occupational health

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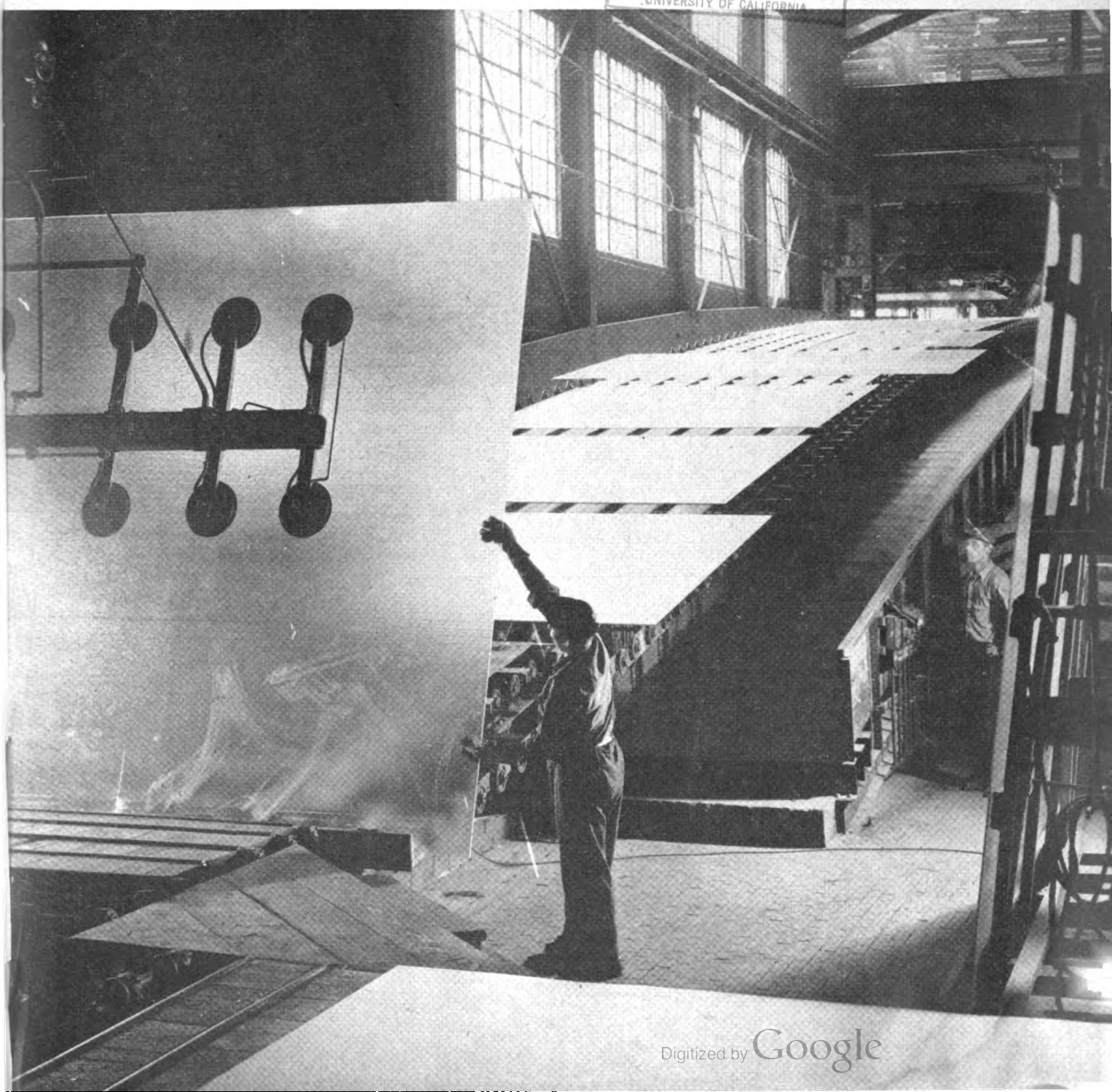
FEDERAL SECURITY AGENCY • Public Health Service



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IN THIS ISSUE

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*MEN AT WORK**

By J. N. Norris, D.P.H.[1]

THE basic objective of work is to provide the worker and his family with necessities and amenities as dictated by individual and class standards. We have lived for long in an expanding economy in which yesterday's luxuries have become today's necessities. The population today at most levels of income, on the standards it wants, is in fact broke. This makes our predicament all the more incongruous: The community requires more than its individuals are prepared to contribute; its individuals require more than the community can at present provide. The issue is clearly not one of economics alone.

Can medicine, and in particular industrial medicine, help? Medicine is concerned with human beings; and if production is related to their health and happiness, it is medicine's affair. The more we learn of people the clearer it becomes that work is in fact very much related to health and happiness—our work affects our health, and how healthy we are affects our work.

Vocational guidance, job analysis, and placement examinations are helping us to provide people with jobs that suit them. But work involves very much more than is yet comprised by these techniques. Studies are now required, on the one hand, of the emotional and social needs that men bring to their work today, and, on the other, of what might be called the relevant properties of different jobs. So far we have only rather sketchy ideas of what these needs are, but we regard them as deriving

(Continued on page 161)

***Excerpted, with permission, from an address to the Association of Industrial Medical Officers, and printed originally in the *British Medical Journal*, June 17, 1950.**

[1] Dr. Norris is a member of the Social Medicine Research Unit, Medical Research Council (England).

COVER PICTURE — Transferring rough plates of glass from the warehouse to the grinding and polishing lines. Photograph by courtesy of Pittsburgh Plate Glass Co.

Noisy Industries Should Install Hearing Conservation Programs

By Joseph Sataloff, M. D.

It has been assumed that noise associated with certain jobs produces hearing loss. This fact has been so marked that the conditions have become known as boilermakers' deafness, weavers' deafness, and gunfire deafness.

The responsibility of handling the over-all problem of hearing loss in industry lies chiefly with the industrial physician and hygienist in cooperation with the safety engineer and all others responsible for the health of personnel. The importance of establishing comprehensive hearing conservation programs is obvious for three principal reasons: First, the medico-legal, next, the prevention of deafness, and third, for scientific research purposes.

There is little need to go deeply into the medico-legal aspect since most of us are well aware that a number of large industries are now entangled in multi-million dollar claims on the basis of occupational deafness. The military services are also vitally concerned because of the compensation problems resulting from exposure to acoustic trauma of gunfire, airplanes, large engines and industrial machines.

The importance of the prevention of deafness is self evident. As for scientific research, to date it demonstrates that there is still much uncertainty concerning the intensity and type of noise which can produce deafness. There is extensive disagreement concerning the maximum safe intensity levels, that is, the loudest noise to which nearly all individuals may be exposed without suffering any hearing damage.

Safe Intensity Levels

During the recent years estimates by various investigators of maximum safe intensity levels have ranged from 85 to 110 decibels (com.). This shows a great disparity, but it emphasizes the inadequacy of describing the harmful effect of a sound in terms of its loudness alone.

Although most investigators believe that only intense noise in which the higher frequencies predominate is harmful to hearing, evidence is accumulating that intense low frequency noise may also be harmful. The chief reason for these contradictory experimental conclusions is the extremely complex nature of the science of sound and of the sensitivity of the human ear.

There are at least three or four essential phases in establishing an industrial hearing conservation program; the evaluation of the industrial noise, preplacement audiometry, post exposure audiometry, and also the correlation and integration of the data obtained from each of these. Each phase deserves careful consideration.

Classification of Noise

In the first place, industrial noise may be divided into several important classes with different capacities for affecting the organ of hearing. One such classification is the steady-state noises, such as jet engines and motors, and intermittent noises, such as sharp bursts of gunfire, chipping, and riveting. Another classification depends on whether the noise has most of its energy in the lower or the higher frequencies. Examples of the former are reciprocating engines and many large industrial presses; examples of the latter are certain jet engines and high pressure steam machines.

It becomes necessary, therefore, to find more defining characteristics of a sound than its loudness alone to be able to describe its effect upon hearing. It is obviously insufficient to say that a sound whose intensity is 110 decibels will produce hearing loss. This may be true if the sound is a sharp burst with most of its energy in the higher frequency range, but it may not be true for any other type of noise of the same intensity.

Properties of Sound

At present, it is essential to determine several properties of a sound to describe its potential effect upon hearing. These are: (1) the over-all loudness of a sound, which may be obtained with a sound level meter directly, or calculated from a sound analyzer; (2) the spectrum of a sound, that is, the relative intensity of the various frequencies that combine to produce the sound; and also (3) the source and time relation of the sound, such as from a gun, metal hammer, and intermittent continuous sharp blasts. All of the data are needed for research purposes, so that accurate conclusions may be safely drawn concerning the hazardous effect of noises upon hearing.

From evidence we have accumulated during the past five years in Philadelphia, the following impression has become apparent. Personnel exposed to certain types of jet noise whose intensity may reach 110 or more decibels have not shown evidence of significant hearing impairment even after many hours of daily exposure for at least 5 years. At present, this impression applies only for this specific type of noise.

Measurement of Noise

According to present thinking, a satisfactory practical approach to the problem is to evaluate all intense noise in our individual plants. This can be done by first measuring the over-all intensity with a sound level meter. I personally believe it is safe to conclude that any noise in which the over-all level is less than 100 decibels is safe to practically all ears. If the over-all level is above 100 decibels, the noise should be considered potentially hazardous and investigated further. This is done by obtaining a spectral analysis either with an octave band analyzer or a panoramic sound analyzer.

It is important that both the intensity and the frequency determinations should be measured in relation to the placement of personnel and not the source of the sound. It is also important that the sound level meter be placed in an area where the readings will not be influenced by vibrations.

Preplacement Tests

This brings us to the second phase in the establishment of the hearing con-

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Presented on the Panel "Noise in Industry" held during the U. S. Navy Fourth Annual Industrial Health Conference.

Dr. Sataloff is director of Hearing Center and Research, University of Pennsylvania, Philadelphia, Pa.

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servation program; that is, preplacement audiometry. A long range hearing testing program should be initiated on all present and proposed personnel who are exposed to potentially hazardous sound. The hearing testing should be done with a calibrated audiometer in a quiet room. The resultant audiogram, unfortunately, is not always an accurate picture of the subject's hearing acuity because of the many variables inherent in the performance of this test.

It is essential to check the calibration of an audiometer every day it is used. In some audiometers a calibration dial is present to match the instrument against a 60-cycle line hum. It is best, in addition, however, to test all frequencies on a number of known normal ears each day.

The technique of doing an audiogram is most important. The tester must be well trained and be able to recognize all possible errors and appreciate his responsibility. It is essential that tests be conducted in a room in which the noise level remains reasonably stable and is not loud enough to interfere with threshold determinations. The sound level meter may be used in determining the efficiency of the testing room.

One audiogram is inadequate. This fact is extremely important from the medical-legal aspect. We have encountered a number of situations in which the first audiogram on a subject showed normal hearing. On retest by another audiologist, the audiogram revealed as much as 50 or 60 decibels loss in several frequencies. Obviously, if only one audiogram were done on these subjects, after several weeks of exposure to noise, a retest would show a severe hearing impairment, and the situation would assume a significant medico-legal character. The importance of doing repeated audiograms that are consistent with one another cannot be overemphasized, both from a legal aspect and from a research aspect.

The hearing of an individual fluctuates markedly, particularly if he is exposed to intense noise. An audiogram done at the end of the day's work may show a hearing loss, whereas, the same test in the morning may show normal hearing. Since the performance of an audiogram requires a response from the subject, the speed and manner of presenting the pure tones are quite important. The subject must be familiar with what he is expected to hear and do.

These few points explain why three distinct testers may get different audiograms on the same subject even under standard conditions.

It is redundant to mention that prior to testing, the ears should be examined to rule out impacted cerumen, infection, or other obstructions. A brief history should be taken of the individual's previous exposure to industrial noise and gunfire. The preplacement audiograms are significant primarily in establishing a baseline to determine any hearing change that may ensue during the course of the individual's employment.

Post Exposure Audiometry

This brings us to phase three of the program: Post exposure audiometry, probably the most important aspect of the program. The same precautions of hearing testing previously described are applicable here. All employees exposed to noise classified as potentially hazardous should have hearing tests done at least once a month for 6 months. Experience has shown that an employee who is susceptible to acoustic trauma will show evidence of hearing loss during the first few months of exposure. If repeated audiograms reveal that a certain area is causing significant hearing loss in a number of employees, that area should be classified as hazardous. It should be brought to the attention of the safety engineers and remedial measures initiated.

In addition to all the complex situations just described, further complications are introduced by the fact that some ears are much more sensitive to injury from noise than others. As yet, we have no reliable test to detect these sensitive ears, but considerable work is being done in this direction. It is the general consensus that acoustic trauma is not accumulative, and also that if an employee is removed from his noise environment much of his temporary hearing loss may clear up.

The recovery period may take a number of weeks according to some authors. It is generally accepted that a person with nerve deafness of certain types is more susceptible to auditory fatigue and acoustic trauma than a person with normal hearing. Some recent work at our laboratory suggests that this is not always true. We believe that further investigation in this direction is essential.

Conclusions

(1) It is urgent that a hearing conservation program be established in noisy industries.

(2) These programs should be well planned and conducted under the supervision of the industrial health officers.

(3) Preplacement and post exposure testing under standard conditions are essential.

(4) Careful interpretation of audiometric results and their correlation with the sound characteristics are vital to the success of the program.

Industrial Health News Featured Regularly in Colombian Newspaper

A FULL PAGE of news about occupational health is a regular feature of La Prensa, leading newspaper of Barranquilla, Colombia, according to Marion F. Trice, industrial hygiene engineer in that country.

A recent issue carried an article on the recommendations of the Society of Labor Medicine, which has been trying to standardize the procedures for medical preemployment examinations. In another article, good procedures for lifting loads are discussed.

Prominently displayed is a reprint of the resolution of the National Department of Labor, which stipulates the conditions that must be fulfilled in electric welding shops and the protective equipment that must be used.

Social benefits for the workers are the subject of another article on the same page, and, finally, there is a column of paragraphs containing advice on how to work safely.

Responsible for this weekly page in La Prensa are Dr. Santander Rosales R. and Sr. Pedro Gonzalez Salazar, director and inspector, respectively, of the Barranquilla section of the National Department of Medicine and Industrial Hygiene.

FIRESTONE EMPLOYEES PARTICIPATE IN HEALTH AND SAFETY PROGRAMS

The Firestone Tire and Rubber Co. protects the health of its employees through its medical services, on-the-job safety program, and careful industrial hygiene studies and practices.

At all Firestone plants, both in Akron, Ohio, and in subsidiary installations, dispensaries are maintained for first-aid and follow-up treatment in cases of occupational injury or disease.

First-aid stations are located at various places in the plants and operate on a 24-hour schedule. The main plants in Akron are served by 2 doctors, 15 nurses, a dentist, a physiotherapist and several laboratory assistants. An industrial hygienist, with headquarters in Akron, serves all plants.

Better and safer ways to work in the plants are stressed in intensive safety education of all employees, and all possible safety devices are provided to protect the worker on the job.

After a Firestone employee has been absent from work for a week, he is interviewed by a staff member of the medical department to make certain that he is capable of returning to his job. To help speed recovery in injury cases, the medical department in Akron recently has greatly expanded its physiotherapy division, where employees receive treatment for strains, sprains, muscle conditions and contusions.

This division, with a trained physiotherapist in charge, is equipped with a whirlpool bath, diathermy machine, ultra-violet and infra-red lamps, and treatment tables.

The industrial hygienist and laboratory assistants cooperate with the other members of the medical department and with the company's safety department in studies and tests to protect the health of employees on the job.

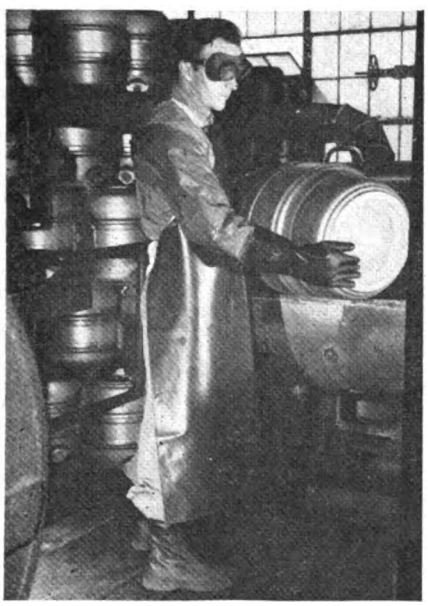
Studies are made of the materials used in the plant to determine their effects, if any, on the health of employees. At the various manufacturing operations, portable machines are used to take samples of dust and other substances in the air to which employees are exposed. These samples are then tested in the laboratory to determine their concentration and effect on health. Blood tests on employees also are made in the laboratory.

If any possibility of detrimental effect on health is found, safety department engineers, in cooperation with the engineering department, provide suitable protective equipment and ventilation. Protective clothing, glasses, and respirators required for different jobs are also provided.

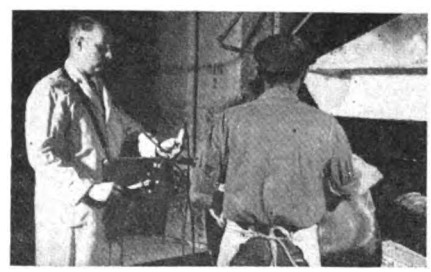
As part of the education program conducted by the safety department, supervisors and foremen hold regular meetings at which they are shown movies and are trained in how to educate other employees in safety. In turn, the supervisors and foremen conduct an active, continuous campaign for safety, approaching each employee every month on some phase of the safety and health program.

Signboards in every plant indicate the progress of safety in the different departments and a stiff, interdepartmental competition for top place keeps all departments alert for safety. A continuous contest among plants also is conducted. In these competitions, plants and departments receive special certificates of appreciation from the company for record safety performances. The company participates in all local, State, and national industrial safety contests.

Individual employees compete annually in a safety slogan contest in each plant, and winning slogans are used to promote safety during the following year. Awards are also presented for safety ideas adopted through the company's suggestion system.



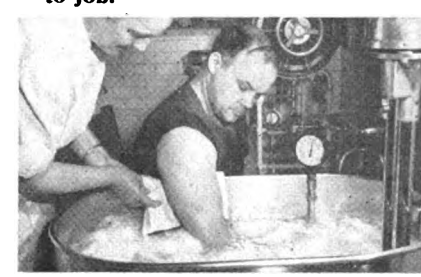
Special safety clothing protects this worker from acids, caustics, cyanides, or other corrosive materials.



Industrial hygienist takes dust sample near employee who applies pigment to "green" tires.

Interviews after illness or injury insure that worker is capable of returning to job.

Industrial hygienist (left) prepares to make dust count from samples taken in plants.



Worker undergoes treatment in the whirlpool bath for an inflammation of elbow bone.

Mountains, Desert, and Jungle in Peru Make Progress in Industrial Health Slow

TRAVERSING the high Andes, trekking through an Amazon jungle, and crossing the desert were part of the job for Miss Victoria Trasko when she went to South America on an industrial health mission this past year.

At the request of the Institute of Inter-American Affairs, Miss Trasko was borrowed from the U. S. Public Health Service for a period of 8 months to assist on two special projects. One was a determination of the incidence of silicosis in Peruvian mines and the other was to organize and conduct a demonstration survey of health problems in Peru's industries.

Miss Trasko's work was carried out under the auspices of the Division of Health Sanitation and Housing, Institute of Inter-American Affairs, now known as the Technical Cooperative Services of the Point Four program. Through the Institute, technical assistance is being made available to our South American neighbors to enable them to fight disease and to establish basic health services.

Miss Trasko had headquarters in Lima, Peru, and spent the major portion of her assignment working with the Department of Industrial Hygiene of the Servicio Cooperativo Inter-Americano de Salud Publica.

Working with the medical and engineering data from reports of studies made in 12 mines during 1949 and 1950, Miss Trasko found that in contrast to the incidence of silicosis in the United States, Peruvian miners have many more cases of silicosis.

The minerals and ores contain from 20 to 40 percent free silica with some values as high as 68, as analyzed by Peru's Department of Industrial Hygiene. One of the complicating factors is that of working in very high altitudes, which range from 10,000 feet to 16,000 feet above sea level.

Because of the rarefied air, only the Peruvian Indian born at these heights is physically capable of doing the labor required in mining operations. There are about 26,000 miners currently employed in the mines. Future studies may determine what influence the altitude has on the incidence of silicosis among miners.

The mines are sometimes so located that they are inaccessible except by foot. It is not unusual to see aerial pulleys transporting ore from the peak of a 16,000-foot mountain down to a concentrator several thousand feet lower.

Another problem is that of getting sufficient water to the stopes to wet down the ores; and still another, perhaps the major one, is the practice of starting drilling dry. The Department has made numerous medical and engineering studies in the mines which Miss Trasko summarized and studied in an effort to learn the incidence rate for silicosis.

Drawing on her experience of 14 years with the Division of Occupational Health in the Public Health Service, Miss Trasko helped plan, organize and supervise the survey of 400 industrial establishments employing 66,000 workers.

With a team of physicians and engineers, Miss Trasko visited industries located in urban areas such as Lima and Arequipa, coastal desert towns, the high sierra, and the jungle region.

Industries in Lima and Arequipa are quite varied and typical of larger cities. Among these surveyed were cotton and woolen textile mills which rank high in the country's economy; tanneries and leather products manufacturing plants; glass and ceramic plants; cement and gypsum products, and others.

Several of the establishments were new and modern, but most of the plants visited were old and depended upon a minimum of mechanical facilities for operation. Because of the difficulty involved in getting machinery, more reliance is placed on human labor.

Despite its aridness, Peru grows much cotton, sugar, rice and grapes along the coastal areas. Crops are all irrigated and, in a few of the large sugar haciendas, spraying is done by airplanes piloted by Americans.

The large haciendas or plantations are in reality self-sufficient communities. The four sugar growing haciendas, for instance, not only engage in the growing of sugar but also have large sugar refineries.

The companies provide hospital and medical care for the workers and families, housing quarters, schools and recreational facilities. The haciendas are located in rural areas some distance from towns and cover thousands of acres of ground. The provision of necessities to insure a supply of workers is a must in these areas.

While medical care is available, little, if anything, is done about prevention and control of occupational diseases and accidents. Physicians and nurses have their hands full taking care of workers with the routine type of illnesses.

Fish canneries scattered along the northern coast of Peru are likewise located in isolated areas; there, too, companies provide some medical and nursing facilities. A few are very modern and clean and have no trouble with labor turnover.

Located high in the Andes are many industries. Peru's largest metal smelters and refiners are nestled in a tiny, arid valley at 12,500 feet. Scattered among the mountains near running water are several large woolen textile mills. Here, archaic machinery is still in use. When one realizes how narrow and rough the roads are leading to these isolated mills, it is not surprising to see old methods and machinery.

Peru is considered a country of three worlds—the desert, the mountains and the jungle. In order to cover the geographical location of the industries, the survey team went into the jungle to the town of Iquitos located at the source of the Amazon River and accessible only by plane or boat.

Here the main industry currently is the lumber industry with large saw mills and furniture factories. Other places of interest visited by the surveyors—by jeep—were establishments processing barbasco roots from which rotonone is extracted. This used to be an important industry in Iquitos, em-

ploying several hundreds of people. Today, with the competition of other insecticides on the market, the industry is slowly dying.

The handling of the root causes considerable occupational poisoning among the workers, such as dermatitis, conjunctivitis and respiratory affections. Other plants of interest were those processing a gum latex brought in from the heart of the jungle which is used for making chewing gum in the States. Since this gum is exported to the States, both of the plants observed were operated according to the standards of the Food and Drug Act

A variety of conditions were observed, but the general impression was that little concern is shown for occupational disease or accident prevention, chiefly because of a lack of knowledge. Sanitation as a rule was not good. None of the rural areas had safe water supplies or sewage-disposal systems. Lakes and streams or rain water often formed the only source of water supply for the workers. The sewerage systems consisted of open canals in the middle of streets. Many of the workers' houses had no water or toilet facilities and those that were available were of the communal type. Workers living in urban areas generally fared better. There is no doubt that industry is interested in improving conditions but, since most of the plants are small, they will need assistance of a governmental agency such as is now functioning in the country.

Rubber Cement Spills—Young Man Dies of Benzol Poisoning

A 16-year-old man was engaged in shifting drums of rubber cement in the stock room of a Detroit company whose business involves the sheet-rubber lining of tanks and other sheet-metal objects, and rubber-dip coating of parts for the automotive industry.

A mechanical hoist was used to lift these drums by means of hooks which gripped opposite sides of the top bead on the drums. An open-top 55-gallon drum approximately three-quarters filled with rubber cement at room temperature slipped from the hoist—a distance of perhaps 2 feet to the floor, whereupon about 10 gallons of material splashed out of the drum.

Although the rubber cement splashed over his head and covered an estimated 60 percent of his body, the worker was able to go to the foreman to ask for assistance in removing the material which was "burning like blazes." A few moments later the worker collapsed and artificial respiration was immediately applied. The worker was dead on admittance to the hospital about a half-hour later. The medical examiner reported the cause of death to be "acute respiratory failure, following inhalation of benzol, a compound of rubber cement (benzol poisoning)."

Our analysis of the rubber cement involved in this accident showed that the solvent was commercial benzene. Nine months previously, we had analyzed another specimen of rubber cement being used by this company and found that the solvent was petroleum naphtha.

The use of rubber cement containing benzene is being discontinued in this plant.—**Victor E. Lavetter, industrial hygienist, Detroit Department of Health, 1151 Taylor Avenue, Detroit 2, Mich.**

Industrial Nurses Should Practice Preventive Care

By Lorraine Bolton, R. N.*

WHILE the importance of care for the injured should not be minimized, the nurse who limits herself to first aid or curative care is not practicing good industrial nursing and she is not deriving the most in personal satisfaction from her job. She should be actively engaged in the plant safety activities; she should make periodic plant rounds to uncover any threats to employee health; and she should busy herself with health counselling and health education.

To evaluate and understand the health and safety problems within the plant, the nurse must maintain adequate records. She has an excellent opportunity to assist in the reduction of accidents by reporting to the safety director and management the repeated minor injuries whose causes may in time result in major accident or injuries. The industrial nurse can readily ascertain from the cumulative record cards which employees are in need of medical counsel.

The nurse should attend the safety meetings in order to keep abreast of safety actions that have been instituted. This knowledge will improve her technique in obtaining information from injured employees which may be of inestimable value in the prevention of similar injuries. She should have a knowledge of plant operations and toxic exposures. Her observations of trends of illness complaints or irritations reported by workers may be important in safeguarding others. Although the nurse at no time assumes the role of the industrial hygienist or physician she can recognize and aid in the solution of health problems by referring them to the proper authorities.

If an accident which results in an injury occurred because of improper attitude, failure to observe safe practices, or failure to use protective equipment, the nurse has a golden opportunity to sell *safety* to the injured employee. For example, there is no reason to assume that the employee who merely nips his fingers on an inrunning roll may not suffer a mangled arm because of his continued violation of safe practices.

Since good personal hygiene is essential in the prevention of many occupational as well as nonoccupational diseases, the nurse should not only teach the employees good personal hygiene but should also be responsible for the adequacy and maintenance of sanitary facilities.

The industrial nurse should be the screening agent for the early detection of the signs of damage caused by illness or by aging. Counselling with an employee may be the means of steering that worker into adequate medical care thus possibly preventing or shortening disability. For example, an employee in one of our assured's plants consulted the nurse because of weight loss and polyuria. The nurse tested the employee's urine and found it to be positive for sugar. Without alarming the

(Continued on page 166)

*Miss Bolton is an industrial health consultant for the Liberty Mutual Insurance Co. Only a part of her paper, which was printed in *Nursing World*, has been included here.

LEADED GASOLINE USED IN CARBON BLASTING POISONS MECHANIC

By W. E. Park, M. D., and G. S. Michaelsen

IT has been assumed that leaded gasoline when it is burned in a high compression engine has then expended itself. Such is not the case. It still has the power to cause lead poisoning.

In looking for the cause of lead poisoning in a garage mechanic in Minneapolis, the trail lead to a comparatively new process known as carbon blasting. In this process, a stream of compressed air and rice or walnut shells is introduced into the engine through a small tube which extends through the spark plug opening. The impact of the abrasive removes the carbon deposit from the inside of the engine.

The annular space between the inlet tube and the spark plug hole serves as the outlet for the spent abrasive and dust laden air. A rubber fitting is provided, which is held in place over the spark plug hole. This fitting contains the inlet tube and is so designed that the escaping air is captured and conducted through a flexible tube to a cloth filter, very much like a household vacuum cleaner bag. The exhaust from the filter is returned to the room. The entire carbon blasting equipment is under pressure throughout the operation.

A study of several machines was conducted in Minneapolis jointly by the Minneapolis Health Department and the Minnesota Department of Health, Division of Industrial Health. Details of the findings are listed in the accompanying table.

The carbon powder, which was caught in the filter, was found to contain approximately 55-percent lead by weight, which is believed to be derived from the tetraethyl lead in the gasoline consumed.

Exposure under the open hood of the car is particularly high. Here the operator bends over the engine and may have considerable quantities of the carbon-lead powder blown up in his face. Another operation which provides a heavy exposure is cleaning of the filter. The lead levels found appear in the accompanying table.

The wide fluctuations in atmospheric lead concentrations reflect the great variations found in operating technique and the differences in the amount of lead laden air escaping from various openings in the carbon blasting machines. Additional factors in this variation are the amount of carbon removed from the engine, the type of engine, the degree of enclosure afforded by the open hood, and the amount of the dilution ventilation available.

The particular points where the carbon-lead powder is most likely to escape during a carbon blasting operation are:

(1) Around the rubber nozzle which is held over the spark plug hole by hand. The amount of dust escaping at this point depends upon the pressure exerted by the operator, the angle at which he holds the instrument, and the amount of wear on the rubber nozzle. This point of escape contributes most of the dust in the immediate vicinity of the operator.

(2) Around the top of the machine where the cover sometimes does not fit tightly on the filter.

(3) Around the bottom of the machine. Several holes in the bottom of the machine provide an outlet for the compressed air after it passes through the filter. This air still contains appreciable amounts of lead. One

Table 1.—Atmospheric Lead Levels During Carbon Blasting

(1) At breathing level of operator

Garage	Number of determinations	Range (mg. per cu. m. of air)	Average (mg. per cu. m. of air)
A	8	1.0 to 11.0	3. 9
B	9	2.7 to 23.0	10. 2
C	8	1.6 to 6.6	3. 6
D	8	0.18 to 1.4	1. 0
E	8	0.33 to 3.8	1. 5
F	7	0.38 to 9.6	2. 4

(2) General atmosphere 2 to 5 feet from the car

A	10	0.04 to 1.9	0. 12
B	8	0.10 to 0.63	0. 35
C	8	0.17 to 0.55	0. 33
D	10	0.04 to 1.7	0. 29
E	10	0.04 to 0.68	0. 20
F	8	0.01 to 0.10	0. 06

(3) At breathing level of operator while cleaning filter

A	1	41.0	---
B	1	1.9	---
C	1	2.8	---

Dr. Park is the industrial health physician, Minneapolis Health Department, and Mr. Michaelsen, an associate director, of the Division of Industrial Health, Minnesota Department of Health, Minneapolis 14.

Appointments to Joint Committee

Appointment has been announced of the members for 1952–53 of the Joint Committee for the Study of Occupational Diseases of the Chest of the American College of Chest Physicians and the Industrial Medical Association. Dr. Louis L. Friedman of Birmingham, Ala., will serve as chairman of the joint committee.

Members representing the American College of Chest Physicians are: Dr. Louis L. Friedman, chairman; Dr. Burgess Gordon, President of Women's Medical College of Pennsylvania, Philadelphia, co-chairman; Dr. Edgar Mayer, New York, N. Y.; Dr. George Meneely, Nashville, Tenn.; and Dr. Reginald Smart, Los Angeles, Calif.

Members representing the Industrial Medical Association are: Dr. Arthur J. Vorwald, Saranac Lake, N. Y., chairman; Dr. Oscar A. Sander, Milwaukee, Wis., co-chairman; Dr. Leo M. Price, New York, N. Y.; Dr. Lloyd E. Hamlin, Chicago, Ill.; and Dr. Frank R. Ferlaino, New York, N. Y.

sample showed this air to contain 0.66 milligram per cubic meter.

In some instances, workmen became further exposed to the carbon-lead dust by eating and smoking without washing. Usually the operators' hands were heavily coated by the black powder.

In the one case of lead poisoning attributed to this type of exposure, the employee worked at carbon blasting continuously for 3 weeks, cleaning the engines of about 3 cars per day or an average of 15 cars per week. When he was seen by his personal physician, he exhibited the usual symptoms of acute lead poisoning and his urinary lead concentration was found to be 0.39 milligram per liter of urine.

The results of this study have been discussed with the company manufacturing the carbon blasting machines and they have shown a willingness to incorporate suggested changes in design which should make the machine reasonably safe under ordinary operating conditions.

Garages are being advised to require their operators to wear respirators approved for protection against lead dusts so long as they are using the present carbon blasting machines. They are also urged to discontinue use of the present machine as soon as a machine is available which eliminates the hazard of lead poisoning. Operators are warned to wash well before eating or smoking.

Further studies are being conducted to evaluate the lead hazard associated with other methods currently being used for removing carbon from automotive and aircraft engines.

Voluntary Medical Care Insurance.[1]— By Margaret C. Klem and Margaret F. McKiever, Division of Occupational Health, USPHS, Washington 25, D. C.

Excerpts: Industrial plans providing service on a prepayment basis often combine care for occupational and nonoccupational illnesses in one program. The increasing tendency of industries to use outside prepayment plans instead of developing their own programs has resulted in a need for closer cooperation between prepayment programs and in-plant medical programs.

[1] From *The Annals of The American Academy of Political and Social Science*, Philadelphia.

Experimental Inhalation of Lead by Human Subjects

By Robert A. Kehoe, M. D.[1]

AUTHOR'S SUMMARY

THE EXPERIMENT which is the subject of this report is the first of a series of long-term investigations of the influence of three individual factors upon the metabolism of lead compounds in the air inhaled by human subjects: namely, (1) chemical composition, (2) concentration, and (3) size of particle.

The experimental procedures are based upon techniques employed previously in the conduct of balance experiments on individual human subjects, in which the intake, output, absorption, elimination, and accumulation of ingested lead were determined by daily observations over prolonged periods of time. Additional technical procedures in this series of experiments relate to the determination of the extent of the pulmonary retention and absorption of lead introduced into the respired air in a known concentration of particles of known size and known chemical composition.

Each experiment involving a given set of conditions of exposure to lead is to be carried out over a sufficient period of time to arrive at an approximate equilibrium (between absorption and excretion), or, alternately, so long as the safety of the experimental subject will permit. In each experiment prolonged observations are to be made before and after the period of experimental respiratory exposure.

The preliminary observations in the present experiment, involving a single subject, extended over a period of 9 months, after which exposure to air-containing particles of lead oxide of the median size of 0.05 micron and in the average concentration of 0.075 mg./m.^{3} was instituted for 7 hours per day on 5 days per week.

The results reported relate to the preliminary period, and to the period of exposure which began on January 20, 1951, and extended to January 20, 1952, at which time an approximate equilibrium appeared to have been reached. The experiment continues in order to put such appearance to the test, but the data have not been examined in detail beyond the last date indicated above.

A brief summary of the results follows:

(1) During the period of respiratory exposure, the lead concentration in the blood rose from the original mean level of 0.026 mg. per 100 grams to that of 0.043 over the period of about 20 weeks and stabilized at or near that level.

(2) The urinary lead output per day rose from 0.032 mg. to 0.059 mg. in about 10 weeks, continued irregularly upward and then diminished, the apparent peak in an artificially smoothed curve being not far from 0.070 mg. at the end of 20 weeks.

(3) The lead accumulated in the tissues during the period of a year, as a consequence of the experimental inhalation of lead, amounted in all probability to about 11 mg., being not less than 9 mg. nor more than 18 mg.

Obviously the conditions of exposure were entirely safe during the period of experimentation, and it seems apparent that no risk of lead poisoning would be incurred from the continuation of such exposure over an indefinitely prolonged period.

[1] Associate authors are J. Cholak, Ch. E.; L. B. Roberts, Ch. E.; and Frank Princi, M. D., all from the Kettering Laboratory in the department of preventive medicine and industrial health, College of Medicine, University of Cincinnati. This paper was presented at the 1952 Industrial Health Conference.

Men at Work—

(Continued from page 154)

from basic human instinctual drives, modified in the long history of our society.

What are they today? Security, approval, status, authority, responsibility, achievement, the instinct of workmanship, and service? What happens to such needs in mass-production industry? Can they be satisfied in the blackcoated jobs or in the lower managerial posts? How do the professions compare with the trades and with unskilled labor? What balance of satisfaction and frustration are men achieving in the work itself, and in its social relations? Have we reached a situation where for many the main satisfactions of the job must come from the human contacts and relationships incidental to the work? And, if so, can we any longer afford to consider them incidental?

Industrial medicine is a specialty, it is commonly said. This is an error not only because it confuses the specialist with the expert, which doesn't matter, but also because it misses the important point that industrial medicine belongs to an era in medicine that has come after the rise of specialism. We need specialists of all kinds, but we now recognize that specialization is not enough; that is why medicine is now beginning to develop along new lines. We have found that we also need a new type of doctor who can see things in the round, who tries to understand the human being as a person in his environment, who is interested in the psychological as well as the physical, in groups as well as in individuals—because all these make us what we are.

Today we have political but little industrial democracy. It is conceivable that there can be healthy and effective small groups in a factory, whose members take no further part in its affair. But it is unlikely that with such an artificial brake on spontaneity there can be any real identification with the purposes of the factory as a whole. And it is unlikely that today's divergence of purpose between the community and its individuals can be bridged unless people feel personally involved in what happens at the levels between the group of mates on the shop floor and the big society of the industry and community as a whole, so often misunderstood as the hostile and impersonal "they."

Unfortunately, no generally effective means have yet been devised to meet this exceedingly difficult problem, either in private or in nationalized industry. Is this our business? Surely it is. With the fragmentation of so much of our social life, joint consultation and similar movements have become as crucial to health as they are to production. They could help men to make use of their abilities; to grow to maturity, adulthood, and responsibility; to cooperate in service; and to develop stronger bonds between the individual and his society by breaking down isolation and promoting community spirit.

Health Councils Plan and Act for Community Improvement [1]

By Ina Collins, R. N.[2]

IN ANY COMMUNITY, there are likely to be a number of agencies and several civic organizations working on various aspects of public health.

All are earnestly trying to do a conscientious job, but are they trying to do the whole job? Or are they just nibbling at the edges and overlapping each other's services?

Many able private citizens are eager to do something constructive in health. Couldn't all of them do a better job if each knew what the other organization or individual was thinking and doing?

Could they use a health council?

A health council is a private organization set up by the people of a community to study the health needs of that community and to inform its citizens of these needs, together with the ways in which they are being—or could be—met.

Its principal functions are: To coordinate as far as possible the thinking and planning of all organizations in the community concerned with public health; to study health needs in the community through inventories, surveys and other fact-finding activities; to develop community health programs related to those needs; to stimulate, through education, the public interest in health problems and their solution; and to analyze and influence health legislation.

In areas where there is a lack of proper and adequate health service, the council is needed to expose the facts of these needs and to point out available services that might be used.

Let us see what some organized health councils have done.

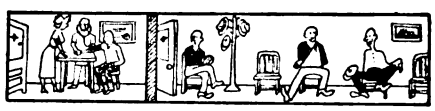
In one community where a mobile chest X-ray unit was working, the health council did such a good job in its efforts to assist in the survey that 90 percent of the adult population in that area turned out for X-rays. In another area the community health council decided a safer milk supply was needed. It went to the proper authorities and, working with them, secured a good milk ordinance.

A few years ago another county group organized for the purpose of securing health services. Through publicity and hard work it was influential in bringing the people to vote tax funds for the support of a fully staffed health department, that is, a health officer, sanitary and nursing personnel, and clerical help.

It further studied the health needs of the community and outlined the most pressing problems while continuing to keep the public informed. When the qualified personnel had been secured to plan the approach to the program, the ground work was well established. Many of the usual misconceptions and prejudices that often beset a new venture in a community had been overcome by the wise planning and foresight of the health council.

[1] Reprinted from *News Bulletin*, Missouri Society for Crippled Children and Adults, Inc. (September) 1951.

[2] Past president of Missouri Public Health Association.



University of Pittsburgh Offers Workshop for Nurses

A workshop for industrial nurses is being offered at the University of Pittsburgh School of Nursing from November 10 to November 21, 1952. The purpose of the workshop is to study the contribution of the industrial nurse to the total industrial health program. Participants in this workshop will meet with consultants from special fields. Supervised field trips to various industrial health services in the area will be arranged to meet the needs of the class.

Students wishing to matriculate in the university will receive two credits. Students not wishing university credit may register on a nondegree basis. Tuition for the workshop is $37.50. Immediate registration is advisable. Necessary application forms as well as additional information may be obtained by writing directly to Glenna G. Walter, Director, Program for Industrial Nurses, University of Pittsburgh School of Nursing, Pittsburgh 13, Pa.

Economics Problems of Older Population Necessitate Re-evaluation of Workers' Usefulness

By Charles E. Dutchess [1]

HOW OLD IS OLD? That is a question which puzzles physicians, economists, sociologists, business leaders, labor union executives, government officials, and every man 50 years old.

Fifty years ago America was a young nation only recently recognized as a world power. And 50 years ago our population was about two-thirds rural. Today America is a leading world power. Most of our people live in cities; and our people, at least by the standards of 1900, are old.

Fifty years ago there were only 3,000,000 persons in the Nation 65 or older. Today there are more than 12,000,000 Americans who are 65 years of age or over. Today, tomorrow, and every day this year 2,700 Americans will become 65—and will still have an expectancy of 13 more years of life. Will they be old at 65, or not until they're 78? How old is old?

What Made Longer Lives Possible?

In the main, four developments must be listed as the key factors which in 50 years have given Americans 20 years of added life expectancy. They are as follows:

(1) A higher standard of living, which includes better diet, clothing, housing, working conditions, and more recreation.

(2) Tremendous advances in preventive medicine and widespread application of public health measures.

(3) Great improvement in standards of medical care.

(4) Broad advances in therapy, particularly development of such antimicrobial agents as the sulfa drugs and antibiotics, which, for the first time in history, gave medical science control of bacterial and rickettsial infections.

But our advances in the present century have not been limited to extending the life span. To be sure, all Americans have been given added years of living; but equally important, they have been given better health. Today's 65-year-old man or woman probably has greater vigor, greater stamina, and better health than the 50-year-old man or woman of 1900.

Nor have we yet seen the end of progress in these vital areas of geriatric interest. The life span will continue to increase. Soon, perhaps within the lifetime of many Americans alive today, a tenth of the population will live to 100 or older. And soon, perhaps within a generation, active, vigorous men and women of 85 or more will be a substantial group in every community.

Who Supports the Retired Worker?

Economic analysis of persons 65 or over in the country today reveals the following: 27 percent are self-supporting because of gainful employment; 20 percent are retired on investments or pensions; 25 percent are dependent on public authorities, chiefly old-age assistance payments; and the remaining 28 percent are at least partially supported by families, friends, or private charities.

The human values of forced retirement at age 65 cannot be overlooked. What happens to the person 65 who is told that his usefulness is over and that his role now must be one of trying to fill his days with hobbies and amusements? If one is to believe the advertisements, such a future calls for day after day of fishing. This may be retirement at its best—but it is not the sort of retirement that most aging people will face. We have already noted that more than half of those over 65 are dependent on someone or on public charity.

Of the 4,000,000 families in the United States with incomes below $1,000, 32 percent are headed by persons 65 or over. Being old is a major cause of poverty in the United States.

By 1980 persons 50 years of age and over will make up 42 percent of the voting population in America. Add to that 42 percent a few million sons and daughters and in-laws who don't want the old folks moving in on them, and you can see the likelihood of legislation which will give all unemployed oldsters a pension they can live on. Such legislation will place a corresponding burden of taxation on everyone who is at work, and on the few financially independent who don't have to work.

Forced retirement is not only bad for the aged; it is bad for the entire population. Prof. Sumner Slichter, the noted Harvard economist, has pointed out that the national economy would lose about $10,000,000,000 worth of goods and services if the 2,800,000 persons over 65 who are now working were to be arbitrarily retired.

For the aged who do not have jobs, alternative methods of support are no longer available as they once were. Those who turn to their children find fewer of them to help bear the burden of support. The shift from the self-sufficient farm of the last century to today's city living has made elderly parents no longer economically useful; there are no chores for them to do. The fact is that the worker who leaves the labor market at 65 in most cases becomes an economic burden on the Nation.

Ten years ago about 1,000 business establishments had pension programs in effect. Even now the National Industrial Conference Board estimates that only 15,000 businesses—out of a total of 2,750,000 business establishments in the Nation—have pension plans.

They cover about 12,000,000 employees, at a cost of about $2,000,000,000 a year to the employers. Obviously, industry has not undertaken a pension program for all retired workers. And as the number of aged workers increases, the problem gets still further beyond the resources of industry. At the same time, we find that the Government's program in this sphere has proved inadequate to the task. Social-security payments have been increased, but they have not kept pace with deterioration of the dollar. Old-age assistance benefits have also proved unequal to the task.

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[1] Dr. Dutchess is vice president and medical director of Schenley Laboratories, Inc. This article is a briefed version of an address given at the 1952 Industrial Health Conference. The speech was published in full in *Vital Speeches of the Day*, May 15, 1952.

Retirement Requires Difficult Adjustments

The person forced into retirement due to an arbitrary age formula loses more than just an income. He is faced with emotional problems every bit as serious as the economic ones that we have already described. Work means recognition in our society, and it is largely through work that one gets a sense of being useful as a member of the community. The feeling of being useless, unwanted and insecure produces unhappiness almost as readily as poverty or dependency.

Old people need a secure place in our national community and the national community needs the skill and productivity of elderly workers.

Match the Worker With the Job

In fitting the aging worker to the right job in industry the personnel man needs the help of the industrial physician, who alone can determine the physical capabilities of the employee. To aid in the task of classifying industry's elderly manpower, the geriatrician alone will be able to assign proper importance to the worker's past and present health record and his emotional stability.

To utilize the Nation's aging population we need efficient methods of weighing individual capacity. The problem is not easy, but we must find a solution if we are to go from a policy of forced retirement at 65 to a policy of individual retirement on the basis of individual capability.

Keeping the elderly worker on the job, and keeping him productive, frequently calls for the combined skills of the geriatrician, the social worker, and the social scientist, and for the support of business executives and labor union officials.

Arbitrarily retiring employees on the basis of age alone is not only unfair, but it is economically unsound.

If we succeed in changing the popular conception of age and if we return the aged to the role of useful citizens, we meet two great needs of elderly people—the need for a chance to make a living and the great emotional satisfaction that comes from the feeling of being useful, of being respected for productivity rather than for antiquity.

WOOD-ALCOHOL POISONING [1]

By Martin Wukasch [2]

WOOD ALCOHOL causes a particularly vicious type of poisoning because of its effects on the nerves of the eye, causing partial or total blindness. The nervous system is its main object of attack.

Some of the occupations in which workers may be exposed to wood-alcohol poisoning are in the manufacturing of artificial silk, artificial leather, linoleum, boots and shoes, antifreeze, colors and chemicals, explosives, varnish and shellac, rubber, felt hats, artificial flowers and hats; workers may also be exposed in dyeing fabrics, cleaning metals, and polishing.

Handling wood alcohol may cause local inflammation of the skin or some absorption of the poison, but the chief danger lies in breathing the fumes. Where the poison is absorbed rapidly and in large amounts, it strikes at the nerve tissues and often results in acute or even fatal intoxication. If the worker recovers, he may suffer partial or total blindness. Wood-alcohol poisoning on the job, however, is usually chronic, the result of breathing small amounts of the fumes over a period of time. The poison accumulates in the tissues and is difficult for the body to throw off. The extent of the injury to a worker depends on how promptly the condition is detected and the hazard is controlled.

Although the symptoms of wood-alcohol poisoning may also be produced by other poisons, the most characteristic symptom of wood-alcohol poisoning is blindness. Some of the other symptoms are: Irritation of the nose and throat, headache, dizziness, drowsiness, loss of consciousness, convulsions, mental disturbance, impaired eyesight, vomiting, chills, subnormal temperature, and irregular heart action.

A worker who thinks he detects signs of wood alcohol poisoning should talk over with his fellow workers ways of safeguarding against the poison, and should call management's attention to the hazard. If symptoms of poisoning persist or are marked, he should consult a doctor at once. If a worker is overcome, he should be removed to the fresh air and kept warm, and medical aid should be summoned immediately.

All cases of wood-alcohol poisoning should be reported to the State health department, so that steps may be taken to correct conditions and to protect other workers.

Employers can eliminate a good deal of the hazard by informing all workers about the possible dangers of wood-alcohol poisoning, about the measures taken to protect them, and about proper first-aid treatment. Providing personal protective equipment for workers who must actually handle the compound is essential, as is good general workroom ventilation.

If possible, processes using wood alcohol should be isolated or else enclosed with provisions for local exhaust ventilation to draw off escaping fumes at the point of origin.

An inspection of all mechanical exhausts and all ventilating equipment regularly to make certain that it is operating effectively is helpful. Make use of the standard tests and measuring devices for maximum concentration of wood-alcohol fumes in the air; if you are not equipped to make these tests, call in an expert (200 parts of wood alcohol per million parts of air is the maximum safe concentration for prolonged exposure; many authorities state that it cannot safely be more than 100 parts). Because of the cumulative effects of the poison, try to keep concentration below the maximum permitted.

Employers should provide adequate medical supervision for workers who may be subjected to the hazard and encourage them to report any conditions which they suspect to be dangerous, or any symptoms of poisoning. Employers should thoroughly investigate all such reports, and make certain that all illnesses resulting from exposure to

(Continued on page 166)

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[1] **Reprinted from the *Texas Health Bulletin*, March 1952.**

[2] **Mr. Wukasch is senior engineer with the Industrial Health Section, Bureau of Sanitary Engineering, Texas State Department of Health, 410 East 5th St., Austin 2, Tex.**

PHILADELPHIA VISITING NURSE SOCIETY SERVES INDUSTRIES SUCCESSFULLY

By Irma McDevitt

To help meet the nursing need in small plants, a number of visiting nurse organizations are supplying part-time nursing service to plants where management does not feel a full-time program is justified. Such programs are not intended to compete with nurses who are able to devote full time to industrial nursing. In many instances they have served as a means of demonstrating the value of nursing service in industry. This has been evidenced in Philadelphia, where several plants, after using visiting service over a period of time, have employed full-time nurses.

Part-time programs vary widely within different communities. The attitude of management toward health promotion, as well as corrective services, and the availability of adequate medical supervision will greatly influence the kinds of service and the degree of responsibility of the nurse. The primary aim of a part-time nursing program is to give the best possible service to the employee and employer alike in a given amount of time. In planning such a program, the following factors are generally agreed upon: (1) Medical approval of plans for the program; (2) proper selection of the plant nurse; (3) adequate medical supervision; (4) adequate nursing supervision; and (5) establishment of policies regarding the type of service, the amount of nursing time, and the lines of administration.

In securing medical approval it is customary for visiting nurse associations to ask approval of their plans from their medical advisory committees, which, in turn, will interpret such plans to the medical profession in the community. Many county medical societies have committees on industrial health whose approval and help in planning should also be sought.

The proper selection of the plant nurse is of utmost importance. In addition to the professional qualifications required for staff appointment, she should possess the personal qualities essential in a good public health nurse, such as a mature mind, emotional stability, and ability to exercise good judgment.

Previous experience in industrial nursing is desirable but not absolutely necessary. A special orientation period, including field observation in industrial nursing, has been an effective means of preparing the public health nurse for her new assignment. In our own agency we find that nurses without previous experience in industry have worked out very well after their orientation period. In providing field observation we try to select a plant whose health problems are comparable to those the nurse will encounter in her own plant.

Nursing supervision is just as essential in industry as in any other field of nursing. The industrial nursing supervisor acts as a liaison person for the industry, the plant physician, the plant nurse, and the nursing agency. In addition to the routine duties of supervision, she assumes the responsibility of preparing the new nurse for industry and for providing continuous in-service education for her industrial staff.

The type of service and the amount of nursing time will depend on a number of factors. The type of employees as well as the number to be served, the type of industry and the hazards involved, the accident frequency rates as well as sickness absenteeism, the location of the plant, and the availability of community resources, such as neighboring physicians and hospitals, will greatly affect the type of program.

These policies should be established jointly by the plant physician, management, and the visiting nurse association. The lines of administration must be clearly defined so that amicable and cooperative interdepartmental relationships can be established. Although the nurse is professionally responsible to the physician, she is administratively responsible to a representative of management.

A good working relationship must be established between the nurse and the personnel or employment department, since she is often the person to interpret the physician's recommendations in regard to job placement and follow-up of physical defects. A similar relationship must be maintained with those responsible for plant safety.

Although the foreman is considered the key man in safety in any size plant, his responsibility is even greater in the small plant. His full support must be secured to obtain continuous observance of all preventive measures and to insure prompt referral to the health service of all ill or injured workers. Department heads should be consulted for information regarding hazardous processes so that the nurse may be alert to the symptoms which may be produced as a result of these processes. A nursing program would be of little value without the support and cooperation of everyone on the industrial team.

The Visiting Nurse Society of Philadelphia was especially fortunate when it first ventured into industry. A part-time program, sponsored by the Philadelphia Health Council and Tuberculosis Association, was already in effect, and it was upon their request, in 1932, that our agency agreed to accept the responsibility of the four small plants which had been receiving the part-time services of a physician and nurse since 1926.

The general policies of the nursing service were already established, and they are reviewed periodically and revised as the need arises. Our service is carried on a contract basis. A staff nurse is regularly assigned to each plant and carries full responsibility for the nursing service under the nursing supervision of the Visiting Nurse Society industrial consultant and the direction of the plant physician.

During her time in the plant, she is entirely at the service of industry and is administratively responsible to the person under whose direction the dispensary is maintained. To assure continuity in service in the absence of the regular nurse, each plant has a substitute or relief nurse assigned.

In addition to a carefully arranged introductory period and continuous nursing supervision, each staff nurse assigned to industry is a member of the

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Presented at the last annual meeting of the Worcester, Massachusetts, Society for District Nursing.

Miss McDevitt is a nursing consultant for the Philadelphia Visiting Nurse Society.

Visiting Nurse Society, Industrial Nursing Group which meets monthly from October to June for the purpose of concurrent staff education in industrial nursing. The supervisors in whose branches VNS industries are located, as well as the physician in each plant, are members of the conference.

The programs in the plants we serve are under the direction of qualified physicians who have contributed in no small measure to our success in this field. The activities of the nurse vary within each plant. In general, she gives nursing care under the standing orders of the plant physician to employees injured or stricken ill in the plant. She may also give treatments and medication prescribed by the employee's personal physician if she has a written request to do so.

She helps the physician with the physical examination in the plant and assists the employees in following the physician's recommendations. She assists in developing measures to preserve the health of employees and to prevent accidents. Health education as well as education in accident prevention is a major part of her job.

Because of the limited time she spends in the plant, she has to integrate the education program with her other activities. Her teaching is confined to informal discussions with the employees. She may be asked by an employee to help with a specific problem, and very often she serves as a "listening post," as well as a counsellor.

It is our custom to assume responsibility for all procedures in relation to first aid. With the physician's approval the nurse usually plans and conducts classes in first aid for the employees who carry on in her absence, and who, for one reason or other, have not been able to secure this training through the American Red Cross. The follow-up of the in-plant first-aid service consists of periodic checks of the records of the first-aid men and supervision of the first-aid boxes and supplies.

The keeping of adequate records is another necessary function of our nurses. Because of the time involved, it has been one of our biggest problems. Our record system consists of a daily record or log, individual record for each employee, including medical examination, clinical visits and the correction of remediable defects, compensation records and reports, and monthly and annual reports to management. Although plant clerical assistance is provided for compensation, monthly and annual reports, the collection of data for these reports is the responsibility of the nurse.

The activities of the nurse vary, and the amount of time she can devote to one particular activity depends on the needs of her plant and the attitude of the physician and management regarding these needs.

Excluding the cost of promotion, our service to industry has been self-supporting. The hourly charge is based on the nurse's salary, the cost of vacation relief, supervision and transportation. Our agreement with each plant specifies the amount of nursing services to be given and the hourly cost.

Kentucky Air Pollution Engineers Study Methods Used in Pennsylvania

Two engineers from the Louisville and Jefferson County area of Kentucky spent a week studying Pennsylvania's air pollution program. That particular State was selected because it has had wide experience in this field and is well equipped with a mobile laboratory and meteorological instruments.

The Louisville and Jefferson County Air Pollution District of Kentucky comprises an area of 389 square miles and encompasses the city of Louisville and surrounding territory. An enabling act of the State legislature empowered the city and county to set up this District and to provide funds for its operation.

Personnel from the Pennsylvania Division of Air Pollution Control assisted the engineers, Mr. Clyde Hawkins and Mr. John C. Marks, in a thorough inspection of the laboratory and equipment. They were taken to several locations where air pollution investigations are being conducted, and also visited the Franklin Institute in Philadelphia.

The Bureau of Industrial Hygiene has indicated a willingness to assist any other engineers who wish to study Pennsylvania's air pollution program.

Industrial Nurses—

(Continued from page 159)

man and without telling him her findings, she suggested that the employee permit her to telephone his family physician and make an appointment for him. The physician found the man to be a diabetic and started treatment accordingly. Since treatment was instituted early, disability was prevented.

The industrial nurse should be to a large extent the "ventilating" agency where the employees can air their complaints and symptoms. Many employees have personal and individual problems with which they are unable to cope. The nurse should develop good techniques in counselling and know where to send the employee who needs medical aid.

Today's industrial medicine concerns itself with all problems of employee health. It involves itself in a wide range of activity aimed at improving and maintaining the health and stability of the working force. Hence, it is a major contribution to the individual employee's productiveness and effectiveness. Fundamentally, a program of human maintenance is essentially the same as machine maintenance that is so deeply ingrained in industry as sound business practice. It is based on the knowledge that maximum production comes from healthy people, healthy not solely in a physical sense but also in a mental and emotional sense.

Wood-Alcohol Poisoning—

(Continued from page 164)

wood alcohol are promptly treated. No one who has been affected by the poison should return to work until he has completely recovered.

Workers can help themselves by remembering that early treatment may prevent serious disability from wood-alcohol poisoning. Of course, wood alcohol in any form should not be taken internally and, since use of alcoholic beverages may increase susceptibility to wood-alcohol poisoning, workers should avoid their excessive use.

If management and employees cooperate in promoting safe working conditions, the dangers and distresses of wood-alcohol poisoning can be avoided.

HARMFUL EFFECTS OF LIGHT ON THE EYES
Part I

By A. Link Koven, M. D.

ALTHOUGH much has been written on inadequate illumination, there is little information available for industrial personnel on the harmful effects of light on the eyes. This discussion is presented here as a convenient source of summarized facts on the various kinds of light which industrial workers may be exposed to and harmed by if precautions are not taken.

Because the term "light" is sometimes used loosely, it seems advisable to review some definitions.

Beginning with the more inclusive term of radiant energy, which consists of transverse vibrations propagated in space by electromagnetic vibration, the classification is as follows:

1. Light, which is made up of:
   (a) Visible rays.
   (b) Infrared rays.
   (c) Ultraviolet rays.
2. X-rays and gamma rays of radium.
3. Electricity.

In order of decreasing wavelength the classification reads as follows:

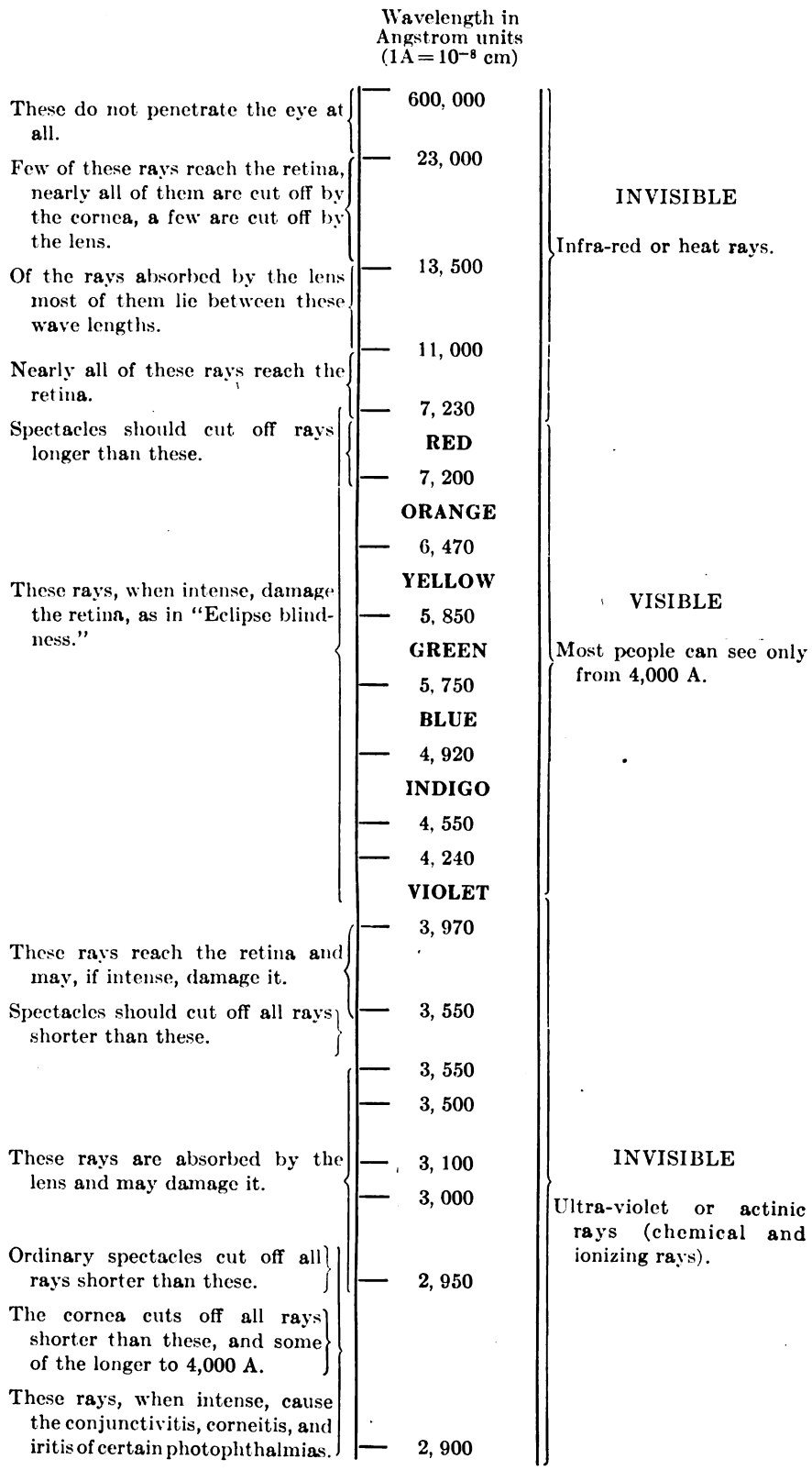
1. Electricity; several thousands of kilometers (for ordinary alternating current).
2. Infrared; exceeding 8,000 Angstrom units.
3. Light; 8,000–4,000 Angstrom units.
4. Ultra-violet; 4,000–200 Angstrom units.
5. X-rays and X-rays of radium—average of 1 Angstrom unit.

Penetration and Absorption of Radiant Energy by the Eye.—The different components of the eye, that is, the cornea, the lens, and the vitreous body, each has a selective power of absorption for light and its rays. The cornea and the lens very effectively retain the ultraviolet rays. The structures of the eye as a whole absorb the entire infrared band down to 15,000 Angstrom units. Visible light passes through, and reaches the retina in the proportion

Dr. Koven is associated with the University of Pennsylvania Graduate Hospital, Philadelphia.

Diagram of the Spectrum

[From Legge: Ophth. *13*, 545, 1916]



of 94 percent. Violet and ultraviolet radiations of low penetrative power are stopped by the lens and cornea.

Of the X-rays, the Grenz rays, also called Bucky's rays, have a relatively great wavelength and a lower power of penetration. The other harder X-rays are more penetrating in proportion as their wavelength is smaller. The gamma rays of radium and radioactive materials are comparable with the hard X-rays. In general, radiant energy must be absorbed to produce a reaction. Therefore, the rays absorbed by the different components of the eye produce some alteration, while those which are transmitted do no work on it, and therefore induce no change.

Mechanism of Action on the Eye.—In general, one can state that radiations of wavelengths exceeding 2,800 Angstrom units (some of the ultraviolet rays, visible rays and infrared rays) present comparatively little danger to the eye, whereas radiations below 2,800 Angstrom units (for example, ultraviolet with shortwave length, X-rays and X-rays of radium) are exceedingly dangerous.

Light (photons) represents electric charges which act on the atoms forming the cells of eye tissue. As the result of this electric bombardment, disarrangement of structure and function of the eye results. X-rays and radioactive substances act in a similar manner. However, electricity, in the case of direct current acts by means of electrolysis, whereas alternating current, either low or high frequency, acts by means of the heat developed in the structure of the eye.

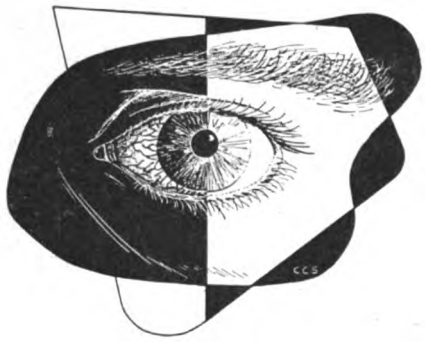
The damages produced by radiations of wavelength lower than electricity have certain characteristics in common. The damage these rays produce is not immediate as that which one experiences in destruction produced by heat or chemically caustic substances. For example, the effects of these radiations on the conjunctiva come on some 5 to 12 hours after the rays have entered the eye. Changes in the lens of the eye make their appearance many months later, or at least they attract the attention of the patient many months after exposure.

In general, one may summarize these destructive effects of radiant energy as follows:

1. Light chiefly produces conjunctival and corneal damage and the effects are also associated with visual disturbances, which in most cases are transitory in nature.

2. X-rays and X-radiation may produce cataract and, more rarely in larger doses, such grave damage to the eye that would require removal of the eyeball.

3. Electricity can give rise to cataract by means of high tension currents, and at times damage to the inner linings of the fundus of the eye.



Damage to the Eye Produced by Light.—Sunlight is dangerous only under exceptional circumstances, such as looking at the sun for too long a period of time. Most of us have experienced seeing small fleeting dark spots in our field of vision, by prolonged observation, especially at sunset. These are of no clinical significance. However, the observation of the sun during an eclipse is particularly dangerous. Very bright artificial light, as in arc welding, can cause eye damage and is one of the causes of industrial eye injuries. The injurious components of light in some categories are its ultraviolet components; in others, the infrared, with its heat burn effect.

It is analagous to a burn of the skin induced by focusing the rays of the sun on the skin. However, the skin is protected by a layer of keratin, a physically tough horny material and chemically resistant. With chronic exposure to ultraviolet rays the skin acquires an acclimatization through increase in the amount of its keratin layer. However, the eye shows no such change in susceptibility with repeated exposures.

(To be continued in the next issue)

Southern Safety Conference Scheduled for March 1–3

The Southern Safety Conference and exposition is to be held in the Hotel Atlanta Biltmore, Atlanta, Ga., on March 1, 2, and 3, 1953.

For further information write to W. L. Groth, Executive Director, P. O. Box 8927, Richmond 25, Va.

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