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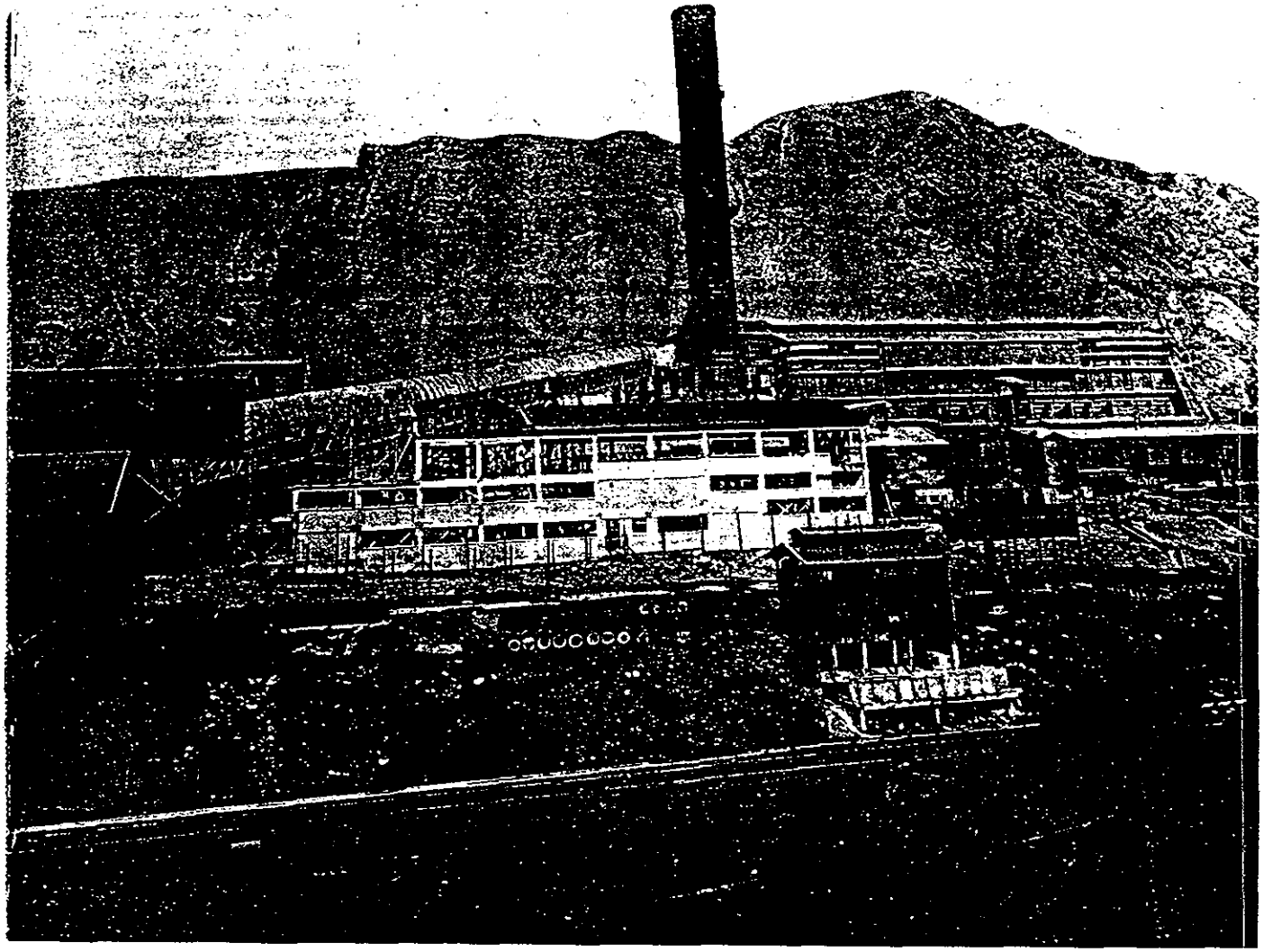

NEWSLETTER

INDUSTRIAL HYGIENE NEWSLETTER

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Bloomfield Recommends Broad Industrial Health Program for Peru

After 3 months of observation in the mines, mills, homes, and schools of Peru, South America, Mr. J. J. Bloomfield, USPHS, recommended a broad industrial health program for the workers of that country. In view of the inadequate housing, sanitation, and education available to thousands of Peruvians, Mr. Bloomfield emphasized the need to develop better living conditions at the same time that industries improve the working environment.

Peru passed a law in March 1947, creating a Department of Industrial Hygiene in the Ministry of Public Health and Social Welfare. Soon after the law was enacted, through the Institute of Inter-American Affairs, the Minister of Health and Social Welfare requested the Public Health Service to detail Mr. Bloomfield to assist him in studying the industrial hygiene problems of the country and in organizing the new department.

Under the auspices of the Health and Sanitation Division of the Institute of Inter-American Affairs, Mr. Bloomfield went to Peru where he worked jointly with the Ministry of Health and Social Welfare and the Servicio Cooperativo Inter-Americano de Salud Publica. That Peruvian industries had serious health hazards was well recognized. However, there was no one source of information which presented a well-rounded picture of these hazards, and it was necessary for Mr. Bloomfield to obtain first-hand information.

Peru's Future

Although Peru is primarily an agricultural nation, its manufacturing industry is growing rapidly, and it is extremely rich in mineral resources. Until recently Peru's high, rugged mountains retarded the development of some of these resources. But in the past few years, a number of good roads have been constructed which connect the three important sections of the country and make good transportation and communication services possible on a national scale. Aviation also is playing an increasingly large role in the communication field.

The study made by Mr. Bloomfield included an investigation of general living conditions in Peru; a survey of industrial hygiene conditions in 21 representative mines, mills, and manufacturing establishments, employing approximately 23,000 persons; and a brief study of official and nonofficial agencies whose work was related to industrial hygiene.

Present Conditions

About 2½-million people in Peru are gainfully employed, and approximately half of them work at agriculture. About a half million are engaged in industries known to present major health hazards.

Living standards among all Peruvian workers are extremely low. These conditions exist because of the low wages paid most workers and are aggravated by the economic inflation which currently prevails. Although the miner is somewhat better off than the factory worker in Peru, because of certain employer-provided benefits, his low wage is insufficient to provide a decent standard of living. Diet deficiency, poor and inadequate housing, overcrowding and lack of sanitation—the usual accompaniments of low living standards—are widespread. This problem is made more acute by the high rate of illiteracy in the country, especially in the mining regions, and by the scarcity of educational facilities.

Much Sickness

The development of Peru's rich natural resources is seriously hampered by disease, the control of which has been limited by lack of funds and trained personnel. Tuberculosis is rampant throughout the country, considerably aggravating the silicosis problem. Because of impure water supplies and lack of sewage treatment facilities, enteric diseases are also very common. Mortality from respiratory diseases in Peru accounts for nearly 30 percent of the deaths in the country.

Hazards to health and safety abound in all Peruvian industry. In mines the chief health hazards are exposures to silica dust, sulfur dioxide, heat and high humidity, and fumes from blasting powder. Dry drilling and the handling of dry ores in the mines and mills are common practices. Mechanical ventilation is practically nonexistent, and natural ventilation is insufficient to cope with the dust problem even when wet methods are used.

In the manufacturing plants and in most of the mines and mills, safety hazards are created by obsolete and run-down machinery; unguarded moving parts; unsafe floors, stairways, and platforms; exposed electric wires; and poor ventilation and illumination.

COVER PICTURE—A calcium arsenate plant in the mountains of Peru, South America.

Reliable nation-wide statistics are not available in Peru on occupational diseases or on compensation costs for such diseases. However, data obtained from individual enterprises indicate clearly that industrialists spend hundreds of thousands of dollars needlessly because of the lack of a preventive program.

Labor Shortage

A corollary of bad working and living conditions is high labor turn-over which is a serious problem in Peru. All the mining establishments visited by Mr. Bloomfield are in dire need of labor. The compensation law which provides payments for partial disability from silicosis aggravates this situation, since it makes workers with early silicosis poor insurance risks, and therefore less employable.

Sanitation facilities in mines and mills and in manufacturing plants are wholly inadequate and in a poor state of maintenance. Water supplies, washing facilities, personal clothing lockers, and other facilities are completely lacking in many establishments and wholly inadequate in others.

Although medical services are available to most industrial workers, the standards of such services are very low. Preplacement examinations are given to workers in accordance with law, but no agency makes a careful analysis of these examinations in order to raise the health level of the working population. Practically no follow-up examinations are given, and, in spite of the fact that the chief health hazard in the mines of Peru is silicosis, only two of the surveyed mines use X-ray as a diagnostic tool.

Health Center Recommended

At the conclusion of his survey, Mr. Bloomfield recommended that the Department of Industrial Hygiene should take leadership in encouraging large industries to sponsor complete industrial hygiene programs of their own. These programs should include not only activities related to the control of hazards in the working environment, but also activities which will improve workers' general health. The industrial hygiene program should be, in effect, an extension of a general public health program and should make use of all health resources available in the community. For this reason, Mr. Bloomfield recommended the establishment of a health center in the most important mining area in the Central Andes. Activities of the health center—tuberculosis control programs, venereal disease control programs, and other health improvement activities, for example—can be brought to the industrial population through a plant's industrial hygiene program. The poor health of the mass of the Peruvian population makes this an urgently needed activity.

Corrective measures for the protection of the health of industrial workers are put in effect largely by private effort and with the use of private funds. The department's most important task, in Mr. Bloomfield's opinion, will be to show industry how to solve its own health problems. The department should help industry achieve a healthful environment; cooperate with and coordinate the work of all other public and private agencies involved in industrial hygiene activities; develop standards for healthful practices; collect and analyze occupational disease reports; and give impartial advice when it is needed for the adjudication of claims.

Progress Made

Several steps have been taken already to implement the 1947 legislation which authorizes medical and engineering control of health hazards. At Mr. Bloomfield's urgent recommendation the administration of the Department of Industrial Hygiene was placed under the direction of the Servicio Cooperativo Inter-Americano de Salud Publica. Mr. B. D. Tebbens, industrial hygiene engineer, was transferred from Bolivia to Peru to take charge of the program, and another engineer employed to assist him. A physician is now receiving training at Harvard preparatory to assuming leadership in the medical program for Peruvian industrial workers, and another physician is already on the job. A chemist from the Industrial Hygiene Division, USPHS, will be sent to Peru on loan for approximately a year to set up a laboratory, establish standard procedures and train personnel in chemical techniques.

Ventilation Plan Examination in New York

The period of reconversion from war to peace has provided our engineering unit with an unusual opportunity to assist industry with its industrial ventilation problems—particularly the installation of local exhaust ventilation for the removal of injurious dusts, gases, fumes, vapors, and mists.

While much of the plan examination work comes to our unit as a result of inspectors' orders for ventilation in connection with their enforcement of industrial code rules and labor law requirements, other plans come in for approval as a result of consultation with industry by members of our engineering unit, or their own initiative, in connection with regular field studies conducted by our division for the control of health hazards in industry.

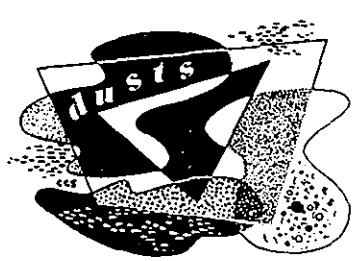
Many of the largest plants in New York State, each employing thousands of workers, have worked in close cooperation with our division in designing their ventilating systems. In one plant alone, recommendations made by our engineers, on the basis of their extensive experience with industrial ventilation, made it possible in a system employing close to a million cubic feet of air per minute to save 25 percent from the amount specified by plant engineers in their original plans and actually provide better protection for the workers. From this it can be seen that substantial savings were effected not only in the original ventilation costs, but in costs for current operations of the systems.

One plant which manufactured heat exchangers for submarines, tanks, and airplanes during the war, has now reconverted to its former peacetime production of automobile radiators, heaters, and defrosters. Their main problem was that of safely and economically controlling the *lead hazard* due to extensive torch soldering and hot lead dipping operations as required in the process of manufacture. Close cooperation between the plant and our engineering unit resulted in the design of about 50 highly efficient exhaust systems with a concurrent net saving of about 150,000 cubic feet of air each minute.

In another plant, it was possible for our engineering unit to contribute materially to the solution of a rather unique problem in ventilation. It developed that it would be necessary to supply to this factory about 750,000 cubic feet of make-up air per minute to replace the air removed by industrial exhaust systems. This was tempered by direct firing of commercial gas in the air supply system. This method of air heating is very economical, but it was necessary for our engineering unit to require extensive safeguards in order to protect the workers from the possible *carbon monoxide* exposure which might result from incomplete combustion of the gas. These safeguards were worked out with company engineers and the system has been satisfactorily installed.

Still another large company was faced with the problem of a rapid reconversion from the manufacture of airplane subassemblies to automotive subassemblies. Their problem was of a general nature, including *metal working*, *degreasing*, *plating*, and *painting*, and was distinguished by its great number of exhaust systems and the enormous quantity of air exhausted. Although the systems were largely of standard design, careful checking by our office resulted in very substantial savings of power and heat.

In the postwar expansion program in a different type of industry, it was necessary to control *dust from a battery of about 60 newly placed knife finishing machines*. The particular problem encountered in this plant was one of collecting great quantities of waxy and other sticky buffing compounds generated by the process. Systems which had previously been installed on similar machines were known to have resulted in serious clogging of air ducts by these buffing compounds. In order to maintain efficient dust control, it was necessary to devise a method of preventing this clogging. A system was proposed to the company engineers, which provided that the bulk of the refuse was collected at each machine by a small primary cyclone dust separator. The exhaust mains and secondary dust collector were thus relieved of this burden and the trouble-free operation achieved. This system has been installed and is functioning very satisfactorily.



In the field of industrial solvents, control designs recommended by the engineering unit were very numerous. One such installation is presented: The chief engineer for a plant manufacturing *artificial pearls* brought a tentative design for exhaust ventilation for this operation to the engineering unit for approval. This involved exhausting about 12,000 cubic feet of air per minute from the dipping and drying machines. After careful study of the operation, our engineer suggested a design employing only about 1,500 cubic feet which when installed resulted not only in effective control of the solvent vapor hazard to health but in improving production.

The above illustrations are indicative of the nature and the diversity of the problems which were presented to our engineering unit for solution in recent months, in connection with the examination and approval of ventilation plans for the control of health hazards in industry.

During 1946, a total of 2,606 ventilation plans were submitted to our engineering unit. Of the 2,587 plans which were acted upon, 2,051 were approved. A total of 19,480 workers at 11,904 machines were protected thereby from injurious exposure to noxious dusts, gases, and fumes. This plan examination work necessitated 1,707 plant visits for study of the ventilation needs of the situation and for consultation with management.

Some Thoughts on Silicosis

L. E. Hamlin, M. D., American Brake Shoe Co.

Silicosis, perhaps more than any other condition, has demonstrated the inexactitude of diagnostic standards for occupational disease. For example, the work of Gardner and other investigators has shown that, far from being fatal, the uncomplicated form is nondisabling except in extreme degrees of fibrosis. There has been so much intensive study of silicosis that it might appear that little remains to be done. Complacency amounting to boredom has crept into the picture, and on occasion speakers discussing the subject have been introduced with a note of apology for bringing up such a shopworn, dusty topic. A few individuals imbued with unjustified optimism have even predicted that since we have learned everything about silicosis, the application of modern methods of control will soon make the disease another vanishing entity.

Unfortunately, the experience of the last few years does not substantiate this rosy outlook. Tremendous advances have been made in controlling the hazard but knowledge of these often seems to be lacking, especially in those quarters where it is most urgently needed. Physicians, industrial and otherwise, still make a diagnosis of occupational fibrosis because of the chest X-ray pattern and/or a history of employment in a supposedly dusty industry. No consideration is given to the fact that dependable estimations of respirable sized particles of dangerous dust and safe atmospheric concentrations have been established. The plant physician is frequently unaware that such standards exist and management has been lax in bringing the matter to his attention. Industrial compensation commissions need to be reminded that consideration of these factors is essential before awards for disability, based on vague roentgenographic shadows and uncertain exposures, should be granted or upheld.

As more unrelated conditions whose X-ray appearances closely simulate silicosis are recognized, the unreliability of the roentgenogram alone as a diagnostic measure becomes obvious and accurate interpretation is correspondingly difficult.

A situation of this kind points out the necessity of accumulating factual data on exposure through industrial hygiene surveys. Such appraisals must include enough samples to be truly representative. They should faithfully portray actual working conditions and environmental hazards. One should not be concerned so much with the amount of visible dust in the atmosphere of a working place as with the number of harmful particles that actually reach the alveoli of the lungs and are retained. We have seen reports of plant surveys where obviously the hygienist has been too impressed with visible dust around a shake-out where careful analysis revealed mostly smoke, steam, and carbon particles with free silica well below accepted safe limits. This same individual missed a really serious dust hazard where free silica was present in high concentrations but was not evident because the general atmosphere appeared to be clean.

In recent years considerable attention has been given to nodular patterns observed in the X-rays of workers exposed to significant concentrations of iron dust. Reports from this country and abroad have shown that such exposures are capable of producing shadows almost identical with those of silicosis, even in occupations where tests indicate a practically complete absence of free silica in the atmosphere. Postmortem findings on some of these individuals have demonstrated only simple deposits of iron particles in the lungs with no evidence of fibrosis.

We have noted similar X-ray changes in certain grinders and burners in the foundry industry. The shadows have appeared in comparatively short periods of time, the average being about 6 years. Analysis of the air-borne dust in these locations by counts, X-ray diffraction, and estimations of particle size and per-

(Continued on page 16)

CHEST CONDITIONS WHOSE X-RAYS SIMULATE SILICOSIS

A. Industrial

I. Organic	(a) Byssinosis.
	(b) Bagassosis.
	(c) Tabacosis.
II. Inorganic	(a) Anthracosis.
	(b) Radiopaque Deposits—
Inert	Barium (Baritosis).
	Iron (Siderosis).
	Tin.
Toxic	(c) Beryllium.
Proliferative	(d) Asbestosis.

B. Nonindustrial

I. Mycotic	(a) Aspergillosis.
	(b) Moniliasis.
	(c) Wood dust spores.
Yeasts and Molds	(d) Coccidioidomycosis.
	(e) Blastomycosis.
	(f) Actinomycosis.
II. Miscellaneous	(a) Miliary tuberculosis.
	(b) Sarcoidosis.
	(c) Mitral Stenosis.
	(d) Cancer (Metastases).
	(e) Vascular changes.
	(f) Miliary calcicosis (Wheatena).
	(g) Polycythaemia Vera.
	(h) Bronchiolitis.

ELECTROSTATIC PRECIPITATOR IMPROVED

In the November 1947 issue of the *Journal of Industrial Hygiene and Toxicology*, an improved M. S. A. electrostatic precipitator is described. The article, written by George D. Clayton, USPHS, is summarized as follows:

"1. The operating voltage has been increased by the development of an oil immersed coil which will provide voltages up to 13,500;

"2. Increased dependability of the electrical system has been secured;

"3. Rapid and easy changing of the vibrator points has been achieved by the development of new, totally enclosed vibrator unit;

"4. A flexible head has been developed which will insure greater sampling flexibility;

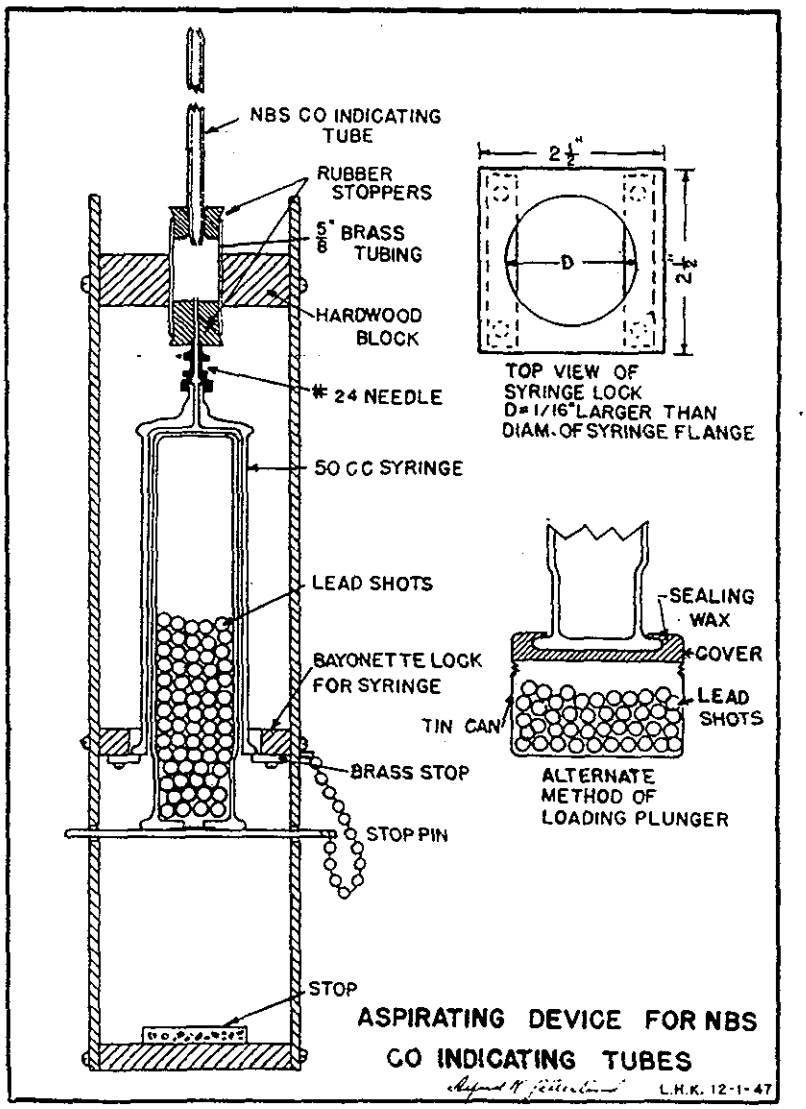
"5. A manometer made of plastic material has been designed to obtain greater accuracy in measuring flow rates; and

"6. A description is given of a simplified voltmeter which will indicate the performance of the instrument with ease and dependability."

ENGINEER WANTED BY UNIVERSITY OF CALIFORNIA

"We are looking for a relatively young engineer who has had experience in industrial hygiene and sanitary engineering to join the faculty of the University of California. The post will probably be primarily in the school of public health, but will also be coordinated with the college of engineering. The man's time will be devoted primarily to industrial hygiene, but he would possibly also be required to teach some classes in sanitation or sanitary engineering. The position that we have in mind will probably pay $5,000 to $5,400 a year for the man whose experience, previous research, and publications meet the standards of the university for the tenure grade of associate professor."—**Harold B. Gotaas, University of California, College of Engineering, Berkeley, Calif.**

No one has a "corner" on ideas. We believe industrial hygienists have found many ideas and devices to increase the efficiency of their work, or to decrease the time and energy spent in doing a job, or perhaps both. If you will share your favorite labor-saving devices or successful techniques which you have discovered useful in laboratory, office, or field, we will publish them in this column. Send your ideas, illustrated with sketch or photograph, if possible, to the Managing Editor, INDUSTRIAL HYGIENE NEWSLETTER, U. S. P. H. S., Washington 25, D. C.



Aspirating Device for NBS CO Indicating Tubes

A. N. Setterlind, Chief Chemist, Division of Industrial Hygiene, Illinois Department of Public Health

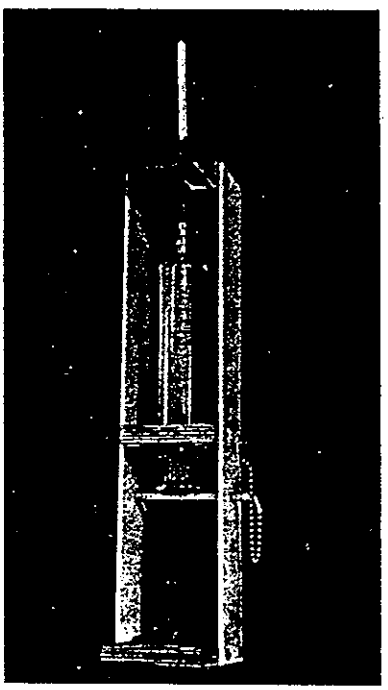
Some time ago we needed to determine a very low concentration of CO in a small sample of air.

Having on hand a quantity of National Bureau of Standards CO indicating tubes but not the needed aspirating device, we constructed the instrument shown in photograph No. 1.

It consists of a 50 ml. syringe, locked in a vertical position, having a B–D No. 24 short needle. The needle penetrates a rubber stopper inserted in a short length of brass tubing press fit into the upper wooden block. The other end of the brass tubing serves as seat for the rubber stopper into which the indicating tube is inserted.

The plunger is weighted to give the desired rate of flow. In the instrument shown, this was accomplished by filling the plunger with buckshot through a hole drilled in the handle. An alternate method is suggested in the drawing. To eliminate variations in flow due to friction between the plunger and the housing, the plunger is made heavy and the flow restricted by use of the relatively fine No. 24 needle. The weight of the plunger shown in the photograph is 275 g.

No. 1



The color development of the NBS tubes is critical to the rate of flow. They have been calibrated for a rate of 90 ml/min. In determining the load of the plunger a fresh tube should be connected to the inlet side of the syringe and the plunger successively weighted until the time taken for the plunger to pass between the 5 ml. mark and the 50 ml. mark is exactly 30 seconds.

The volume equivalent to 1 squeeze of the NBS instrument is 54 ml. A stop consisting of a cork black or other means should be attached to the base to limit the stroke of the plunger to the above volume.

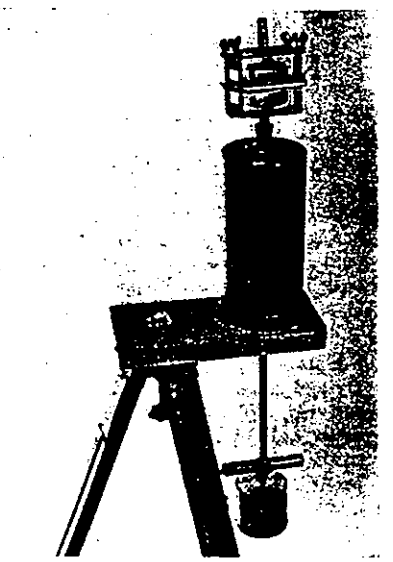
In the field, a tube, after breaking the seal, is inserted in its place at the top of the instrument which is then placed in a position as vertically as possible. Molding the plunger with the finger against its top position the pin stop is removed and the finger released to let the plunger travel by its own weight. After the stroke is completed the tube is removed and read, and the plunger pushed up to its top position. (On later models the side pieces protrude above the brass tubing, as indicated in the drawing. This permits the operator to stand the cradle on its head letting the plunger slide back to the original position while the tube is being read or exchanged.)

The device has been very successfully used. It is easily constructed and easily maintained. The syringe may be quickly removed for cleaning with alcohol when and if necessary.

Its chief advantage over the squeeze-bulb type is the ease with which the rate of flow is checked and the fact that the flow is constant throughout the sampling period.

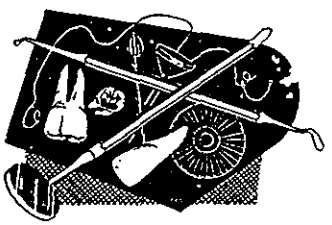
The availability of a simple method to obtain a constant rate of flow caused us to reexamine our method for determining H_2S by the use of filter papers impregnated with lead acetate as described in Leaflet No. 1, Department of Scientific and Industry Research. Previous calibration of the papers against known concentration of H_2S has shown rather wide variations when aspirating the test gas manually by pumping. After constructing the device shown in photograph No. 2 it was found that excellent reproducibility was obtained at a rate of flow of 300 ml/min. Thus by producing stains from known concentrations and reading the percent light reflection of the stain compared to that of unstained paper (in a meter of our own design), a calibration curve was obtained fully as accurate and reproducible as many of the curves of colorimetric solutions in standard colorimetry. The pump shown in photograph No. 2 was obtained from a Sears Roebuck tire pump and converted to a suction pump. It had a capacity of 600 ml. The lead weight weighs 1,240 g. A No. 20 syringe needle inside the tube connecting the test paper holder with the pump serves as the flow constricting orifice.

No. 2



DENTISTRY IN INDUSTRIAL HEALTH PROGRAMS[1]

Dr. R. I. Humphrey, in a talk before the Illinois Public Health Association in April of 1947, spoke on the importance of the almost unrecognized part in the profit-making role that oral health plays in our industrial plants, namely, that a healthy oral cavity has a direct constructive influence on industrial production. On the other hand, the contrary is true in the case of oral infection.



"An aching tooth in an individual can become a company's toothache affecting not only the well being of the individual, but jeopardizing the safety of fellow employees. Pain of dental origin causes loss of sleep, fatigue, and mental distraction. Accidents follow; industrial accidents are always costly.

"Infected teeth can mean a staggering loss of man-hours. There is authority for the statement that at least 25 percent of employee absenteeism from nonoccupational illness is directly traceable to the mouth. Continued study and analysis of absenteeism will some day enable a greater degree of accuracy in translating the cost of lost man-hours in terms of dollars and cents to industry. This problem could be solved through the war-born philosophy of labor-management groups with the cooperation of the medical and dental professions."

Many industrial oral health programs are in operation and are providing excellent service for the workers yet "they are minute when compared to the vast field yet untouched. Approximately only 1 in 10 industrial plants offers any type of dental attention today.

"There is no altruistic approach to the problem of dental health in industry. By and large, management is chiefly interested, and will continue to be interested, only in terms of what the health of the worker means to the company in profit or loss statements.

"Occupational hazards, directly traceable to and responsible for oral diseases, are readily understood by management, and therefore are likely to result in active oral health programs.

"There have been unfortunate experiences involving unethical and poorly qualified dentists, resulting in expense to the company, loss of good will and respect. And in some rare instances, antiquated state laws governing industrial dental practice have acted to limit or retard the advancement of oral health for worker .

"Labor unions—ever watchful over the general well-being of their members, have demonstrated an eager willingness to cooperate with management, with professional organizations, national, State, and local groups. Usually they favor complete dental service for themselves and their families with a minimum outlay of expenditure.

"* * * There can be no fixed uniform program which can be wrapped in cellophane or Christmas paper and laid at the door of industry * * * . There are many factors entering into a decision of the most desirable program. Different conditions prevail in different industries.

"Occupational hazards must be taken into consideration. Wage levels, available community medical and dental resources, size of the industrial plant and the number of employees—all of these factors must be considered in developing an oral health program.

"Out of the welter of existing industrial dental services has come a definite trend. Some term it preventive dentistry. Briefly, it consists of examination—pre-placement or pre-employment, periodic examination—dental health education—referral—follow-up and emergency treatment when necessary."

Dr. Humphrey emphasized the use of an examination service utilizing roentgenological methods as patterned after the Chicago Dental Society mobile service for industries. This plan for examination and X-ray could be utilized by several of the smaller plants employing less than 100 persons or as many as 500 employees.

"No dental service plan can be successful without health education of employees. Employee publication or house organ furnishes an excellent avenue of approach in this respect. Information carried on these pages, including authoritative articles, is frequently taken into the homes of employees and read by other members of the family."

[1] A complete print of this address by Dr. Humphrey appears in volume 4, no. 2 of *What's New In Industrial Hygiene*, Department of Public Health, Division of Industrial Hygiene, 1800 W. Fillmore St., Chicago 12, Illinois.

COMMENTS ON 1947 MAC VALUES

By Lawrence T. Fairhall

Over a period of years the American Conference of Governmental Industrial Hygienists has been concerned with threshold limits and has at various times released tables of such values. According to the constitution these values are subject to ***annual revision***. Some adverse criticism has recently been made of the values set up by the American Conference of Governmental Industrial Hygienists. Also the fact that these values were published in the August 1947 *Industrial Hygiene Newsletter* has been interpreted as implying that the values are those of the Industrial Hygiene Division, U. S. Public Health Service, in spite of the following statement at the head of the list: "The following maximum allowable concentration values were a part of the report submitted by the Committee on Threshold Limits and accepted by the American Conference of Governmental Industrial Hygienists at the 1947 meeting. These values are revised annually."

Moreover, inference has been drawn that the changed values were not made on the basis of scientific evidence but presumably according to the whims of the committee. Concerning this, one of the committee members writes as follows: "Some 35 of the 1946 values were changed. Of these, three were increased and presumably these changes are satisfactory to our critics. Of the remaining 32, 7 were reduced from values of 10,000 p. p. m. and less down to 1,000 in accordance with the basic idea, which has been proposed several

(Continued on page 9)

INDUSTRIAL TOXICOLOGY

Lawrence T. Fairhall, USPHS

2,4-DICHLOROPHENOXYACETIC ACID

2,4-Dichlorophenoxyacetic acid, known as 2,4-D, has come into extensive use within the past 3 years as a plant hormone which kills common lawn weeds such as dandelion, morning glory, thistle, and burdock, without harming ordinary grass. It is reported to hasten the ripening of fruit and has been used in orchards to prevent the premature dropping of apples. This substance is prepared commercially by causing chloroacetic acid and 2,4-dichlorophenol to react to aqueous alkali or by the direct chlorination of phenoxyacetic acid.

Since 2,4-D is a plant hormone, it acts as a plant growth regulator rather than as a contact poison. In its action on leafy plants it appears to be absorbed primarily into the epidermal cells from which it is translocated to various parts of the plant. 2,4-D induces rapid hydrolysis of starch to sugar and increased respiration (*1*). The killing of plant tissues is usually a slow process and the killing time may require two weeks or even longer. Young, vigorous plants are quickly affected and the most efficient herbicidal effect occurs when plants are treated in a state of active vegetative growth.

Since 2,4-D is not very soluble in water or oil, water-soluble salts or oil-soluble esters prepared in the form of emulsions or as dry dust mixtures are used. Water-soluble salt dusts of 2,4-D have been used extensively in rice and sugar cane fields with uniform weed control. During 1945, the first year in which production figures are given for 2,4-D, 917,000 pounds were prepared in the United States.

Owing to the phenomenal effects of 2,4-dichlorophenoxyacetic acid on weed eradication and the consequent commercial development of this substance as a weed killer, knowledge of its toxicity is important. Workers are exposed to the dust of the sodium or ammonium salts and to the mist from tributyl phosphate-Diesel oil emulsions, in applying this weed eradicator. Further, an important factor in the use of this material is related to residual 2,4-D on plants intended for human or animal consumption. Hill and Carlisle (*2*) found that the LD50 dose of 2,4-D by mouth was 375 milligrams per kilogram for mice, 666 for rats, 800 for rabbits, and 1,000 for guinea pigs. Rats were fed up to one-tenth percent by weight of their diet over a period of 1 month without any harmful effects. Guinea pigs tolerated 1 gram of the material administered in divided doses of 100 milligrams over a period of 12 days. The experimental work indicated that the mist or clouds of the dry dust of the sodium salt was relatively nontoxic.

Mitchell and his associates (*3*) have shown that no harmful effects on the health or performance of farm animals resulted from the consumption of pasture grass liberally sprayed with 2,4-D. The 2,4-D was not found to be secreted into the milk nor was it found in the blood serum of a calf fed milk from the cow that received it in her ration. According to experiments conducted by the U. S. Department of Agriculture, one cow received a special dose of about one-fifth of an ounce of 2,4-D daily. Blood samples showed its presence in her circulation but it did not appear in her milk. Mitchell quotes the experimental work of Kraus concerning the ingestion of 500 milligrams of purified 2,4-D per day by a man over a period of 21 days without ill effect.

The possible presence of poisonous impurities in commercial preparations of 2,4-D should be noted. Methods for the determination of 2,4-dichlorophenoxyacetic acid consisting essentially of the titration of the acid group have been developed by Rooney (*4*).

References

(*1*) Southwick, L. Chemical weed killers. Chem. Ind., *60*, 786 (1947).

(*2*) Hill, E. V., and Carlisle, H. Toxicity of 2,4-dichlorophenoxyacetic acid for experimental animals. J. Ind. Hyg. & Toxicol. *29*, 85 (1947).

(*3*) Mitchell, J. W., Hodgson, R. E., and Gaetjens, C. F. Tolerance of farm animals to feed containing 2,4-dichlorophenoxyacetic acid. J. Animal Science, *5*, 226 (1946).

(*4*) Rooney, H. A. Determination of 2,4-dichlorophenoxyacetic acid and its compounds in commercial herbicides. Ind. Eng. Chem., Anal. Ed., *19*, 475 (1947).

MAC VALUES

(*Continued from page 8*)

times, that 1,000 p. p. m. is the most which should be allowed of any unnatural atmospheric contaminant.

"Five substances, benzene, ethylene chlorhydrin, nitroethane, nitromethane, and tetrachlorethane were changed in the light of recent data which certainly can be classed as experimental evidence. Two others, ethylene dichloride and methyl cellosolve, were revised in accordance with previously reported field evidence which had been ignored when the previous list was compiled. Three other substances, arsine, stibine, and dioxane, were reduced because a very superficial examination of the data available indicated that the values previously given were much too high. Three additional substances, styrene, MIK, and methyl butanone, were reduced to make them all more in line with other similar substances. Finally, two other substances, tri- and tetra-chlorethylene, were reduced on the basis of extensive experience by one of the divisions involved."

Furthermore, the observations of experienced members of the conference derived from various plant surveys have added to our knowledge of the effects of many of these substances on humans and should be considered as valuable supplementary information beyond that obtained by an animal experimentation.

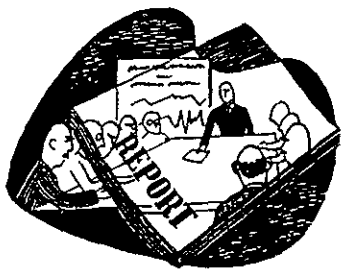
For the benefit of those who would ascribe a legal interpretation to such values, it may perhaps be advisable to use the older expression "threshold limit" rather than "maximum allowable concentration." Furthermore, it is the writer's opinion that the maximum allowable concentration values referred to should not form part of a code itself but should appear as supplementary information in an appendix and should be used only as originally intended, that is, as a guide and not as fixed values.

Massachusetts Holds Worker Health Conference

Through the cooperation of the Massachusetts Division of Occupational Hygiene and the Merrimack Valley Nurses Club, an outstanding program was arranged for the Merrimack Valley Conference for Health Workers in Industry, held on November 22, 1947, in Lowell. Much of the planning was done by Mrs. Sarah E. Almeida, R. N., State industrial nursing consultant.

Highlights of the conference were talks on "Interdepartmental Relationships" by Prof. Herman H. Brase, Lowell Teachers College; "Combating Absenteeism" by Dr. Robert B. O'Connor, Liberty Mutual; "Expanding the Medical Department" by Dr. Benjamin Lambert, Sylvania Electric Products, Lowell; and "Emotional Illnesses" by Dr. Warren Stearns, psychiatrist and professor of sociology at Tufts College. Particularly stimulating were the discussions in groups led by authorities on each subject.

Leading industrial health workers and educators in the region attended this meeting, including nurses covering plants having a total-worker population of 32,000.



Industrial Health Conference to Meet in England, 1948

The Ninth International Congress of Industrial Health is scheduled to convene in England, September, 1948. Meetings are planned for both general and special sections to be held from September 12 to 17. All communications should be addressed to: The Secretary, The Ninth International Congress on Industrial Medicine, 14 Hobart Place, Westminster, London, S. W. 1, England.

COSTS OF INDUSTRY'S HEALTH FACILITIES

Dr. C. O. Sappington summarized the findings of a 2-year plant-to-plant survey in a speech titled *Administration Functions and Costs of Industry's Health Facilities* given at the Industrial Hygiene Foundation meeting in Pittsburgh, Pa., Nov. 20, 1947. He said, in part:

"The findings from this 2-year field study, covering 278 plants in 33 States, help piece together the story of what industry is doing about the health of its employees and how this is being done.

"*Administration.*—Taking the person in charge of the health or medical service as an example of administrative policy, we find physicians in charge in half of the groups, nurses in 6 percent, and other persons in 43 percent. However, in the largest plant grouping (10,000 employees and over) physicians were in charge in 90 percent of the cases.

"Taking another example of the administrative relationships, in more than one-third of all establishments, reporting was done direct to top management by the health department; the three divisions of safety, industrial relations, and health were administratively on a par in approximately 40 percent of all plants; and the health department had the final word on health problems in approximately 43 percent of all plants.

"*Functions.*—Comparing those functions which have been well established over some period of time with those which are newer, there was great variation in both types according to population groupings in the different sized plants; but those functions not so well established (that is, newer) showed greater variations in the size breakdowns. Preplacement examinations showed the highest percentage in all groups (72 percent); return-to-work examination after illness or injury (65 percent); provision for dispensaries (61 percent) and periodic examinations (60 percent). The largest plants of 10,000 employees and over showed high pluralities (above 90 percent) in all of these functions, while the smallest plants (under 500 employees) showed less marked but nevertheless definite pluralities in the doing of preplacement, periodic, and return-to-work examinations. Less than half of the smaller plants provided dispensaries.

"*Justification.*—Benefits may be divided or classified as economic, professional, and social.

Economic Benefits

"Prompt treatment—prevention of infection and other complications.

"Early control of disability.

"In-plant service more economical.

"Decrease in spoilage.

"Better control of medical, hospital, and insurance expense.

"Good care more economical than high compensation rates.

"Healthy worker more productive.

"The manager of a chemical plant figures that a sick absence costs the company at the rate of a dollar an hour. On this basis, obviously any reduction in sick absence is bound to add up to a sizeable sum over a large group of workmen for the period of a year. Good working conditions reduce labor turnover. A conservative figure is that each turnover case costs a company $100. On the basis of the dollar-an-hour figure for absences, and $100 per case for turnovers, the company found that it saved $4.08 for every dollar it had spent for industrial health."

Los Angeles Holds Industrial Health Conference

Los Angeles' first industrial health institute was an all-day meeting held at the Riviera Country Club last November 18. The institute was sponsored jointly by the Industrial Health Advisory Committee of the Los Angeles Chamber of Commerce and the Section of Industrial Medicine and Surgery of the Los Angeles Medical Association.

Some of the speakers and their subjects were: Carl Peterson, M. D., Secretary, Council on Industrial Health, American Medical Association, "History and Economic Aspect of Industrial Health"; F. E. Poole, M. D., medical director, Lockheed, Rexall, and others "Organization of Plant Health Services"; A. A. McDermott, supervisor of plant hospital, Warner Bros. Studio, "Industrial Nursing"; Henry L. Clark, General Motors Corp., "Management Views Industrial Health Programs"; and, E. F. Stegen, M. D., National Physicians Committee, "Industrial Health and the Community."

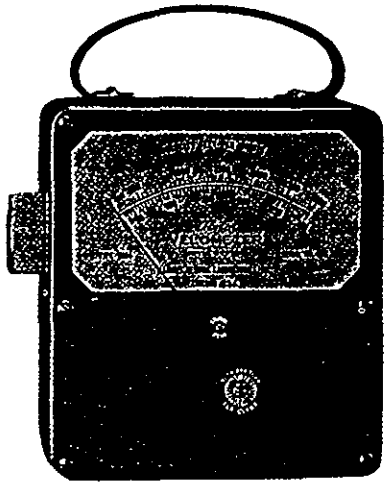
AIR FLOW MEASURING INSTRUMENTS

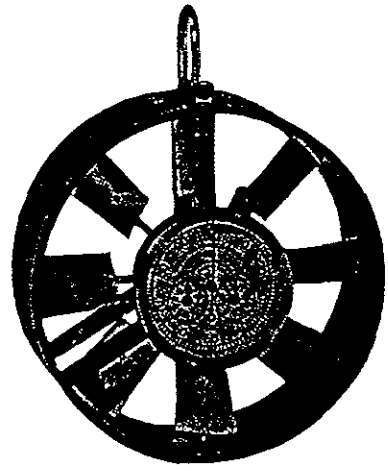
Engineering Section, Industrial Hygiene Division, USPHS

Many times it is of considerable interest to industrial hygienists to measure air movements for purposes of evaluating the adequacy of control measures or comfort conditions in a workroom. Several different types of instruments are available for making such measurements and are in common use by engineers. The choice of metering device depends on features pertinent to the instrument as well as on the character of the airflow. Principles of operation and limitations of these devices will be discussed briefly, direct reading instruments in this issue, and indirect reading instruments in a subsequent issue of the NEWSLETTER.

Velometer

A velometer operates on the principle of radial displacement of a pivoted vane by the air stream. The vane is counterbalanced for steadiness and operates against a torsion spring. A pointer attached to the vane indicates the amount of displacement on a calibrated scale. The mechanism is enclosed in a plastic case with an inlet and outlet opening for the air stream. Numerous attachments are available for measuring different ranges of air velocities at inlet and exhaust openings of various shapes and sizes. The vane is very sensitive to fluctuations in the air stream and therefore the indications of the pointer must be averaged to obtain the average air velocity. For accurate measurements, correction factors must be applied to the readings. Serious errors of unknown magnitude are introduced when the velometer, without attachments, is used to measure air flow through very small openings.





Vane Anemometer

The vane anemometer consists of a small multivaned propeller mounted inside a thin metal ring. Linear feet of air movement through the instrument are indicated on a calibrated dial counter to which the propeller is connected by a gear mechanism. A lever is provided for engaging or disengaging the gear mechanism from the dial counter. A time interval device such as a stopwatch must be used with the usual anemometer for obtaining air velocity. Special anemometers are available which indicate air velocity directly. The anemometers are designed for a limited air velocity range, but are available in various ranges. Like the velometer, correction factors must be applied to measurements made at various types of air discharge and exhaust openings. Also, errors of unknown magnitude are introduced when the instrument is used in the plane of very small openings.

Smoke Tube

This device consists of a tube filled with a specially prepared chemical which reacts with the moisture of the air aspirated through it to produce a smoke. By observing the time of travel of the smoke over a measured distance, the velocity of air is determined. At best, such measurements are only estimates. Smoke tubes are especially useful for determining the direction of air movement or distribution of air currents.

Report on Prepayment Hospital and Medical Care Plans Available

The U. S. Public Health Service has published the report of a Nation-wide, 3-year study of Blue Cross hospital service prepayment plans and affiliated medical service prepayment plans. The report, *Blue Cross and Medical Service Plans*, by Dr. Louis S. Reed, health economist, Division of Public Health Methods, gives a detailed account of the development and growth of both types of plans, the areas served, enrollment, subscription rates and benefits, remuneration of hospitals and physicians, enrollment procedures, the legal status of the plans, the composition and selection of the boards of directors, finances, administrative organization, cancellation rates, subscriber utilization of hospital and medical services, and interplan coordination. An appendix describing commercial hospital, surgical, and medical expense insurance is included. Copies of the report may be obtained free from Public Inquiries Section, U. S. Public Health Service, Washington 25, D. C.

NOTICE TO STATE EDITORS

When you have news of a timely nature, such as a conference, which you wish to announce in the INDUSTRIAL HYGIENE NEWSLETTER, please keep in mind the deadline dates for each issue. For instance, the copy for the April issue goes to press February 18. Your copy should reach the editor's desk by February 12 to give time for typing, proofreading, and clearance by the editorial board.

MASSACHUSETTS

Conference—Dr. Hervey B. Elkins, as chairman of the New England Section, American Industrial Hygiene Association, was active in arranging the program for the annual meeting of this group which was held on November 29, 1947, in Boston.

Talks were given on a wide variety of subjects of interest to workers in the field of industrial hygiene. Those on the staff of the Massachusetts Division of Occupational Hygiene who were speakers included Director John B. Skinner on "The Hazards of Ozonizer Use in Garages," and Dr. Harriet L. Hardy and Dr. Hervey B. Elkins on "Medical Aspects of Maximum Allowable Concentrations: Benzene." In addition, Dr. Elkins also led a round table discussion on "Urinary Excretion of Toxic Substances," and acted as chairman of the afternoon session.

Personnel—Gertrude J. Hornung, R. N., has been appointed to join Mrs. Sarah E. Almeida, R. N., in the nursing consultant activities of the Massachusetts Division of Occupational Hygiene. Miss Hornung has an academic background in physiotherapy and public health nursing, and was on the staff of the Massachusetts Department of Public Health. During the war she served with the U. S. Army Nurse Corps.

Foundry Survey—The engineers of the Massachusetts Division of Occupational Hygiene, in cooperation with the U. S. Public Health Service, are now making a complete survey of some 100 iron and steel foundries in Massachusetts. The present status of dust and fume conditions, as well as available medical and sanitary facilities, is determined in each plant in order to evaluate existing health hazards and their control.

NEW JERSEY

Publication—*Phosphorus* is the title of the most recent industrial health bulletin issued by the New Jersey Division of Adult and Industrial Health. The incidence, toxicology, control, and medicolegal aspects are discussed briefly.

PENNSYLVANIA

Speech—In a talk before a meeting of the Engineers Society of Pennsylvania, held in Harrisburg on November 5, Dr. Joseph Shilen, director of the Pennsylvania Bureau of Industrial Hygiene, stressed the importance of health in today's industrial establishments. His subject was "Improved Health Means Increased Production." Pointing out that the plant manager who utilizes modern industrial hygiene methods benefits not only his employees but his balance sheet as well, Dr. Shilen touched on many instances drawn from his own experience in the field of industrial health to emphasize his points to the audience.

TENNESSEE

Conference—The Tennessee Industrial Hygiene Conference held its second meeting in the auditorium of the Doctors Building in Nashville on December 5, 1947. There were 85 persons registered, among whom were representatives of some of the larger industries in the State.

An excellent program had been arranged. Mr. Guy Isenberg, safety engineer of the Tennessee Eastman Corp., Kingsport, spoke on "The Eye Protection Program of the Tennessee Eastman Corporation." Mr. Charles L. Cornelius, Jr., discussed "Tennessee's Occupational Disease Law," which was passed by the 1947 General Assembly. Dr. R. A. Kehoe of the Kettering Laboratory of Applied Physiology, University of Cincinnati College of Medicine, spoke on "Metal Fume Fever." The program was well received and there were many requests for copies of the paper presented by Mr. Cornelius and for transcripts of the discussion by Dr. Kehoe.

During the business meeting the Conference voted unanimously to make application to the American Industrial Hygiene Association for the incorporation of the Conference as the Tennessee Section of the Association.

Institute—The Industrial Hygiene Service participated in the program of the Institute for Factory Inspectors held at the University of Tennessee, Knoxville, November 3–8, 1947. The institute was sponsored jointly by the Tennessee Department of Labor, the Division of University Extension, and the Department of Sociology of the University. The subject, "Medical Aspects of Safety," was discussed by Dr. H. H. Hudson and Mr. M. F. Trice, director and chief engineer, respectively, of the Industrial Hygiene Service. Their discussion was based largely on the State's recently enacted occupational disease compensation law, which is administered by a division of the State Department of Labor.

The relation of industrial hygiene activities to the work of the labor department was developed to disclose that the function of each agency complemented the work of the other. All State factory inspectors were present and evinced much interest in the discussions. An amicable liaison has existed between the two departments, but an even closer cooperation is anticipated henceforth as all present were in accord with the idea that each could be the eyes and ears of the other to the end that a more effective program of worker health conservation may be realized. Many of the instruments commonly employed in workroom studies were exhibited.

Nurses—Due to the increased number of nurses employed by industry in Tennessee, another industrial nursing consultant, Mrs. Elsie Bryant, was added to the industrial hygiene staff. Mrs. Bryant has several years' experience in industrial and public health nursing. Recently she received postgraduate training at Peabody College.

WEST VIRGINIA

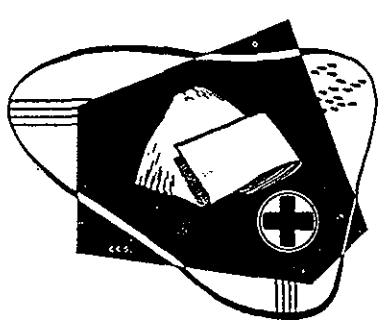
Publication—Recently released by the West Virginia Department of Health, Bureau of Industrial Hygiene and Division of Sanitary Engineering, is a 12-page publication entitled *Industrial Sanitary Facilities*. The recommenda-

tions made by the department are classified into two groups, as follows: minimum, or those which are obviously necessary for the preservation of life and health of employees; and supplementary suggestions in regard to design of equipment to conform to good public health practice; and personal conveniences which contribute primarily to the comfort of employees or pleasant employer-employee relationship.

WISCONSIN

Clinics—The Wisconsin Council of Safety will conduct two clinics. One will be held at Manitowoc, Wis., on February 27, 1948, and the other at Eau Claire, Wis., on March 26 and 27, 1948. These clinics will be arranged by the Industrial Health and Safety Section of the council in cooperation with the Industrial Hygiene unit. Both clinics will feature outstanding speakers in the field of industrial health and safety.

Plans have been developed for a series of industrial medical clinics. The plant visitation type of clinic held in the past has been so successful that it was decided to continue with the same kind of clinic. The only exception is to hold such clinics within various county medical societies. This will reduce the attendance but stimulate greater discussion, particularly of the specific hazards and controls of the industries visited as part of the clinic.



Nurses—The Industrial Nurses' section of the Wisconsin State Nurses' Association will hold a 1½-day nursing institute at the Hotel Pfister in Milwaukee on March 12 and 13, 1948. A group of nationally prominent authorities on industrial nursing will participate in the program. The industrial Hygiene Unit of the State Board of Health is assisting in arranging this institute.

The Committee on Industrial Health of the Wisconsin State Medical Society, in conjunction with the Industrial Hygiene unit, is revising and greatly expanding the recommendation for standing orders for the industrial nurse. A subcommittee of physicians representing the various specialties of medicine and surgery are cooperating in developing those sections of the standing orders which apply to their specialty.

HAVE YOU MADE YOUR BOSTON RESERVATIONS?

If you have not made your hotel reservations for the week of the industrial health conference to be held in Boston from March 28 to April 4, it is time you made them. Information about hotels was distributed over a month ago to members of the American Conference of Governmental Industrial Hygienists, but a reminder may be in order.

Members of the American Association of Industrial Nurses are also reminded by their publicity chairman, Kiletta K. Kaspar, R. N., that their sixth annual conference is scheduled to start in Boston, Hotel Statler, on March 31 and to close April 4.

Other groups meeting at the same time are the American Association of Industrial Physicians and Surgeons, American Industrial Hygiene Association, and the American Association of Industrial Dentists.

RECOMMENDED READING

Anon.: Factories Save Money by Spending on Safety and Health Programs. *Wall Street Journal* (November 21) 1947.

Brandt, A. D.: Industrial Health Engineering. John Wiley & Sons, New York, 1947. $6.00.

Coleman, B. S.: Union Contract and Industrial Hygiene. *Amer. Jour. Pub. Health*, 37: 1449–1454 (November) 1947.

Goldwater, Leonard: The Future of Industrial Medicine. *Amer. Jour. Pub. Health*, 37: 1247–1255 (October) 1947.

McMullen, T. A.: Safety and Health and the Industrial Engineer. *Mill & Factory*, 41: 154–156 (October) 1947.

Morris, J. N.: Coalminers. *Lancet*, 2: 341–346 (September 6) 1947.

Roemer, M. I.: Disability Insurance Programs and Public Health. *Pub. Health Rep.*, 62: 1657–1667 (November 21) 1947.

Simonson, Ernst: Physical Fitness and Work Capacity of Older Men. *Geriatrics*, 2: 110–119 (March-April) 1947. 28 refs.

Stern, B. J.: Medicine in Industry. Commonwealth Fund, New York, 1946. $1.50.

Various authors: Labor Relations and the Public. *Annals of American Academy of Political and Social Science*, 248: 1–316 (November) 1946.

Various authors: Symposium on Diseases of the Respiratory Tract. *Medical Clinics of North America* (November) 1947.

DENTAL EROSION IN WORKERS EXPOSED TO INORGANIC ACID FUMES

J. B. Lynch and John Bell—*Brit. J. Industr. Med.*, 4: 84, 1947

Lynch and Bell report on oral examinations of 118 female workers exposed to inorganic acid while employed in an ordnance factory. These workers were exposed during processing of nitrocellulose and guncotton. Acid solutions used contained 70 percent H_2SO, 22 percent HNO_3, and 8 percent H_2O. Length of time spent at acid-dipping baths varied. For instance, cotton-waste dipping required 20 minutes, whereas paper-roll (scrolls) dipping required only 2 to 3 minutes. Nitrous fumes are given off from the baths during these operations.

Wearing of a light-weight face shield of visor pattern is recommended as is a close fitting respirator. Periodic dental examinations should be carried out and workers showing initial erosion excluded. Mouth breathers should be excluded from this work. Better exhaust ventilation of the tanks should be installed to eliminate escape of fume.

Five illustrations accompany this article, four showing the progress of enamel erosion and one showing the working environment.

EXHIBITS

Arkansas Health Bulletin, Oct. 1947

With the end of the war and the return of fairs, livestock shows, conventions, and other such occasions where people gather, the exhibitor is again having his chance to teach and to arouse interest by the visual method.

The exhibit is an especially effective method for teaching the facts of health and health work—if it is a good exhibit.

The great amount of hard labor involved should not deter a zealous public-health worker from accepting the responsibility of setting up and conducting an exhibit, but the person accepting the assignment of exhibit space should certainly be aware of the fact that he is letting himself in for a lot of sweat, if not even blood and tears. Many learn this the hard way and often end up by filling up the space at the last possible moment with a feeble clutter of etceteras.

The exhibitor should first acquaint himself with the limitations of the particular situation and then plan to do the very best educational job possible within these limitations. Here are some questions he should learn the answers to:

What kind, or kinds, of people will make up my audience—urban, rural, or both? young, old, or all ages? predominantly men, or women? race? economic status? educational level?

The exhibitor himself may have some limitations? Does he have ideas? It may cost money. How much time can he spare?

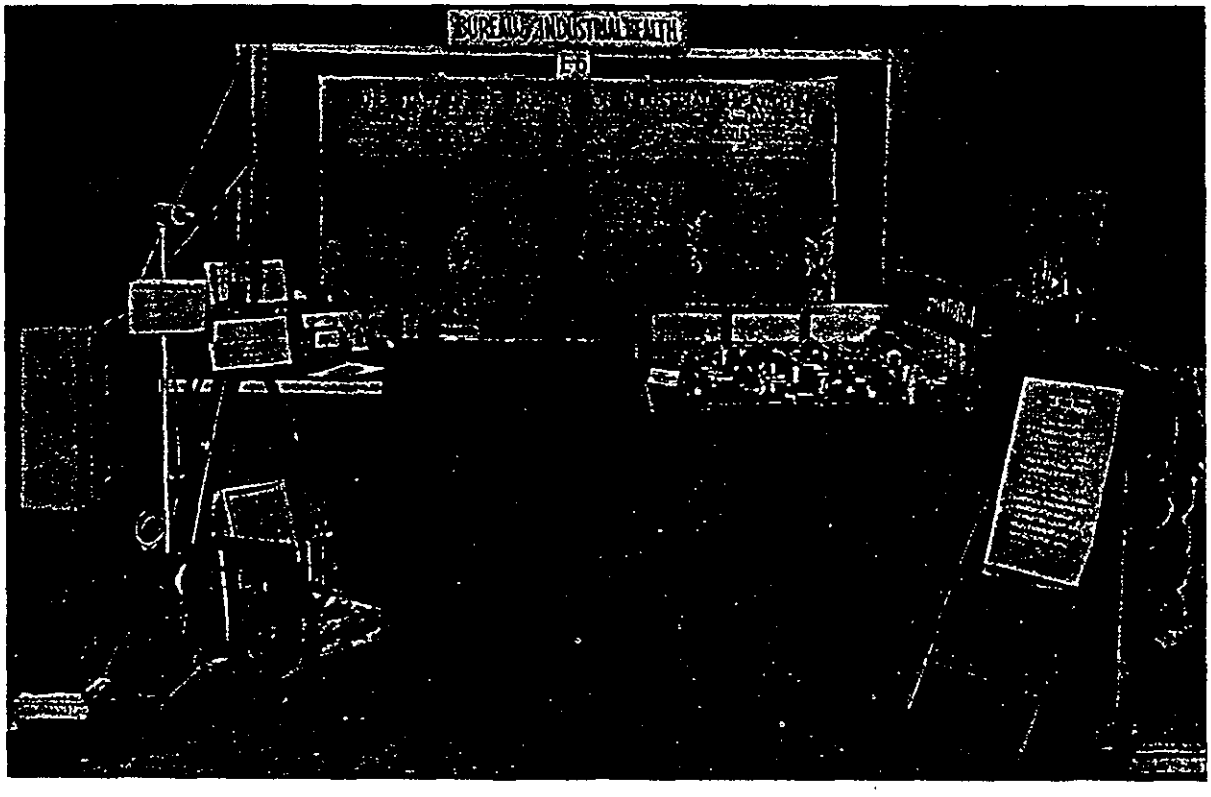
And now comes the actual educational planning. An exhibit, like any other educational activity, should be learner-centered. What do the kind of people who will see the exhibit most need to know? What are the most serious health problems in this community? The answers to these questions should determine the central idea, and the exhibit should be an elaboration of this central idea.

How can this idea best be taught? Two things must be kept in mind. Use language and devices that your given audience can understand, and make fullest use possible of the universal laws of learning. Arouse curiosity. Arrest attention. Speak to your learner through as many of his physical senses as possible. Appeal to his self-interest as well as his sense of duty, his feelings as well as his intellect. Plan to get him to act on the information you give him.

Dr. H. E. Kleinschmidt of the American Red Cross names these four requirements as minimum for the planning of a good exhibit.

A complete manuscript stating the

(Continued on page 16)



This exhibit, furnished by the Bureau of Industrial Health, Michigan Department of Health, for the Grand Rapids Municipal Open House, attracted 22,000 people. It included photographs, an equipment display, and a three-dimensional scale model factory layout showing proper illumination and "three-dimensional" painting which was volunteered by an employee of Grand Rapids industry.

OCCUPATIONAL DISEASE REPORTING

IN TENNESSEE

In the absence of legislation requiring the reporting of occupational diseases, the Industrial Hygiene Service of the Tennessee Department of Public Health has adopted the best available substitute.

Claims for Compensation

An arrangement has been made with the Division of Workmen's Compensation of the Tennessee Department of Labor whereby this agency provides the Industrial Hygiene Service with copies of all claims that it receives for compensation involving an occupational disease. The Tennessee occupational disease law became effective March 14, 1947. This arrangement has been in effect since October 1, 1947, and during this month there were received 118 reports, most of which were for occupational dermatitis. Although these reports of claims will not provide complete coverage it is anticipated that they will provide much valuable information on occupational disease incidence in the State.

Death Certificates

The death certificates received by the Division of Vital Statistics of the Tennessee Department of Public Health were recognized as an additional potential source of information relative to deaths from occupational disease. The *Manual of the International List of Causes of Death* was studied and information requested regarding certificates with deaths coded to the following title numbers:

I, 7. Anthrax (infection by *Bacillus anthracis*).
II, 51. Cancer of the male genital organs:
  a. Scrotum.
V, 78. Lead poisoning:
  a. Specified as occupational.
  b. Not specified as occupational.
79. Chronic poisoning by other mineral or organic substances:
  a. Specified as occupational.
  b. Not specified as occupational.
VIII, 114. Other diseases of the respiratory system (except tuberculosis):
  a. Silicosis.
  b. Other and unspecified forms of pneumoconioses.
XVII, 178. Accidental absorption of poisonous gas:
  a. Illuminating gas.
  b. Motor-vehicle exhaust gas.
  c. Other carbon monoxide gas.
  x. Other poisonous gases.
179. Acute accidental poisoning by solids or liquids:
  A. Arsenic and compounds.
  C. Cresol compounds.
  D. Mercury and compounds.
  F. Carbolic acid and phenol.
  G. Lye and potash.
  H. Tobacco and derivatives.
  M. Narcotics.
  O. Methanol and other alcohols.
  X. Other and unspecified substances.
191. Excessive heat.

Upon receipt of information relative to any of the above causes of death, an investigation will be made and appropriate measures taken to prevent further fatalities.

IN INDIANA

Under the Indiana laws occupational diseases are reportable to the State Industrial Board and to that agency solely. Occupational diseases have not been made reportable to the State Board of Health, either by adoption of rules and regulations, to that effect by the Board of Health, or by legislative enactment.

Thus, reporting to the Board of Health is entirely voluntary. Through an agreement with the State Industrial Board, copies are supplied us of all occupational diseases reported to them. This, at the outset, would indicate that through this technique one should have available data on all occupational diseases occurring within the State. This is not quite true, for frequently occupational diseases are not reported to the board unless it appears that compensation may result. However, I am certain results are as good as one could expect from reporting to any agency.

In addition to the reports received by the industrial board, physicians and nurses frequently report cases to us as information or reasons for further epidemiological studies. All these reports are tabulated and follow-up studies are undertaken whenever the data appear to be statistically significant.

Two attempts were made to have our legislature pass legislation requiring the reporting of all occupational disease to the State board of health. The first attempt was in 1937 and the last in 1947. Both attempts failed.

Through the techniques described we believe that the voluntary reporting of occupational disease is adequate for the purpose of follow-up studies, and it has one advantage; namely that there is no compulsion.—**L. W. Spolyar, M. D.**

IN CALIFORNIA

California's reporting of occupational diseases is relatively complete. This is undoubtedly due, at least partially, to the complete coverage law, and the fact that the same forms are used for reporting accidental injuries and occupational diseases. The liability of the employer for treatment regardless of the severity of the disability is another factor which makes the employer desire reporting even for conditions that might seem at first insignificant.

Physicians, in order to be compensated by the insurance carrier, are required to furnish reports on all cases treated. That is probably the strongest incentive for reporting. Another aspect influencing the total statistics is the fact that the reports include the non lost-time cases, which is not usual in accident or disease reporting. Of course, no records are available of non lost-time cases which occur in industries having in-plant medical services where the physician is on salary.

California has no special occupational disease law such as many other States have. Under the workmen's compen-

sation law, injuries are reportable to the Industrial Accident Commission and are adjudged for compensation under it. The term *injury* as used in this law, includes any injury or disease arising out of employment, including injuries to artificial members.

Legally, occupational diseases as such are not recognized, but under the definition of injury all occupational diseases are covered. The law is therefore a complete coverage, or blanket, occupational disease, as well as injury, law.

Since this law has such broad coverage, many illnesses are reported which do not appear in the reports of many other States. For example, many infectious diseases have been ruled compensable when they have been contracted by medical and nursing personnel from contact with patients. Upper respiratory infections contracted as a result of exposure to inclement weather, and tenosynovitis are other examples.

The term "compensation" defines both treatment and indemnity payment, and is furnished as follows: "All medical, surgical and hospital treatment including medicines, medical and surgical supplies, crutches and apparatus, including artificial members that may be reasonably required to cure and relieve from the effects of the injury." Treatment must be given for any injury or illness arising out of the employment although no indemnity is paid for the first 7 days of the disability.

In as much as the employer is liable for the immediate treatment and the law is well enforced, practically all injuries or illnesses are reported. When the employee first appears for treatment, an initial report is sent to the Industrial Accident Commission by the attending physician or surgeon.

The Bureau of Adult Health of the State Department of Public Health, through an agreement with the Department of Industrial Relations receives from the latter's Division of Labor Statistics and Research a copy of all injury reports which are considered to be occupational diseases. These first reports are studied and followed up by the Bureau of Adult Health and each month summaries are prepared of all the cases reported. For several years 1,000 to 1,200 of these initial reports of occupational diseases have been received and studied each month.

SILICOSIS—

(Continued from page 5)

centage of free silica indicates that the amount of free silica of respirable size in the atmosphere is not sufficient to produce the variations noted in the time indicated. However, there *is* enough iron oxide in the air to cause them.

In an effort to determine whether this dust can produce silicosis we have been conducting experimental work at the Saranac Laboratory for the past year and a half. Animals exposed to typical concentrations of particles collected in the foundry cleaning room have shown no evidence of the disease thus far. Moreover, there has been no tendency to activate tuberculosis in those animals experimentally infected. The reaction resembles that produced by other inert dusts. The study will be continued for at least another year when a complete report will be made. It is hoped that the results of this work will aid materially in the proper evaluation of occupational disease and discourage the diagnosis of silicosis based on improper and inadequate claims. Until sincere consideration is given to the hygienists' findings, erroneous decisions are going to be made.

Heretofore, the accumulation in the lungs of dust particles below one-half micron in size has been considered of little consequence. Recent studies by Hatch and Kindsvatter, however, have shown very clearly that exposure to low mass concentrations of quartz particles, smaller than one-half micron, results in significant alveolar retention in test animals and produces demonstrable lung change in a relatively short time. It is pointed out further that because of the known pathogenicity of quartz with decreasing size, particles below one-half micron may be of greater importance in the etiology of silicosis than is commonly thought. In this connection, the use of the electron microscope may well result in revision of much of our present thinking on the part played by submicroscopic particles in the production of occupational disease.

The injection of recent observations into the study of silicosis should provide the stimulus for more intensive research since the problem is far from solved.

While it is true that there is still much to learn about silicosis it should not be assumed that definite standards for diagnosis and control of the disease do not exist. Present day methods which take into account such essentials as a complete occupational history, accurate evaluations of exposure to respirable sized particles of harmful dusts, adequate physical examinations and intelligent interpretation of satisfactory chest roentgenograms, have been very effective in establishing the existence of this occupational condition. Periodic employee health examinations, including chest X-rays, provide an efficient adjunct to engineering and hygienic control of the hazard, while the sensible application of sound ventilating principles will result in safe atmospheres and better places to work.

Reference

Hatch, F. T., and Kindsvatter, V. H.: Lung Retention of Quartz Dust Smaller than One-Half Micron. J. Indust. Hyg. & Toxicol., *29:* 342–346, September 1947.

EXHIBITS

(Continued from page 14)

purpose of the exhibit, the basic idea, the facts to be presented, the technique to be used, and a budget of the probable expense.

A preparatory sketch showing floor and wall space, partitions, panels, electrical installations, color, and captions.

All-inclusive copy of captions, explanatory matter, charts, slogans, diagrams, and other written, drawn, or printed matter.

A budget showing probable preparation, construction, and operation expenses.

While such a procedure may seem rather formal for some of the simple exhibits set up locally, the beginning exhibitor might be surprised at the good effect achieved by the discipline of a little paper work.

A simple and usable bulletin for the amateur exhibitor is *Exhibits, How to Plan and Make Them* issued by the National Publicity Council, 130 East 22nd Street, New York, N. Y. (60 cents).

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