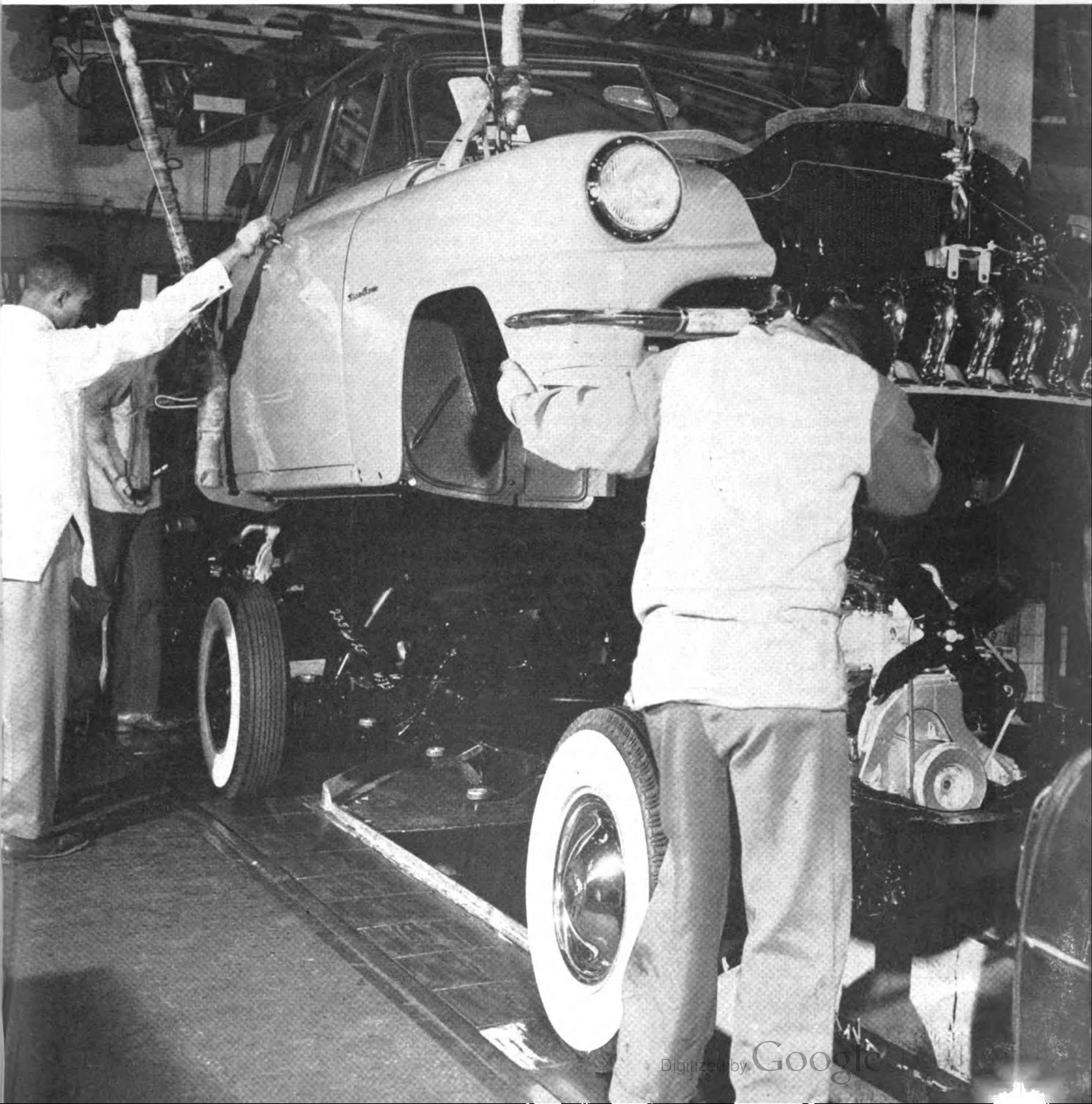
occupational health

DECEMBER 1952

FEDERAL SECURITY AGENCY • Public Health Service



OCCUPATIONAL HEALTH

Formerly *Industrial Health Monthly*

Volume 12 | December 1952 | Number 12

Issued monthly by
FEDERAL SECURITY AGENCY
Public Health Service
Division of Occupational Health

IN THIS ISSUE

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); single copies 10 cents.

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

Articles in this publication are indexed in the *Current List of Medical Literature.*

The printing of this publication has been approved by the Director of the Bureau of the Budget, December 6, 1951

PHS REACTIVATES COMMITTEE WORK IN CHEMICAL LABELING

THE introduction within recent years of a multitude of new chemicals and the increasing commercial application of chemical products have intensified the need for proper precautionary labeling. The use of adequate warning designations on containers of chemical products is essential in protecting the health of not only those who handle these materials in their various repackaging and processing stages but also of the ultimate consumers.

To reappraise current needs and to take new steps to meet today's problems, the Public Health Service is reactivating the work of the Chemical Products Agreements Committee, which had functioned prior to 1950. The new committee, to be known as the Chemical Products Labeling Committee, will serve in an advisory capacity to the Labels and Precautionary Information Committee of the Manufacturing Chemists Association and to other agencies, such as State health and labor departments. It will provide a focal point within the Public Health Service and the Federal Security Agency for obtaining expert opinion on the need for labeling as well as for developing baselines for uniform labeling practices.

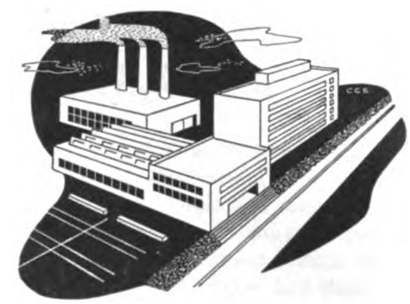
In recent years, practically every State health department and many labor departments have become interested in the labeling of toxic materials, and the resultant development of varying labeling requirements throughout the country has made it difficult for industry to cooperate. In the interest of promoting uniform labeling, an effort will be made by the Chemical Products Labeling Committee to unite the activities of the various groups interested in this problem, to

(Continued on page 199)

COVER PICTURE

Automobile Production in Detroit—Body meets chassis! That dramatic moment when proper body, built to specific schedule, is lowered to its own chassis while final assembly line continues to move. Photograph by courtesy of Chrysler Corporation.

DETROIT, PIONEER IN MUNICIPAL INDUSTRIAL HYGIENE, LEADS IN MODERN HEALTH PROTECTION PRACTICES



A LEAD poisoning epidemic among Detroit automobile plant workers led to the establishment in 1936 of the city's industrial hygiene service, one of the first municipal units in the country.

A change from the old wood and metal automobile bodies to the present all-steel, welded bodies necessitated the use of lead solder to smooth over certain rough welded seams and imperfections on the metal body stampings. The molten solder was applied to the necessary points of the body, and then smoothed off with motor-driven disk sanders. The high lead dust exposure from the process resulted in an alarmingly large number of lead-poisoning cases. The Bureau of Industrial Hygiene of the Detroit Department of Health began as a three-man division to cope with this problem and other industrial health exposures.

During the past 15 years, the Bureau has grown from a three-man staff to the present personnel of 16, including engineers, chemists, and nurses. However, the increase in staff has not kept pace with the growth of industry, and the present staff is not large enough to adequately protect the large worker population in Detroit, estimated at 760,000.

The automotive industry, although it is the best known and employs a relatively large number of industrial workers, is only one of a great variety of industries in Detroit. Even Detroiters in general do not know that approximately 80 percent of the world's supply of soft gelatin capsule vitamins are capsulated in Detroit; and that 1,100 feet directly under the city of Detroit, an enormous mine is being operated. This mine is so extensive that 60 miles of smooth streets and alleys—complete with stop lights, traffic signs, and car tracks—are needed for transportation purposes.

Included in the diversified industry of Detroit are cement plants, aviation equipment factories, several large pharmaceutical plants, approximately 50 foundries, cigar, stove, and refrigerator factories, and granite cutting and electroplating shops. Occupational exposures are of a great variety, including the common ones, such as lead dust and silica dust, and the unusual exposures, such as those from beryllium and radiation hazards.

NOISE CONSCIOUS CITIZENS REQUEST ENGINEERS TO CHECK SOUND LEVELS

NOISES from steam exhaust, compressed air intake and exhaust, and vibrations from various causes have been sources of worry and annoyance to plant managers and housewives in Detroit.

Industrial plant owners want to protect their workers from even the possibility of occupational hearing impairment. Homemakers object to the noise for nuisance reasons.

Well equipped to check the sound levels of various industrial operations, the Detroit Bureau of Industrial Hygiene makes an analysis of the sounds present, such as levels and pitch, and recommends possible means of correcting any unwanted or excessive sounds.

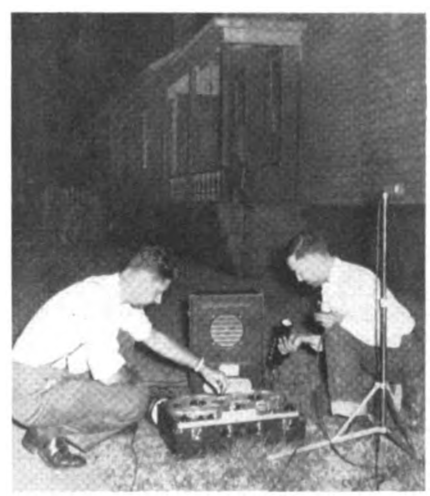
Among the instruments used are a sound level meter with microphone extension, a frequency analyzer, and an amplifier and oscillograph for low-frequency vibrations. A much-needed accessory, for the study of intermittent sounds of short duration and for determining the effects of acoustical treatment, is a high-fidelity tape recorder.

Under certain circumstances where the frequency of the sound waves that were generated was found to be too low for standard sound level equipment, it was necessary to use the vibration equipment of the Bureau. This equipment consists of an oscillograph, amplifier, and modified vibration pickup.

The pickup is modified to receive the vertical component of the vibrations which are transmitted through the surfaces. The sensitivity of the vibration instrument group is sufficient to record the dripping of water from a leaking faucet when transmitted through the sink basin. These instruments are useful in recording vibrations up to 500 cycles per second although the frequencies most commonly encountered are between 10 and 100 cycles per second. The oscillograph chart can be operated at a speed of 12.5, 2.5, or 1 centimeter per second, as desired.

These instruments are used to analyze any vibration for frequency and amplitude. Low frequency vibrations are of interest to the people of Detroit because of possible structural damage to property and nuisance to individuals.

The Bureau maintains a reprint library where articles are filed pertaining to sound, vibration, their effects on man, and methods for control. The Bureau of Industrial Hygiene's field staff attended the course recently given by the University of Michigan's School of Public Health on noise, its effects and control.



Effectiveness of acoustical treatment of a noisy operation is checked both before and after by high-fidelity tape recording, along with sound level measurements.

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Labor Department Inspectors Refer Health Hazards to Bureau

COOPERATION with the inspectors of the Michigan Department of Labor has made it possible for the Detroit Bureau of Industrial Hygiene to help many plants make their work places healthier and safer.

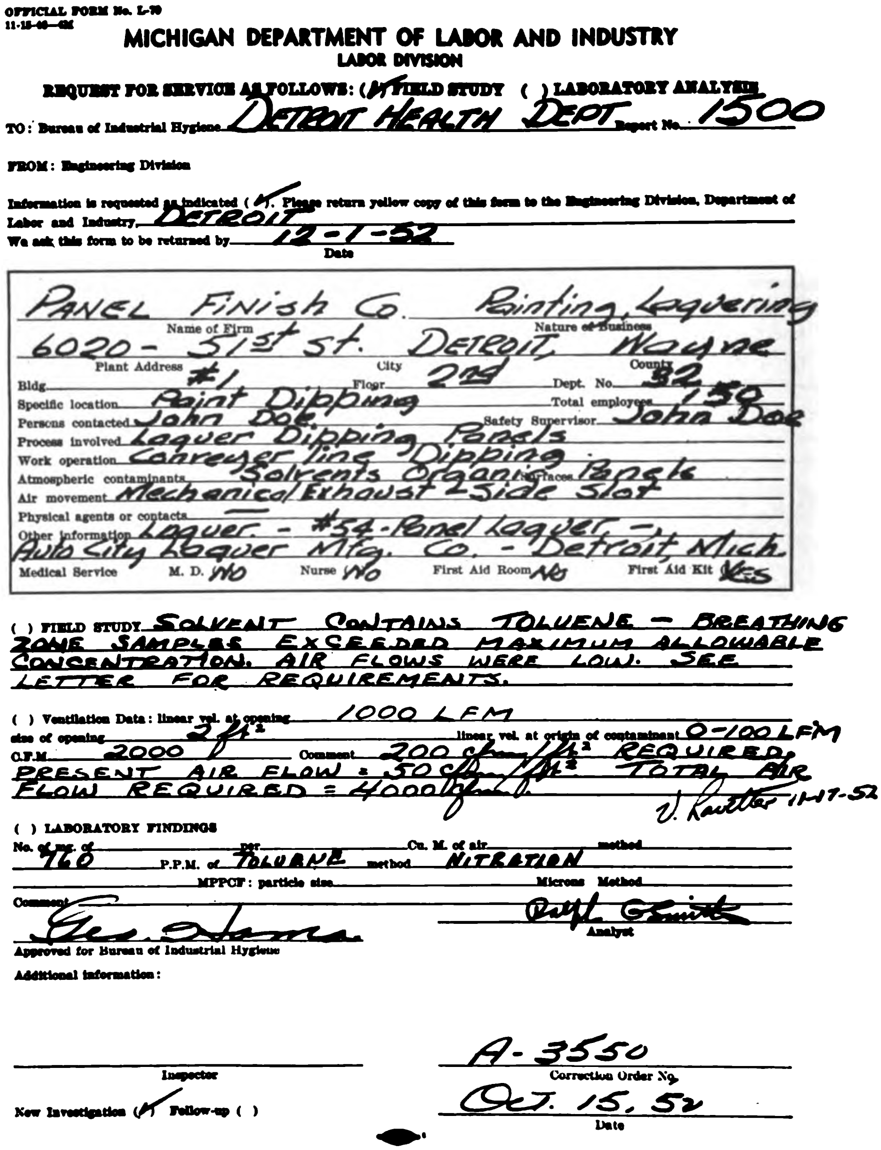
The inspectors in the area who investigate such items as safety, health, employment of minors, and wage-and-hour claims are well-trained, competent men who regularly inspect a large number of plants. An agreement was made whereby the Labor inspectors refer to the Bureau any health hazards they uncover. The referral is sent in writing in a specially prepared form, giving full details of the process which causes the exposure, the material used, the exact location in the plant, and other pertinent information.

The Labor inspector also informs the plant management that an investigation will be made by industrial hygienists. When the investigation is complete, the results and requirements for the plant are given to the Labor Department on a duplicate of the referral form. The Labor Department then assists the Bureau of Industrial Hygiene in enforcing the requirements for controlling the health hazard. Meetings are held at which are present both the Labor Department inspectors and the Bureau industrial hygienists. At these meetings new and unusual exposures are discussed, as well as policies and current problems connected with the handling of investigations.

Another type of request for investigation in which the joint efforts of governmental agencies are used to protect the workers is the cooperative work of the Bureau with agencies which issue licenses to certain types of establishments. An example of such an agency is the Fire Marshal's Division of the Michigan State Police. This agency issues licenses to all synthetic dry cleaners in Michigan. Before issuing such a license to a dry-cleaning establishment, the Michigan State Police request the Detroit Bureau of Industrial Hygiene to make an investigation of the health conditions in the workplace. Such a request is made through the Michigan Department of Health. The Bureau of Industrial Hygiene informs the State Police of any corrections which are necessary. The State Police then require compliance of the corrections before the license is issued.

Other City Departments.—Additional requests for investigation come from the many inspectors who are employed by other departments of the city of Detroit. Many of these inspectors have been asked to observe health conditions. Their help is of great value to the Bureau industrial hygienists in protecting the health of the workers of Detroit.

Office of Civil Defense.—The Detroit Bureau of Industrial Hygiene is actively engaged in assisting in civil defense plans. These plans include a method for helping industry to be safely rehabilitated, so that production can be resumed as soon as possible after disaster takes place. The Bureau also assists in technical details of detection and protection in biological warfare attacks. Members of the Bureau are cooperating by consultation on the details of monitoring and protection against radiation hazards.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MICHIGAN DEPARTMENT OF LABOR AND INDUSTRY
LABOR DIVISION

REQUEST FOR SERVICE AS FOLLOWS: (✓) FIELD STUDY ( ) LABORATORY ANALYSIS

TO: Bureau of Industrial Hygiene DETROIT HEALTH DEPT Report No. 1500

FROM: Engineering Division

Information is requested as indicated (✓). Please return yellow copy of this form to the Engineering Division, Department of Labor and Industry, DETROIT

We ask this form to be returned by 12-1-52 (Date)

PANEL FINISH CO. — Name of Firm; Painting, Laquering — Nature of Business
6020 - 51st St. — Plant Address; DETROIT — City; Wayne — County
Bldg. #1 Floor 2nd Dept. No. 32
Specific location Paint Dipping Total employees 150
Persons contacted John Doe Safety Supervisor John Doe
Process involved Laquer Dipping Panels
Work operation Conveyer line Dipping
Atmospheric contaminants Solvents Organic Surfaces Panels
Air movement Mechanical Exhaust - Side Slot
Physical agents or contacts
Other information Laquer - #54 - Panel Laquer - Auto City Laquer Mfg. Co. - Detroit, Mich.
Medical Service M. D. NO Nurse NO First Aid Room NO First Aid Kit YES

( ) FIELD STUDY SOLVENT CONTAINS TOLUENE - BREATHING ZONE SAMPLES EXCEEDED MAXIMUM ALLOWABLE CONCENTRATION. AIR FLOWS WERE LOW. SEE LETTER FOR REQUIREMENTS.

( ) Ventilation Data: linear vel. at opening 1000 LFM
size of opening 2 ft² linear vel. at origin of contaminant 0-100 LFM
C.F.M. 2000 Comment 200 cfm/ft² REQUIRED, PRESENT AIR FLOW = 50 cfm/ft². TOTAL AIR FLOW REQUIRED = 4000 cfm.
V. Kautter 11-17-52

( ) LABORATORY FINDINGS
No. of mg. of ___ per ___ Cu. M. of air ___ method
760 P.P.M. of TOLUENE method NITRATION
MPPCF: particle size ___ Microns Method
Comment
[signature] — Approved for Bureau of Industrial Hygiene
[signature] — Analyst
Additional information:

Inspector
A-3550 — Correction Order No.
New Investigation (✓) Follow-up ( )
OCT. 15, 52 — Date

Tunnel Workers Protected From Methane Gas and Bends by Many Devices and Regular Checks

WHEN the Detroit Water Board began the construction of a tunnel connecting an existing raw-water tunnel, supplying a northwestern water treatment plant, and a new water treatment plant on the northeastern side of Detroit, the Bureau of Industrial Hygiene was called upon for help.

The tunnel, when finished, will be approximately 5 miles long. Seventy-five to eighty feet of earth cover the tunnel which will be 10 feet in inside diameter when finished. Gravity feed will carry the water to a caisson at the new water treatment plant.

During the mining, concrete segments were fitted into place forming a wall 15 inches thick. A 16-inch layer of concrete (monolithic lining) was then poured over this initial wall, giving a final smooth wall 31 inches thick. In the early stages of mining, no air pressure was required in the tunnel.

The Detroit Bureau of Industrial Hygiene maintained routine checks on the carbon dioxide content of the air at the digging shield and spot checks for methane, which existed as gas pockets in the ground. With the introduction of air pressure to minimize gas and water seepage, more problems were posed. These were resolved with the cooperation of the contractor, Water Board engineers, and this Bureau.

Exhaust ventilation, approximately 3,000 c. f. m., was provided via bleeder tubes to the surface to minimize the methane exposure and maintain enough oxygen-carrying air. As a further precaution, vent tubes were inserted into the ground ahead of the digging shield to ventilate gas pockets in line with the path of the tunnel. An automatic gas-alarm system was also installed in the tunnel.

The construction inspectors were instructed in the proper use, repair, and check of the combustible gas indicators. A special calibration post for the combustible gas indicators was established in the resident engineer's office. In the tunnel, a fresh-air box was provided for zeroing in the combustible gas indicators.

As a further precaution for safe working practices with methane present, work in the tunnel was to be stopped when the concentration exceeded 10 percent of the lower limit of flammability. Recording pressure gages were installed at each air lock, so that a continuous record was maintained for study by the inspector for proper decompression times.

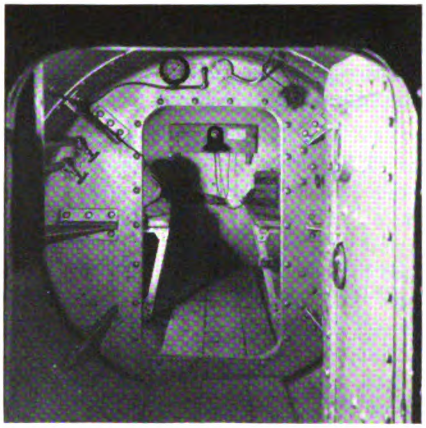
A test gage was used to check all the gages on the air locks. The average working pressure was 25 pounds per square inch, with a maximum of 38 pounds per square inch. The condition of the ground determined the pressure requirement. Frequent checks were made to determine that proper work schedules under air pressure were followed.

To minimize the incidence of bends due to chilling, the air locks were provided with banks of overhead infra-red heating lamps to heat the men as they were being decompressed. The added heat assisted in maintaining a better decompression schedule. The "No Spitting in Air Lock" sign on the wall of the air lock was set up for more than sanitary reasons. A good aim and a hot infrared lamp could produce a broken lamp.

The cars transporting men back to the lock from the digging shield carried wind shields, or the men sat on the bottom of the cars for protection from the cold air of the tunnel during transit.

A bank of infrared lamps in the air lock is used as a source of heat during decompression.

On the surface and near the lift, a medical air lock, capable of treating two men simultaneously, was constructed for the prompt treatment of the bends. The man inside maintained contact with the operator outside the booth by telephone. The city police also used this air lock for emergency cases occurring elsewhere.



A medical air lock with two chambers where cases of the bends are treated.

Detroit Staff Active in Industrial Health Education

The large universities in and near Detroit provide the Bureau with unusual opportunities in the promotion of industrial health education. During 1951, 48 lectures were given at the University of Michigan, Wayne University, and the University of Detroit.

Staff members of the Bureau have participated in many special adult education courses as well as those for regular classes. The short courses are useful for the promotion of a particular phase of industrial health or for the special training of a particular industrial group.

Short, special courses to which staff members contributed lecture time during the past year were as follows:

The Acoustical Spectrum, Sound

(Continued on page 190)

DETROIT BUREAU DISTRIBUTES GUIDE TO X-RAY PROTECTION

An information sheet entitled *Protection of Personnel Exposed to X-Ray from Equipment Used in Therapy and Diagnosis*, has recently been prepared by the Bureau of Industrial Hygiene. The content is as follows:

Although all reasonable precautions may have been taken to insure that buildings and equipment conform with accepted standards, it is nevertheless possible, through misuse or improper operating techniques, to cause excessive exposure of personnel to ionizing radiation from X-ray and fluoroscopic equipment. To avoid unnecessary exposure, the following precautions are required:

(1) A serial record showing all use of X-ray producing equipment. Include: (*a*) Exposure serial number and date; (*b*) type and length of exposure (that is, X-ray, therapy, or fluoroscopy; and number of seconds); (*c*) kilo-voltage and milli-amperage used; (*d*) names of fluoroscopists, therapist, technician, and assistants.

(2) Preemployment and periodic physical examinations, including complete blood counts of all personnel working in or adjacent to rooms containing X-ray, fluoroscopic, or other equipment which produces ionizing radiations. (Plotting of each individual's serial blood counts on graph paper will facilitate the detection of any trend toward an abnormal level.)

(3) A suitable personal radiation-monitoring device for each person working in or adjacent to rooms containing radiographic, fluoroscopic or other equipment which produces ionizing radiations. Personal exposure shall not exceed 0.3 roentgen per week, 0.05 roentgen per day, or 6.25 milli-roentgens per hour.

(4) Suitable clothing or other radiation barriers of sufficient density so that the rate of personal exposure will not exceed 0.01 milli-roentgen per second.

(5) Mechanical positioning devices for use in those cases where the subject is unable to maintain position for radiography without assistance. Such subjects may be held in position by persons who are not frequently exposed to ionizing radiations, provided that such assistants are warned that repeated exposure may be injurious.

(6) Appropriate filters and collimating cones to be used, unless specifically contraindicated.

(7) Make certain (before initiating excitation of X-ray tube) that nobody is being needlessly exposed to either direct or scatter radiation.

(8) Restrict fluoroscopic viewing aperture to the smallest usable size during examination. Close fluoroscopic shutters upon conclusion of use.

The above are to be regarded as minimum standards and should not be construed as superseding more stringent control measures deemed necessary by the staff radiologist.

LETTERS from the READERS

Subject: Ferromanganese Processes

Sir: A problem of considerable magnitude confronts me, and I cannot find any suitable literature on the subject. I feel that some of your readers will be able to offer me guidance.

My problem must surely have confronted a large number of public health authorities throughout the world, and it would be reasonable to expect that measures have been evolved whereby the unsatisfactory features can be minimized or entirely eliminated.

Within my local authority area there is a factory which uses ferro-alloy processes by which large quantities of very fine oxide particles are produced. Such particulate matter is discharged into the external air via up-cast ventilators. A continuous stream of reddish-brown "smoke" belches from these ventilators and travels for a considerable distance before it finally disperses, or becomes deposited on the surrounding terrain.

Analysis of the "smoke" shows the following percentage distribution of the indicated chemicals:

	Percent
MnO_2 and MnO	42.3
CaO	18.3
SiO_2	11.2
Al_2O_3	7.7
Fe_2O_3	2.1
MgO	3.0
C	10.8
Sulfuric oxides	4.6
	100.0

Microscopic counts on this furnace dust reveal that 86.48 percent of the particles are less than 3 microns in size. Moreover, 27.30 percent are less than 1 micron in size. The largest particle is less than 70 but greater than 60 microns.

Various tests have been carried out with a view to arresting the passage of this matter into the atmosphere, but results have been discouraging. The only method to have proved successful was by means of water scrubbing, but this is considered too expensive. Some success has been achieved, however, with the sonic agglomerator, yet the results were far from encouraging.

(Continued on page 198)

HEALTH EDUCATION—

(Continued from page 189)

Wanted and Unwanted—University of Michigan.

Health Protection in Foundry Practice—University of Michigan.

What's New in 1952—University of Michigan.

Stack Sampling and Air Pollution—University of Michigan—Extension Course.

Industrial Ventilation Conference—Michigan State College.

Examples of courses given to regular students in which members of the Bureau of Industrial Hygiene participated recently are as follows:

Methods and Principles of Industrial Health—University of Michigan.

Engineering Control of Industrial Exposures—University of Michigan.

Industrial Health for Junior Medical Students—University of Michigan.

Industrial Health for Medical Students—Wayne University.

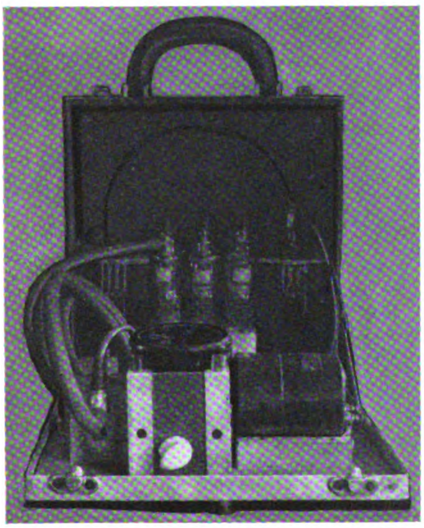
Health Hazards for Chemistry Students—University of Detroit.

The Bureau of Industrial Hygiene has also participated in health educational work of a less formal type, such as radio and television programs, and special lectures and talks pertaining to industrial health. During 1951, 20 lectures and discussions were given by staff members to lay groups.

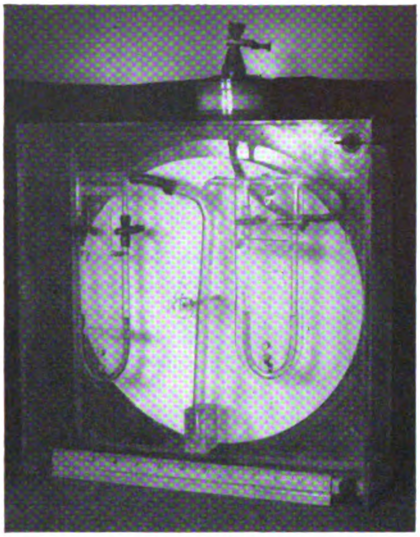
DETROIT CHEMISTS DEVELOP NEW METHODS AND INSTRUMENTS

To evaluate the toxic exposures in Detroit industries, several thousand analyses are performed annually in the laboratories of the Bureau of Industrial Hygiene. Although fundamental research is not often possible, practical research is frequently necessary to devise means of solving problems that are brought to the Bureau. Such problems may concern the collection or analysis of a new material in use by industry, or perhaps recent toxicological data may create the need for much more sensitive methods than are presently available.

Beryllium Method.—The relatively recent recognition of beryllium as a highly toxic substance under certain conditions will serve as an illustration. Existing methods of sampling and analyzing beryllium-containing atmospheres were entirely inadequate for the extremely minute amounts of the metal reported to cause lung damage. Research undertaken to develop a suitable method resulted in a spectrographic procedure for determining beryllium in urine or other biological materials, and in air. This method has been used successfully on a number of occasions where potential beryllium exposures were found in Detroit plants.



A portable battery-operated midget impinger pump used by the engineers to sample the air breathed by the workmen in possibly hazardous situations.



A hydrogen sulfide recorder used in the Bureau's laboratory.

Portable Pump.—Engineers on the Bureau staff developed the design and construction of a portable battery-operated pump suitable for collecting dusts and other materials in the air with midget impingers. This pump has found wide use in the field, largely replacing the hand-operated pump formerly used. It enables the engineer to devote more fully his attention to the worker's activities during the sampling period, and thus obtain representative air samples.

Hydrogen Sulfide Recorder.—Concern with atmospheric pollution problems led to the development of a continuous recording device for determining small amounts of hydrogen sulfide in air. Using a large filter paper impregnated with a lead solution, the instrument yields a 24-hour record of sulfide exposures in a semiquantitative fashion. Work is still in progress to further refine the instrument so that more quantitative results may be obtained. Fading of the lead sulfide stain also takes place to some extent, and means are being sought to lessen or eliminate this effect.

Ozone.—The frequent uses and misuses of ozone have been a constant source of concern to industrial hygienists, and the general lack of satisfactory methods of analysis for this gas has made the evaluation of exposures to it rather uncertain. Research has been in progress for the past year to develop a fully satisfactory method of ozone sampling and analysis, and the results to date are very promising.

Radioactive Matter in Air.—Outdoor air normally contains a very minute amount of radioactive dust, and this amount has been shown to vary considerably with the weather. Inasmuch as the weather, or more specifically the vertical stability of the air, has a direct bearing on the amount of air pollution on a given day, it has been found useful to measure the radioactivity and attempt to correlate it with other sampling data. Previous work along these lines required several thousand dollars worth of elaborate measuring and recording equipment, but a method has been devised and used by the Bureau which requires only an inexpensive electrometer and other equipment normally available. This same method would easily detect any contamination of the general atmosphere resulting from a distant atomic blast or other source of radioactive dust.

The examples of practical research cited illustrate in a general way the approach by staff members to new problems. A field as varied and changeable as industrial hygiene requires constant work of this kind.

THRESHOLD LIMIT VALUES FOR 1952 AVAILABLE

The threshold limit values of toxic substances as adopted at the last annual meeting of the American Conference of Governmental Industrial Hygienists have been reproduced in reprint form, and copies are now available.

The publication is entitled **Threshold Limit Values for 1952.** Free copies may be procured from Mr. Allan L. Coleman, Chief Industrial Hygienist, Bureau of Industrial Hygiene, Connecticut State Department of Health, Hartford 1, Conn.

UNCOMMON RADIATION EXPOSURES FOUND IN DETROIT INDUSTRIES

X-Rays in the Streets.—The installation of a pipe line to convey natural gas into Detroit brought with it the exposure attendant upon the X-raying of welds at the site of installation.

A film tape is wrapped around the outside of the pipe at the weld, and the X-ray head is introduced into the pipe and moved to the site of the weld by means of a motor-driven creeper. A "feeler" automatically stops the X-ray head at the site of the weld, whereupon the exposure is started. It takes about three minutes to complete the 360° exposure. Some X-raying is done in the trench, but most is done above ground.

The survey indicated that the hazard to the general public was minimal; and under the conditions encountered in the city, the amount of X-raying did not result in hazardous levels of exposure to persons engaged in this work. However, outside of cities the pipe line is laid above ground, and the work progresses more rapidly. The resultant faster rate of X-raying could cause excessive exposure to the workers. This information was communicated to the State health department for further investigation.

Thickness Control.—With the advent of sensitive instruments for radiation detection, an extremely useful application of ionizing radiation has been the thickness gage for quality control in plants whose products or intermediates are in sheet form.

A source of radioactivity is located on one side of the sheet and a sensitive detector, on the other. The amount of radiation reaching the detector varies according to the thickness of the mass of material in the sheet. In some cases, the detector automatically regulates the spacing of the rolls so as to make the thickness of the sheet more uniform. The Detroit Bureau of Industrial Hygiene had occasion recently to check the hazard from an X-ray thickness gage used in a brass rolling mill and also from a strontium 90-thickness gage used in a rubber plant. Although the amount of radiation leakage did not exceed the allowable limit, in one case the leakage was further reduced by installation of a small shield. When used, automatic controls prevent the escape of excessive radiation. However, there is a possibility of overexposure while setting up the job since the automatic controls must be locked out.

Where's the Leak?—A Detroit commercial supplier of radioactive isotopes recently had occasion to assist a plumber in locating a water pipe leak in a ranch-type home. Many of these homes have the plumbing embedded in the earth below the slab, since there is no basement. Although this case occurred outside the city, the isotope supplier requested a consultation with the Bureau of Industrial Hygiene, in view of the fact that the water supply came from Detroit and because of the likelihood that similar jobs might be contemplated within the city.

The leak is located by pumping diluted radioactive isotopes, such as iodine 131, into the plumbing system and monitoring with a sensitive detector. As the result of this consultation, the following recommendations were made:

(1) Plumbing to be completely sep-

Welds in a gas pipe line are being X-rayed on the site of installation in Detroit. A complete mobile X-ray laboratory makes this on-the-spot check possible. Stray radiations from this examination are monitored by the Detroit Bureau.

arated from water supply mains until system is thoroughly flushed of radioactive material and disinfected.

(2) Work to be done only under direct supervision of persons with adequate training in nuclear physics.

(3) Only short half-life isotopes to be used.

(4) Each job to be reported to and checked by the Bureau of Industrial Hygiene.

A closeup of the engineer using a "Cutie Pie" radiation detector and pocket dosimeters to evaluate the X-ray hazard connected with a gas pipeline installation.

Nurses Urge Plants to Maintain First Aid Services as Part of Health Employee Program

TWO nurses working with the Bureau of Industrial Hygiene made over 500 visits to plants last year to give consulting service to industrial nurses, management, and first-aid workers. Conferences were held with public health nurses and other personnel of the Detroit Department of Health to inform them of new happenings in the field of industrial health and to coordinate various Department of Health activities.

Consultation With Industrial Nurses.—Nurses new in industry who work in small plants are especially in need of help from the Bureau nurses, and more experienced nurses also have welcomed this consultation to keep them informed of new educational materials and current happenings. The industrial nurses in the large plants often offer their assistance to the nurses in the small plants.

Three-Point First-Aid Program for the Small Plant.—The Bureau recommends that small plants with up to 150 employees meet certain minimal first-aid standards. These standards call for provision of a first-aid kit with recommended content and a posted medical emergency plan; it is also required that at least one worker from each shift have first-aid training from an approved source.

The same plan is recommended for the industry with 100 to 500 employees (depending on the type of employment): but, in addition, the plant should have a part-time registered nurse and a first-aid room. This part-time nursing service is available in Detroit from the Visiting Nursing Association.

A great deal of work has been done to aid in the establishment of an industrial first-aid course for this plan. The instructors for the course have been given assistance in planning the content in accordance with recommendations of the Detroit Industrial First-Aid Advisory Committee. The basis of the course and the reference manual are reprinted in the May 1952 issue of *Industrial Medicine and Surgery*.

Full-Time Industrial Nurse.—The employment of a full-time, registered nurse who meets qualifications recommended by the American Association of Industrial Nurses, Inc., is urged for the larger plants. Also, the services of a part-time physician are often recommended.

Chest X-Rays for Small Plants.—Nurses of the Bureau have worked closely with the Tuberculosis Division nurses in channeling the services of the mobile X-ray unit to Detroit industries. When the Bureau nurses call upon industrial nurses, the services of the tuberculosis unit are explained. Where small plants are located close together, a cooperative arrangement is worked out so that offices or plants with as few as 2 workers have been able to have chest X-rays. Many of these small plants have never before offered X-rays as part of their physical examination program, and survey findings have indicated that this service was well justified.

Study of Silicosis in Detroit.—Tabulations are kept currently of available information on the incidence of silicosis in Detroit. Of the 1,137 persons diagnosed as silicotics, the majority have had their silica exposures while working in mines before coming to Detroit. Second only to mining as an occupation causing silicosis is foundry work. Other predisposing jobs have been in brick work, monument carving, tunnel work, sandblasting, sanding, and enameling. The only woman who was diagnosed as a silicotic had worked in a pottery kiln. The average age of the patient at diagnosis was 55.1 years, and the average length of exposure on the dusty job was 19.8 years. However, several persons were 25 years of age and had had only a few months on a silica-dusty job.

Of the 1,137 silicosis patients, 457 were diagnosed as having tuberculosis. Recent years have shown a lower tuberculosis rate; but previous to 1946, it had been higher.

Insurance Company Provides Industrial Health Service

In the survey of a lead storage battery plant to check on the use of carbon tetrachloride, the Los Angeles City industrial hygiene staff found that the compensation insurance carrier performed a yearly industrial health study, sending one of its industrial hygiene engineers from its home office in the East to perform this service.

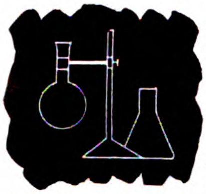
Each year upon completion of this study, the insurance carrier mails the firm a brochure of its findings together with its recommendations. Not only does the firm take advantage of engineering knowledge, but it also employs a part-time physician to check its 55 employees. Blood smears for lead are taken every 2 weeks from employees in hazardous areas. Other workers who are handling lead have blood smears taken monthly. Lead urines are done yearly.

The plant is modern, with many automatic devices. Vacuum cleaning is a must, the reclaimed lead paying the wages of the janitor.

FLAME SPECTROPHOTOMETRY

By Dohrman H. Byers

SOME TIME during our elementary course in chemistry, each of us dipped a wire loop into a solution of a sodium salt, thence into a flame. We learned that the resulting yellow color of the flame indicated the presence of sodium.



Perhaps we even made a similar test for potassium by looking at the flame through a cobalt blue glass. The glass filtered out the yellow of the sodium flame so we could see the violet flame produced by the potassium. Detection of the presence of a limited number of elements by such visual flame tests has been used for nearly a century, since it was recognized that the colors produced are characteristic of the elements present.

Now the flame tests have been mechanized to give accurate quantitative determinations of a number of elements. A monochromator and a photoelectric cell have been combined to replace the eye to recognize the flame's color and to register the intensity of that color. This modernized version of the old flame tests is the rapidly expanding field known as flame spectrophotometry.

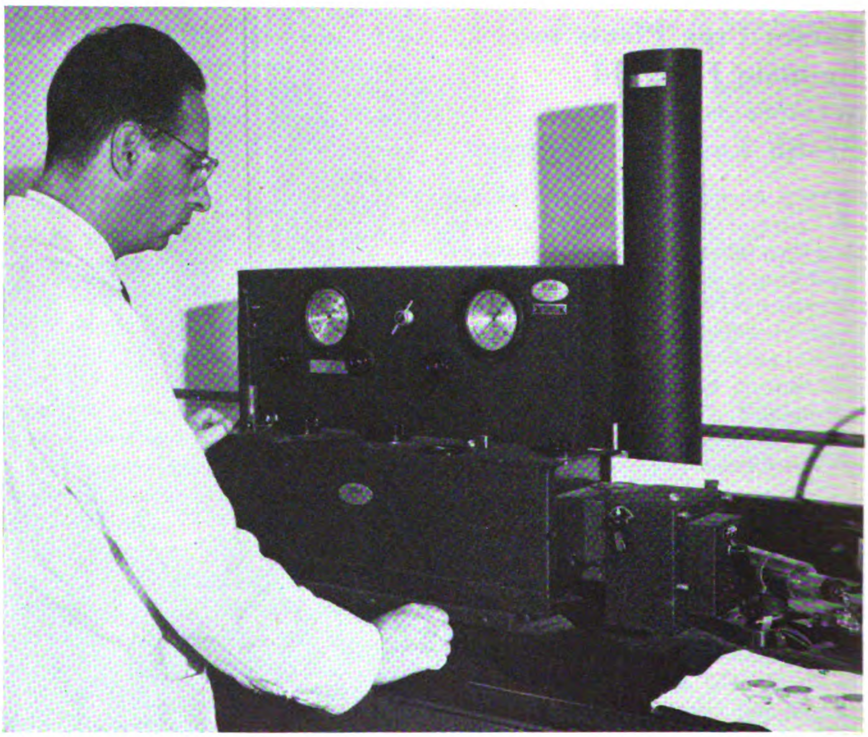
Before flame spectrophotometry was to evolve, these flame tests led to another closely related technique of analysis. In 1859, the development of the prism spectroscope provided an instrument which would separate the colors into distinct lines and specifically arrange them according to wave length. This separation of the colors into their spectral lines almost eliminated the masking of one color by another. Much superior in this respect to our cobalt glass and other filters, the visual spectroscope permitted the detection of smaller quantities and a greater number of elements.

Later, the human element was further removed by the substitution of a photographic plate for the eye as a means of registering the spectral lines. This gave a permanent record which could be examined leisurely in the place of the fleeting glimpses of color of the visual method. Photographic methods also extended the use of the spectra into the wave lengths outside the visual range, and provided a means for rather exact quantitative measurement of the light. Still later the flame was abandoned for the stronger and more controlable electric arc and spark for the excitation of the elements to produce their spectra. Thus the new science of spectrography completely departed from the original flame test.

The flame test returned to a relatively minor role as a qualitative test until 1929 when Lundegardh published a treatise on the use of flame spectra for quantitative analyses. Others then became interested, but not until 1939 was there any published work in this country. These early workers used a spectrographic technique. A solution of the material to be analyzed was sprayed into a gas flame placed before the slit of a spectrograph. The spectrum was photographed and the quantitative determination was made by measurement of the density of the line produced on the photographic plate by a characteristic spectral line of the element desired.

In 1945, Barnes, Richardson, Berry and Hood published a description of a direct reading flame spectrophotometer. Thus the photoelectric cell was introduced as a means of measuring the intensity of the lines in the flame spectra. The instensities can then be interpreted quantitatively in terms of the concentrations of the respective elements. A flame, a modified spectroscope, a photoelectric cell and a galvanometer were combined to produce this new instrument—a flame spectrophotometer.

The first instruments available commercially used a gas-air-oxygen flame. These have been remodeled considerably



A USPHS chemist prepares to use the Beckman flame spectrophotometer for analysis of a sample. Note that the usual cuvette holder and a supplemental test tube holder (the grained portion) are left in place so that the instrument can be used for colorimetric analyses by the simple attachment of the electric light source.

Mr. Byers is chief of the chemical analytical unit, toxicology section, Division of Occupational Health Field Headquarters, PHS, 1014 Broadway, Cincinnati 2, Ohio.

to give increased sensitivity. Now there are several excellent instruments available using either oxyacetylene or oxyhydrogen flames. They are reportedly many times as sensitive as the gas flame models.

In all of the various models, the material to be analyzed must be placed in solution. Aqueous solutions are most common. Organic solvents may be used and sometimes increase the sensitivity. From a small beaker, the solution is drawn through the capillary tube of a combined atomizer-burner and directly into an intense flame. The resulting light of the flame is focused upon the slit of the spectrophotometer by means of a mirror in back of the flame. The operator sets the spectrophotometer optical system to select light of the wavelength of a characteristic spectral line of the desired element. The intensity of this line produced in the flame is measured by a suitable photoelectric system. The concentration is finally determined from a plot of intensity readings versus known concentrations or by immediate comparison of the readings with those of known solutions.

A reproducible flame is essential to give comparable intensity readings for known and unknown solutions. Regulators and gauges built into the instrument control precisely the delivery pressures of both fuel gas and oxygen to the carefully designed atomizer-burners. The gas pressures used are relatively low. This exact control of pressures results in a high degree of reproducibility of flame temperature and conditions, and also provides constant and reproducible rates of aspiration of sample solutions into the flame. Flame temperature is very important. The flame temperature required for maximum sensitivity or precision is not the same for all elements. It even varies for different concentrations of a given element.

Unfortunately, the intensity of a given line of the flame spectrum of an element is not independent of the other constituents in the sample. Other substances may tend to intensify or diminish the strength of the line. The presence of substances other than the element being measured may cause the following interferences:

(1) An appreciable variation of flame temperature may be produced.

(2) The excitation energy of the desired element may be changed.

(3) Overlapping spectral lines or bands may augment the intensity of the desired line.

(4) Intense lines or bands near the desired line may contribute stray light to the photocell.

(5) Background luminosity of the flame may be greatly changed.

(6) Reabsorption of light of the desired wave length may occur.

The preparation of standards and the technique of comparison must compensate for such possible sources of error.

As is commonly done in spectrography, an internal standard may be used. A known amount of a selected element not likely to be present in the sample is added to the sample. The concentration of the desired constituent is then calculated from the relative intensities of characteristic spectral lines of the added and the desired elements. The use of an internal standard may introduce some of the aforesaid six interferences as well as require readings at two or more wave lengths. The effects of interfering elements on the spectra of the desired element and the internal standard may be different, thus destroying the proportionality between concentrations and intensities of lines.

It is preferable, if interference is present, to prepare standards of approximately the same composition as the test samples. Often a preliminary flame analysis will give all the information that is needed to prepare standards of suitable composition and range. Sometimes interferences can be overcome by diluting the solutions until the interference is no longer significant. If the results of determinations at two different dilutions do not agree when calculated to the original strength, it is indicative of interference. Usually the relationship of sample concentration and relative luminosity of the flame is more nearly linear at low concentrations.

By flame spectrophotometry, analysis can be made on very small samples. Only 1 to 3 milliliters of sample solution is necessary, and as little as 0.05 milliliter of this may be consumed for each reading. Several elements could be determined even on such a small sample. The instrument does not require cleaning or rinsing between samples. Determinations may be made as rapidly as the solutions can be fed to the instrument and the readings taken. After the samples are ready, readings may be made at a rate of several per minute.

To prepare a sample for analysis by flame spectrophotometry, the sample must be placed in solution. It matters not whether the solution is acid, neutral or alkaline. Undissolved material must be filtered off because the fine capillary of the atomizer is easily clogged by any suspended material. Care must be exercised that interfering substances are not introduced unnecessarily, and that the concentration of the desired constituent does not become too diluted. The addition of certain auxiliary materials to control or offset interferences may be necessary. The preparations are less formidable than most procedures and the simplicity of sample preparation is one of the decided advantages of flame spectrophotometry.

The instrument and technique may be used qualitatively as well as quantitatively. One article lists 45 elements as having detectable spectral lines or bands, although data on limits of detection are given for only 25. The lower limits of detection expressed in parts per million by weight in aqueous solutions with the most recent phototube instruments are as follows:

Sodium	0.005
Potassium	.01
Lithium	.02
Calcium	.05
Manganese	.1
Rubidium	.1
Copper	.5
Barium	1.0
Cesium	1.0
Chromium	1.0
Gallium	1.0
Indium	1.0
Strontium	1.0
Thallium	1.0
Magnesium	2.0
Vanadium	2.0
Nickel	5.0
Boron	10.0
Cobalt	10.0
Iron	10.0
Silver	10.0
Titanium	10.0
Molybdenum	20.0
Lead	30.0

(Continued on page 198)

Production At Any Age

AS A NATION, we have placed sharp accent on youth. We have tended to consider aging as synonymous with disability. Actually, aging is not a state of ill-health. Aging is the wages of living.

Today, the steadily advancing age level of our population belies that we are still a nation of young people. In sheer self-defense, if nothing else, we have to reorient our thinking. While the first half of the twentieth century has been called the age of the child, during the next 50 years we shall be directing our efforts to make the period of maturity more useful and productive.

Who is old?

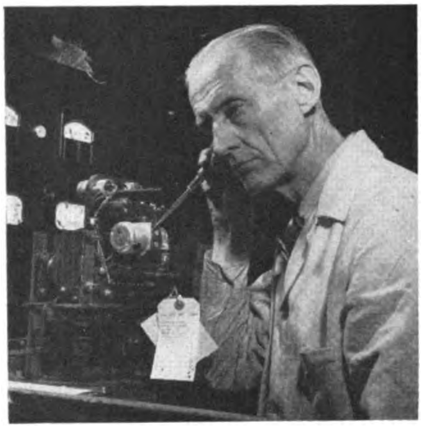
Segregating the older worker is wasteful of human resources. It has no place in a complex economy, nor in an aging society with an increasing span of life.

Age itself is relative. In 1900, when the median age of our population was just under 23 years, the person of 45 was in the older age group. Today, however, the median age is just over 30, and in 1975 it is expected to be 34. By 1980, it is estimated that there will be 43 million persons between 45 and 64 years of age, and over 22 million persons past 65. As the age make-up of our population changes, so must our concept of the older person.

What is "Old"?

Age may be considered as chronological, physiological, and psychological. Chronological age is the least important because it merely represents the ticking off of birthdays. Physiological as well as psychological age varies with each individual. Consider, for instance, the Bernard Baruchs, the Connie Macks, the Grandma Moses', and the Arturo Toscaninis, who are contributing their talents, though past threescore and ten.

In employment, it is the skill, ability, and work capacity that count. Each worker must thus be considered on his own individual merits instead of an arbitrary chronological basis. Recognizing the fallacy of relying purely on the calendar, certain management and labor leaders are urging that retirement policies be based on the individual's work capacity and desire for continued employment. This is particularly important in view of the increasing life expectancy. In 1900, for example, a worker retiring at age 65 could anticipate 3 years in retirement. By 1940, he could expect nearly 6 years in retirement.



Too old for what?

The years give as well as take. For physical aging, there are compensations, such as long-maintained skill and an increase in judgment when speed of reaction lowers. There are man-made compensations, too, such as the machine which takes the place of purely physical effort. For every job for which a worker may be too "old," there are a score of others that he can perform.

Older Workers Can Perform Competently.—Studies show that older workers are more experienced, have fewer outside distractions, are more conscientious, have less wastage, and often are as productive as young workers. Undoubtedly, old age weakens ability on those jobs requiring great energy and speed. But even on such jobs, it has been stated that the decline from age 50 to 75 is gradual and varies with the occupation.

Older Workers Can Perform Safely.—According to the Bureau of Labor Statistics, a study of work conditions of about 17,000 workers in a variety of 109 manufacturing industries revealed that the only disadvantage of older workers is that their disabilities last longer once they are injured. But on the whole, they are likely to be absent less frequently and less likely to be injured than the younger worker. The older worker's respect for safety practices not only protects him, but also influences his coworkers.

Older Workers Contribute to Employee Morale and Productivity.—The "old-timer" usually has more knowledge of the traditions of the firm, a greater sense of belonging, and a higher sense of loyalty. He inspires confidence and loyalty among the other employees. He is particularly helpful in interpreting to younger employees the changes which the industry has undergone and in helping them to better understand various rules and regulations. The mature judgment and perspective that the older worker has gained through experience enriches the outlook and work of younger employees.

Older Workers Need Productivity, Our Economy Needs Production.—While older people have a need for regular productive activity, for pay checks, and for the feeling of independence—industry, the community, and the Nation also have a stake in the usefulness and economic productivity of older persons. The present high standard of living can be seriously affected by supporting a growing group of people who are not only nonproductive but who are also dependent on others for their livelihood and care.

Our changing cultural and economic pattern makes it necessary for the older person to be productive and self-sustaining. For one thing, today's trend toward longer educational preparation makes young people dependent for a longer period of time and delays their

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This article has been prepared in pamphlet form by the U. S. Office of Defense Mobilization, Health Resources Advisory Committee, Washington, D. C. Free copies may be procured by requesting them from the U. S. Office of Defense Mobilization. The title of the pamphlet is "Production at Any Age." Other pamphlets in the same series are entitled "The Disabled Can Work," "The Worker and His Health," and "A Job for Women."

entry into gainful work. Because of this later start, early withdrawal from productive employment, either because of hiring prejudices or arbitrary retirement age, places many workers at a particular economic disadvantage and forces them to a state of dependency again.

Assisting the older worker

Attitudes.—Prejudices against older people must be broken down and widespread changes brought about in attitudes of employers, the community, and the older person himself. Rigid retirement policies based on chronological age urgently need reexamination.

Proper Job Placement.—Older workers can do very effective work if the job requirements are matched with individual fitness. Frequently, job placement must be preceded by retraining which will enable the older person to make any adjustments required. State employment services are making special efforts now to counsel and place older workers, and many social agencies are helping in this effort. Through special assistance of this type, two to three times as many older persons can be placed, according to a Bureau of Employment Security study.

By careful study of its job requirements, the conditions of entry, and the productivity of older workers, industry can help provide much-needed information for the proper placement of older workers.

Training for new and perhaps less strenuous types of work should begin well in advance of the ages when occupational changes may be desirable or necessary. Industry thus has a tremendous opportunity to retain the loyalty and experience of its older workers through a process of retraining and gradual change-over to jobs that will suit individual ages and capabilities.

Health Maintenance.—Industry can contribute much to the health and productivity of the older worker by the provision of in-plant health services. In many plants, periodic physical examinations and other preventive services are made available to older members of the supervisory staff. If such services were extended to all workers, great benefit would accrue from detecting, and minimizing the effects of, the chronic diseases and impairments which accelerate the aging process.

Summary

Stripped of erroneous impressions, employment of the older worker actually represents the reaping of maturity's harvest. In the older-worker group there is a reservoir of training, experience, and judgment on which industry and the community can draw to mutual benefit. Industry can help to utilize this growing source of manpower through improved job analysis, counseling, and selective placement procedures, matching the job requirements to the physical, mental, and emotional capacities of the older worker. Through preventive services in in-plant health programs, the health and productivity of the older-worker group, a growing segment of the gainfully employed population, can be effectively maintained.

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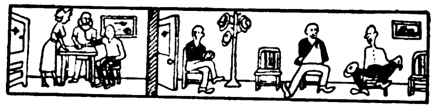

Kiln Operators Get Skin Burns from Sand High in Carbonates

By Louis W. Spolyar, M. D.

DURING the hot summer months of this year, a group of building brick beehive kiln operators developed some annoying skin changes that were occupational in origin. The building bricks were fired by one of two methods—either through the use of beehive or gas fired continuous kilns. The dermatitis was a problem only among the workers involved in the use of beehive kilns.

These kiln operators noticed that they would develop a dermatitis when they manually unloaded the kilns during hot weather. This occurred during the past two summers and is not a problem during the winter months. The skin changes occurred on all exposed surfaces with special predilection for areas above shoe tops and the wrists. Other lesions were found on the dorsum of the forearm and V of the neck. The men wore rubber hand pads to protect the palms of their hands.

The kiln loading was a manual operation done by three or four men. As the green bricks were stacked, white-river sand was used as a bedding agent. Once the kiln was full, it was fired at 1,900° F. for variable periods of time and then opened, cooled, and unloaded manually.

After the bricks were fired, it was evident that the bedding sand had changed at least in appearance. It then appeared chalky white, was quite soft, and would crumble on pressure. Samples of burned and unburned sand were taken to the laboratory for further study. By X-ray diffraction, the unburned sand was found to contain calcium carbonate, dolomite and silica.

(Continued on next page)

Dr. Spolyar is director of the Division of Industrial Hygiene, Indiana State Board of Health, Indianapolis.

In the laboratory, 10 grams of bin sand were fired at 1,700° F. for 5 hours. On firing, the change in appearance was marked in that there were present a great number of large white porous particles. After cooling, 20 cc. of water was added to the fired as well as to the unfired sample of sand. After one hour, the pH of the water on the unfired sample was found to be 7.6 while the pH of the water on the fired sample was 12.0.

It was evident that at the temperature of the kiln the calcium and magnesium carbonates broke down to the oxide and thus increased the alkalinity. With sweating occasioned by the hot weather, the calcium and magnesium oxides would act as slaked lime and produce minor skin burns.

The sand used originated from a river basin in Indianapolis and, on close visual examination, was found to contain a large amount of extraneous material such as bits of shells, gravel, and dirt. It was suggested that a sand with a low carbonate content be used. When this was done no additional cases of dermatitis occurred.

FLAME PHOTOMETRY—

(Continued from page 195)

These values are a measure of flame spectrophotometry as a qualitative technique under the best of conditions. For quantitative determinations of the same elements with no more than 1 percent deviation, the concentrations must be at least 100 times greater. A wide range of concentrations above the lower limit may be read directly, and those which are too great may be brought within the useful range by simple dilution of the sample.

The simplicity and rapidity of analysis by flame spectrophotometry are virtues which highly recommend this technique. These advantages combined with its great sensitivity for alkali and alkaline earth metals have led to widespread adoption of the method in clinical laboratories. There the important determinations of sodium, potassium, and calcium in blood and serum have been greatly facilitated. The flame spectrophotometer is particularly adaptable to routine determinations. For this reason soil, water, and industrial control laboratories are finding this instrument of increasing value and application.

The industrial hygiene chemist must consider the possible uses in his work of any such new technique. Unfortunately, most toxic metals are either not determinable or have poor sensitivity by present methods of flame spectrophotometry. A quick glance at the table of limits of detection shows lead, cadmium, cobalt, and others to be among the least sensitive determinations. Despite this, there are applications for this technique in occupational health laboratories.

Several years ago, the Division of Occupational Health, U. S. Public Health Service, purchased one of the early gas-air-oxygen flame models supplied by Beckmann Instruments, Incorporated. This instrument has been used for numerous determinations of sodium, potassium and calcium with considerable savings in time over the long chemical procedures.

One state industrial hygiene unit is known to have a flame spectrophotometer. This permitted them to do a study requiring many determinations of high concentrations of manganese, iron and chromium with a very significant saving in time. Although the analytical problems of occupational health studies to which flame spectrophotometry is presently applicable are limited, the technique should be given careful consideration in planning analytical programs. Where applicable, it has much to offer.

HERBERT G. DYKTOR DIES

Herbert George Dyktor, commissioner of air pollution control in Cleveland, Ohio, died October 4, 1952. His death was caused by lung cancer.

Nationally known in the occupational health and air pollution fields, Mr. Dyktor began his career in industrial hygiene with the State of Missouri. He then became chief of the industrial hygiene service for St. Louis, later serving as chief engineer for the Bureau of Industrial Hygiene of the Michigan Department of Health.

In 1944, Mr. Dyktor was named chief of the Cleveland Bureau of Industrial Hygiene and 3 years later became commissioner of air pollution control, a newly formed division which encompasses industrial hygiene, industrial nuisances and smoke abatement. Mr. Dyktor was very active both in professional organizations and in community activities. Personally and professionally, he will be sadly missed.

LETTERS from the READERS—

(Continued from page 190)

In short, therefore, none of the usual methods has been satisfactory; and I am at a loss to decide what action to take. Furthermore, I wonder whether the liberation of the dust into the atmosphere constitutes a real menace to public health. Admittedly, the air is being polluted; but, has any malady been directly ascribed to this pollution? In the comparatively short time that the plants have been operating in my area, employees actively engaged in the production of ferrosilicate, ferromanganese, and ferrochromate have been X-rayed regularly, but no cases of silicosis or other lung disorder have been isolated. What are the results of similar examinations of workers who have been exposed to the dust for many years?

Any advice and assistance your readers can offer will be greatly appreciated.—**H. Bernstein, Medical Officer of Health, Vereeniging Gesondheids Department, P. O. Box 35, Vereeniging, Transvaal, South Africa.**

Subject: Safety

SIR: In the August 1952 issue of *Occupational Health*, page 117, is a photograph showing a workman with a loose left sleeve. In this vicinity recently a man lost his life as a result of a loose sleeve getting caught in a gear box. Therefore, I do not think this illustration was a good example of worker safety.

The whole question of appropriate clothing for various jobs is extremely important and deserves extensive investigation and application.—**Bernard I. Goldberg, M. D., 481 Beacon Street, Boston, Mass.**

CHEMICAL LABELING—

(Continued from page 186)

encourage better labeling practices throughout industry, and to assist in the development of improved labels.

The forerunner of this committee, in cooperation with the Manufacturing Chemists Association, had been concerned with the development and administration of specific agreements between the Surgeon General and certain chemical manufacturers, covering warning designations to be used on containers. Drawn up in the early 1930's, these agreements with manufacturers of methanol, carbon tetrachloride and other chlorinated hydrocarbons, carbon disulfide, aniline, benzene, and chlorinated naphthalenes, diphenyls and diphenyl oxides were self-limiting because they were designed for specific conditions. These agreements have now been discontinued by the Public Health Service as part of its effort to foster broader labeling practices better adapted to present conditions.

The products specified in the agreements that have now been abrogated, as well as all other potentially hazardous chemicals, are covered by a label pattern developed by the Labels and Precautionary Information Committee of the Manufacturing Chemists Association, with the concurrence of the Public Health Service. Such a pattern is believed to afford a more feasible approach to the problem presented by the tremendous expansion of the chemical industry.

Surgeon General Leonard A. Scheele, commending the work of the Labels and Precautionary Information Committee, indicated that the Public Health Service endorses the principles of labeling as set forth in Part I of Manual L–1, *Warning Labels*, published by the Manufacturing Chemists Association. He stressed that the identification of potentially hazardous materials through proper, uniform labels is vital to the public health.

This labeling program has been developed for bulk packages of chemicals intended for commercial use and in no way affects the provisions of the Federal Caustic Poison Act, which applies to some caustic and corrosive chemicals intended for household use, or the Federal Food, Drug, and Cosmetic Act, which requires adequate warnings on the labels of all drugs.

Members appointed by Dr. Scheele to the Chemical Products Labeling Committee represent a cross section of Public Health Service activities related to this problem. Mr. Joseph E. Flanagan, Jr., assistant chief, Division of Occupational Health, will serve as chairman of the committee, which will consist of Dr. Samuel W. Simmons, chief, technical development branch, Communicable Disease Center; Mr. Frederick S. Kent, chief, home accident prevention unit, Division of Sanitation; Dr. Donald J. Birmingham, chief, clinical investigations section, and chief, dermatology unit, Division of Occupational Health; and Dr. Herbert Stokinger, chief toxicologist, Division of Occupational Health. An appointment to the committee will also be made by the Manufacturing Chemists Association.

Philippine Health Department Gives Three-Week Seminar to Industrial Physicians

Nineteen industrial physicians attended the first seminar held by the Philippine Bureau of Health for acquainting these specialists with the latest developments in industrial medicine and laboratory procedures. Planned and carried out by Dr. Gregorio Dizon, chief of the Industrial Hygiene Section, the seminar was not only the first of its kind ever held in the Philippines but it also preceded the first of a series of in-service training seminars for public health workers.

Health Secretary Juan Salcedo, Jr., who was recently elected president of the fifth World Health Assembly, helped to plan the 3-week training program. Dr. Dizon had just returned from a tour of the United States and Europe through a travel grant of the WHO.

Speaking to the physicians at the close of the seminar, Dr. Salcedo urged the men to organize a society for industrial hygienists, declaring that the health and safety of thousands of workers demanded the creation of such an organization.

The physicians who attended the seminar are responsible for the occupational health of over 21,000 workers. A second seminar has been planned for those who could not attend the first one.

X-RAY PROTECTION DESIGN EXPLAINED IN HANDBOOK

Accompanying the increased application of X-ray equipment and techniques is the growing need for specially designed treatment rooms. One of the major problems involved in any building program of this type is that of protecting against X-rays the persons working with the equipment and those in adjoining areas. Many publications are available to assist in the solution of this problem, but none has undertaken to explain certain assumptions and recommendations, or to include detailed design specifications. Extensive computations and analyses by the National Bureau of Standards of all phases of the problem have resulted in the development of detailed procedures for the design of barriers for X-ray protection.

The results of the NBS program, including X-ray protection recommendations, sample design problems, and methods for computing barrier thickness, are presented in a handbook that should prove valuable to architects and engineers planning structures in which X-ray equipment is to be used (*1*). The primary factual data and basic principles necessary for designing shielded X-ray installations included in the publication are based on the recommendations of the National Committee on Radiation Protection (*2*).—**From National Bureau of Standards Summary Technical Report 1708.**

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(*1*) *X-Ray Protection Design*, by H O. Wyckoff and L. S. Taylor. National Bureau of Standards Handbook 50, (May) 1952. For sale by Superintendent of Documents, Washington 25, D. C. Price 15 cents.

(*2*) *Medical X-Ray Protection up to Two Million Volts.* National Bureau of Standards Handbook 41, (March) 1949. For sale by Superintendent of Documents, Washington 25, D. C. Price 20 cents.

Worker Using Carbon Blasting Machine To Clean Auto Engines Exposed to Lead Dust

By Louis W. Spolyar, M.D.

An Indianapolis physician was of the opinion that one of his patients developed lead poisoning while cleaning automobile engines with a carbon-blasting machine. This machine used ground walnut shells as the abrasive, feeding the shells into the motor by a blast of air at 40 to 60 pounds per square inch pressure.

It has been shown that the carbon deposits in an internal combustion motor are contaminated with lead when leaded gasoline is used in a fuel.

Dust brought to our laboratory by this physician was found to be 45 percent lead. Urinary lead studies, done five weeks after the exposure, showed that the patient excreted 0.262 milligram of lead per liter of urine.

With this clinical background, the Division of Industrial Hygiene undertook some atmospheric lead studies in the garage where the patient worked. The manufacturer of the blasting machine, who was present during the study, informed us that similar studies had been done by the Division of Industrial Hygiene, Minnesota Department of Health, on June 4.* Our studies were made on September 3, 1952, and substantiate the Minnesota findings, thus re-emphasizing the existence of the lead hazard associated with this operation.

Following the Minnesota studies, the manufacturer redesigned the machine by adding a screw type nozzle to the cylinder head and installing an additional bag collector in the machine. The old machines used a rubber stopper on the cylinder head. The results of our atmospheric studies were as follows:

1. New machine, nozzle plug screwed into cylinder head, two filter bags and operated at 45 p. s. i.:

Location	*Milligrams lead per cubic meter*
Breathing zone of operator under hood	0.136
Under unit at air exhaust	.820
General atmosphere near unit	.175

2. Old machine (where patient worked):

Location	*Milligrams lead per cubic meter*
Breathing zone of operator under hood	2.39
Under unit at air exhaust	7.55
General atmosphere near unit	.121

3. Same as test 2 except deflector ring was in the machine:

Location	*Milligrams lead per cubic meter*
Breathing zone of operator under hood	0.252
Under unit at air exhaust	3.140
General atmosphere near lid of unit	1.678

4. Another old machine but a little later model:

Location	*Milligrams lead per cubic meter*
Breathing zone of operator under hood	1.57
Under unit at air exhaust	1.44
General atmosphere near unit	.174

Until these machines are so designed as to eliminate the lead hazard, all routine personal protective measures must be used. We have informed every garage in Indiana of the lead hazard present and what controls are necessary.

Dr. Spolyar is director of the Division of Industrial Hygiene, Indiana State Board of Health, Indianapolis.

***Reported in the October 1952 issue of *Occupational Health*.**

RECOMMENDED READING

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U. S. GOVERNMENT PRINTING OFFICE. 1952