State health departments. Funds for this study have been provided in part by a grant from the National Cancer Institute to the Colorado Board of Health.

In addition to environmental studies in the mines and mills, complete physical examinations have been made by the field team. These include extensive blood studies, chest X-rays, and metabolic studies. This investigation will likely be followed by re-examinations at some future date.

Other agencies cooperating in this study include the Atomic Energy Commission; Department of the Navy; United States Bureau of Mines; United States Bureau of Standards; Los Alamos Laboratory of the University of California; Division of Industrial Hygiene, Medical Center, University of Colorado; and the mining and milling companies concerned on the Colorado Plateau.



INDUSTRIAL HYGIENE IN WISCONSIN

Half Million Workers Protected

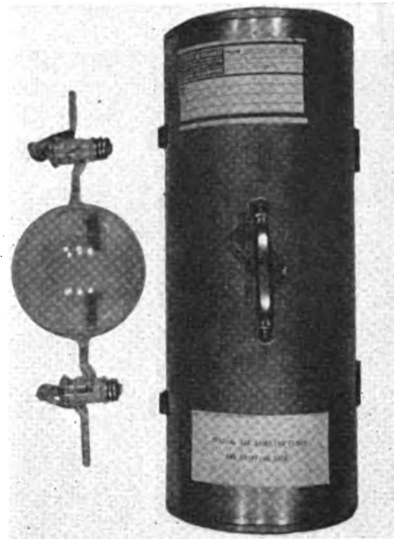
WISCONSIN is known as America's Dairyland. Yet nearly half a million workers are employed by 7,000 light and heavy industrial plants. The southeastern section, which includes Milwaukee, is by far the most heavily industrialized; and it is a rare city of any size that does not have some type of industry within its limits. As a result of the amount and diversity of manufacturing processes, some incidence of accidents and occupational disease exists.

Since its conception in 1937, the Industrial Hygiene Division has been a part of the State Board of Health. It has no direct connection with the State Industrial Commission, yet the Division maintains close contact stimulated by years of cooperation. The Industrial Commission has established various industrial codes in an effort to reduce occupational disease, including ventilation codes. Problems met by the Commission concerning collection and analysis of contaminants in the air of industrial plants are turned over to the Industrial Hygiene Division for evaluation.

While only one industry in Wisconsin, Allis-Chalmers Manufacturing Co. of West Allis, has a full-time industrial hygiene section, many other industries request periodic surveys by the Industrial Hygiene Division of the State Board of Health and follow the recommended procedures for the control and evaluation of potential hazards.

Many of the activities strike an understandable resemblance to those taking place in other States. The following articles have been written in the hopes of presenting a well-rounded picture of industrial hygiene in Wisconsin.

Unless otherwise specified, all Wisconsin articles in this issue have been written by the staff of the Industrial Hygiene Division, Wisconsin State Board of Health.



A special flask and case help to speed results.

Mass Spectrometer Is Means for Accurate Analysis of Gas

AS accurately as can be determined, 11 people in Wisconsin were killed and 39 others burned from flash fires or explosions caused by combustible mixtures of gas and air during the 2-year period from June 30, 1948, to July 1, 1950. This number of fatalities is significant when one considers that there were only 10 reported deaths in Wisconsin from all occupational diseases during the year 1948.

Industrial hygiene, as defined by Patty, does not include the investigation of explosions in homes and other buildings. However, in the interest of public health and safety, the Division of Industrial Hygiene has responded to a number of requests for assistance in identifying the substances which have created explosions. Frequently the Division has worked with the Fire Prevention Department of the Wisconsin Industrial Commission in a joint effort to determine the causative agent.

It is obvious that searching for the explosive substance can be very difficult since in many cases the evidence

(*Continued on page 8*)

Engineers Check New and Old Plant Processes Regularly

ADEQUATE detection methods greatly facilitate the control of airborne hazards. Although in practice "adequate detection methods" vary from occasional general checks to all-day surveys at specific areas or operations, there is no doubt as to the advantages of an exhaustive dust survey program. By taking an unlimited number of samples in a foundry dust survey, for example, at a specific operation and under varying conditions of time, temperature, and humidity, industrial hygienists can make the comprehensive evaluations they need to most effectively deal with the particular problem.

A case in point is the work of the industrial hygienists at Allis-Chalmers Manufacturing Co.'s West Allis works. Their program provides for regularly scheduled dust counts of the general atmosphere and breathing zones at all dust disseminating operations in each of the plant's three foundries.

One such operation consisted of conditioning raw sand into usable core sand. The raw sand was shoveled out of railroad boxcars into the foundry basement. From there, it was put into a small dump truck by means of a portable sand loader and delivered to the mullers. The sand was then mixed and a conveyor belt carried it upstairs to the coremakers. The mullers were the only part of the operation that was exhausted. Dust counts revealed that during the unloading of sand into the basement and during the operation of the sand loader, the dust concentration in the work area was raised as much as five times the permissible limit. The other operations, however, did not appreciably change the concentration.

The information gleaned from all-day surveys taken at the various operations in this area was called to the attention of management in the form of graphs and reports. Specific recommendations for correcting the problem were also given.

These recommendations were then discussed in detail with members of the

A completely enclosed sand bin and exhaust system help keep the silica count within permissible limits.

foundry engineering department. All of this resulted in a number of steps being taken to eliminate the harmful exposure. First, the individual sand bins in the basement were completely enclosed. Second, chutes were provided in the bins so that the sand could be gravity fed into a bucket attached to a monorail system. Third, the monorail was so designed that it would transport the sand bucket from the bins directly to the mullers and dump the load into them for mixing. Fourth, the exhaust system was redesigned to service each of the sand chutes in addition to the mullers and conveyor belts.

Since these revisions have been made, the average concentration of free silica for the work area in discussion has been reduced to 1.5 million particles of free silica per cubic foot of air. Even during the time when the bins are being filled the concentration has not averaged more than 2 million particles of free silica per cubic foot of air, which is well below the permissible limit.

Thus, because of the thoroughness of the detection measures, it was possible to determine what parts of the operation were producing excessively high concentration of dusts. These studies had shown where the controls would have

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MANUFACTURERS CAUTIOUS IN HANDLING PARATHION

THOSE concerned with the control of occupational health hazards have good cause at times to throw up their hands in utter frustration because compounds of known and unknown toxicity are being developed and introduced to the market in a never-ending stream. Fortunately for all concerned, the manufacturers of many of these compounds are doing much in the way of warning the users of their products regarding toxic properties involved. Such has been our experience in the case of parathion.

Parathion was first developed in Germany during World War II to control aphids or plant lice. It is now being used rather extensively throughout the United States. Wisconsin has particular use for it in combating pea aphids and corn borers. To meet the demand, an agricultural chemical plant decided to blend and bag a 2 percent parathion dust. Their supplier of 25 percent parathion dust not only furnished literature containing toxicological information but also made a personal investigation to insure that the management was fully aware of the toxicity before blending was attempted. Representatives of the supplier also contacted the State Industrial Hygiene Division.

Plans of the local exhaust system were submitted to the Industrial Commission, and upon approval, installation was begun. Known quantities of pure parathion were run, using a quartz spectrophotometer, and standard curves were plotted in preparation for contemplated air sampling.

On the first day of operation, air samples were taken using different methods and instruments. Rubber stoppers and caps on the impinger flasks interfered considerably with the ultraviolet spectrophotometric analysis and erratic results were obtained. It was found that samples taken with the electrostatic precipitator were more suitable for analysis.

Samples were taken of effluent air coming from the local exhaust system to determine whether appreciable outdoor air pollution could be expected. The presence of only extremely small amounts of parathion in the atmosphere within the plant indicated that the local exhaust units were functioning satisfactorily.

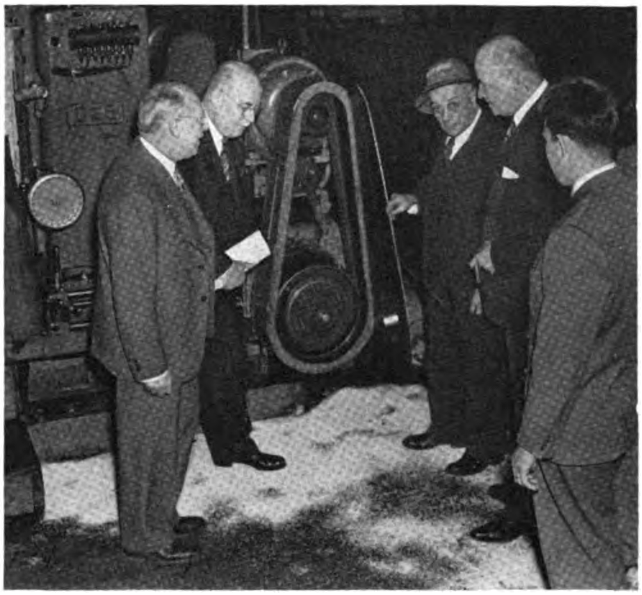
(Continued on page 8)

A deadly insecticide demands good local exhaust.

IN-PLANT INDUSTRIAL HEALTH CLINICS

A New Approach to Medical Education in Wisconsin

By D. E. Dorchester, M. D.[1]



Physicians observe first hand the working environment in a heavy industry.

HOW many physicians know about the occupation of their patients who have their hands immersed in cutting oils all day and develop a dermatitis? Is it practical to write the employer that "the patient has sufficient cardiac involvement to require light work?" In short, how good is a physician if he knows little or nothing about the environment in which his patients work?

These and many related questions disturbed the Industrial Health Committee of the State Medical Society of Wisconsin and the Industrial Hygiene Division of the State Board of Health. Instead of just talking about it in the same detached manner in which one discusses the weather, they decided to do something about it.

For many years the majority of industries in Wisconsin have subscribed to the open panel program in connection with workmen's compensation. This meant that any physician affiliated with the State Medical Society, if he or she chose to do so, could be listed on panels furnished employers for posting in the plants. This wide choice of medical care has retained to a remarkable degree the relationship between the patient and the physician of his choice which is deemed so desirable by both medicine and the consumers of medical care. The wide acceptance of the open panel program has brought with it, however, more responsibilities on the part of the participating physician. Although he is supposed to know something about industrial work in his community, the average doctor is too busy with office calls, hospital rounds, and home visits to spend much time in industrial plants.

During World War II, the Industrial Health Committee and the State Board of Health started an intensive program of postgraduate education in subjects directly related to industrial medicine. While they were related to industrial practice, they still were the same old type of meetings; that is, didactic lectures in hotels, far from the noise, fumes and excitement of an industrial plant.

In the fall of 1947, it was agreed to attempt a new type of teaching program: To stage clinics in the plants themselves; to have doctors and industrial nurses rub shoulders with labor and management; to have them see how industry is controlling some hazards, and what other hazards are still leading to injuries in spite of all precautions taken. The idea of having doctors and nurses meet together was in itself a rather radical suggestion but to hold the clinics in the plants themselves was an idea which seemed somewhat impractical to some of the committee members.

However, a beginning was made, with three plants chosen to give a good cross-section of industrial activity in Wisconsin—a paper mill, a foundry, and a plant specializing in the manufacture of farm equipment.

The initial programs soon demonstrated the interest physicians had in such a direct approach to medical education. The pattern was roughly the same for all three clinics: A late morning plant tour, a luncheon, and a 2-hour scientific program in the afternoon.

The results of the first series of clinics were startling, to say the least. Instead of a handful of physicians as was anticipated, each clinic attracted nearly 100 physicians and about as many industrial nurses. The enthusiasm of those in attendance indicated clearly that the committee had hit upon a good idea and it was decided to incorporate the industrial health clinics as an annual feature of the postgraduate teaching program.

Since 1948 the in-plant clinics have been carried out in all sections of the State which have sufficient industrialization to make the programs practical. During the course of the clinics, more than 1,000 physicians have participated, and the majority of the industrial nurses in the State take part in the clinics each year.

To what extent the in-plant clinics will be continued is a question still to be decided. The success of the program suggests repetition, but the committee is aware that a new approach would be desirable. However, it is felt that the programs conducted in the past 3 years have given many physicians a better understanding of industrial processes than they have had in the past, and it has given them a better basis upon which to examine patients whose health has been affected by their vocational activity.

The Committee on Industrial Health of the State Medical Society and the Industrial Hygiene Division of the State Board of Health recommend this type of program without reservation. It has dramatic appeal; it brings nurses and doctors into better contact and understanding; and it gives assurance to management that the physicians are

[1] Dr. Dorchester is chairman of the committee on industrial health, State Medical Society of Wisconsin.

really interested in what is going on in industry. The public relations value of the program is beyond measure. For this reason alone it should command attention and consideration in other States.

Industrial health thus becomes not just the concern of a limited number of physicians known as "industrial specialists." Every physician in an industrialized community has a responsibility to know what is going on in the plants which employ his patients. If he is to serve them intelligently, it is to his interest to know more about the physical requirements of the work being done by those he serves. The in-plant clinic is one way in which he can acquire that knowledge.

To industrial health committees of other States we say: "Try it out, and see how much your members enjoy seeing the hot metal of a foundry fly; how much they will learn about industrial fatigue in a stamping press department; and how much management will appreciate an opportunity of 'strutting its stuff' to a bunch of dignified practitioners. We recommend it as good postgraduate education and the best type of public relations your professional group can enjoy."

Wisconsin Air Pollution Problems Vary Widely

In addition to industrial exposures, every State is confronted with a complexity of outdoor atmospheric pollution problems. Wisconsin is no exception. Many of the complaints involve odors or dusts. As a general rule, when existing maximum allowable concentrations for indoor industrial exposures are modified and applied to these cases, a potential health hazard has never been found to exist. In reference to these outdoor problems, Wisconsin has several assets on its side. There is an absence of high mountain ranges to hem the pollutants in, as in the case of Los Angeles and its smog. There is an absence of certain types of industry concentrated in deep valleys to duplicate an acute and rare condition similar to the one that occurred in Donora, Pa., in 1948. Another important factor is that industry has been decreasing pollution by recognizing its presence and taking steps toward its control. These preventive measures are taken by industry for several reasons. First, there is a desire for better public relations; then again continued complaints may result in correction, or a local ordinance is put into effect and must be complied with.

These odors and emanations are as varied as the solutions to the problems. The odor of kiln drying chicken manure comes in on the breeze. Fine limestone dust drifts into the open schoolhouse window and little fingers trace pictures on the desk tops. The smoke of burning animal hair carries a characteristic odor to the nearby residential area. Sulfur dioxide from coal-fired boilers kills the vegetation and smarts the eyes. Fly ash from an overloaded boiler harasses a housewife. Coal dust plagues another. These and many other situations have presented themselves. Generally, the offender is made to realize that an unpleasant condition exists. The next task is to convince him that he is the offender. Finally, methods are recommended for correction. Seldom are there cases where identical remedies are possible.

Milwaukee Is Pioneer in Protecting the Worker

Although Milwaukee's Industrial Hygiene Section formally acquired its name only this year, it is interesting to note that factory inspection has been a function of the Milwaukee Health Department for nearly 40 years. An ordinance passed in October 1910[1] authorized the appointment of five inspectors "for the purpose of inspection of factories and working places * * *." This ordinance, although passed in a day when MAC values were virtually unknown, nevertheless gave rather broad powers of inspection and enforcement in regard to air pollution in foundries, paint shops, dye works, chemical works and all industries where the air may be impure.

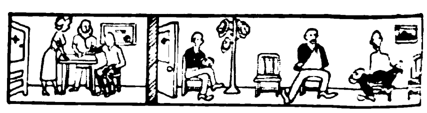
Even at this early date, inspection was authorized to protect the health of the working man "in regard to ventilation, estimating the sufficiency or insufficiency of the amount of fresh air per workman; also general sanitary conditions, sufficiency or insufficiency of proper light, temperature, and whether or not persons afflicted with tuberculosis are employed." Employers were prohibited to permit employees to work where lint, dust, or other particles fly in the air or where chemical gases or fumes are created without proper ventilation by suction fans, currents of air or other means. Employees were not to work so far removed from a window or other light as to be injurious to eyesight. Artificial illumination was to be provided where sunlight was not adequate for work to be done.

The Commissioner of Health was authorized to order changes and improvements in the structure, windows, ventilation, equipment, location of machinery, lights, and air-purifying devices in factories and working places to meet the requirements of this ordinance. The Commissioner was required, however, to confer with the employer prior to ordering such changes, and the employer allowed to begin the changes voluntarily. Orders were to be issued only upon refusal to voluntarily cooperate within a reasonable period of time.

The formation of a State code by the Wisconsin Industrial Commission in 1913 and its subsequent revisions and amendments set more definite standards. The Milwaukee Health Department has operated under these standards since they have been made available. Factory inspections have been made by personnel of the Sanitary Inspection Division since passage of the 1910 ordinance.

During the past decade, particular attention was paid to the elimination of cross-connections in factories to protect the drinking water supply, as well as general cleanliness and sanitation of plants.

The Industrial Hygiene Section is presently conducting a radiation survey of all the X-ray shoe fitting machines in the city. Two of the major manufacturers of these machines are located in Milwaukee and have allowed the use of their factory facilities in training personnel for this survey. A survey of the carbon monoxide hazard in garages will be made this fall and winter.—**Bureau of Environmental Sanitation, Milwaukee Health Department.**



[1] Sanitary Code of the Milwaukee Health Department, August 1, 1912.

ALL GIRLS IN WHITE ARE NOT NURSES

By Walter H. Poppe, Jr.

HAD WE not known in advance, we would have thought we were walking into a hospital instead of a radium paint application studio. Here in front of us, seated on comfortable steel stools at shiny metal-covered benches, were girls dressed in neat white laboratory coats with white turbans covering their hair and white masks over their mouths.

The use of the laboratory coats and hair covering was obvious, but what about those gauze masks? They are not a recommended health feature for this type of work. What was their purpose? Did the girls object to wearing them? The plant manager explained that he felt it was an extra precaution to prevent the girls from touching their lips or mouths with anything that might possibly be contaminated with radium paint and that the girls did not object to wearing them.

As we moved further into the room, we noticed a gentle breeze about our arms and heads. Velocity measurements and subsequent calculations showed that the air in the studio changed at the amazing rate of 30 times per hour. One would think that the installation of a local exhaust system with such a high rate of air removal during Wisconsin's cold winters would make the company's profit barometer act as though it had been moved from Death Valley to Mount Whitney. However, this is not the case because in addition to radium paint application, the company is engaged in the manufacture of industrial glass products. In connection with these products, an immense gas-fired baking oven is used. The waste heat from this oven compensates for the heat loss of the exhaust system in the radium room.

Another unique feature of the air removal system is the 12 geometrically spaced inverted pyramid-shaped exhaust hoods near the ceiling of the studio. The purpose of these hoods is to prevent radium-bearing dust from settling on the ceiling. Silk screening operations are performed under sheet metal exhaust hoods placed at an angle of 45° to the bench surface. Hand brush application is meticulously done under glass hoods of the conventional type. Lay-away silk screens and painted dials are stored in air-exhausted cabinets.

The studio is frequently checked at night with ultraviolet light for radium paint contamination. An excellent housekeeping program is practiced by this company. A man is employed for the sole purpose of cleaning up the room after the girls have finished their day's work. He spends an entire 8-hour shift every working day at this job and when he has finished, it is difficult to find a speck of luminous paint on the floors, stools, bench tops, or the walls. However, as one flashed the ultraviolet light onto the rack where the laboratory coats were hanging, eerie, ghost-like figures appeared out of the dark. These coats were contaminated with radium paint which laundering or dry cleaning does not remove. The heaviest areas of contamination were at the waist, where the coats probably touch the benches, and on the inner sleeve near and at the cuffs.

Film badges from a commercial laboratory are furnished by management and routine radon breath samples have been collected by our Division. Many other health-protecting features common to all radium paint application establishments are employed and need not be mentioned here. However, we do solicit suggestions in regard to the contaminated laboratory coats. We want to keep these girls in white as healthy as possible.

Radium dial painters at work, well protected by protective clothing and local exhaust ventilation.

COVER PICTURE: An industrial hygiene engineer takes samples of the air in the vicinity of a shakeout operation in a Wisconsin foundry. His samples, taken with the midget impinger, will reveal the dust content of the air. The ventilation system appears to be carrying off the steam and dust satisfactorily, but the samples will tell a more accurate story. Photo courtesy of Fairbanks Morse and Co., Beloit. All photographs in this issue have been submitted by the Industrial Hygiene Division of the Wisconsin Board of Health.

CALENDAR

American Public Health Association meets in St. Louis, Mo., October 30 to November 3

Smoke Abatement Week October 22 to 28

MASS SPECTROMETER—

(Continued from page 3)

has been destroyed. The usual approach is to employ a combustible gas indicator for locating the gas and then to collect, in glass flasks, samples of the gas mixture for analysis. In the laboratory, the samples are analyzed by combustion on a precision Orsat gas analyzer. The ratio of the volume of contraction to the volume of carbon dioxide formed during combustion is calculated. This ratio for the unknown gas is then compared to similar ratios for known gases or hydrocarbons and the unknown substance identified.

This method of analysis has proved to be very satisfactory for identifying the gases or vapors that are commonly found in basements and sewers following explosions. In one instance where a man had been killed, a chemist, representing the utility company involved, was able to discredit our method of analysis by pointing out that it would be possible to have combinations of other hydrocarbons which would produce the same ratio upon combustion. Although the possibility of such mixtures being present in constant concentration ratios in basements and sewers is very remote, a more conclusive method of analysis was desired. This is where the mass spectrometer entered into the picture.

Arrangements were made with a privately owned laboratory at Evanston, Ill., for analyzing samples on their mass spectrometer. Our Division purchased special glass flasks which fitted directly onto the spectrometer. An aluminum, foam rubber lined shipping case was also purchased. It is now possible to speed the samples collected at the scene of a disaster to the laboratory in Evanston with a minimum loss of time. Recently from the time the sample was taken, it took less than 24 hours to obtain the results of the spectrometer analysis. Incidentally, in all cases to date where duplicate samples have been run on the Orsat analyzer and on the mass spectrometer, there has been complete agreement as to the identity of the unknown gas.

Many local authorities are not aware of the services that can be rendered to ferret out the cause of gas explosions. This fact has created several bad situations that could have been much worse. Personnel of this Division have been called to disaster areas 4 or 5 days after the explosion occurred. Gas-air mixtures as rich as 20 to 30 percent have been found in sewer and telephone service manholes. It is a hair-raising experience to find these conditions so many days after an explosion. Fortunately, the people in these areas were not aware of these conditions and luckily there had not been any succeeding explosions.

The Industrial Hygiene Division believes that the use of the mass spectrometer has had a good influence on the general public health and safety of Wisconsin. The sale of combustible gas indicators to utility companies and to fire departments has been brisk within the past 2 years. One utility company has sent its own samples directly to the laboratory in Evanston following explosions in its service area. Like many public health endeavors, the indirect results are often greater than the direct results.

RECOMMENDED READING

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PARATHION—

(Continued from page 4)

In this case, the control of this material was not confined to the manufacturing process alone. Users of the 2 percent parathion blend were also checked. In most instances, airplanes were used in pea crop dusting operations. Air samples were taken during the loading of the dust hoppers in the planes, and also in the pea fields during dusting operations. Because single-seater planes were used, it was not possible to obtain any samples of the pilot's breathing zone while dusting.

Approved respirators were worn by everyone handling parathion, from the original blending operations to the final application on the infested crops. Used respirator pads and cartridges were analyzed for parathion content.

Although many of the steps taken in connection with the parathion study were fairly routine and unspectacular, two factors made it most gratifying. One was that the initial distributor of parathion took every precaution to acquaint the blending plant with the toxic properties and offered suggestions for control. The other was that the blending plant sought the service and advice of the Industrial Hygiene Division in controlling and checking the potential hazard even before actual production was begun.

ENGINEERS CHECK PROCESSES

(Continued from page 4)

to be applied so that maximum results could be obtained at minimum cost.

Although this is but one case in hand, similar instances of the effectiveness of this program might be cited where management has come to realize the true value of its hygiene investment in terms of reduced harmful exposures and improved working conditions.—**Health and Safety Department, Industrial Relations Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.**

Chemical analyses are an important part of almost every study.

Industrial Nurses Take Active Part in Educational Activities

TO insure having the advice and guidance of nurses actively engaged in industrial nursing included in the planning of educational activities for industrial nurses by universities and the Industrial Hygiene Division of the State Board of Health, a request was presented to the officers of the Industrial Nurses Section of the Wisconsin State Nurses Association that a committee be organized to serve in this capacity.

The functions of the committee, as defined in the rules, are "to promote regional and State-wide educational opportunities for industrial nurses through institutes, workshops, and courses in colleges and universities in the State, and shall upon request be prepared to act in an advisory capacity to curricular committees of colleges and universities offering courses for industrial nurses."

Four industrial nurses representing several areas in the State, in addition to the officers and the industrial nursing consultants from the Industrial Hygiene Division, were invited to serve on the committee.

This committee has been a good example of how a large group can have democratic participation and representation in the educational activities being planned for them. The committee has assisted greatly in determining the content of courses and institutes for industrial nurses in Wisconsin.

WELL EQUIPPED LABORATORY USED BY STATE STAFFS

THE Wisconsin Industrial Hygiene Laboratory, located at present in quarters furnished by the State Laboratory of Hygiene on the campus of the University of Wisconsin, possesses an array of fine equipment. Available to the full-time chemist employed by the Division are many of the recent developments in analytical instrumentation, as well as the standard equipment of an analytical laboratory. By sharing many laboratory facilities with the Water and Sewage Analysis Section of the State Laboratory of Hygiene, a workable arrangement is made possible despite limited space.

Most recently acquired by the laboratory is a Beckman DU quartz spectrophotometer, which was put into immediate use for the determination of parathion. Meanwhile, methods are being investigated to employ this instrument in other determinations, especially with respect to organic materials, such as benzine and its homologs. The Coleman model 11 Universal spectrophotometer is still in general use for determinations involving color comparison in the visible range.

Along with the routine analyses requested by the Division engineers, industries and the Industrial Commission, one occasionally encounters such requests as the chemical analysis of a pair of shoes or a child's play ball. This type of thing usually involves cases of dermatitis which are handled as allergies.

Plans for a new laboratory are nearing completion. The building will house the Laboratory of Hygiene and will provide generous space for the Industrial Hygiene Laboratory. A spacious laboratory, an instrument storage and calibration room, office space and a darkroom comprise the proposed layout of the Industrial Hygiene Laboratory to be located on the third floor of the new four-story building on the University of Wisconsin campus.

THE CASE OF THE DROWSY PATTERN MAKERS

SOMETHING strange was happening in his foundry so the owner sat down and wrote for help. He made mention of a mysterious sleeping gas which was making his pattern makers drowsy and causing headaches.

Adjacent to the pattern shop and separated from it by a partition, which did not come to the ceiling, was the aluminum castings department.

Aluminum was melted in a gas-fired furnace. Air was furnished to the furnace by a blower originally intended for a pipe-organ.

Tests for carbon monoxide showed values far above the maximum allowable concentration. It was found that the blower could not supply sufficient air to burn completely all of the gas normally entering the furnace.

Installation of a blower large enough to insure complete combustion reduced the carbon monoxide concentrations to a point not considered harmful. As a result of this correction, the pattern makers experienced no further periods of unusual drowsiness or headaches.

Physiological Response to Dust From Mine Locomotive Traction Material

By Lawrence T. Fairhall, Benjamin Highman, and Vernon B. Perone

ABSTRACT*

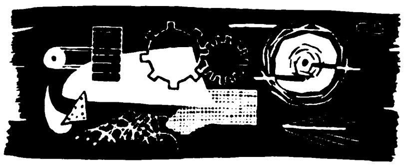
SILICOSIS as an occupational disease among locomotive operators in mines has been attributed to the traction material in common use. This traction material, which in many cases is ordinary sand, is systematically distributed on the rails in order to afford sufficient traction for the locomotive. The spinning and grinding action of the wheels necessarily produces dust which, in the confined space of entries or tunnels, may rise to high atmospheric concentrations. In the case of sand, the free silica content of the atmospheric dust may be far in excess of the maximum amount permissible in dusty trades.

Various substances other than sand have been proposed for traction material. Some of these substances, however, are not sufficiently hard for the purpose, or have other physical characteristics, such as packing or the tendency to absorb moisture, which have limited their usefulness. Economic factors are obviously of importance also, as the tonnage of traction material required for ordinary operation is large. Among the substances which have been proposed or used are certain mine tailings and also the various metallurgical slags.

The purpose of this study was to determine the relative safety of possible substitute materials. Guinea pigs were injected intraperitoneally according to the method of Miller and Sayers with suspensions of the various powdered materials or dusts. The dusts caused a cellular reaction with the formation of peritoneal nodules. An attempt was made to grade the severity of the reaction objectively by estimating the percentage of dust by volume in nodules, using Chalkley's method for the quantitative morphologic analysis of tissues. The severity of the reaction was considered to vary inversely with the percent of dust in the nodules.

With this method of grading, it was found that quartz and silica sand produced a severe cellular reaction. A marked cellular reaction was induced by vitreous silica and slags Nos. 1, 2, 3, and 5. A moderate cellular reaction was induced by Lyon Mountain ore tailings, magnetite, obsidian, slag No. 4, and trap rock No. 3088. A mild cellular reaction was evoked by anthracite, bituminous coal, hematite, and lodestone.

Miller and Sayers have noted, at least in some cases, a correlation between the severity of the peritoneal reaction in guinea pigs and the pulmonary response in man. In this study, it was noted that anthracite, bituminous coal, and hematite, which are relatively harmless to man, produced only a mild peritoneal reaction in guinea pigs, and that quartz, which can produce severe silicosis in man, produced a severe peritoneal reaction in guinea pigs. These findings suggest that the materials which produced a mild or moderate peritoneal reaction in guinea pigs are likely to be less harmful to man than those which produced a marked or severe peritoneal reaction such as quartz and silica sand. Among the materials which fulfilled this condition were iron ore tailings corresponding to the composition indicated, slag No. 4 (U. S. Bureau of Mines No. 49–303 (3)), and trap rock conforming to the type described. These materials also appear to have the requisite hardness, commercial availability, and other properties suitable for use as traction material.



*The complete article was printed in *Public Health Reports*, August 11, 1950.

Dr. Fairhall is toxicologist of the Division of Industrial Hygiene Field Headquarters, Public Health Service, Cincinnati, Ohio.

Dr. Highman is with the Laboratory of Pathology and Pharmacology, National Institutes of Health.

Mr. Perone is a medical technologist with the Division of Industrial Hygiene, Public Health Service.

NEW MEXICO WARNS ARC WELDERS TO WEAR GOGGLES

THE high rate of eye injuries resulting from exposure to the ultraviolet rays from welding arcs prompted Carl R. Jensen, Supervisor of Industrial Hygiene, Division of Sanitary Engineering and Sanitation, New Mexico Department of Public Health, to issue a bulletin warning arc welders to wear protective goggles.

The bulletin reads:

"Most persons who have worked with arc-welding equipment are well acquainted with the symptoms of flash burn. These symptoms result from exposure to rays generated during the arc-welding operation. However, few people seem to realize that severe exposures to these rays may result in serious eye damage.

"The ultraviolet rays in the arc-flash cause the damage. Slight exposure may result in a mild conjunctivitis with symptoms similar to 'sand in the eyes.' More severe exposures may result in headaches, severe eye pain, and partial loss of vision. Prolonged exposure can result in permanent damage through cataract formation. Whether the symptoms are severe or mild, the partial blindness which accompanies the exposure may easily bring about a serious accident.

"No one should suffer from such exposure. The preventive measures are simple. Goggles designed for filtration of ultraviolet rays of harmful intensity can be obtained and should be worn by the workers who must be in the vicinity of the welding operations. If the welding operation is not stationary, movable screens should be used to protect other workers in the vicinity.

"Ordinarily the welder wears the proper protective goggles. It is generally the laborer, carpenter, or painter who helps the welder hold a piece of material in place, that gets hurt. The welder should not permit anyone to assist him who does not have on protective goggles. This should be a plant or company rule!

"If these simple precautions are observed there should be no suffering or lost time from flash burns."

Classification of Environmental Exposures

By J. J. Bloomfield

This article is one of a group of lectures which Mr. Bloomfield gave to a class of physicians in Rio de Janeiro, Brazil. In view of the constant demand for basic material on industrial hygiene techniques and for practical help in this field, a number of these lectures are being printed in the INDUSTRIAL HYGIENE NEWSLETTER.

This is the second in the series. In the first article, which appeared in the September issue, Mr. Bloomfield discussed types of plant surveys, illustrating with the Public Health Service study of mercurialism in the hatters' fur-cutting industry.

Before proceeding with a discussion of the techniques of studying health hazards in industries, it is important to understand the classification of environmental agents. These are discussed in this article.

ONE of the major objectives of industrial hygiene is the prevention of adverse effects on health by environmental agents. To accomplish this objective, it is first necessary to recognize the hazard, evaluate it, and then provide corrective measures. To do this, one must have a knowledge of the chemical and physical properties as well as the physiological effects of these agents; also of the basic principles of engineering control procedures. The number of injurious environmental agents is so great that it would be impossible to consider each separately. Therefore, various classifications have been utilized, and this is but one version.

Environmental agents may be divided into three categories: (1) chemical, (2) physical; and (3) biological. Since chemical agents are likely to be encountered more frequently, and as the general procedures for recognition, evaluation, and control are similar for the other types, the chemical agents will be discussed in more detail than the others.

CHEMICAL AGENTS

Chemical agents may be divided into two types, those that exist in the gaseous state and those present as particulate matter. Gaseous contaminants are made up of those materials which exist as gases at ordinary temperature and pressure. Vapors represent the gaseous state of materials that are liquid at ordinary temperature and pressure. Examples of gases are carbon monoxide, hydrogen sulfide, hydrogen cyanide, hydrogen fluoride, sulfur dioxide, and ammonia. Examples of vapors are volatilized benzol, petroleum, carbon tetrachloride, acetone, methyl alcohol, and other organic solvents. One of the most important properties of the gaseous contaminants is their ability to mix intimately with air and become an integral part of it. Stratification may result from the difference in specific gravity of the contaminant and air; but, once they are intimately mixed there is no significant separation, regardless of difference in specific gravity.

Particulate matter may consist of either solid or liquid particles and is usually classified on the basis of formation, as dust, fumes, mist, and fog. Dusts are solid particles generated by disintegration, as by grinding, crushing, rapid impact, and blasting. Fumes are solid particles formed by condensation, as occurs on burning metals. Mists are liquid particles generated by disintegration of a liquid, as by atomization. Fogs are liquid particles formed by condensation of moisture on dust nuclei. Particulate matter does not form an intimate mixture with air but is merely held in suspension. It therefore tends to settle out and be deposited either near an operation or at great distances, depending on the particle-size as well as on its tendency to agglomerate and adsorb moisture. The particle-size is, therefore, an important property of particulate matter, as it plays a significant role in the length of time the particles stay suspended and the distance they travel; also, it is significant in regard to retention in the respiratory tract.

Dusts may be divided into two groups—organic and inorganic. The organic may be subdivided into natural and synthetic. Examples of natural organic dusts are wood, grain, cotton, pollens, feathers, hair, bacteria, and fungus. Examples of synthetic organic dusts are plastics and numerous organic chemicals and drugs. The inorganic dusts may be grouped as siliceous and nonsiliceous. The siliceous dusts include free silica and the numerous silicates. The nonsiliceous dusts include the metallic compounds and the numerous inorganic chemicals.

Fumes are most commonly encountered as metal oxides when they are formed by heating metals to high temperatures or by burning metals. They also may be formed by the volatilization of solid organic materials or by the reaction of chemicals, as hydrochloric acid and ammonia. Fumes, in general, consist of very fine particles which remain suspended in air for long periods of time. They have a tendency to flocculate much more readily than dust and then will settle out due to increased particle size.

Mists are likely to be formed when air or gas is passed through a liquid. Chromic acid mist, produced during plating operation, is caused by the escape of hydrogen and oxygen. The spray produced when one sneezes may be considered a mist.

Fogs are encountered usually when some substance is present in the air which attracts moisture. For example, there is sulfur trioxide fog, or fog from other acid gases, as hydrochloric acid.

Sources of Atmospheric Contamination of Chemical Agents.—In determining the sources of atmospheric contamination by chemical agents, one must consider not only all the raw materials being used, but also the processes and conditions under which they are being used. If carbonaceous material is being used in founding operations, carbon monoxide may be produced. Similarly, other hazardous products may be formed. Also the association of operations must be considered. Sodium cyanide should not be used in the vicinity of acids; otherwise hydrocyanic acid may be evolved. Phosgene and other chlorine compounds have been produced when degreasers using trichlorethylene were operated near open flames. Compounds with very low vapor pressure may be handled safely at ordinary temperatures, but a significant hazard may result if the operation is carried out at elevated temperatures.

Determination of Chemical Agents.—It is not the purpose of this article to describe sampling methods and analytical procedures, but a few words are in order to indicate their role in the evaluation of potential hazards. In an industrial hygiene survey, the analysis of atmospheric samples is essential. The type of sample, the number taken, and the accuracy of analysis will depend on the primary purpose of the survey. If the purpose is to ascertain the source of contaminants or to check on control procedures, satisfactory results may be obtained even though only a few samples may be taken and the analytical procedure may be relatively crude. On the other hand, if the purpose of the sampling and analysis is to obtain data for legal purposes, for correlation with codes, or for evaluation of health hazards, careful and thorough sampling should be carried out to obtain an overall measure of the exposure of the workers, and accurate analytical procedures should be used. The sampling procedure to be used shall be one that experience shows is necessary to secure a sample which is truly representative of the actual working conditions at the location tested.

Physiological Effects of Chemical Agents.—The action of a chemical agent on the body may be classified as local or systemic. By local action is meant that effect due to direct contact with the skin. Systemic action refers to effects produced after absorption of the chemical into the blood stream and also includes those effects due to irritation of the respiratory tract.

Local action.—Chemical agents producing injury by direct contact with the skin may be classified as primary irritants and specific irritants. The primary irritants are such compounds as acids, alkalies, and corrosive salts, which in sufficient concentration and length of contact will cause injury to the skin of virtually everyone. Such injuries may range from severe chemical burns to mild irritation or reddening of the skin. Usually included with the primary irritants are many of the organic solvents which act by removing the fat from the skin, thereby causing it to chap and crack, thus making the skin susceptible to secondary infection.

The specific irritants produce their effect in hypersensitive persons. Some persons apparently are naturally sensitive to certain chemical compounds, and others become sensitive as a result of contact. In such persons only a very minute amount of material may be necessary to produce a severe skin reaction. It has been estimated that approximately two-thirds of all occupational diseases in the United States are dermatoses.

Conjunctivitis also may be produced by many chemical agents, a notable example being hydrogen sulfide. Concentrations of this substance which would not produce systemic poisoning except after prolonged exposure readily cause conjunctivitis.

Systemic action.—Chemical agents may gain entrance to the body by (*a*) ingestion, (*b*) skin absorption, and (*c*) inhalation.

Ingestion.—There are two main ways in which poisons may be ingested in industry: (1) By the handling of food and tobacco with dirty and contaminated hands, and (2) by the entrainment of particles on the moist surfaces of the mouth and throat in the process of breathing and subsequent swallowing.

Skin Absorption.—A number of compounds will penetrate the intact skin rapidly enough to produce serious poisoning. Many other compounds are absorbed through the skin, but the rate of absorption is so slow that serious poisoning or even mild poisoning rarely occurs. Of the compounds that exist as gases under ordinary conditions of temperature and pressure, hydrogen cyanide is the only one known that is absorbed rapidly enough to produce serious poisoning. For example, it is estimated that in an atmosphere containing 2 percent hydrogen cyanide by volume serious poisoning can occur in a matter of 2 or 3 minutes.

With regard to compounds that are normally in the liquid state, the following are some notable examples of those that are known to cause serious effects by absorption through the skin: Aniline, nitrobenzene, nitroglycerine, phenol, and tetraethyl lead. There are, of course, many other liquids that are absorbed through the skin; in fact, most organic solvents are considered to be absorbed through the skin. However, many of these are absorbed so slowly that the hazard from the skin absorption is minor or negligible compared to the hazard from inhalation of vapor, and therefore little consideration need be given to their skin absorption properties.

Inhalation.—By far the most important route of absorption of industrial poisons into the system is that of inhalation. Materials may be taken into the lungs as gases, vapors, or as particulate matter, so that absorption may occur regardless of the physical state of the material. The amount of material taken into the lungs will depend on the concentration of the contaminant and on the volume of air breathed. Approximately 10 cubic meters of air are taken into the lungs in an ordinary 8-hour working day; that is, at the rate of about 20 liters per minute. When calculated to a weight basis, it is found that 10 cubic meters of air weigh about 26 pounds, or about five times the weight of food and water ingested in a day.

To consider the effect of inhalation of contaminants, it is desirable to have information on such factors as (*a*) rate of absorption, (*b*) distribution in the various body tissues and fluids, (*c*) rate of elimination, (*d*) fate in the body, (*e*) effect on normal body constituents, as well as (*f*) pathologic changes, and (*g*) diagnostic signs and symptoms. Such information should be available for concentrations ranging from those which produce definite effects after a single short exposure to those which produce slight or negligible effects after repeated daily exposures.

Effects produced by a single short exposure, that is, acute effect, are usually recognized and may be considered in the nature of an accident due to some unusual circumstance. However, in some cases, although the amount absorbed is sufficient to cause death even after a single exposure, the symptoms are delayed for hours. For example, oxides of nitrogen exert such an action. In the Cleveland Clinic fire some 20 years ago, persons were not aware that they had received a serious exposure until 12 to 24 hours later, when pulmonary edema of sufficient severity to cause death occurred.

Chronic effects, which are produced only after repeated daily exposures to relatively low concentrations, are of most importance to industrial hygienists. Your attention is called to two factors—concentration and time. The effect of a substance depends not only on the concentration but also on the length of exposure. This "time-concentration" effect is really the basis for prevention of occupational diseases. It is accepted that the human body can detoxify, destroy, eliminate, or otherwise handle a certain amount of any material without any measurable damage. The problem, therefore, is to control the environmental conditions so that harmful amounts of contaminants are not present under conditions that will permit their contact with or absorption into the body. This logically leads to the subject of maximum allowable concentrations, permissible concentrations, or hygienic standards of exposure.

Hygienic Standards of Exposure.—The evaluation of a potential hazard requires the correlation of the concentration of the contaminant found in the working atmosphere with a knowledge of the toxicity and physiological effects of the contaminant. Numerous correlations of this type have been made, and as a result there are now available tables which list the M. A. C. value for many compounds. The values have been established on the basis of (1) laboratory tests on animals, (2) laboratory tests using human subjects, (3) field investigations, and (4) a combination of all the above methods. The criteria used in establishing the limits are based on (1) pathological effects, (2) slight physiological effects which apparently do not discernibly affect health but cause impairment of coordination and reaction time and tend to make workers more prone to accidents, and (3) discomfort or sensory effects.

It is not the purpose of this article to discuss M. A. C.'s in detail, but merely to call attention to their role in industrial hygiene programs. In a subsequent article more time will be devoted to this subject. Briefly hygienic standards are an important tool of the industrial hygienist but should be used intelligently with due regard to their limitations, particularly in connection with the criteria and data on which they are based. One word of caution, they should not be construed as a diagnosis of poisoning if the concentration exceeds the permissible limit, nor as conclusive evidence that occupational disease cannot occur if values less than the permissible are found.

Measurement of Exposure and Diagnostic Signs.—In addition to evaluation of exposure based on analysis of the atmosphere, there are biochemical and physiological responses that serve the same purpose and with certain advantages. For example, the concentration of lead in the blood or urine serves as a measure of absorption of lead and also as a basis for evaluating the severity of exposure. Obvious advantages of this procedure are that variations in concentrations from time to time and place to place, as well as differences in respiratory volume and retention, are automatically compensated. Changes in the organic-inorganic sulfate ratio in the urine is a measure of benzol exposure. Also, if sufficient information on physiological response is available, a simple functional test may be utilized to determine if the exposed person is reacting sufficiently to indicate possible future injury. These methods serve as excellent supplements to the determination of the concentration of the contaminant in the air.

PHYSICAL AGENTS

The multiplicity of physical agents that may be encountered in industry is indicated by the following tabulation:

1. Air pressure.
   a. Compressed air (tunneling—caisson).
   b. Rarefied air (high altitudes—aviation).
2. Temperature and humidity.
   a. Relation between temperature and humidity.
   b. Sudden variations in temperature.
3. Illumination.
4. Radiant energy.
   a. Infrared radiation.
   b. Ultraviolet radiation.
   c. Ionizing radiation (X-rays, gamma rays, beta rays, alpha particles).
5. Mechanical vibratory spectrum.
6. Noise.

Time does not permit a discussion of each of these agents. In general, the same basic procedures and principles are followed as outlined for chemical agents. In a subsequent article, one of the agents will be discussed in some detail to give you a background for handling other problems in this category.

BIOLOGICAL AGENTS

Biological health hazards include infections such as anthrax, tuberculosis, fungous infection, brucellosis, typhoid fever, malaria, yellow fever, hook worm, pneumonia and other respiratory diseases. The significance of the biological agents in industry is indicated by the number of agents listed. While the problem of biological agents differs considerably from that of the chemical and physical agents, there are many points of similarity which will be evident in the subsequent article which deals in detail with health hazards from biological agents.

The purpose of this article has been to present in a general way the factors that must be considered in making an industrial hygiene survey. The following articles will take up in more detail the application of these principles and the actual techniques used in making plant surveys.

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ARKANSAS

Radioactivity—In the development of the civilian defense program, this Division has been asked to serve in an advisory capacity for the State on radioactivity, instrumentation and monitoring.

Personnel.—E. Frank Wilson, chemist, is enrolled at North Carolina School of Public Health for graduate work.

Clarence N. Overcash, industrial hygiene engineer, attended a 5-week course in radiological defense at the Illinois Institute of Technology this summer.

Publication.—Beginning with the March issue, the Division of Industrial Hygiene instituted a regular section of industrial hygiene news in the State Health Bulletin. It goes regularly to all physicians, nurses, hospitals, and key personnel in industrial establishments.

Mercury.—This Division began a study on mercury exposure in the treatment of cottonseed with Ceresan. Because of the short treatment season and the wide separation of plants using this treatment, our information and data are still too limited to permit the drawing of any definite conclusions. This project will be continued during the late winter and early spring seasons.

CALIFORNIA

Agricultural Chemicals.—The Bureau Chief presented a statement on the extent and incidence of occupational poisonings from agricultural chemicals at the public hearings in Los Angeles to consider new regulations in the control of economic poisons proposed by the State Department of Agriculture.

The study of the aircraft crop dusting industry got a good start this month with arrangements being made with the largest crop duster in the Central Valley area for sampling of atmospheric contamination in the aircraft and on the ground and with the testing for cholinesterase activity in the blood of the persons exposed.

The death of a 35-year-old man who had been spraying with parathion was reported and started an intensive program which is being developed in cooperation with the local health department. Investigation so far fails to substantiate parathion as the cause of death.

Several cases of parathion and other organic phosphate poisoning were received by the Bureau, and in some instances blood cholinesterase activity levels were determined. The Bureau is attempting to secure considerable data in order to test the validity of the cholinesterase determination as a diagnostic tool in parathion poisoning.

Personnel.—Dr. Christine Einert and Mr. Robert Mendell have returned from a year's study at Harvard University. Miss Patricia Warr, statistician, is a new member of the staff. During the summer, Mr. Kenneth Gard, medical student, and Mr. Isaac L. Beauchamp, student in public health, assisted in the Bureau's work.

MASSACHUSETTS

Radiological Defense. — Engineer Harold Bavley has recently taken 2 weeks' training in radiological defense at the Chemical Corps School, Army Chemical Center, Edgewood, Md. This training which Mr. Bavley had is expected to be valuable in the Division's work in controlling hazards from handling of radioisotopes, for example.

Starting with the background of nuclear physics, the students proceeded to a review of mathematics and chemistry and then area damage control. Laboratory work consisted of calibration of various types of instruments, some of which are used by the Division, such as the Geiger-Mueller survey meter, ionization chamber, and scaler; also, plotting of function of shielding and plotting of isointensity lines. Field work and class problems involved plans for civilian defense against atomic attack for large cities. In addition, a quantity of essential information on the subject, which amounted to a small library, was available to each student.

MONTANA

Floor Wax.—In a department store it was noticed that the employees became ill whenever they used a floor wax. Upon investigation, the Industrial Hygiene Division found that the cause of the illness was normal propyl alcohol, the solvent in the wax. The store manager decided the best control would be to eliminate the use of this wax and replace it with another type.

Labor Institute.—The Director of the Division of Industrial Hygiene has been invited to participate in a panel on workmen's compensation and industrial hygiene, which is part of an annual Labor Institute held on the grounds of the University of Montana. About 75 to 125 union officials and labor leaders attend these institutes each year.

NEW JERSEY

Personnel.—Marie A. Sena, M. D., M. S. P. H., has been appointed chief of the Bureau of Adult and Industrial Health. Dr. Sena received her medical degree from Women's Medical College of Philadelphia in 1930 and her master's degree in public health from Columbia University in 1944.

Her varied experiences afford Dr. Sena an excellent background for the special field of adult and industrial health. She was engaged in general practice and was public health physician with the Newark Board of Health and the Newark Board of Education. For the past 7 years she has been industrial hygiene physician with this Bureau.

Richard J. Sullivan, M. E., and Preston C. Shimer, B. S., have recently joined the staff of the Division of Preventable Diseases and are at present receiving an indoctrination in the field of industrial health under the supervision of the Bureau of Adult and Industrial Health.

NEW MEXICO

O. D. Reports.—Although not known as an industrial area, New Mexico had a

(Continued on page 16)

Information on Industrial Health Legislation Compiled

LEGISLATION affecting the health of industrial workers has been a subject of increasing interest in recent years, particularly legislation concerning the administrative authority for industrial hygiene activities and the promulgation of standards regulating health conditions in industry.

In view of this interest on the part of many agencies and individuals, information on this subject has been compiled by Victoria M. Trasko of the Division of Industrial Hygiene, Public Health Service. The multilithed book of 162 pages is titled, ***Industrial Health Legislation.***

It is presented as a collection of selected citations from State laws and regulations delegating powers and functions to health and labor authorities in each of the States and the District of Columbia for the prevention and control of occupational diseases and the promotion of health and safety of workers. Municipal and county legislation and regulatory aspects of air pollution control are not included.

The specific features dealt with are: The basis of authority for conducting industrial hygiene activities or safety programs, the extent of rule-making and enforcement powers, and related functions; the control of occupational health hazards in industry; the reporting of occupational diseases; and compensation for disability from occupational diseases.

The sources of the citations are the most recent compilations of State laws available. Laws enacted up to and including 1949 were examined.

The purpose of this compilation is to make available in convenient form information concerning State legislation for the prevention and control of occupational diseases. Provisions dealing with health aspects are given in detail, while those dealing with industrial safety are included but are not treated at length. Reference to these safety provisions is made only to bring out the contrast in type and scope of legislation. No interpretation is made of the material other than classification of provisions under specific headings.

Although an attempt was made to strive for completeness and accuracy of information, the section listing the rules and regulations issued by the respective agencies is incomplete for some of the States because of the unavailability of information. No mention is made of construction industries, boiler inspection and elevator inspection, since they do not fall within the scope of this compilation.

Likewise, this compilation does not include legislative provisions on hours, wages, and employee relations, regulation of food handling and processing industries, mattress manufacturing, and similar industries where the regulations are aimed at the sanitation and safety of the completed product from the standpoint of the health and safety of the public and consumers.

A limited number of copies are available from the Division of Industrial Hygiene, Public Health Service, Fourth Street and Independence Avenue SW., Washington 25, D. C.

Panel Appointed for Environmental Cancer

THE Committee on Growth of the National Research Council, adviser for research to the American Cancer Society, announces the formation of a Panel on Environmental Cancer with the following membership: Dr. Willard Machle, chairman, Dr. Francis Heyroth, Dr. George H. Gehrmann, Dr. Herman Lisco, and Dr. Norton Nelson.

Increasing realization of the importance of further research in environmental cancer led to the creation of this new panel which, at the outset, will concern itself with an evaluation of the status of knowledge in this field and with the formulation of criteria for the establishment of valid relationships between environment and occupation and the occurrence of cancer. The panel also will review applications for grants in support of research in these areas. These applications, as with others submitted to the Committee on Growth, will be received until October 1, 1950.

Communications regarding grants may be addressed to the Executive Secretary, Committee on Growth, National Research Council, 2101 Constitution Avenue NW., Washington 25, D. C.

Radiological Health Course To Be Given in Cincinnati in October

A 2 WEEKS' program in basic radiological health training has been planned by the Public Health Service and will be given at the Environmental Health Center, 1014 Broadway, Cincinnati 2, Ohio. The course will be presented October 9 to 20, and again November 6 to 17, 1950.

The staff in charge is Simon Kinsman, Robert G. Gallaghar, and Donald J. Nelson. They will be assisted by personnel of the Environmental Health Center and Radiological Health Branch, and prominent consultants in specific fields.

Some of the major subjects to be covered in the course are:

Definition and description of the language and units of radiation, biological effects of radiation, radiation physics, and medical aspects of radiation.

Others are: General theory and use of radiation detecting and measuring instruments, area and personnel monitoring, uses of radiation and radioisotopes, radiation shielding and attenuation, decontamination and waste disposition, public health aspects of radiation, and organization of a health physics group.

This program is offered for professional people who are or will be primarily concerned with radiological health problems in their respective areas. Candidates should have a degree in medicine, engineering, physical science or biological science, and have had considerable experience in public health work. Applicants who have been certified in the 2, 3, or 6 weeks' courses in radiological defense since July 1, 1948, are not eligible.

No tuition will be charged and necessary texts will be furnished. However, trainees are expected to arrange for their own living and traveling expenses while attending the course, either through State stipend or other means.

Letters of application for this program should be sent to the Officer in Charge, Environmental Health Center, 1014 Broadway, Cincinnati 2, Ohio.

Maryland Surveys All Counties for Air Pollution Facts

AT THE request of the Governor's Commission on Noxious Fumes, the Division of Health made a survey of the counties of Maryland during the summer months. The purpose of this study was to evaluate the sources, kinds, and extent of air pollution occurring in various areas of the State.

Three men with graduate experience in chemical engineering and medicine were employed. They received a 3-day indoctrination course in the central office before they visited the counties to collect information from existing sources and make surveys of industrial plants or other units that may be contaminating the atmosphere. Community sources of pollution—such as odors or smoke from dumps, incinerators, sewage disposal systems and industrial lagoons were also investigated. Meteorological and topographical data were collected. The findings of this survey will be tabulated and will form the basis of a report which the Commission on Noxious Fumes will submit to Governor Lane at the end of the year.

In addition to the evaluation of the sources of air pollution made in the State, a pilot study of morbidity in relation to air pollution is being made in one community.

The Public Health Service assisted in the planning of this study and will make the analysis of the collected data. The data are being gathered by house-to-house visits performed by public health nurses.

STATE NEWS—

(Continued from page 14)

number of occupational diseases reported in 1949. Dermatitis cases were most numerous. Flash burns from ultraviolet rays, chemical conjunctivitis and silicosis were the other diseases named in 66 cases. The chemical conjunctivitis resulted from exposure to tar fumes released during the rust-proofing of pipe. The poisoning cases reported were caused by carbon monoxide, paint vapors, solvent vapors, oxides of nitrogen, metal fumes, lead, gasoline vapors, chlorine, halogenated hydrocarbons, and sulfur dioxide.

Radiological Course.—Three employees of the New Mexico Board of Public Health plan to attend the Basic Radiological Health Training Course offered by the Public Health Service in Cincinnati. Those who plan to attend are: W. K. Harrell, Senior-Assistant Bacteriologist-Serologist, Carl Henderson, Supervisor of Food Sanitation, and Carl R. Jensen, Supervisor of Industrial Hygiene.

WEST VIRGINIA

Industrial Consultant.—The Bureau of Industrial Hygiene has expanded its scope of health services to industry through an affiliation with the University of Pittsburgh School of Public Health. Through this arrangement, Dr. A. G. Kammer will provide consulant services to West Virginia on problems concerned with industrial medicine and toxicology. Dr. Kammer is the head of the Department of Occupational Health at the Pittsburgh school.

The provision of this consultant's services will enable the State Department of Health to provide a better balanced program of medical, nursing, engineering, and laboratory services to West Virginia labor and industry.

Threshold Limit Values for Toxic Substances Published in *Archives*

THE threshold limit values for toxic substances compiled by a committee of the American Conference of Governmental Industrial Hygienists and reported at a recent meeting of that organization have been published in the August issue of the *Archives of Industrial Hygiene and Occupational Medicine.*

This list is revised every year to keep it up to date with the findings of research and practical experience. Dr. L. T. Fairhall, chairman of the Committee on Threshold Limits, in his report to the conference, suggested that more attempts should be made on the part of those reporting original work to define safe working conditions, that is, permissible concentration values to which workers may be exposed. All too frequently original work on the toxicity of a given substance fails to take into account the possible need for such data and it requires much study to arrive at any conclusion regarding its usefulness for inclusion in a table of threshold limit concentrations.

In connection with its review of the threshold limit values, the committee undertook the special task of bringing the significant information concerning 25 of these substances together in permanent form. This compilation of references and abstracted material documents the threshold limit values for each substance.

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