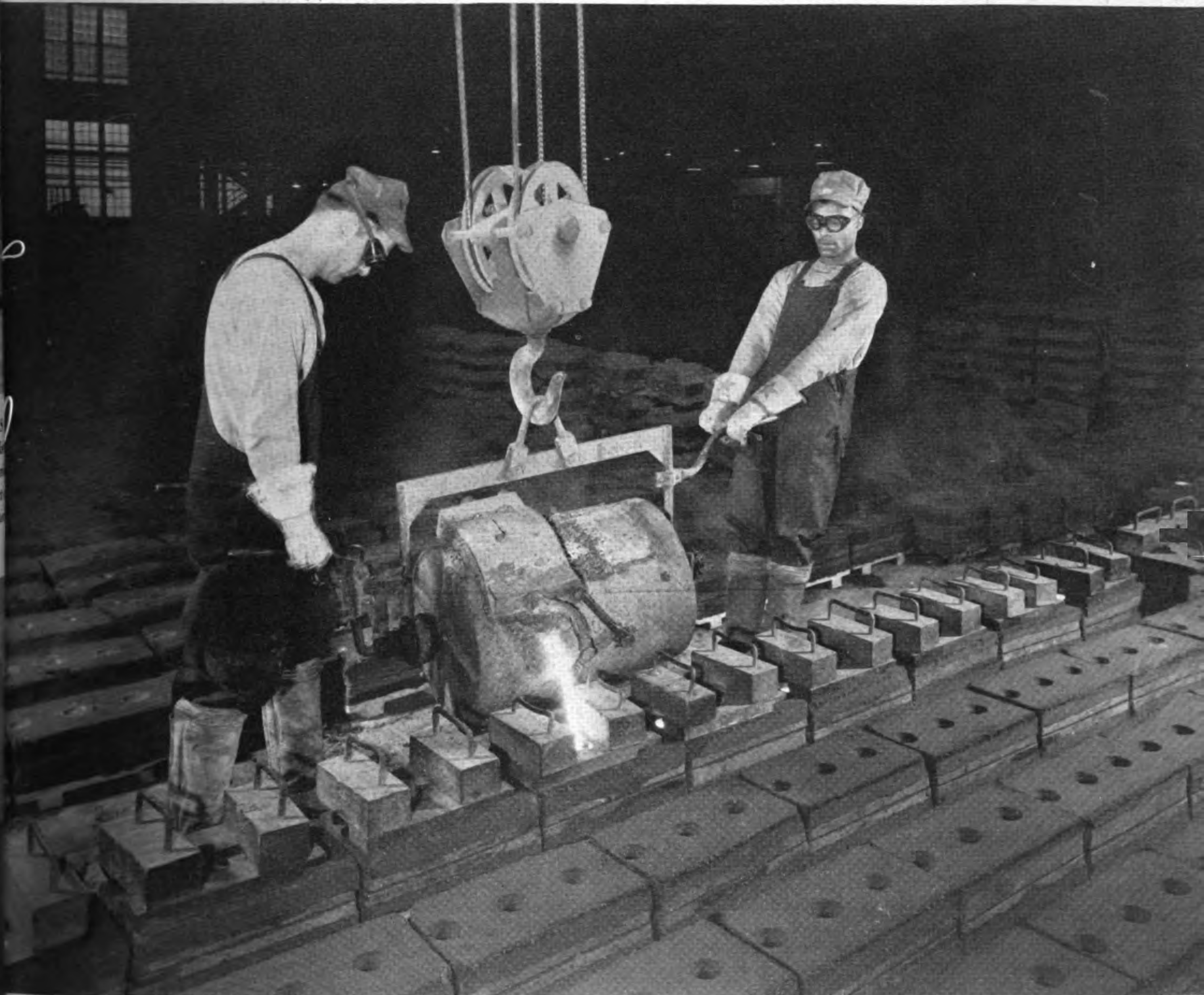
Industrial Hygiene

Vol. 9. No. 2 February 1949



NEWSLETTER

INDUSTRIAL HYGIENE NEWSLETTER

Volume 9 | February 1949 | Number 2

Issued monthly by
FEDERAL SECURITY AGENCY
Public Health Service
Industrial Hygiene Division

FEATURES

This publication is free to persons engaged in industrial hygiene in governmental agencies (Federal, State, or Local). For sale by Superintendent of Documents, Government Printing Office, Washington 25, D. C. Rates—$1 a year (Domestic); $1.25 (Foreign).

Statements made in this publication by authors who are not members of the Industrial Hygiene Division do not necessarily represent the viewpoint of the USPHS.

Any information printed in this publication may be reprinted without request from the USPHS. Acknowledgment would be appreciated.

Approved March 29, 1946, by Director, Bureau of the Budget, as required by Rule 42 of the Joint Committee on Printing

USPHS STUDIES ALL FACTORS IN DONORA, PA., SMOG DISASTER

Teams of physicians, nurses, engineers, and analysts from the Division of Industrial Hygiene, USPHS, are working in Donora, Pa., in a comprehensive study to determine the causes of the smog which took 19 lives last November.

A three-pronged, preliminary investigation of all factors potentially related to the tragedy was made in December. The study was initiated at the request of and in cooperation with the Pennsylvania State Department of Health, the Borough Council of Donora, and the United Steelworkers of America, CIO. The information obtained in the preliminary investigation was the basis for planning the detailed study which started in January. Data on topography and meteorological conditions, industrial and domestic activities, and types and quantities of fuels used for transportation and domestic purposes are fundamental facts which must be known prior to making a study of this magnitude. A survey of Donora industries to obtain information on materials and processes used and the size of operations was also a part of the preliminary investigation.

Engineering studies are twofold: those to determine the sources and amounts of contaminants and those to determine the dissemination of contaminants. Medical studies include analyses of cases of illness as well as cases of fatalities. A house-to-house canvass of approximately 1,200 families is being made to ascertain health histories. Interviews with members of the Red Cross, Fire Department, and other groups who were actively concerned with stricken citizens are also a part of the investigation. The relation of housing conditions to the incidence of morbidity, mortality records of the community, plant records of morbidity, and other factors which may contribute to the total picture are also being examined.

It is hoped that the investigation will not only reveal the elements in the smog which caused the deaths, but will also furnish information that will be helpful in preventing future occurrences and at the same time contribute worthwhile data to the general field of atmospheric pollution. Because of the complexity of the problems under study, the field work alone may take several months to complete.

Seventeen Ferrous Foundries Studied and 1,937 Workers Examined

A study to determine the relation of the health of the ferrous foundry worker to his environment has been underway for the last 10 months. The USPHS and the Division of Industrial Hygiene, Illinois State Department of Public Health, have cooperated in a most comprehensive study of this industry.

The study has been under consideration since 1946 when three States requested the USPHS to make an investigation of their foundries. Information on the potential health hazards in this industry is incomplete because no extensive coordinated engineering and medical study of foundries had been conducted up to this time.

After the State of Illinois completed a preliminary survey of 85 iron and steel foundries, 25 were selected as representative of the industry in Illinois. Of these, 17 were studied environmentally, and in 15 the physicians examined 1,937 workers.

The study was made possible by the cooperation and assistance of the National Founders Association, American Foundrymen's Association, Chicago Foundrymen's Association, the International Molders and Foundry Workers Union, United Electrical Workers (CIO), United Automobile Workers (CIO), and the United Steel Workers (CIO).

On April 19, the detailed engineering and medical work was started. The first USPHS team consisted of two physicians, two engineers, three technicians and a dentist. Illinois assigned two physicians and two engineers to assist. A USPHS statistician was also present to supervise the compilation of data. Before the study was completed several teams alternated in the field work.

ENGINEERING STUDY

Approximately 1,000 dust samples were taken in the foundries by the impinger method (USPHS light field technique). Gross samples of all parent materials—that is, heap sand, facing sand, and core sand—were taken for analysis. The engineers also collected rafter samples and gross samples of airborne dust. To determine the presence of iron fume or dust, samples of airborne dust were taken by the electrostatic precipitator. Tests for carbon monoxide were made during melting operations and the pouring of molten metal. Carbon monoxide tests were also made around motor-driven trucks and the salamanders used for heating foundries in cold weather. Tests for aldehydes were made during pouring operations and during operation of core-baking ovens.

Tests were also conducted for illumination levels, levels of noisiness and noise frequencies. An evaluation of sanitary facilities was made as well as the effectiveness of dust-suppression measures already in use. Personal protective devices, ventilation, methods of operation and any other factors that might contribute to the entire picture of the working environment were noted.

The laboratory of the Illinois Division of Industrial Hygiene was made available to the Public Health Service engineers for the daily counting and recording of dust samples. In Rockford, Ill., the city health department cooperated by making its laboratory facilities available. All chemical analyses of dust were done in Washington, D. C. To get a representative sample, the engineers worked on certain night shifts as well as day shifts and during all seasons of the year. Samples taken for any specific occupation were made during various hours of the day and on different days. The time spent in any one plant varied from 1 to 3 weeks, depending on the size of the plant.

MEDICAL STUDY

The physical examinations of the workers were conducted in mobile examining rooms. The examinations included detailed occupational histories and past medical histories, especially information pertaining to chest conditions, skin diseases, and other illnesses that might be related to occupation. Present medical symptomatology was also noted, such as headaches, colds, impaired hearing and vision, nervousness, numbness, and irritability.

The examination of the chest, skin, heart, blood, and eyes was of primary importance. Blood tests were made for the count of white and red corpuscles, hemoglobin, sedimentation rate and syphilis. A chest X-ray and urine analysis were made on each worker.

All medical records are kept confidential by the USPHS. During the course of the survey, the physicians notified the worker of any condition which was found that needed medical follow-up; the worker was referred to his own physician for further examination of the detected conditions.

The oral examination was made to observe dental need, to obtain a case history, and to learn of pathological conditions in the mouth. At the same time an oral health education program was carried on and, if indicated, the patient was advised of his dental needs.

REPORT TO BE WRITTEN

After the medical and engineering data are collected, processed, and correlated, a report will be printed and made available to the public.

COVER PICTURE.—Pouring grey iron castings from a distributing ladle. Photograph by courtesy of American Telephone & Telegraph Co.

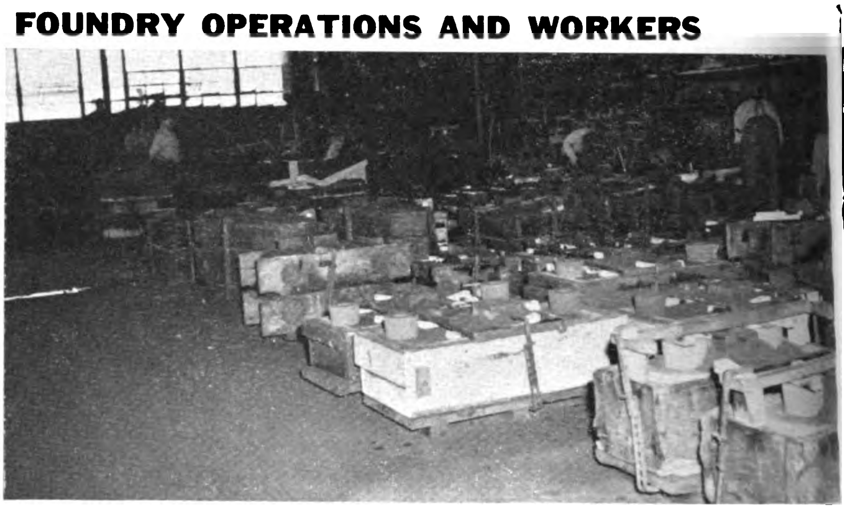
OMISSION

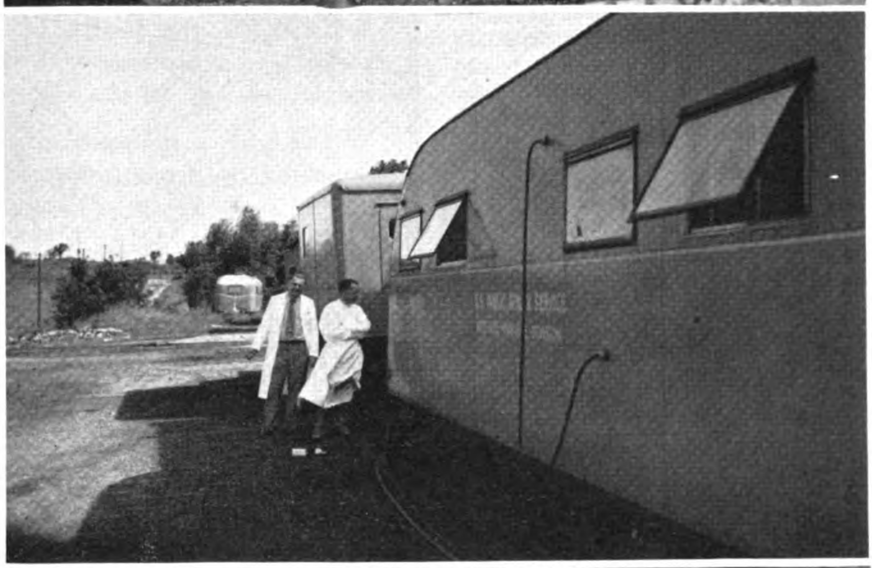
The cover picture on the December 1948 number of the *Industrial Hygiene Newsletter* showed how an automobile exhaust can be properly ventilated in a closed garage. The photograph of the General Motors installation was taken at the Buick-Oldsmobile-Pontiac Assembly Division in Doraville, Ga. The courtesy line was inadvertently omitted in the December number.

USPHS STUDIES FOUNDRY OPERATIONS AND WORKERS

Foundries studied by the USPHS and the Illinois Division of Industrial Hygiene vary in size from a small one with 28 employees to the largest with 399 employees. Eleven of the seventeen plants employ less than 100 men. The photographs reproduced here were taken in different foundries and were selected to show typical operations. Reading down from left to right:

(1) Tamping a large floor mold.
(2) Making a small machine mold.
(3) Floor molds ready for pouring.
(4) Pouring the molten steel requires a steady hand.
(5) After the pouring smoke fills the room.
(6) Loosening the sand mold is a dusty job.
(7) Cleaning a mold with a pneumatic tool.
(8) Adequate locker and shower space is especially necessary in foundries.
(9) Grinding the rough edges off the castings.
(10) An informal photograph of the trailers used in the foundry study for medical and dental examinations of the foundry workers.
(11) Dr. Fridl makes an oral examination.





Chicago Spotlights Industrial Health During AMA Congress

When the Ninth Annual Congress on Industrial Health convened in Chicago January 17, the delegates were greeted by a city-wide recognition of the meeting. Sparked by the mayor's proclamation, Chicago industries and organizations interested in industrial health welcomed the guests through newspapers, business publications, radio broadcasts, and special meetings by management and labor groups.

Previous conferences had been called by the Council on Industrial Health of the American Medical Association, but this year the assembly was sponsored jointly with the Division of Industrial Hygiene of the United States Public Health Service. It comprised representatives of all groups interested in preserving and maintaining the health of the worker: professional personnel, such as industrial physicians, nurses, and engineers; management; labor; and others.

The Congress brought together delegates from all parts of the Nation, paralleling in scope the National Health Assembly held in Washington last spring. The question of industrial health was not considered in any special panel at that assembly, and this Congress sought to appraise present and projected problems and to arrive at suggested solutions and recommendations toward which interested agencies and organizations may work.

The Congress itself was a limited one, since it was a working body. Invitations were extended to national leaders of the various groups concerned with industrial health. An open public meeting was held on the evening of January 18, at which time local leaders and others attending the conference made important contributions.

The meetings were held on January 18 and 19 at the Drake Hotel in Chicago, with preliminary panel committee conferences the previous day. The opening general session defined the purposes of the Congress, and the operation of the panels. The keynote address on the worker's interest in health was presented by Arthur Goldberg, General Council of the CIO.

A symposium was conducted on "New Horizons in Industrial Health" participated in by Surg. Gen. Leonard A. Scheele of the Public Health Service, President Ned Dearborn of the National Safety Council, and President Joseph G. Norby of the American Hospital Association.

The Congress was resolved into four panels: To discuss scope and distribution of medical services in industry; environmental hygiene; medical aspects of industrial human relations; and health education.

PROCLAMATION

by

The Honorable Martin Kennelly
Mayor of the City of Chicago

WHEREAS the health of those who live and work in Chicago is a vital asset to themselves, their families, their employers, and to the entire city; and

WHEREAS a planned, effective health protection plan is important in promoting good industrial health and hygiene; and

WHEREAS the Council on Industrial Health of the American Medical Association and the Division of Industrial Hygiene of the United States Public Health Service have devoted many years of study and research toward improving and preserving the health of the industrial worker; and

WHEREAS the Ninth Annual Congress on Industrial Health, sponsored jointly by these two organizations, will be conducted in the City of Chicago on January 17 through 19, 1949, comprised of representatives of all groups interested in preserving and maintaining the health of the worker;

NOW, THEREFORE, I, Martin H. Kennelly, Mayor of the City of Chicago, do hereby proclaim the period from January 16 through January 22, 1949, as INDUSTRIAL HEALTH WEEK IN CHICAGO, and I urge all our citizens to avail themselves of this opportunity to become better acquainted with the efforts being made to preserve and promote industrial health in our community and nation.

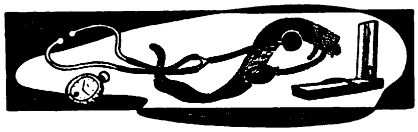
Dated this 15th day of December A. D. 1948.

Martin H Kennelly

MAYOR

The Place of Occupational Medicine in the Undergraduate Curriculum *

Ernest W. Brown, Headquarters, Council on Industrial Health, American Medical Association, Chicago, Ill.



The principal purpose of this paper is to present a brief summary of the findings of a partial survey of the medical colleges of the country with respect to the status of instruction in the field of occupational medicine. I conducted this study under the auspices of the Council on Industrial Health of the American Medical Association with the object of promoting the introduction and more adequate recognition of the subject as a standard discipline in the curriculum. The present status of the situation ranges all the way from a complete lack of attention to the subject to recognition on the departmental level.

Mention should be made of a recent step taken by the American Medical Association toward official recognition of occupational medicine as a specialty. The House of Delegates, at the last session, approved the setting up of residencies and fellowships in occupational medicine, and the requirements will be found in the June 1947 edition of *Essentials of Approved Residencies and Fellowships*, prepared by the Council on Medical Education and Hospitals. There is no certifying board as yet in this field, but this appears to be an important move in that direction.

The adoption of the residency and fellowship program poses the question as to training facilities available. Apropos of this, the following recent developments are pertinent: the Institute of Occupational Medicine and Hygiene, Yale University; the Institute of Industrial Health, University of Cincinnati; the Institute of Industrial and Social Medicine, New York University; and the School of Occupational Health, Wayne University. The fellowship program at the University of Pittsburgh Medical School, the first of its kind, merits special mention. The Long Island Medical College has announced plans for an Institute of Industrial Medicine. Such a program is also being planned for the University of Michigan School of Public Health.

If occupational medicine is to be pursued as a specialty, it must necessarily be taught for that purpose as a graduate subject, but occupational medicine for medical undergraduates is quite another matter. Such a small fraction of medical graduates will enter on careers in this branch that there is no occasion for more than general orientation, but this should be sufficient to assure that the graduate in medicine will have enough knowledge on which to base an intelligent attitude toward industrial health.

*From the Journal of the Association of Medical Colleges, July 1948.

The Council on Industrial Health takes the position that occupational medicine should be officially accepted as a part of the standard undergraduate curriculum (*a*) in the form of a course designated as such, and (*b*) conducted under unified direction.

The underlying reasons for this policy are as follows:

1. The need of awareness of the general medical graduate that his patient has an occupation; that this occupation may have some bearing on the etiology of an illness under consideration; that the economic results of illness may have significant repercussions in other respects; and that his treatment is not complete until he can be restored to earning ability. This implies some capacity in the search for and the evaluation of occupational history statements.

2. To prepare him with some background to grasp those problems of industrial medicine which might arise in the course of the general practice of medicine, or in his capacity as a specialist, even though not employed by industry.

3. To afford an opportunity for the medical student to evaluate this branch of medicine for a future field of selection as in the clinical specialties.

Summary of Interim Progress Report of Current Survey

Of the 36 medical colleges already surveyed by personal visits, 1 is in a Western city, 13 are in the Middle West and 22 in the Northeastern part of the country. All of the last group are located in the States of Massachusetts, Connecticut, New York, Pennsylvania, Virginia, and the District of Columbia.

Four provide no instruction whatsoever. The amount of time allotted in the remaining 32 schools ranges from 1 to 2 hours in 3 institutions, up to 20 to 38 hours in 6. This instruction time is inclusive of both formal teaching and field visits and demonstrations. This wide variation in hours assigned reflects the extreme differences in curricular recognition of this field. It should be stressed, however, that the effectiveness of a teaching program is not necessarily merely a function of the time factor. There are other significant considerations as well, too obvious to require mention.

The general trend of instruction in these 32 schools is the system of formal lectures supplemented in varying degree by field work, in many instances entirely confined to lecture periods. Field instruction, according to circumstances, includes visits to industrial medical departments, special types of industrial health centers, government bureaus of industrial hygiene and workmen's compensation proceedings.

Fifteen, or 47 percent, of the 32 schools utilize field instruction, while 17, or 53 percent, do not employ this technique. The extreme fluctuations in teaching practice are illustrated by the following: Schools conducting field practice vary from 20 to 87 percent of the total instruction time in the number of hours scheduled for field study. For example, 1 school prescribes 21 lecture hours with no field periods; another only 2 lecture hours, but 14 hours of field instruction.

Instruction falls under the Department of Bacteriology in 2 schools, the Department of Medicine in 4, and under the Department of Preventive Medicine and Public Health, or a corresponding combined department, in 24. Occupational medicine has a departmental status in two medical colleges, namely: Yale University and the University of Pittsburgh.

Of the schools administering instruction under a Department of Preventive Medicine and Public Health, Jefferson Medical College and New York University have a section of industrial medicine under full-time direction in that department. The University of Louisville is planning a similar arrangement. Columbia University has a division of industrial medicine in the School of Public Health, and the University of Michigan may adopt such a policy, these two schools of public health being utilized for undergraduate medical instruction. The University of Colorado has a full-time section under the Department of Medicine.

Sixteen, or 50 percent of the 32 schools, attempt a general coverage of the subject, the range of hours running from 11 to 26. Considerable variations are found in the range of subject matter and the weighting of components, even in courses of approximately equal length. Seven schools appear to aim at a partial coverage of the subject in periods of from 6 to 8 hours. In the third category of 9 schools, in periods of 1½ to 5 hours, there is no attempt at systematic presentation, only a few scattered topics being discussed.

CONCLUSIONS

1. The undergraduate curriculum should contain a course in occupational medicine, designated as such and under unified direction.

2. The course should provide coverage of the following:

(*a*) The organization of industrial health services and their various ramifications including preventive measures and standard practices employed;

(*b*) Occupational diseases, environmental health hazards of industry and industrial hygiene methods of control;

(*c*) Medicolegal aspects;

(*d*) Supplementing of instruction by field visits in small units to industries and other agencies if practicable.

3. If there is no faculty member available to teach the subject, consideration should be given to enlisting the services of an industrial physician with faculty rank in a neighboring industry or in the industrial hygiene division of the State or Federal agency.

Cleveland Studies Hazards in Paint Manufacture

During the summer of 1948 the Bureau of Industrial Hygiene, Cleveland Department of Public Health and Welfare, made a study of plants manufacturing paints. The study was made following a death reported to be due to lead poisoning acquired in a paint plant. The workman had apparently been perfectly healthy in the 2 years he had been employed in this plant. Then he suddenly became ill and died within a few days. Lead encephalitis was given as the cause of death. The deceased had refused to wear the respirator provided by the company.

The general working conditions in the plant were satisfactory. There was good general ventilation, but no local exhaust ventilation. The company was using about 2,500 pounds of lead carbonate per day during the lead paint season; and the exposure, averaged from several tests, was approximately 20 milligrams of lead per cubic meter of air. The period of exposure was about 10 minutes. The length of the operation varied because of the different sizes of the batches which were handled, but the average time during which workers were exposed was three-quarters of an hour per day.

As a result of this fatality, the bureau visited 51 plants in the city, which were manufacturing paints. Of these, 35 were found to be using lead carbonate or leaded zinc in appreciable quantities. Atmospheric samples were taken in 16 of these plants.

Samples were collected in the breathing zone of workers who were emptying 50-pound bags of lead pigments into mixers of various types. The sampling was done only during the time required to empty bags of lead pigment and not for the full mixing period. Ten-minute samples taken immediately following the emptying of bags gave results varying from 0.1 to 0.6 milligram of lead per cubic meter. This indicated that the exposure to residual lead in the air was reduced very quickly. A sample taken for 1.1 minutes, while 22 empty bags were flattened down, showed a concentration of 2.4 milligrams of lead per cubic meter. The exposure while handling both full and empty bags, other than the emptying operations, could not be determined readily.

The concentration of lead in the air during the periods of emptying bags of lead pigment occasionally exceeded the maximum allowable concentration by as much as 150 times. However, mixing operations are performed in most plants only a few times each month, and in some cases the weighted average may be within safe limits.

In many plants the respirators in use were damaged or fitted poorly. The proper use of respirators should be adequate in plants where lead paints are infrequently mixed, but where frequently mixed, local exhaust ventilation should be provided. One plant which had its pony type mixers covered and exhausted through the covers had an exposure of 0.39 milligram of lead per cubic meter. This was the lowest value found in the study. One plant with an overhead canopy which drew the dust past the workman's face showed the highest value of 48.6 milligrams per cubic meter.

This study indicates that, although lead poisoning is not widespread in the paint industry now, there is considerable evidence to show that there still is a potential health hazard due to exposure to lead compounds.

Second Course Given in Use of Radiation Measuring Instruments

The Industrial Hygiene Division of the Public Health Service has given for the second time a week's course on the use of radiation measuring instruments. Thirteen engineers from 10 States attended the first course given in October.

Those who attended the course during the week of December 13 to 18 were:

George L. Wilson, West Virginia; Lawrence P. Benjamin, Charles Ford, John E. Silson, New York; John Soet, D. E. Van Farowe, Michigan; H. K. Smithson, Tennessee; K. M. Morse, George Winkler, Illinois; N. E. Schell, Kentucky; Otto Paganini, Texas, and Arnold Moen, Washington.

INFORMATION ON TWO OF THE NEWER INSECTICIDES

Most recently a new group of compounds, the organic phosphates, has come into use and represents a potential threat to human beings.

Hexaethyl tetra phosphate (HETP) was developed in Germany and in that country was known as "bladan." Tetraethyl pyro phosphate (TEPP), which is the active toxic ingredient in HETP, was independently developed at the University of Chicago a short time ago. Both these compounds are heavy, syrupy liquids freely miscible with water. On contact with moisture they readily hydrolyze and lose their toxicity; hence there is little residual action as in the case of DDT.

They are both extremely toxic to insects and animals, and very minute amounts (2–10 mgm/kgm) are fatal to experimental animals. Several human cases of poisoning have occurred in California and because of the increasing use of these compounds, others will doubtless be reported.

Absorption.—These products are freely absorbed from the gastrointestinal tract following ingestion. In addition, experimentally, they are rapidly absorbed through the intact skin, a property which makes them extremely hazardous. They are only slightly irritating when first applied to the skin so that there is no immediate warning sign as to the potential danger. Instillation in the eye produces immediate local reaction. It is probable that these products are also absorbed through inhalation of their vapors.

Pharmacology.—HETP and TEPP act pharmacologically by causing an irreversible destruction of the enzyme cholinesterase. As a result of this action there is an accumulation in the body of acetyl choline with consequent symptoms of excessive parasympathetic nervous stimulation. In addition to these muscarine effects, these compounds also stimulate the myoneural junction in a manner similar to that of nicotine.

Symptoms.—Symptoms from acute poisoning with these compounds are primarily those due to parasympathetic stimulation. There is marked pupillary contraction and spasm of the eye muscles of accommodation which may persist for 2 or 3 days, resulting in

Bulletin issued by Bureau of Adult Health, Department of Public Health, State of California.

blurred vision and inability to focus on distant objects. There is frequently a feeling of tightness of the chest; observers have noted dyspnea, bronchial spasm, and pulmonary edema resulting from capillary dilatation and excessive glandular secretions in the bronchi and bronchioles. The smooth muscle of the gastrointestinal tract becomes spastic, causing vomiting, constipation, or diarrhea, and abdominal cramps. The central nervous system is affected, causing excitement and sometimes convulsions, frequently followed by central nervous system depression.

Death in acute poisoning may be due to any one of the following mechanisms:

1. Bronchial constriction and cardiovascular collapse.
2. Central nervous system stimulation and eventual depression.
3. Stimulation and eventual depression of neuro-muscular junctions.
4. Accidents occurring as a result of visual or mental impairment.

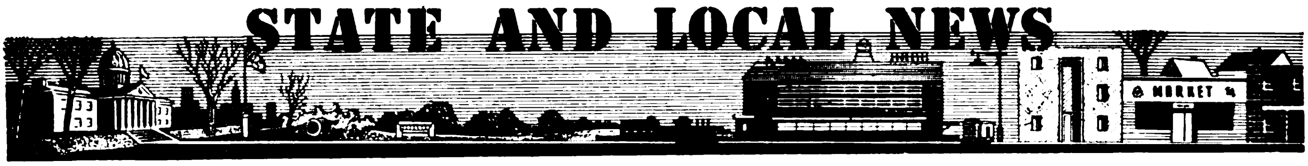
Information regarding chronic toxicity and cumulative action is both incomplete and inconsistent. Experimental animals receiving sublethal doses have survived with no residual damage, presumably because they were able to reproduce enough cholinesterase to replace the amount destroyed by the insecticide. However, "ginger paralysis" in humans is believed to be a manifestation of chronic intoxication with triorthocresyl phosphate, a compound pharmacologically similar to HETP and TEPP.

Diagnosis.—At the present time diagnosis of intoxication with these compounds depends mainly on an awareness of the syndrome and on a high index of suspicion in areas where these chemicals are being used. Any person who may possibly have come in contact with these insecticides, complaining of "blindness," blurred vision, tightness of the chest or any other symptom listed above should be suspected of suffering from acute intoxication caused by an organic phosphate. The laboratory finding of reduced cholinesterase in the plasma is confirmatory evidence.

Treatment.—Atropine protects against, and counteracts, the central and autonomic nervous system disturbances caused by these phosphates. Therapeutic doses (0.1–0.5 mgm/kgm) protect experimental animals against 3 to 4 lethal doses. Curare-like agents, especially the magnesium ion, protect the myoneural junction against the nicotinic effects. The most effective therapy is a combination of atropine and magnesium.

Prevention.—Poisoning by these compounds can be prevented if proper attention is given to safe methods of handling them and if all persons concerned appreciate fully their extreme toxicity. All contact with the bare skin must be avoided and impervious gloves must be worn when handling the compounds. If any of the material gets on the skin it should be thoroughly washed off with copious amounts of soap and water. Inhalation of TEPP and HETP dust, mists, and aerosols should be avoided by use of a mask approved by the State Division of Industrial Safety. Workers should change clothes completely and bathe with soap and water after using the material. Contamination of food, and tobacco, should of course be avoided. Any exposed person developing symptoms should immediately be removed from the exposure and should be seen by a physician as soon as possible.

Report to State.—Physicians are urged to report cases of poisoning from insecticides to their State industrial hygiene divisions. Such reports can be used as a basis for study of the problem.



CLEVELAND, OHIO

Carbon tetrachloride.—A recent death in Cleveland, reported to have been caused by exposure to carbon tetrachloride vapors, emphasizes the hazardous nature of carbon tetrachloride and also the difficulty of learning where and how it is being used in industry. The operation involved was testing pipe fittings for leaks by immersing in a liquid, applying compressed air, and observing bubbles from leaks. This was done in a small booth with a small overhead exhaust. The exhaust was sufficient to prevent the vapors from leaving the opening of the booth, but the workmen had to lean over the tank to observe the bubbles, and the overhead exhaust fan drew the vapors directly past their faces. The liquid used at the time of the incident contained 40 percent carbon tetrachloride. The liquid formerly used had been a solvent with a flash point of 104° F., but following an accidental flash fire, the company had added carbon tetrachloride to reduce the fire hazard.

The carbon tetrachloride mixture had been in use for approximately 1 year with two workmen on the operation. The workman who died became sick after his first workday on the job and died after 2 weeks' hospitalization.

This plant had been visited about 6 months before the changeover to carbon tetrachloride, and even if it had been in use then, it may have gone unnoticed because quite frequently the guides are not entirely familiar with unusual operations.

Recommendations were made to discontinue the use of carbon tetrachloride and to improve ventilation if any toxic solvents are substituted.

MASSACHUSETTS

Tunnel construction.—The staff of the Massachusetts Division of Occupational Hygiene continues its survey for potential health hazards arising during the construction of the Hultman Aqueduct. The initial study at this project was described in the October 1948, issue of the *Industrial Hygiene Newsletter.* Approximately 3 miles of a total of 5⅓ miles of tunnel have been driven as of present writing. The operations are carried on approximately 300 feet below the ground level. Rock encountered has been of three types: melaphyre (andesite), slate, and argilite. Although the free silica content of the melaphyre rock is usually approximately 10 percent, spotty veins have been shown to raise the free silica content of the dust as high as 40 percent.

Air analyses for nitrogen oxide fumes were made directly after the blast was performed, as the men were returning to the face of the heading, and at certain intervals thereafter. On the basis of these evaluations of air contamination by nitrogen-oxide fumes, the following computations were made to show when the workers could resume operations safely at the face of the heading after blasting.

Safe distances from the face of the heading, based on tests for nitrogen dioxide, are 15 minutes after blast: 125 feet; 30 minutes after blast: 90 feet; 45 minutes after blast: 50 feet; 1 hour: face.

It is expected that the west heading of shaft No. 6 and the east heading of shaft No. 7 will "hole through" sometime in April 1949. The distance from shaft 6 to shaft 7 is 11,350 feet.

Meanwhile, the chemists and engineers will make repeat visits to the tunnel to determine the health hazards involved during construction, and will make the necessary recommendations for the control of these hazards.

Sootfall study.—The Division of Occupational Hygiene of the Department of Labor and Industries, the Division of Sanitary Engineering of the Department of Public Health, and the Department of Bacteriology of the University of Massachusetts are planning to act jointly in a sootfall study in the lower Connecticut Valley.

MONTANA

Lecture course.—Through arrangements with the President of the Montana School of Mines, a 10-hour lecture course on industrial hygiene has been made compulsory for all senior students taking mining, metallurgy or petroleum engineering. This course will include a résumé of various types of dusts, metals, gases, and other toxic materials found in mining, metallurgical operations, and in the petroleum industry, as well as the effects these metals have on the human body. Sanitation, abnormal temperature and humidity, and illumination will also be discussed. Demonstrations of air sampling devices and discussion of engineering control methods will complete the lectures. The course will be conducted by the Director of the Division of Industrial Hygiene.

NEW YORK

Noise.—Assistance was requested for the elimination of objectionable noise emanating from a large manufacturing plant which was disturbing the adjacent community. Our engineering unit traced the noise to several exhaust fans, running at a high rate of speed with a peculiar noise pattern at the discharge. Curiously enough, the sound of the fans was not objectionable in the workroom, or even in the immediate vicinity of the discharge, but was apparently projected in a straight line from the fan discharge to more distant points.

Recommendations made to the plant for relocation of the fans and reconstruction of the discharge corrected this nuisance.

PENNSYLVANIA

Conference.—At the seventy-sixth annual meeting of the American Public Health Association held in Boston, Dr. E. R. Aston, Dental Consultant of the Pennsylvania Bureau of Industrial Hygiene, addressed the Dental Health Section and Subcommittee on Medical Care. The subject of his paper, which will be reported in the *American Journal of Public Health,* was "The Industrial Dental Program in Pennsylvania."

Fans in reverse.—An example of how improperly operated exhaust equipment can fail to accomplish the purpose for which it was installed is illustrated in the findings of a survey recently completed by the Bureau of Industrial Hygiene.

Smoke and heat in the casting room of a foundry were excessive, in spite of the fact that five exhaust fans were installed in the roof. Upon inspection, it was discovered that three of the fans were operating in reverse, that is, drawing air into the building, in opposition to the other two which were functioning properly. As a result, smoke exhausted by the two fans was immediately redrawn into the building by the other three, creating a condition worse than that which would have been present had no fans at all been installed.

When, upon advice of the Bureau's engineer, the fans were adjusted and operated as exhaust fans, the trouble was rectified.

Exhibits.—In cooperation with other sections of the Pennsylvania State Department of Health, the Bureau of Industrial Hygiene has held exhibits at several county fairs. Equipment used in industrial hygiene work was on display and personnel of the Bureau were on hand to explain its use and to answer questions in regard to the Bureau's activities and services.

Illustrated in the photograph is the exhibit at the Columbia County Fair, Bloomsburg, the second largest fair in the State. During a typical day of the week's program more than 4,000 persons were counted viewing the industrial hygiene display.

County fairs offer opportunity to explain industrial hygiene program in Pennsylvania

WASHINGTON

Lead.—The management of two plants of a large national can manufacturer located in this State requested assistance in measuring the extent to which lead dust was contaminating workroom atmospheres and in finding the sources of this hazard. Engineering investigations made at the two factories disclosed atmospheric lead concentrations as high as 0.5 milligram/cubic meter in one plant and 1.4 milligrams/cubic meter in the other. In both cases the major source of lead contamination was found to be the seam wiper. Contributing factors were escape of lead from the solder pots and from the afterburners due to inadequate hooding and/or insufficient air movement. The results were presented to the Pacific coast representative of the company and recommended means of control were discussed with him. The findings and recommendations by this section have contributed to a long-range program by the company in these two plants as well as in other branch plants throughout the country.

The first step in this program was installation of an experimental ventilation system on one can line in one plant. The improvement involved partially enclosing the seam-wiper wheel. The enclosure was exhausted by means of a Rotoclone unit. A recent engineering study on this can line indicated that lead from the seam wiper, the principal source of contamination, may have been reduced 95 percent or more.

The company and the Industrial and Adult Hygiene Section will continue to cooperate in improving conditions in their plant environment.

Xylene.—At the request of a private physician, investigation was made of a process where fish netting was being impregnated with a plastic material. An illness of a patient who worked at this process was tentatively diagnosed as liver damage suggesting that he may have experienced excessive exposure to chlorinated solvent vapors.

Investigation of the processes as well as inquiries at the plant manufacturing the impregnating material disclosed the chief exposure to be xylene, the main solvent in the plastic solution. From these preliminary findings and from further diagnostic work it was felt that the symptoms were not attributable to the patient's occupation.

The investigation revealed, however, that protective measures against xylene vapors were entirely inadequate. The fish nets after being dipped in the plastic solution and run through a set of squeeze rolls were festooned from the rafters to dry. Although a large amount of general ventilation was provided by a fan in the roof over the drying area the high rate of evaporation taking place caused vapor concentrations which were noticeably irritating. The chief exposure occurred to the worker or workers who were hanging the netting in the rafters, since these men were located between the vapor source and the exhaust fan. Not only was a health hazard involved but the danger of narcotic effects from solvents made evident a serious safety hazard because there were no measures to prevent a fall from the rafters if a worker became dizzy.

This being the slack season for processing fish nets there was not sufficient activity to allow an evaluation of actual xylene exposures. Such a study is to be made at the first opportunity and suitable means for control will be recommended.

DIAGNOSIS AND TREATMENT OF LEAD POISONING *

Although available statistics indicate a progressive decline in the incidence of fatal lead poisoning over the past twenty years, control of the lead hazard in many industries is far from perfect, and often the unwitting use of lead compounds in new processes leads to serious intoxication. During the first 6 months of 1948, there were 38 cases of lead poisoning reported to the Bureau of Adult Health of the California State Department of Public Health. Lead is the most commonly found systemic poison, and exposure may occur in over 150 industries, including lead mining, wet battery work, outdoor painting, pottery glazing, welding and soldering, metalizing, ship scrapping, and handling of high-test gasoline. Physicians in general practice not infrequently are faced with the problem of determining whether symptoms in a given patient are due to lead poisoning, and the task of differential diagnosis is a complex one, involving, sometimes, medicolegal controversy as well as the health of the patient.

The following brief résumé of current information regarding lead intoxication is presented with the hope of helping the physician who sees occasional cases of this disease, to arrive at the correct diagnosis and treatment.

Method of Intoxication

Lead is taken into the body through the respiratory tract, the alimentary tract, and occasionally through the intact skin. By far the greatest number of cases in industry are due to absorption of lead dust and fumes by inhalation, since the respiratory mucous membranes are capable of transforming the lead into a soluble absorbable form. Nonindustrial poisoning commonly occurs due to swallowing of lead compounds. The action of the gastric juice increases the solubility of the lead salts, and thereby increases absorption, although a major portion is retained within the bowel and excreted unchanged. At present, tetraethyl lead, as found in gasoline, is the only form of widely distributed lead capable of being absorbed through the skin. Cases of poisoning incurred in this fashion have been reported but are rare.

Types of Lead Poisoning

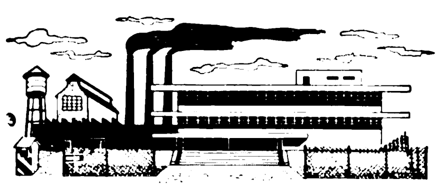
A. ***Acute forms of poisoning***—If a large dose of soluble lead gains entrance to the blood by any one of the various methods of absorption, the symptoms are chiefly these: irritation of the mucous membranes, metallic taste, vomiting, severe colic, and diarrhea with bloody stools. There may be further developments of headache, muscular cramps, collapse, and death. Lead poisoning by absorption is extremely rare.

B. ***Chronic poisoning***—This is by far the most frequent type of lead poisoning and can be divided into three general groups. This classification is not absolute, and mixtures are more common than a pure group. Headaches, lassitude, weakness, joint and muscle pains, and insomnia are symptoms common to all these groups.

1. ***Alimentary group***—In these cases gastro-intestinal symptoms predominate, with loss of appetite, metallic taste, constipation, and abdominal cramps sometimes occurring as acute colic which may be mistaken for a surgical abdomen.

2. ***Peripheral neuritis***—This group is characterized by weakness or paralysis of extensor muscle groups, particularly those of the forearms and hands. Weakness usually precedes paralysis by a number of weeks. This group shows also arthralgia, myalgia, and weakness of other muscle groups. Severe cases may have bilateral wrist drop. The lesion is essentially a peripheral neuritis, and is characterized by the fact that it is painless, essentially motor, and limited to extensor muscles.

3. ***Encephalopathy***—Though rare, this occurs in both the acute and chronic form, and usually after exposure to tetraethyl lead. In the acute state there is excitation and confusion which may lead to stupor with or without convulsions, coma, and death. In the more chronic type there are nervousness, tremors, insomnia, dizziness, and personality changes.



Diagnosis

The diagnosis of lead poisoning is dependent upon the correct interpretation of four factors—namely the occupational history, the clinical history, the physical examination, and the laboratory data. The practicing physician should undertake to make a diagnosis of suspected cases of lead poisoning by means of comprehensive study of his patient. The diagnosis of lead poisoning cannot be made by any single laboratory procedure. The results of the laboratory examinations merely answer the question of whether the individual has had significant lead exposure within the recent past. They tell nothing concerning the presence or severity of his illness.

A. ***Occupational history***—The value of the occupational history is directly proportional to the care with which it is taken and interpreted. The points to be considered are previous and present exposures, in which specific jobs are considered, and the length of time spent in each; the presence or absence of symptoms in other workers; the degree to which hazards were controlled; the medical supervision of previous employment; and time of onset of symptoms in relation to occupational exposure. The Bureau of Adult Health may be of assistance to the practicing physician by determining the precise chemical nature of the materials handled by his patient as well as the concentrations of lead in the air of the plant where his patient is employed.

B. ***Clinical history***—Since lead, when absorbed, is carried in the blood stream to all parts of the body, it is evident that a great diversity of symptoms may result, depending upon the tissues or organs involved. These symptoms need not necessarily differ in any respect from those produced by other organic disease of the same tissues or organs. In order to determine whether or not symptoms complained of are due to lead, a complete clinical history is indispensable. The time of onset of symptoms in relation to the occupational exposure is obviously important.

*Bulletin issued by the Bureau of Adult Health, California Department of Public Health.

C. ***Physical examination***—Although none of the signs is specific or pathognomonic of lead poisoning, the most commonly occurring are as follows:

1. ***Pallor***—This is probably a manifestation of inadequate peripheral circulation, and may or may not be associated with anemia. The skin is cool, damp and clammy, and there is usually an associated low blood pressure and slow pulse.

2. ***Weakness and paralysis***—This occurs mainly in the extensor muscles of the wrist. Early stages can be detected by excessive fatigability of these muscles when they are exercised. There may be no objective evidence of general muscular weakness, so that the striking feature of the condition is the discrepancy between the muscular development of the patient and his apparent lack of strength when tested.

3. ***Gingival lead line***—This is due to a deposit of lead sulphide just under the gums and may also occasionally be seen in the mucous membranes of the mouth. It appears as a grayish black series of dots most easily seen along the gum margins. Care must be taken to avoid confusing this with gingivitis; and, when a lead line is found, it must be differentiated from that caused by other metals, which can be done by means of a good occupational history. A magnifying glass and a good light are very useful in finding a lead line. When present, it indicates absorption and storage of lead in the gums, and does not, per se, indicate the existence of lead poisoning.

D. ***Laboratory data***—No single test exists to determine whether a worker has or has not lead poisoning. The laboratory supplements the history and the results of physical examination. Good medical practice requires complete haemtologic study and urinalysis. The laboratory studies which aid most in establishing a diagnosis of lead poisoning are as follows:

1. ***Blood count***—The anemia of lead poisoning tends to be characteristic, but is not pathognomonic. Despite the fact that the haemoglobin and red cell count are not markedly lowered in many cases, changes within the red cells occur very frequently. Polychromatophilia, stippling, nucleated red cells, and poikilocytosis and anisocytosis are all to be found in a person suffering from lead absorption. These abnormal cells, including the stippled cells, are thrown into the circulation spasmodically and are not always found if only a single smear is examined. Multiple smears should be taken. A sharp drop in the haemoglobin of an exposed worker may be significant of impending toxicity.

2. ***Stippled cells***—These cells are not pathognomonic but represent a reaction of bone marrow to a toxic substance. They may be absent in chronic cases. The finding of stippled cells has long been used as a criterion of lead absorption. Diagnostic value is gained by periodic examination of the blood so that a change in the proportion of stippling may be noted. This is important because the proportion of stippling in a normal individual is occasionally high, and is not necessarily significant. Stippling of the erythrocytes up to a limit of 800 or even 1,000 per million erythrocytes may be a normal phenomenon. This is equivalent to 10 to 12 stippled cells in 50 oil immersion fields that average 250 red cells per field. Some degree of stippling of the red cells is almost certain to be present in the blood during the active period of lead intoxication.

3. ***Urinary lead***—The amount of lead excreted in the urine gives one of the more valuable measurements of lead absorption. However, one must differentiate between lead absorption and lead intoxication, since many workers with evidence of absorption show no signs or symptoms of intoxication. Unexposed individuals excrete a small amount of lead in the urine normally, but figures of 0.15 milligram or more of lead per liter of urine are practically always indicative of lead absorption. After cessation of the exposure, the amount of lead in the urine rapidly diminishes, usually in a matter of a few weeks, but occasionally it may remain high for months. It is essential that the interpretation of the values of urinary lead be correlated with the date, duration, and severity of exposure.

The procedure for collection of urinary samples from lead workers must be meticulous, since there is always the possibility of lead contaminants in their clothing, on their skin, in the glassware, or in the air. Since the quantity of lead actually found in the urine is so small, the most minute contamination will greatly magnify the results. When it is feasible to do so, urine samples of large volume should be collected so as to avoid the diurnal variations in lead concentration. Frequently, it is necessary to collect small spot samples of approximately 100 cubic centimeters, and these may be employed with satisfactory results if care is taken to avoid either highly concentrated or dilute urines. Values between 0.10 milligram and 0.15 milligram of lead per liter of urine indicate lead absorption. This may not be of clinical concern in the case of persons with lead exposure, but if found in a patient presumably not exposed, a thorough search for a hidden source of absorption should be made. Values over 0.15 milligram per liter indicate definitely increased lead absorption.

4. ***Blood lead***—The analysis of the blood for lead gives invaluable information as to the general level of the lead exposure that has recently been experienced. Here again the sample must be taken with meticulous care to avoid contamination by either glassware needle, or reagents. Results in excess of 0.07 milligram per 100 grams of whole blood are indicative of lead exposure within some recent period, while results in excess of 0.10 milligram per 100 grams show that the exposure has been considerable.

Therapy

The first step in the treatment of lead poisoning is to make sure that the lead exposure has been brought to an end. There are mild cases with but slight symptoms and no disability, in which a transfer to work involving no exposure, plus medical observation, may be all that is required by way of treatment. In these instances the continuation of occupational lead exposure at any level may be dangerous and should be avoided.

During the acute attack it is important to give vigorous treatment for the relief of the immediate symptoms. Abdominal pain is best relieved by the intravenous injection of 10 cc. of a 10 percent solution of calcium gluconate every four hours. The frequency of administration may be reduced with the subsiding of symptoms, but medication with calcium should be continued for at least 2 days after cessation of the colic. Catharsis with one-half ounce of magnesium sulphate daily should be induced, not only to aid in the elimination of further pain, but also to remove the relatively large quantity of lead that is almost certain to be present in the alimentary tract and thereby to prevent further alimentary lead absorption. Enemas may be given in resistant cases. Small doses of iron are given and repeated until repeated blood counts reveal a return to normal of the red cells and haemoglobin.

Until recently the classic treatment of lead poisoning was to "delead" the patient. In recent years this procedure has been discarded due to the belief that lead is excreted from the body by normal physiologic processes, and that no type of therapy influences this action. BAL (British Anti Lewisite) acts as a deleading agent but unfortunately cannot be administered continuously or even repeatedly over a considerable period of time, and therefore the use of this drug accomplishes little or nothing. The brief period of deleading produced by BAL is of physiological interest but of no practical importance. It has no apparent influence on the course of the disease.

In cases presenting wrist drop a cockup splint, to include the fingers, worn night and day, is used until function returns. Hot water baths, and gentle massage once every day or two are used. Strenuous massage and violent exercise should be avoided. Reeducation exercises are of value.

In cases of encephalopathy, lumbar puncture to relieve increased intracranial pressure, and sedation are required. For convulsions, barbiturates, for example, sodium amytal—from 3¾ to 7½ grains, can be given intravenously, and avertin can be used rectally.

Bibliography

Johnstone, Rutherford T.: **Occupational Medicine & Industrial Hygiene,** C. V. Mosby Co., 1948.

Committee on Lead Poisoning of the Industrial Hygiene Section of the American Public Health Association: **Occupational Lead Exposure and Lead Poisoning, 1943.**

Mayers, May R.: **Lead Poisoning and Compensation,** New York State Department of Labor, January 1946.

New Jersey State Department of Health: **Industrial Health Bulletin,** Vol. 1, No. 1.

Kehoe, Robert A.: **Personal Communication,** August 1948.

A NEW USE FOR X-RAYS FOUND IN CONNECTICUT

A new development in the field of accurate gaging has recently been introduced to Connecticut industry. The unit is an X-ray thickness gage which indicates the thickness of metal as it is being processed. It differs from clinical and other industrial X-ray installations in that the X-ray generator is operated continuously.

One type of unit is said to operate at a maximum of 50 kilovolts and 15 milliamperes. Except for an aperture through which the rays are projected, the generating tube is encased in metal to prevent stray radiation. The X-rays are directed through the metal whose thickness is being measured, and suitable devices record the amount of absorption and translate the information into terms of variation of thickness.

The Bureau of Industrial Hygiene is concerned with the possible exposure of employees to X-rays. Studies of installations have shown that the units may be operated safely. However, it appears necessary to check such devices at the time of installation, and periodically thereafter, to determine the amount of radiation to which workers may be exposed.

There appears to be a wide field of application for these devices where extremely accurate thickness measurements are required on a continuous basis without interruption of production. It is felt that many installations will be made, and that with the indicated cooperation between the manufacturer of the X-ray gage, the plant management, and this bureau, the health of the workers will not be adversely affected.

RECOMMENDED READING

Davies, T. A. L.: The morals of employment. *Lancet* **2:** 465, 1948.

Ellis, F. P.: Victuals and ventilation and the health and efficiency of seamen. *Brit. J. Indust. Med.* **5:** 185–197, 1948.

Fishbein, M. and Whelan, J. F.: Medical Writing, the Technic and the Art. The Blakiston Co., Philadelphia, 1948. Ed. 2. x + 292 pp.

Keatinge, G. F. and Littlewood, R.: The agricultural worker. *Lancet* **2:** 281–286, 1948.

Merewether, E. R. A.: The British tradition in industrial health. *Brit. J. Indust. Med.* **5:** 175–179, 1948.

Nuttall, H. C. W.: Compensation for injury. *Lancet* **2:** 425–428, 1948.

Schuster, G.: Human relations in industry. *Brit. Med. J.* **2:** 505–510, 1948.

Shattuck, L. and others: Report of the Sanitary Commission of Massachusetts, 1850. Harvard University Press, Cambridge, 1948. ix + 321 pp.

Wilson, J. R.: Writing the Technical Report. McGraw-Hill Book Co., New York, 1947. Ed. 2. xiv + 388 pp.

ENGINEER WANTED IN WASHINGTON

The Washington State Personnel Board has announced a merit examination for industrial hygiene engineers with the State Department of Health.

Minimum qualifications of education and experience for a senior industrial hygiene engineer are: Graduation from an accredited college or university in engineering (preferably chemical engineering), and 3 years of successful paid experience in public health engineering in an official agency, 2 years of which must have been in industrial hygiene engineering. A year of graduate study in public health, industrial hygiene or related subjects may be substituted for the one year of general public health engineering experience.

Minimum qualifications for a chief industrial hygiene engineer are: College requirements same as above, plus 5 years of successful paid experience in engineering related to industrial hygiene or public health, of which 3 years within the past 10 must have been in an official health agency, including at least 2 years in industrial hygiene engineering. Graduate study in public health, industrial hygiene or related subjects may be substituted, year for year, for experience, except that no substitution may be made for the 2 years of experience in industrial hygiene engineering.

Information and application forms are available from State Department of Health, Seattle, and State Personnel Board, 1209 Smith Tower, Seattle 4, Wash.

INTRODUCING CHARLIE CRAFTSMAN—

The Man in Your Plant Who Knows the Answers to His Health Problems

This article marks the beginning of a series of industrial jobside chats with a typical worker who is interested in helping his fellow workers to a large share of better health. Charlie is sold on the importance of preplacement and periodic physical examinations, which he talks about in his second article, due to appear in the March number of the *Industrial Hygiene Newsletter.* Timely subjects and health information of interest to most industrial workers will be offered by Charlie in subsequent issues.

"Just to keep the record straight, I'm Charlie Craftsman. Maybe you've met me or others like me at the place you work. Wouldn't surprise me one bit, because I've been all over. I picked up the travel bug a long time ago, and I've been on the move ever since. I haven't got a family to keep me in one place, but nobody supports me either. I've had to earn my own way. When I start thinking back, it seems as if I've worked at almost every trade there is. I've been a machinist, welder in a shipyard, tanner in a shoe factory, watchman, dock seaman, just to mention a few. I was even a secretary once.

"Don't get me wrong now. I'm no jack of all trades. I've worked plenty hard to learn the skills of every job I've had. Why, I have enough union cards in my pocket to paper a room.

"I've picked up a lot of other things, too. When a fellow sees different places, different people, and works at different jobs, he learns more than just new skills. He gets to appreciate the other guy's viewpoint. He learns what makes him tick—what's good for him and what's bad. I've found out first-hand that one man's meat can be another man's poison.

"I've seen workers go to pieces, do sloppy, defective work—and end up with pink slips because they weren't cut out for their jobs in the first place. They had no more business there than a square peg has in a round hole.

"I've seen others cripple themselves trying to make a frail body do heavy lifting that called for a thick-muscled Atlas. Wrong jobs robbed them of their health—and their pay. And when a man can't work, he's lost his capital. He's finished—through!

"One day I'm going to sit down and write a book about all the things I've seen. Maybe it'll help some folks avoid the mistakes that I and others have made. Some mistakes are just plain fool ones we can make every day and laugh over the next. Some can spoil your whole life.

"Like being exposed to dangerous fumes, for instance. Can you tell a poisonous fume or dust from a safe one where you work? Sure, there's danger lurking in just about all industries, but you can protect yourself. That's where goggles, respirators, protective creams, fans and other gadgets come into the picture. They're not just a lot of knicknacks or sissy stuff. They're important protection.

"Carelessness can sure deal you a blow below the belt. I've seen men go into convulsions suddenly from overexposure to harmful gases and die a couple of hours later. I've seen a pretty girl's hands get brown and scaly from an acid solution. I've seen men become invalids for life from breathing sand dust. It pays to protect yourself on the job. I've learned the hard way.

(*Continued on page 16*)

EDITORS: Here is the first of a series of articles written in conversational style for industrial workers to read. You may reproduce the article and the illustration in your health bulletin, plant paper or clip sheet, ... in any publication that reaches the workers. Watch for the next one in the March issue. (Make your own linecuts from the reproductions of illustrations in the *Newsletter.*)

ARE POSTERS EFFECTIVE IN A HEALTH EDUCATION PROGRAM?

Since the flood of posters during the last war left many people satiated with that medium, much discussion of their effectiveness has been carried on among health educators. The value of telling an important message by visual media is well recognized.

Articles on this subject have been printed in the *Newsletter* from time to time (the most recent were two articles on exhibits in the November and December 1948 numbers).

In this issue, attention is called to this group of posters because the familiar, cartoon-type is becoming increasingly popular.

The six posters reproduced here are part of a series printed in color by the Canadian Department of Health. French captions are used in the Province of Quebec.

(1) Every day—with soap and water my skin is lovely.

(2) He who eats well lives well—Umm! I am hungry.

(3) Prevention is better—I don't wait until I am sick.

(4) After the work—the fun. My friends will never believe me.

(5) What beautiful teeth! I consult my dentist often.

(6) After 8 hours of sleep—I jump out of bed!

CHARLIE CRAFTSMAN—

(Continued from page 15)

"Germs can knock you for a loop, too, and take you off the production line. Man, how the bills pile up when you lie in bed, unable to earn a living! One of my best buddies died from pneumonia. Trouble was it had just started out as a plain cold, and he didn't pay any attention to it—not till it was too late. Carelessness with health is not a paying proposition.

"I could tell you a lot of things that I've seen in my life . . . tips to help you stay healthy, do a good job, and keep a steady flow of pay envelopes. I've worked in a lot of places—from the mines of West Virginia to the timberlands of the Northwest. No matter whether you take the low road to earn a living or take the high road, I've learned that you have to watch your health to keep on making that living!"

U. S. GOVERNMENT PRINTING OFFICE: 1949 818380—49